EXAMINING THE IMPACT OF GENDER ON ARABIC LANGUAGE ANXIETY

Wan Muhammad Shaker bin Wan Adnan[i], Azlan bin Shaiful Baharum[ii] & Mohd Nizwan bin Musling[iii]

[i] (*Corresponding author*). Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
shaker.wanmd@gmail.com
[ii] Lecturer, Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
azlan_arab@usim.edu.my
[iii] Lecturer, Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
mohdnizwan@usim.edu.my

Abstract

Foreign language anxiety (FLA) is a feeling of nervousness or fear faced by learners when they are learning a second language. Students who faced a severe level of language anxiety will led to negative consequences on their academic performance and their well-being. Some of the consequences are lowered self-esteem, reduced participation in language class and avoidance behaviour. This phenomenon is commonly found in arabic language classes as the arabic language is considered to be one of the hardest language to learn for non-native speakers according to the Foreign Service Institute. The objective of this study is to examine the relations between gender and arabic language anxiety. To this end, a 33 items questionnare from Foreign Language Class Anxiety Scale (FLCAS) with a five Likert-type scale was distributed to one hundred and nine study samples consisting of twenty four males and eighty five females. The study sample (N=109) *was selected from first-year students of the Bachelor of Education (Islamic Education), Faculty of Major Language Studies (FPBU) at Universiti Sains Islam Malaysia (USIM). The data was then analysed by using the independent T-test on IBM SPSS Statistics 26. The result of the study shows that there is a significant relation between gender on arabic language anxiety with a value of .001. In conlusion, males student have a lower level (moderate) of language anxiety than females (high) in learning the arabic language.*

Keywords: *Gender, effect, language anxiety, arabic.*

INTRODUCTION

Foreign language anxiety (FLA) is a state of restlessness, nervousness and easily agitated experienced by a student when learning or using a second or foreign language. According to Horwitz (1986), FLA is best defined as a "distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process". This state will affect a student's journey in mastering a new language related to all the language skills (speaking skill, writing skill, listening skill, reading skill) (Zhou et al. 2023). Therefore, it is clear that a moderate or high level of FLA will delay the student's academic achievement in learning a new language.

Previous studies have been conducted to determine the effects of FLA on students such as an investigation from Oruç et al (2020) on the relation between classroom engagement, foreign language anxiety and English language proficiency. The study was done on a number of 605 students to examine the mediating role of classroom engagement. It shows that FLA affects negatively and partially on student's engagement in class which led to poor language proficiency. The result aligned with a statement from Afzali et al. (2021) in their reseach which stated that students with low engagement in classroom will faced negative effects on their learning process. Other effect of foreign language anxiety is low self confidence among learners (Hu et al. 2024). Language learners with a moderate level of language anxiety tend to have a fear of making mistakes in language class, feeling less capable and afraid of being criticised by friends. These concerns are more likely to make them more anxious and prevent them from learning a new language effeciently (Ozdemir, 2022). So, undoubtedly that FLA is found to have a negative impact on language learners and therefore needed to be explore thoroughly.

The relations between foreign language anxiety and a number of mediators have been researched as the topic of language anxiety is broad and usually brings out different outcomes depending on the mediators such as; teaching method (Chen. 2024), classrooms' emotions (Dewaele et al. 2020) learners' educational background (Kobul, 2020). Besides, gender is also one of the variable that has been researched and paired with foreign language anxiety. A study from Razak et al. (2017) had investigate the gender differences in terms of anxiety among Yemeni university EFL (English Foreign Language) learners. The study was done on 155 students in the English department of the university through stratified random sampling. The results shows that females students experienced a higher level of language anxiety than males students but the difference were not significant. A recent study from Piniel et al. (2022) suggested that females tended to have higher levels of anxiety most of the times but the data compiled in the research stated that the differences failed to reach significance. Meanwhile a study suggested that gender was found to be related to foreign language anxiety, indicating that females had higher levels of anxiety than males (Dordinejad et al. 2014).

The impact of gender on arabic language varied on different researches as some shows a significance difference between male and female while some do not. A research by Yusoff et al. (2020) concluded that there is no significant difference between gender and arabic language anxiety. Meanwhile, the findings from Anandi et al. (2023) showed that students' anxiety level when learning and practicing Arabic differed depending on their gender. The results insisted that females students have a higher level of language anxiety than males students. A study from Jamain et al. (2023) claimed that studies on gender variable on language anxiety are seen as lacking and does not receive attention from researchers. So, this study will focus on the impact of gender on arabic language anxiety to emphasize on the importance of understanding language learners in order to help them master a second language efficiently.

OBJECTIVE

This study aims to:
1- Determine the relationship between gender and arabic language anxiety.

SAMPLE STUDIES

This study is conducted on a sample of one hundred and nine (n=109) first-year students from the Education Programme (Islamic Education), Faculty of Major Language Studies (FPBU). The sample are chosen using the quota sampling method as the researcher gathered the sample based on predefined traits which is those who are learning the Arabic Language, specifically Syntax 1 in session 2023/2024 A231 from the Education Programme (Islamic Education) at Universiti Sains Islam Malaysia (USIM). The gender breakdown is as follows:

Table 1: Sample Studies's Gender

No	Gender	Sample Size	Percentage
1.	Male	24	22.02%
2.	Female	85	77.98%
Total		109	100%

METHODOLOGY

The research was conducted by distributing the Foreign Language Classroom Anxiety Scale (FLCAS) questionnaire that was developed by Horwitz (1986). The questionnaire consists of 33 items, measured on a five-point Likert scale, where 5 indicates the highest level of anxiety, while 1 indicates the lowest level of anxiety. All of these items (33 items) are scored directly, where some of the coded items were reverse-coded. The researcher divided the language anxiety scores based on the degree of anxiety determined by previous studies (Gusdian, 2020), as follows:

Table 2: Level of Anxiety

Questionnaire Scales	Level of Anxiety
33 – 75	Low
76 – 119	Moderate
120 – 165	High

A low level of anxiety is a normal reaction for a learner because it can be a catalyst to fullfill a task in language class perfectly (Katharina, 2024). However, high and severe levels of anxiety can have a negative consequences on a person's daily life and tasks especially for learners who are trying to learn a new language.

The researcher list down all the items from the FLCAS questionnaire in a google form and shared the questionnaire's link to the sample studies. The researcher then explain each items thoroughly in class to ease the understanding of the components and request students' submission at the end of the session.

The data were then analysed using the independent T-test on IBM SPSS Statistics 26 to find the means values and their significance in the study to obtain the objective of the research.

RESULTS AND DISCUSSION

In order to determine whether gender differences exist in the level of arabic language anxiety among Education Programme (Islamic Education students, the researcher computed the means and standard deviations of the questionnaires' data for the male and female students, which is made up of twenty four male and eighty five female students.

The "independent samples t-test" was then employed to compare the level of arabic language anxiety in males and females. The mean, standard deviations, and t-values for male and female students are made clear in Table 3 below:

Table 3: Result of Independent Samples t-test

Gender	Mean	N	Std. Deviation	Df	t-value	Sig. (2-tailed)
Male	110.42	24	19.29	107	-3.50	.001
Female	126.19	85	19.57			
Total	118.31	109	19.43			

Table 3 shows the means, standard deviations, T–Value and level of significance for the male and female. The total mean values for male is 110.42 with a standard deviation of 19.29, meanwhile the mean values for female is 126.19 with a standard deviation value of 19.57. In terms of language anxiety levels, the male students are categorised under 'moderate level anxiety' as their value is between 76 to 119, while the female are put under 'high level anxiety' because the value is between 120 to 165.

The research shows that there is a difference number of values between male and female, specifically a value of 15.77. But in order to determine whether the differences made is signifficant or not, a look at the level of significance. The table shows that the value is less than 0.05 (.001) which defines that the research does reject the null, interpreting that there is a significance difference between the level of language anxiety between the two gender, insisting that females students have a higher level of language anxiety than males students in learning the arabic language.

The result of this analysis is parallel with some of the previous studies such as Dewaele & MacIntyre (2014) with a sample study of 1746 learners from around the world. The study used a measure of FLE (Foreign Language Enjoyment), based on Likert scale ratings of 21 items (Dewaele & MacIntyre, 2014), and a measure of FLCA (Foreign Language Classroom Anxiety) based on 8 items extracted from the FLCAS (Horwitz, Horwitz, & Cope, 1986). The FLE and FLCA scores of the female individuals were higher. Thus, in the FL class, the female participants felt greater positive and negative emotions.

The result also justify the statement from Anandi et al. (2023) stating that females student have a higher level of language anxiety in learning the Arabic Language. The same hypothesis was made by Tercan & Dikilitaş (2015) when they are determining the impact of anxiety on gender in EFL students. 159 students completed the Foreign Language Speaking Anxiety (FLSA) scale. The findings show that compared to male students, those female students experience higher levels of anxiety.

CONCLUSION

From the previous studies relating to impact of gender on language anxiety, we can conclude that the results are different and does not made up a clear hypothesis. Some of the study insisted that there are no effect of gender on language anxiety, but those who found that there is a significance shows that the female tend to have a higher language anxiety than male. Nonetheless this statement does not proves that female are having a hard time in foreign language classes, in fact some studies shows otherwise (Dewaele & MacIntyre, 2014). One of the justification found in a study (Haron et al., 2023) is due to the differences in behaviour of male and female, where female students usually expose their vulnerable side (anxiety) to others while the male students usually keep it for themselves.

The finding of this study shows that from 109 students consisting of 24 males and 85 females, female students have a higher level of arabic language anxiety with a mean value of 126.19 which is considered as high level anxiety, while the male students have a lower level of language anxiety (moderate) with a mean value of 110.42. The result also shows that there is a significant difference with a value of .001. However, more studies need to be made on this particular topic especially in the arabic language course as we are seeing a lack of information on this problem. The researcher would like to suggest that future research to find a balance sample studies from the male and females to gain a better comparison.

REFERENCE

Journal

Afzali, Z., & Izadpanah, S. (2021). The Effect of the Flipped Classroom Model on Iranian English Foreign Language Learners: Engagement and Motivation in English Language Grammar. *Cogent Education*, 8(1), 1870801.

Chen, Y. C. (2024). Effects of Technology-Enhanced Language Learning on Reducing EFL Learners' Public Speaking Anxiety. *Computer Assisted Language Learning*, 37(4), 789-813.

Dewaele, J.-M., & MacIntyre, P. D. (2014). The Two Faces of Janus? Anxiety and Enjoyment in the Foreign Language Classroom. *Studies in Second Language Learning and Teaching*, 4, 237e274. https://doi.org/10.14746/ssllt.2014.4.2.5.

Dewaele, J. M., & Dewaele, L. (2020). Are Foreign Language Learners' Enjoyment and Anxiety Specific to the Teacher? An Investigation into the Dynamics Of Learners' Classroom Emotions. *Studies in Second Language Learning and Teaching*, 10(1), 45-65.

Dordinejad, F. G., & Ahmadabad, R. M. (2014). Examination of the Relationship between Foreign Language Classroom Anxiety and English Achievement among Male and Female Iranian High School Students. *International Journal of Language Learning and Applied Linguistics World*, 6(4), 446-460.

Gusdian, R. I., & Nurhidayah, S. (2020). Speaking Skill's Language Anxiety Experienced by Freshers of English Language Education Department. *Schemata: Jurnal Pasca Sarjana IAIN Mataram*. 9 (2), pp. 247-256.

Haron, N. A., & Mustapha, M. (2023). Perbezaan Gender dan Status Sosioekonomi terhadap Kebimbangan Bahasa Asing dalam Kalangan Pelajar Universiti Awam di Sabah. *Journal of Southeast Asia Psychology (SAPJ)*, 11(2), 13-13.

Horwitz, E. K., Horwitz, M. B., and Cope, J. (1986). Foreign Language Classroom Anxiety. *Mod. Lang. J*. 70, 125–132. doi: 10.1111/j.1540-4781.1986.tb05256.x.

Hu, X., Zhang, X., & McGeown, S. (2024). Foreign Language Anxiety and Achievement: A Study of Primary School Students Learning English in China. *Language teaching research*, 28(4), 1594-1615.

Kobul, M. K., & Saraçoğlu, İ. N. (2020). Foreign Language Teaching Anxiety of Non-Native Pre-Service and in-Service EFL Teachers. *Journal of History Culture and Art Research*, 9(3), 350-365.

Oruç, E., & Demirci, C. (2020). Foreign Language Anxiety and English language Achievement in Higher Education: *The mediating role of student engagement. European Journal of Education Studies*.

Ozdemir, E., & Papi, M. (2022). Mindsets as sources of L2 speaking anxiety and Self-Confidence: *The case of international teaching assistants in the US. Innovation in Language Learning and Teaching*, 16(3), 234-248.

Piniel, K., & Zólyomi, A. (2022). Gender Differences In Foreign Language Classroom Anxiety: Results of a Meta-Analysis. *Studies in Second Language Learning and Teaching,* 12(2), 173-203.

Tercan, G., & Dikilitaş, K. (2015). EFL Students' Speaking Anxiety: A Case from Tertiary Level Students. *ELT Research Journal*, 4(1), 16-27

Yusoff, A., Yusoff, N. M. R. N., & Baharuddin, H. (2020). Efikasi Kendiri dan Kebimbangan Bahasa Dalam Kelas Pembelajaran Bahasa Arab di Sekolah Agama: Self Efficacy and Language Anxiety in the Arabic Language Classroom at Religious School. *Attarbawiy: Malaysian Online Journal of Education*, 4(1), 35-47.

Zhou, L., Xi, Y., & Lochtman, K. (2023). The Relationship Between Second Language Competence and Willingness to Communicate: The Moderating Effect of Foreign Language Anxiety. *Journal of Multilingual and Multicultural Development*, 44(2), 129-143.

Internet

Katharina Star (2024 May 2). *The Benefits of Anxiety and Nervousness.* *https://www.verywellmind.com/benefits-of-anxiety-2584134*

DESIGN AND IMPLEMENTATION OF A GENETIC ALGORITHM-BASED BLOCK CIPHER FOR ENHANCED CRYPTOGRAPHIC SECURITY

Nur Hafiza Zakaria[i], Farida Hazwani Mohd Ridzuan[ii] & Azni Haslizan Ab Halim[iii]

[i] Senior Lecturer, Universiti Sains Islam Malaysia. mzhafiza@usim.edu.my

Abstract

With the increasing sophistication of cyber threats, existing encryption standards like the Advanced Encryption Standard (AES) face challenges in maintaining robust security. This study addresses the critical problem of enhancing cryptographic resilience against advanced cryptanalysis techniques by introducing a novel block cipher algorithm that integrates genetic algorithms (GAs) with traditional encryption frameworks. The proposed algorithm leverages GA operations such as crossover and mutation to improve the confusion and diffusion processes, crucial for securing encrypted data. The research methodology involved a comprehensive evaluation using the NIST Statistical Test Suite and avalanche effect analysis to test the cipher's performance. Results demonstrate that the proposed cipher offers superior resistance to linear and differential cryptanalysis compared to AES, providing a more secure alternative for protecting digital communications. These findings highlight the potential of GA-based cryptographic methods in strengthening encryption against modern cyber threats.

Keywords: *Cryptography, block cipher, genetic algorithm, security analysis, NIST*

INTRODUCTION

The increasing reliance on digital communication and data storage has heightened the importance of cryptographic security. Traditional block ciphers like the Advanced Encryption Standard (AES) have been widely adopted due to their proven effectiveness. However, the rapid advancement of computing power and cryptanalysis techniques necessitates the continuous development of more secure cryptographic algorithms. This paper proposes a novel block cipher based on genetic algorithms (GAs) to enhance cryptographic security. By incorporating GA principles such as crossover and mutation, the proposed algorithm aims to provide superior confusion and diffusion properties, which are essential for secure encryption.

Block Cipher

Block ciphers are the cornerstone of symmetric key cryptography, which encrypts fixed-size blocks of plaintext into ciphertext using a secret key . The security of block ciphers is based on their ability to provide confusion and diffusion, two essential properties introduced by Claude Shannon in 1949. Confusion refers to making the relationship between the ciphertext and the encryption key as complex as possible, while diffusion spreads the influence of a single plaintext bit across many ciphertext

bits. This ensures that minor changes in the plaintext or key result in significant changes in the ciphertext, thereby thwarting attempts at cryptanalysis .

Advanced Encryption Standard (AES)

AES as in Figure 1, developed by Daemen and Rijmen, is currently the most widely used block cipher . It operates on 128-bit blocks of data, with key sizes of 128, 192, or 256 bits, and employs a substitution-permutation network (SPN) structure. AES runs on a 4x4 column-major order matrix of bytes, termed the state. The key size used for an AES cipher specifies the number of repetitions of transformation rounds that convert the input, called the plaintext, into the final output which is we called the ciphertext. The numbers of cycles of repetition are as below:

i.   10 cycles of repetition for 128-bit keys.

ii.   12 cycles of repetition for 192-bit keys.

iii.   14 cycles of repetition for 256-bit keys.

AES is renowned for its security and efficiency, having withstood extensive cryptanalysis since its adoption. However, the evolving landscape of cryptographic attacks, including side-channel attacks and quantum computing threats, necessitates continuous exploration of alternative encryption methods .
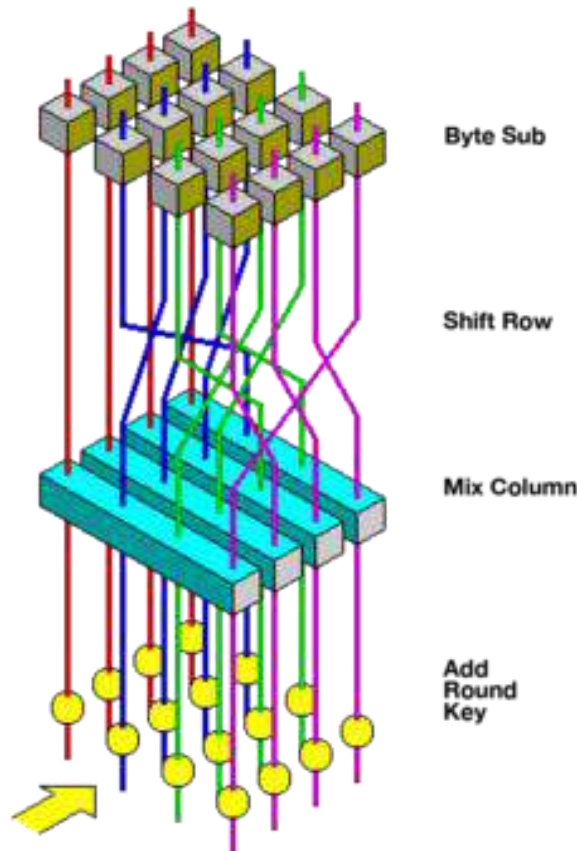
Genetic Algorithms in Cryptography

Genetic algorithms (GAs) are optimization techniques inspired by the process of natural selection. They have been applied to various cryptographic problems, such as key generation, cryptanalysis, and cipher design . GAs operate by evolving a population of candidate solutions through selection, crossover, and mutation, guided by a fitness function. In cryptography, GAs can generate complex transformations that enhance the security of encryption algorithms by introducing additional layers of randomness and complexity.

METHODOLOGY

Genetic algorithms are optimization techniques inspired by the principles of natural selection and genetics. They operate on a population of potential solutions, iteratively applying selection, crossover, and mutation to evolve towards an optimal solution. In the context of cryptography, GAs can be used to generate complex transformations that enhance the security of encryption algorithms .

Cipher Design

The proposed block cipher operates on 128-bit blocks and uses a 128-bit key. The encryption process consists of multiple rounds, each involving the following steps:
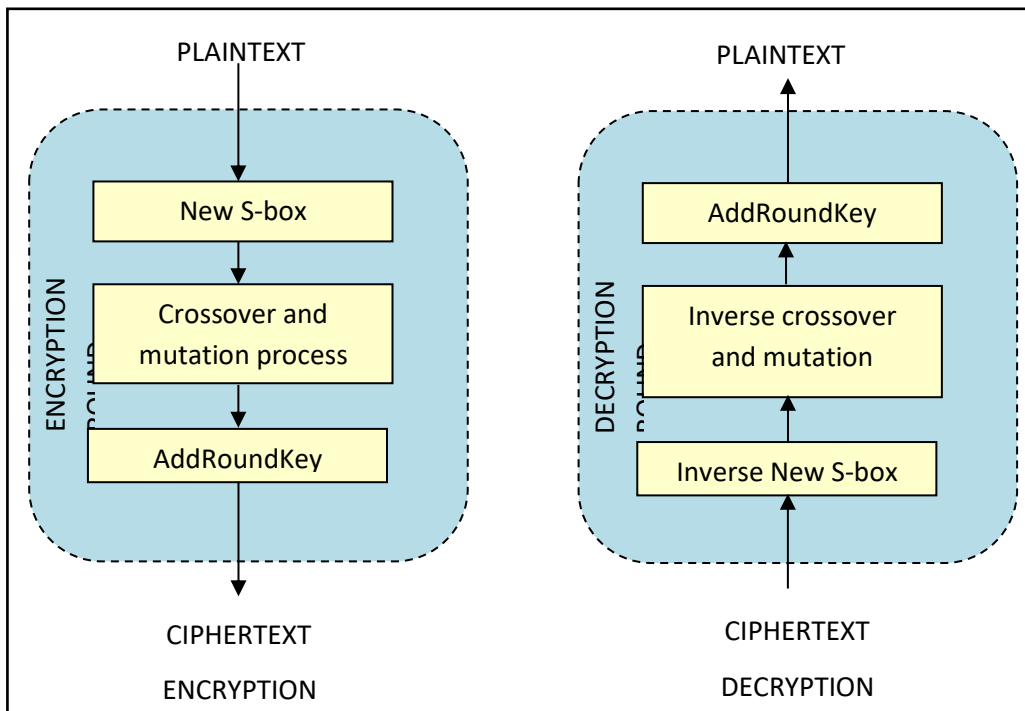
Figure 2: Encryption and Decryption of the Proposed Block Cipher

1. Substitution: The substitution step uses S-boxes derived through affine transformations, which are designed to maximize nonlinearity and resistance to differential cryptanalysis .

2. Crossover and Mutation: These genetic operations are applied to introduce randomness and increase the algorithm's resistance to cryptanalysis . The crossover function swaps portions of the data between different blocks, while the mutation function alters bits within the blocks based on predefined probabilities.

3. Permutation: A permutation function reorders the bits within the block to further enhance diffusion.
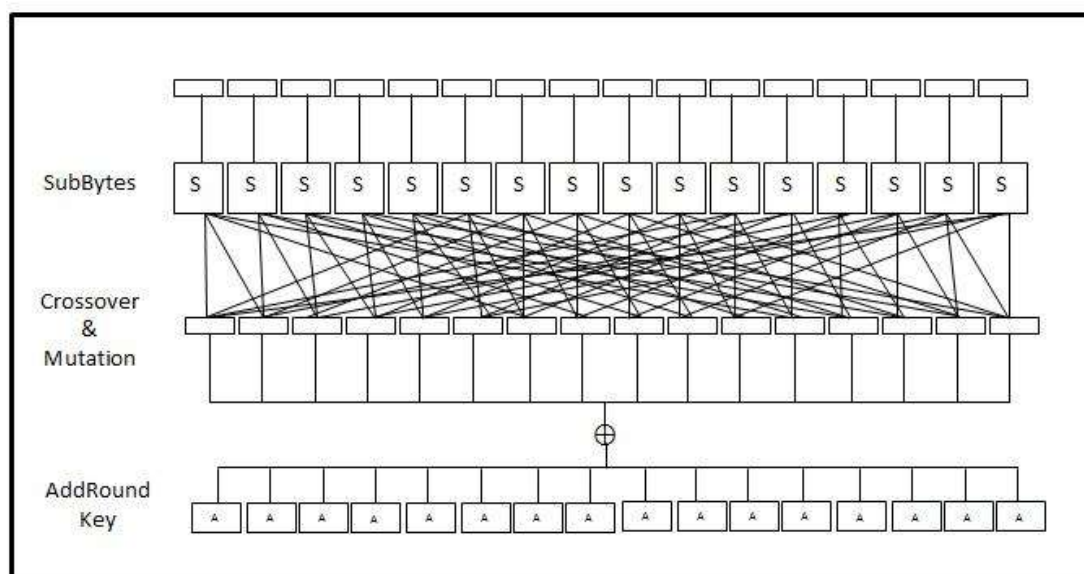

Figure 3: Sequence of Steps of Proposed Block Cipher Algorithm

Figure 3 shows the sequence of steps of the proposed block cipher algorithm. The fundamental concepts of confusion and diffusion as identified by Shannon are the foundations of any cipher system. The S-boxes are an integral part of symmetric key cryptosystems. Their basic purpose is to provide the necessary confusion. They are used for obscuring the relationship between the plaintext and the ciphertext. They are essentially non-linear mapping which take as input a certain number of bits and convert them into some number of bits. The security of systems using the S-boxes depends on the great deal of their proper selection.

RESULTS AND DISCUSSION

Preliminary Test
The order of the application of the tests in the NIST statistical test suite is arbitrary. However, it is recommended that the frequency test be run first, since this supply the

most basic evidence for the existence of non-randomness in a sequence, sprcifically, non-uniformity. If this test fails, the likelihood of other tests failing is high. The focus of frequency test is the proportion of zeroes and ones for the entire sequence. The purpose of this test is to determine whether the number of ones and zeroes in a sequence are approximately the same as would be expected for a truly random sequence. The test assesses the closeness of the fraction of ones to 1/2, that is the number of ones and zeroes in a sequence should be about the same. All subsequent tests depend on the passing of this test. If the computed p-value is < 0.01, then conclude that the sequence is non-random. Otherwise, conclude that the sequence is random. The results reported in Table 6.1 shows that p-value for all rounds are ≥ 0.01. So, we can conclude that the sequence is random.

Table 6.1: Frequency test result over a low-density input

n^{th} round	p-value
1	0.317311
2	0.317311
3	0.077100
4	0.723674
5	0.051830
6	1.000000
7	0.595883
8	0.077100
9	0.077100
10	0.215925

CONCLUSION

This paper presents an enhance block cipher that leverages genetic algorithms to enhance cryptographic security. The proposed algorithm has concluded that the properties and elements in the genetic algorithm can be applied to create a new structure and permutation functions in a symmetric block cipher. The new feature and function is inspired from crossover and mutation in genetic algorithm. The new proposed block cipher should satisfy all the security requirements such as randomness test. Randomness test is one of the security analyses which measures confusion and diffusion properties of the new symmetric block cipher. The

experiments were made using NIST Test Suite application based on the statistical test guideline.

REFERENCE

Nik Azura Nik Abdullah , Nur Hafiza Zakaria, Azni Haslizan Ab Halim, Farida Hazwani Mohd Ridzuan, Azuan Ahmad, Kamaruzzaman Seman and Suriyani Ariffin. (2022). A Theoretical Comparative Analysis of DNA Techniques Used in DNA Based Cryptography, *Journal of Sustainability Science and Management.*

Daemen, J., & Rijmen, V. (2002). *The design of Rijndael: AES—the Advanced Encryption Standard*. Springer Science & Business Media.

Nagaraj, S., Raju, D.S.V.P., Bhamidipati, K. (2013). A New Substitution Block Cipher Using Genetic Algorithm. Proceedings of the International Conference on Frontiers of Intelligent Computing: Theory and Applications (FICTA).

Satapathy, S., Udgata, S., Biswal, B. (eds) *Advances in Intelligent Systems and Computing*, vol 199. Springer, Berlin, Heidelberg.

Schneier, B., & Ferguson, N. 2001. *Practical cryptography*, Wiley.

Shannon, C. E. (1949). Communication theory of secrecy systems, *Bell System Technical Journal*, 28(4), 656-715.

Thirer, N. (2013). *A pipelined fpga implementation of an encryption algorithm based on genetic algorithm*. SPIE Proceedings.

THE STRUCTURAL STUDIES OF LAWSONE IN HENNA: THE FIRST PRINCIPLE APPROACH

Ahmad Nazrul Rosli[i]

[i] Lecturer, Energy Material Consortium (EMC), Computational Physics Lab, Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM), 71800 Nilai, Negeri Sembilan, Malaysia. anazrul84@usim.edu.my

Abstract

Henna is a popular dye material used for skin art and hair colouring. The reddish and yellowish colours come from the lawsone molecules with the chemical formula $C_{10}H_6O_3$. Understanding Lawsone's structural properties will give us a starting point to study the capability of henna and other dye chemicals to react with water. The density functional theory (DFT) calculates molecules' optimised energy and studies the structural properties of lawsone molecules. The calculation was done using Gaussion 09W and optimized using functional B3LYP. The energy gap between HOMO and LUMO shows that the highly reactive material of lawsone which easy to create a new bond. This study will be a starting point for understanding the Lawsone in henna and the capability of henna.

Keywords: *Henna*, lawsone, DFT, energy gap.

INTRODUCTION

Henna, or Lawsonia inermis, is a leaf traditionally used in treatment, dye, and makeup. The extract of henna leaves has antibacterial, antioxidant, anti-inflammatory, wound healer, and cooling agent properties (Karcz, 2023). Studies have been done on applying henna to lower the glucose level in the human body and treat cancer (Hassanien et al., 2023; Orabi et al., 2023).

While the application of henna covers the area of medicine, henna is traditionally used in cosmetics and hair dye. In regions like India, Malaysia and Indonesia, henna will be used as a material to decorate, especially for the bride in the wedding ceremony(Alebeid et al., 2015). Henna is also widely used as a dye for hair, especially for grey hair. In Islam, henna has been known as an acceptable material for hair colouring because of the characteristic of henna to absorb water.

Henna contains lawsone as a red-orange dye in the henna leaves (Ostovari et al., 2009). Lawsone, with the chemical formula $C_{10}H_6O_3$ (Iyyappa Rajan et al., 2018), will penetrate the hair shaft and bind with the keratin in the hair to create a natural colouring pigment (Wong, 2019). The cuticle, which is the outer layer of hair, is transparent (Palmer, 2023. The colour of the hair comes from the melanin in the cortex inside the hair. Meanwhile, the modern technique will bleach the melanin before the colour dye enters the cuticle. This will ruin the structure of hair compared to the henna.

Another concern is the ability of the material used in dye to absorb water since it is related to the Islamic way of cleaning ourselves. While henna was permissible for colouring hair, Muslims were concerned about the order dye technique. Interestingly, many think henna allows water to enter the hair structure, but literature studies show henna has hydrophobic characteristics (Adnan, 2020).

In this paper, we study the structure of lawsone (the chemical in henna) using density functional theory. This simulation helps us understand the structure of lawsone and will help us further this research.

METHODOLOGY

This calculation has been done using the Gaussian 09W module (Frisch et al., 2016). The structure of Lawsone has been optimized to the ground state energy using the density functional theory (DFT) method. The basis set is 3-21g with a trial function of wave functions iterated by a self-consistent field (SCF) before the structure stops the calculation. The hybrid exchange-correlation function, B3LYP, has been chosen because of the accuracy of the result (Khadtare et al., 2015). The highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) are produced at the optimized energy, and the vibration of atoms shows in the IR spectrum.
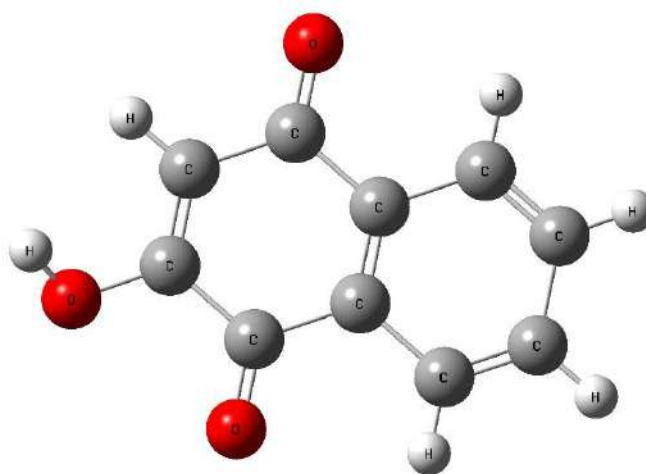

Figure 1: The optimized structure of lawsone molecules, $C_{10}H_6O_3$. Dark grey, light grey, and red represent carbon, hydrogen and oxygen atoms, respectively.

RESULTS AND DISCUSSION

The structure of Lawsone has been optimized to the minimum energy using B3LYP exchange-correlation. Figure 1 shows the structure of Lawsone after optimization. The bond length for single carbon bonding appears between 1.392 and 1.503Å, with the right side of molecules (refer to Figure 1) mostly below 1.400Å, while the left side starts

with 1.463Å and above. The bond length range is in agreement with other calculations. Details of the bond length values are shown in Table 1.

Table 1: The bond length of optimized lawsone molecules

No.	Bonding	Bond Length, Å	
		This study	Literature [Mohr et al, 2015]
1	C – C (left side)	1.463, 1.486, 1.494, 1.503	1.400, 1.4092, 1.4883
2	C – C (right side)	1.395, 1.392, 1.394	1.3947
3	C = C	1.388, 1.389, 1.402, 1.347	1.3542
4	C = O	1.222, 1.213	1.2213
5	C – O	1.343	1.365
6	O – H	0.966	0.972
7	C – H	1.082(2), 1.083 (2), 1.085	1.084

The molecular orbital for HOMO and LUMO (Figure 2) shows the small gap between both orbitals. A difference between HOMO and LUMO is 0.1484 a.u. and 4.041 eV when the value of the energy gap in a.u times 27.2114 eV. This calculation is comparable with Han et al. (2015) calculation using B3LYP/6-31G with an energy gap of 4.09 eV and the calculation done by Said et al. (2021) using B3LYP/6-31G with an energy gap of 3.98 eV. This small gap shows the high reactivity of this molecule, which is essential for henna when applied to the skin or hair. Meanwhile, the negative value of HOMO explains the energy needed to remove an electron from that orbital. With a small energy gap value, the electron can quickly jump to a higher orbital. The negative value of LUMO shows that the electron would still be bound to the molecules when added to the orbital.

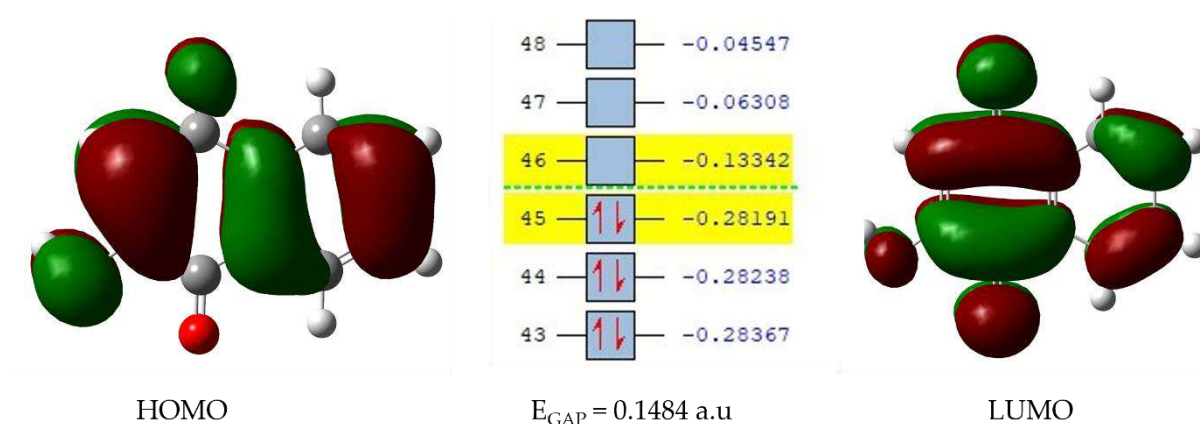HOMO E_{GAP} = 0.1484 a.u   LUMO

Figure 2: The image of HOMO, LUMO and energy orbital (in Hartree, a.u) for optimized lawsone molecule. The isosurface is set to 0.02.

The IR spectrum calculated the vibration frequency of each bond in the lawsone molecule. All bonding is shown in the IR peak in Figure 3. The single bond of O-H has the highest frequency at 3800 cm^{-1}. Double bonding of C=C and C=O shows the highest intensities at frequencies 1656 and 1736 cm^{-1}, respectively. The comparison is shown in Table 2, and the result is in accordance with the experimental data (Devi et al., 2020).

Table 2: Comparison of frequency from IR Spectrum and FTIR from experimental result.

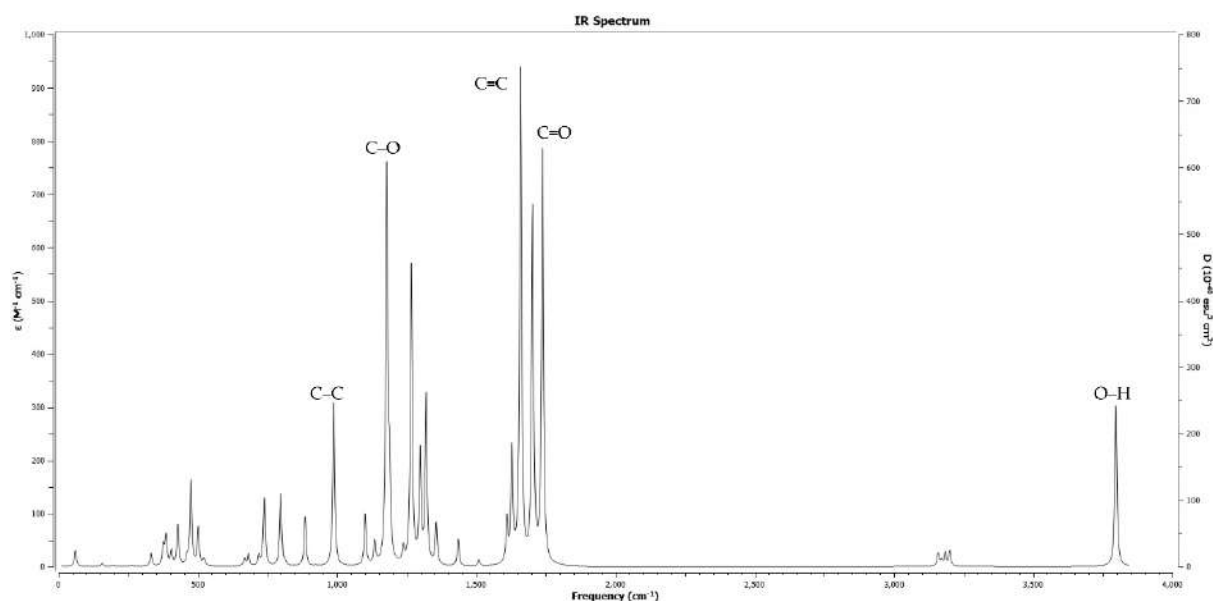| No.	Bonding	IR Spectrum, cm^{-1}	Experimental FTIR, cm^{-1}		
		This study	[Devi et al, 2020]	[Monem et al, 2024]	[Musa et al, 2019]
1	C = C	1656	16244.44	-	1510
2	C = O	1736	1776.17	1735	1712, 1632
3	O – H	3800	3409.24	3600	3311

Figure 3: The IR spectrum of optimized lawsone molecule.

CONCLUSION

The calculation to study the structural properties of Lawsone molecules found in henna has been successful. Compared with the literature, the result shows that the B3LYP can be calculated accurately. Based on this study, we found that Lawsone has high reactive energy and is suitable for use as a dye. Further studies need to be done to understand the ability of lawsone molecules to react with water, bond with protein

or creatine, and absorb water as part of the cleanliness of Islam. A detailed study can be done to understand the effect of chemical dye on hair and compare it with Lawsone.

REFERENCE

Journal

Adnan, S. A., Zainuddin, F., Ahmad Zaidi, N. H., Zulkeply, N. A., Adzali, N. M. S., & Che Daud, Z. (2020). The effects of henna fillers on the properties of polyurethane foam composites. *Materials Science Forum*, *1010 MSF*, 520–525.

Alebeid, O. K., Tao, Z., & Seedahmed, A. I. (2015). New approach for dyeing and UV protection properties of cotton fabric using natural dye extracted from henna leaves. *Fibres and Textiles in Eastern Europe*, *23*(5), 60–65.

Devi, N. R., Karthiga, N., Keerthana, R., Umasankareswari, T., Krishnaveni, A., Singh, G., & Rajendran, S. (2020). Extracts of leaves as corrosion inhibitors – An overview and corrosion inhibition by an aqueous extract of henna leaves (Lawsonia inermis). *International Journal of Corrosion and Scale Inhibition*, *9*(4), 1169–1193.

Frisch, M. J.; Trucks, G. W.; Schlegel, H. B.; Scuseria, G. E.; Robb, M. A.; Cheeseman, J. R.; Scalmani, G.; Barone, V.; Petersson, G. A.; Nakatsuji, H.; Li, X.; Caricato, M.; Marenich, A. V.; Bloino, J.; Janesko, B. G.; Gomperts, R.; Mennucci, B.; Hratchian, H. P.; Ortiz, J. V.; Izmaylov, A. F.; Sonnenberg, J. L.; Williams-Young, D.; Ding, F.; Lipparini, F.; Egidi, F.; Goings, J.; Peng, B.; Petrone, A.; Henderson, T.; Ranasinghe, D.; Zakrzewski, V. G.; Gao, J.; Rega, N.; Zheng, G.; Liang, W.; Hada, M.; Ehara, M.; Toyota, K.; Fukuda, R.; Hasegawa, J.; Ishida, M.; Nakajima, T.; Honda, Y.; Kitao, O.; Nakai, H.; Vreven, T.; Throssell, K.; Montgomery, J. A., Jr.; Peralta, J. E.; Ogliaro, F.; Bearpark, M. J.; Heyd, J. J.; Brothers, E. N.; Kudin, K. N.; Staroverov, V. N.; Keith, T. A.; Kobayashi, R.; Normand, J.; Raghavachari, K.; Rendell, A. P.; Burant, J. C.; Iyengar, S. S.; Tomasi, J.; Cossi, M.; Millam, J. M.; Klene, M.; Adamo, C.; Cammi, R.; Ochterski, J. W.; Martin, R. L.; Morokuma, K.; Farkas, O.; Foresman, J. B.; Fox, D. J. (2016). Gaussian 16, Revision C.01, Gaussian, Inc., Wallingford CT.

Han, M. W., Ekanayake, P., Ming, L. C., & Yoong, V. N. (2015). DFT/TD-DFT Studies on the Lawsone (Henna) as a Photosensitizer for Dye-Sensitized Solar Cells. *Applied Mechanics and Materials*, *789–790*, 56–60.

Hassanien, A. E., Abd EL-ghani, G. E., & Elbana, G. G. (2023). Synthesis, DFT Studies, and Biological Applications of Some Novel Compounds Containing Lawsone by Using Halo-Reagents. *Polycyclic Aromatic Compounds*, *43*(2), 1378–1394.

Iyyappa Rajan, P., Judith Vijaya, J., Jesudoss, S. K., Kaviyarasu, K., Lee, S. C., John Kennedy, L., Jothiramalingam, R., Al-Lohedan, H. A., & Mahamad Abdullah, M. (2018). Investigation on preferably oriented abnormal growth of cdse nanorods along (0002) plane synthesized by henna leaf extract-mediated green synthesis. *Royal Society Open Science*, *5*(3).

Karcz, W., Burdach, Z., & Rudnicka, M. (2023). The Effects of 1,4-Naphthoquinone (NQ) and Naphthazarin (5,8-Dihydroxy-1,4-naphthoquinone, DHNQ) Individually and in Combination on Growth and Oxidative Stress in Maize (Zea mays L.) Seedlings. *Plants*, *12*(4).

Khadtare, S. S., Ware, A. P., Salunke-Gawali, S., Jadkar, S. R., Pingale, S. S., & Pathan, H. M. (2015). *Dye Sensitized Solar Cell with Lawsone Dye Using ZnO Photoanode: Experimental and TD-DFT Study. RSC Adv., 5, 17647-17652.*

Mohr, T., Aroulmoji, V., Ravindran, R. S., Müller, M., Ranjitha, S., Rajarajan, G., & Anbarasan, P. M. (2015). DFT and TD-DFT study on geometries, electronic structures and electronic absorption of some metal free dye sensitizers for dye sensitized solar cells. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, *135*, 1066–1073.

Monem, A., Habibi, D., & Goudarzi, H. (2024). A new DES-mediated synthesis of Henna-based benzopyranophenazines and benzoxanthenetriones. *Scientific Reports*, *14*(1).

Musa, M. S. M., Sulaiman, W. R. W., Majid, Z. A., Majid, Z. A., Idris, A. K., & Rajaei, K. (2019). Application of henna extract in minimizing surfactant adsorption on quartz sand in saline condition: A sacrificial agent approach. *SN Applied Sciences*, *1*(8).

Orabi, M. A. A., Orabi, E. A., Awadh, A. A. al, Alshahrani, M. M., Abdel-Wahab, B. A., Sakagami, H., & Hatano, T. (2023). New Megastigmane and Polyphenolic Components of Henna Leaves and Their Tumor-Specific Cytotoxicity on Human Oral Squamous Carcinoma Cell Lines. *Antioxidants*, *12*(11).

Ostovari, A., Hoseinieh, S. M., Peikari, M., Shadizadeh, S. R., & Hashemi, S. J. (2009). Corrosion inhibition of mild steel in 1 M HCl solution by henna extract: A comparative study of the inhibition by henna and its constituents (Lawsone, Gallic acid, α-d-Glucose and Tannic acid). *Corrosion Science*, *51*(9), 1935–1949.

Said, M., Datti, Y., Nuhu, A. A., Buhari, T. R., & Ahmed, A. B. (2021). Computational Study of Lawsonia Inermis as Potential and Promising Candidate for Production of Solar Cell. *European Journal of Advanced Chemistry Research*, *2*(1), 21–27.

Internet

Palmer, J. (2023 January). *Know Your Hair Structure And Anatomy*. https://www.hairknowhow.com/know-your-hair-structure

Wong, M. (2019 April 21). How Do Different Types of Hair Dye Work? The Science. https://labmuffin.com/how-does-hair-dye-work/

OVERVIEW OF THE DIFFERENT HALAL CERTIFICATION SCHEME IN MALAYSIA

Ainil Hawa Mohamad Fauzi[i] , Dzulfadli Rosli[ii], Mohd Sukri Hassan [iii] & Mohd Fared Abdul Khir[iv]

[i] Universiti Sains Islam Malaysia. ainilhmf@raudah.usim.edu.my
[ii] Universiti Sains Islam Malaysia. dzulfadli@usim.edu.my
[iii] Universiti Sains Islam Malaysia. mohdsukri@usim.edu.my
[iv] (*Corresponding author*). Universiti Sains Islam Malaysia. fared.khir@usim.edu.my

Abstract

Malaysia is a pioneer in establishing halal assurance system. Efforts included intiating halal control management systems with standards and guidelines for key players. This paper aims to review the different halal schemes available in Malaysia to differentiate and find underlying issues. Today, nine halal certification schemes are available namely food and beverages, food premise, consumer goods, cosmetics) pharmaceuticals, logistics, slaughterhouse, original equipment manufacturing (OEM), and medical devices. Each scheme has the potential to contribute to the halal industry and bring great returns to the economy. Based on the literature, issues with the halal industry includes the complexity of the halal ecosystem and halal status assurance and authentication. These two issues can be problematic but cosntant work is carried out to find solutions. Harmonization between the different components in the ecosystem has to take place. Methods of authentication for various products and services can help verify the halal status of products and services while traceability and Internet of Things can facilitate the entire process. Future work has to factor in possible new areas that would require a unique halal certification scheme to be developed. The understanding of halal in totality is encouraged so that halal assurance matters can bring benefit to all.

Keywords: *Halal assurance, Halal certification, Halal ecosystem, Halal authentication.*

INTRODUCTION

What is permissible and prohibited in Islam is defined and guided by Allah through Quran and hadiths (Doi, 2007). Al-Qaradawi (1960) stated that the Shariah law or Islamic ruling is a system that is aimed for the good of mankind. It is to guide Muslims in their day-to-day activities in all living aspects. The concept of halal and haram is part of the Shariah law. The word halal is an Arabic word meaning permissible, lawful, allowed, and permitted. The opposite of the word halal is the word haram which means forbidden, unlawful, and not allowed. Halal is also defined as actions, conducts, objects, or item that is permitted without restrictions in any other form and permissible by Allah through Shariah law (Miskam et al., 2015; Al-Qaradawi, 1960). It is compulsory for Muslims to ensure that their daily activities are halal as instructed by Allah through various Ayat in the Quran. The concept of halal is not limited to individualistic needs, but it also encompasses the societal needs in all aspects of life.

There has been rising demand for halal products and services with an estimated worth of USD 5 trillion by 2030 (Frost & Sullivan, 2022). In 2021, the Muslim community spent around USD 2 trillion dollars on food, pharmaceutical, cosmetics, fashion, travel, and entertainment (Tighe, 2024). Several factors have been identified to contribute to the increasing demands. Firstly, the Muslim population is continuously rising and makes up about 28.7% of the global population (Islamic Services of America, 2023). This naturally increases the demand for halal products and services as more practicing Muslims observe their faith. Secondly, there is a rise in awareness and acceptance of halal products and services among Muslims and non-Muslims where halal is associated to have high quality standards, promotes good values and ethics, and emphasizes economic and social fairness (Rejeb et al., 2021; Pacific, 2010). The current Muslim demographic have higher levels of education and awareness creating the demand for the halal market (Ahmad et al., 2023). Thirdly, Muslims spending power and economic advantage has increased leading to higher affordability of products and services (Azam et al., 2019). For example, there is an increase in spending that contributes to the halal industry revenue through tourism, food industry, and financial services (Azam et al., 2019). The term halal tourism is used to describe tourism activities that accommodates the Muslim's needs such as having access to halal food and praying facilities (Muhamad et al., 2019; Henderson, 2009). The halal food industry is the largest contributor in the halal industry market with an estimated spending of USD 1.2 trillion in 2017 for food and beverages to an estimated USD 1.9 trillion by 2023 (Aneesh & Khadar, 2022) and USD 2 trillion by 2024 (Izza & Rusydiana, 2023). Islamic finance in the halal industry have attracted interest in halal compliant financial products and services where Muslims can be assured that all financial activities are guided by Islamic principles (Mas'ad & Abd Wakil, 2020) and non-Muslims can benefit from these principles that are considered fair and transparent (Tarver, 2023).

The expansion of halal industry has seen developments and changes in various industries including but not limited to food, finance, cosmetics, and logistics (Muhammad et al., 2008). Malaysia is a pioneer in the halal industry and has actively put an emphasis on their commitment to strengthen and maximize the potential of the halal industry. This is apparent in the New Industrial Master Plan 2030 (NIMP 2030) where halal industry is one of the focused sectors (Ministry of Investment, Trade, and Industry (MITI), 2023). The growth and success of the halal industry involves several key players in the form of business corporations and enterprises, relevant ministries and government agencies, regulatory bodies, competitors, and consumers (Abd Mubin et al., 2022). These key players may be involved directly and indirectly in the implementation of halal which requires standards, regulations, policies, and certifications in place based on the respective parties involved.

As of 2020 in Malaysia, nine different halal schemes have been established that exists at different stages of maturity in terms of regulation and implementation. For example, the food and beverage scheme are one of the earliest established since the 1970s, while the medical device scheme was only recently added in the Malaysian

Halal Certification Procedure Manual (Domestic) 2020 (MPPHM 2020) (Jabatan Kemajuan Islam Malaysia (JAKIM), 2020). Additionally, the different schemes are usually investigated separately to put focus on each relevant sector. To have an overall view of the halal industry scene, this paper aims to review the different halal schemes available in Malaysia. The objective of this study is to differentiate the different halal schemes available and to explore some issues in the implementation of the halal schemes. The significance of this work is to foster understanding of the different scheme available, provide a clear overview of each halal scheme and its elements, and identify underlying issues.

METHODOLOGY

This work applies a qualitative method in literature review analysis as the main method. The literature considered included articles, reviews, conference proceedings, books, reports, and legislative documents. A thematic method with an inductive approach was taken to review the relevant sources to find significant themes and topics present.

RESULTS AND DISCUSSION

Different Halal Certification Scheme in MPPHM 2020.

In the MPPHM 2020, there are nine certification schemes which are 1) food and beverages, 2) food premise, 3) consumer goods, 4) cosmetics, 5) pharmaceuticals, 6) logistics, 7) slaughterhouse, 8) original equipment manufacturing (OEM), and 9) medical devices. The last two schemes (8 and 9) are new addition that was added to the updated MPPHM 2020. These new additions show that the importance of these sectors are acknowledged and considered for proper regulation because there is high demand for the product and a need to ensure its halal status. Based on the NIMP 2030, the Malaysian halal market sees greatest return from three core sectors namely food and beverages (75.88%), cosmetics and personal care (10.23%), and pharmaceutical (4.97%). The remaining 8.92% is from other sectors in the halal market such as consumer goods, logistics and supply chain, medical devices, medical tourism, and modest fashion (HIMP, 2030).

Food and Beverages

Food and beverages are defined as any food and beverage products produced for human consumption. It is apparent from the beginning of the halal assurance establishment that products and services related to food and beverages are most scrutinized. This could be due to its significance and relatability in consumer's daily life. Halal awareness in food and beverages can be influenced by religious beliefs, exposure to halal assurance and certification system, and the perception of health and quality of life (Ambali & Bakar, 2013). Islam puts emphasis on food choice and consumption in daily life as highlighted in Islamic dietary laws (Kassam & Robinson, 2014). The quest for halal food is considered obligatory and an act of worship in Islam

which has been the ultimate motivation for halal assurance of food and beverages (Biglari et al., 2020). Thus, it is crucial that the halal status of food and beverages are compliant and assured for consumption.

Food Premise

The certification for food premise is a separate scheme from food and beverages. Food premise is any space or structure that is permanent or temporary used in preparing, serving, and selling food products. The different type of food premises is restaurants or café, canteen, bakery, food chains, central kitchen, food truck, food court, and kiosks (JAKIM, 2020). In food consumption, halal is not limited to the food item but also considers the condition of the food premise that needs to adhere to the objective of Islamic rulings (Nazim & Yusof, 2023). A halal food premise is expected to maintain good hygiene by maintaining the cleanliness of the premise, ensure proper sanitation and waste management, and free from pollutant and harmful matters (Lateb & Yusof, 2020). As food and drink items will be in direct contact with the premise, contamination must be avoided to ensure that the halal status of the products is well maintained.

Consumer Goods

Consumer goods cover products that are not food and drinks. This could be an array of products and services ranging from banking and financial services, tourism, fashion and apparel, (Khan et al., 2017; Zakaria et al., 2017). The ISA (2021) also lists down several non-consumables like cleaning products, filtration systems, sanitizers, packaging materials and industrial products that requires halal certification too. Azman et al. (2024) highlighted that a Muslim must find what is good and avoid what is bad for the body physically and spiritually. It is important that these goods and services are halal and can be used with confidence that they are free from any contaminants, pollutants, and matter that are non-halal and harmful (Azman et al., 2024). For instance, the halal status of water filtration system was questioned when the common carbon filters in the system can be sourced from bovine or porcine (Komar et al., 2023). For apparels and accessories, the halal status of the product considers the source of the material, the processing methods, and the business ethics (Mustafa'Afifi et al., 2013). As part of the halal industry, Islamic banking and finance can ensure that all financial activities are according to Islamic rulings that could benefit all parties involved (Mas'ad & Abd. Wakil). With halal assurance measures and certification implementation, due process can be taken to ensure the halal status of all the goods and services available.

Cosmetics

Cosmetics are any substance or preparation intended to be placed in contact with various external parts of the human body. The primary purpose could range from cleaning, perfuming, changing their appearance, correcting body odours, protection, cleanliness. Ultimately, halal cosmetics must be free from but not limited to pig and

pig-derived materials, human parts, blood, carrion, and harmful and dirty substances (Hashim & Mat Hashim, 2013). Muslims demand halal cosmetics due to their faith. For non-Muslims, the appeal of halal cosmetics is attributed to ethical consumerism, high quality standards, and product safety (Sugibayashi et al., 2019). The production of halal cosmetics encompasses the ingredients, the manufacturing process, and conformance to guidelines and standards imposed by authorities.

Pharmaceuticals

Pharmaceuticals include prescription and non-prescription medicines for human use. In Malaysia, it could be in the form of bio-pharmaceutical, radio-pharmaceutical, traditional medicine, supplements, and investigational medicine registered with the Drug Control Authority under MOH. Studies have shown that halal pharmaceuticals are positively accepted from pharmacists and medical practitioners (Sadeeqa et al., 2013). The halal status and assurance system are similar to halal cosmetics except that the National Pharmaceutical Regulatory Agency (NPRA) holds authority on regulations. Due to the nature of the commodity, strict regulations and legal framework is required in obtaining and maintaining the halal status of the products (Ramli et al., 2018).

Logistics

Halal logistics refers to the services related to transportation, delivery, storage and warehousing, and retail activities for consumer goods, food, and beverages. The demand for halal logistics stems from the demand for halal goods and services (Talib & Hamid, 2014) where it is important to maintain the halal status of products from producers to consumers. The participation in halal logistics from logistic service providers shows that there is a commitment to support the initiative (Ab Talib et al., 2020). Attention to the regulation, financial incentives, taxation, infrastructure, knowledge transfer, and guidance should be given to logistic service providers (Ab Talib et al., 2020). The authority and regulatory bodies have an important role to play in ensuring that halal logistics are not overlooked to preserve the halal supply chain.

Slaughterhouse

For Muslim consumption, halal meat is obtained from animal that have been slaughtered according to Islamic rulings. Slaughterhouses are premises where animals are slaughtered and processed. In Malaysia, the Department of Veterinary Services (DVS) handles all regulatory affairs related to livestock and poultry. Halal compliance at a slaughterhouse is necessary to ensure that halal meat is supplied. Regulations include conforming to rules and technical specifications on location, equipment and instruments used, processing methods, personnel's hygiene and safety practices, cleaning and sanitation procedures, and effluent treatments (Hashim et al., 2019). In this sense, halal assurance encompasses the pre-slaughter, slaughter, and post-slaughter process to ensure that the meat produced is genuinely halal (Yaacob et al., 2016).

Original Equipment Manufacturing (OEM),

Halal certification scheme for OEM is relatively new as it was recently added in the MPPHM 2020. OEM is a manufacturing company that offers manufacturing services to other companies. Upon request, the OEM may produce parts or whole products for other companies to sell under their own branding. For example, one OEM that is halal certified is OEM Brand Manufacturing Sdn. Bhd., a company that produces health-based food and drink products for other small trades. Although the literature on the subject is scarce, an example of a successful implementation shows that the sector is viable. The interest in halal OEM could originate from the desire of small entrepreneurs that has the idea and drive to market halal products without the need to have individual facilities.

Medical Devices

In the MPPHM 2020, medical device was listed as a new scheme under halal certification. The medical device industry is growing with the advancement of technology. Malaysia's medical device export has seen an increase over the years (AMMI, 2014). Medical devices are any medical equipment, instruments, tools, implement, machine, and appliance to be used on humans for medicinal purposes. This differs from pharmaceuticals because it does not involve any metabolic, immunological, and pharmacological reactions. In Malaysia, there is sufficient legal framework that oversees the regulation of medical devices in relation to halal certification (Zarmani et al., 2014). To certify halal medical devices involves regulation and standards, manufacturing licensing, guidelines on import and export, monitoring of operation and application of the medical device that includes usage and disposal procedures. This relatively new area in halal assurance has the potential to grow extensively. Further discussion on the implementation and promotion of halal medical device is necessary in order to for it to bring impact the halal industry.

Issues Related to Halal Certification Schemes

Complex ecosystem of the Halal Industry

In the establishment of the halal assurance system, a complex halal ecosystem materialized. In the Halal Industry Masterplan 2030 (MIHP 2030) that was launched in April 2024 (Bernama, 2024), the Malaysian Halal Ecosystem is described as a network of all the components involved in the growth, delivery, and success of halal products and services. This complex network in the halal ecosystem presents challenges on multiple levels (Arif et al., 2024). As outlined by the NIMP 2030, challenges include lack of standardization in certification and regulation, narrow talent pool, restricted research and development, under-utilized facilities and limited participation from micro, small, and medium enterprises (MSMEs) (MITI, 2023). All the components in the ecosystem have separate roles but are dependent on each other. The halal ecosystem was introduced as a conceptual view to illustrate the complexity

of the process (Ahmad Hishamuddin, 2007). The considerable size and network in the ecosystem illustrate the complexity consisting of numerous legal frameworks, regulatory bodies, enforcement authorities, federal government, state government, industry players, local and international corporations and enterprises, and consumers (Noordin et al., 2014). This network requires appropriate segregration of duties, harmonization of regulations, agreement on policies, and teamwork on administration. The overwhelming components to the halal industry should not be perceived as a limitation. One of the focuses of MIHP 2030 is to create a strong and sustainable relationship between all the components.

Halal Status Assurance and Authentication

It is apparent that Malaysia is dedicated in providing halal assurance to consumers local and international. Several factors that could impede the success of halal assurance are lack of manpower, inadequate knowledge and understanding, low awareness, and lack of accountability (Muhammad et al., 2020; Ahmad et al., 2017). With halal assurance system in place, cases of fraud may still affect the halal status of goods and services. Food fraud such as adulteration, contamination, substitution, and unethical practices could present itself in any goods and services at any stage of the process (Yahaya et al., 2024). Proper legislation and enforcement can be a deterrence to fraud, but it requires an empirical and analytical methods of assessments (Smith, 2020). For example, immense food authentication efforts are carried out to find the most optimum method to detect and validate the components of food and beverages (Yahaya et al., 2024). The importance of halal authentication of cosmetics and pharmaceutical products are equally crucial (Mursyidi, 2013). Methods that have been used to investigate product's authentication includes spectroscopy, chromatography, DNA analysis, electronic nose, immunoassay, and imaging (Yahaya et al., 2024; Mursyidi, 2013). A major part in managing halal assurance is traceability which could be applied to all the halal schemes available. Through traceability in the various industries involved in the halal schemes, the halal process can be evaluated and assessed thoroughly. The halal integrity of halal logistics is also key in ensuring the halal status of the supply chain can be guaranteed (Majid et al., 2019). The application of the Internet of Things (IoT) in halal assurance is also believed to help in traceability of products, authentication of halal status, monitoring of halal certifications, enhance supply chain efficiency, and facilitate livestock management (Rejeb et al., 2021).

CONCLUSION

In more than 50 decades, Malaysia has spearheaded the halal assurance system efforts by establishing world class systems in place. The process started with awareness and the motivation to find best practices to fulfill the Muslim's need in ensuring that all aspect of life is halal and within the confines of Islamic rulings. As of 2020, nine halal certification schemes are available for relevant parties. The different halal schemes shows that the halal industry is diverse and constantly evolving to fit the need of the

current world. In order to stay ahead, Malaysia has to focus on new and emerging niche area that could possibly be part of the halal industry. Additionaly, the pre-existing areas still has to be revised and updated to ensure its relevance and growth. It should be acknowledged that the halal ecosystem is a complex environment and it should be managed objectively to achieve the goal for Malaysia to become the world leader in halal matters. Despite having regulations to control halal products and services, threat to the halal status still exists in the form of fraud that manipulates and abuse halal products and services. Therefore, it is also important to have methods in place to authenticate and validate the halal status of products and services. Future work has to anticipate the possibility of additional areas that might require its own halal certification scheme to be developed. Discussion and investigations should continute in matters related to halal for total understanding.

ACKNOWLEDGEMENT

REFERENCE

Ab Talib, M. S., & Bakar Abdul Hamid, A. (2014). Halal logistics in Malaysia: a SWOT analysis. *Journal of Islamic Marketing*, *5*(3), 322-343.

Ab Talib, M. S., Pang, L. L., & Ngah, A. H. (2020). The role of government in promoting Halal logistics: a systematic literature review. *Journal of Islamic Marketing*, *12*(9), 1682-1708.

Abd Mubin, N., Abd Rahman, A., Kamarulzaman, N. H., & Yusof, R. N. R. (2022). Readiness and Stakeholders Influence for Halal Logistics Practices Implementation towards Supply Chain Performance. *International Journal of Asian Social Science*, *12*(1), 26-42.

Ahmad Hishamuddin. (2007). Community Participation and Empowerment: An Approach for JAKIM Halal Verification and Feedback Mechanism. Unpublished master's thesis, University Teknologi Mara, Malaysia.

Ahmad, A. N., Rahman, R. A., Othman, M., & Abidin, U. F. U. Z. (2017). Critical success factors affecting the implementation of halal food management systems: Perspective of halal executives, consultants and auditors. *Food control*, *74*, 70-78.

Ahmad, Z., Mafaz, M. N. A., & Rahman, M. M. (2023). Harmony in halal: Understanding stakeholder views analyzing products and evaluating policies in Malaysia. *West Science Business and Management*, *1*(05), 495-508.

Ambali, A. R., & Bakar, A. N. (2013). Halal food and products in Malaysia: people's awareness and policy implications. *Intellectual Discourse*, *21*(1), 7.

Aneesh, A., & Khadar, A. (2022). Halal Food Industry in World: Opportunity and Challenges. *Available at SSRN 4153508*.

Arif, S., Fazila, N. S., Sidek, S., Mat, Z., & Ismail, N. (2024). A Conceptual Stakeholder-Based Model of Malaysia Halal Food Control System. *Journal of Electrical Systems*, *20*(4s), 1747-1762.

Azam, M. S. E., Abdullah, M. A., & Razak, D. A. (2019). Halal tourism: definition, justification, and scopes towards sustainable development. *International Journal of Business, Economics and Law*, *18*(3), 23-31.

Biglari, H., Dargahi, A., Vaziri, Y., Ivanbagha, R., Hami, M., & Poursadeqiyan, M. (2020). Food safety and health from the perspective of Islam. *Journal of Pizhūhish dar dīn va salāmat*, *6*(1), 131-143.

Doi, A.R.I. (2007), Shari'ah: The Islamic Law, A.S. Doordeen, Kuala Lumpur.

Frost & Sullivan. (2022, Jul 29). Global Halal Economy Growth Opportunities. https://store.frost.com/global-halal-economy-growth-opportunities.html

Hammad, A. Z. (1994). The lawful and the prohibited in Islam. Translated by K. Helbawy, M.M. Siddiqui, S. Shukry. Indiana, American Trust Publications.

Hashim, P., & Mat Hashim, D. (2013). A review of cosmetic and personal care products: Halal perspective and detection of ingredient. *Pertanika Journals of Science and Technology*, *21*(2), 281-292.

Hashim, H., Saad, N. M., Khalid, H., & Laluddin, H. (2019). Halal compliance in poultry industry: A review of regulatory system in Malaysia. *International Journal of Academic Research in Business and Social Sciences*.

Henderson, J. C. (2009). Islamic tourism reviewed. Tourism Recreation Research, 34(2), 207–211.

Islamic Services of America. (2021, March 23). Why Halal Certification Matters for Non-Consumables. https://www.isahalal.com/news-events/blog/why-halal-certification-matters-non-consumables

Islamic Services of America. (2023, February 23). A Glimpse into The Global Halal Industry. https://www.isahalal.com/news-events/blog/glimpse-global-halal-industry-2023

Izza, N. N., & Rusydiana, A. S. (2023, March). A qualitative review on halal food: NVivo approach. In *Proceedings of Femfest International Conference on Economics, Management, and Business* (Vol. 1, pp. 90-106).

Jabatan Kemajuan Islam Malaysia. (2020). Manual Prosedur Pensijilan Halal Malaysia (Domestik) 2020.

Kassam, Z., & Robinson, S. E. (2014). Islam and food. *Encyclopedia of food and agricultural ethics*, 1282-1291.

Khan, M. M., Asad, H., & Mehboob, I. (2017). Investigating the consumer behavior for halal endorsed products: Case of an emerging Muslim market. *Journal of Islamic Marketing*, *8*(4), 625-641.

Komar, M. A. A. N., Makazan, W. F. N. W., & Hashim, A. Issues on Activated Carbon Filter in Halal Water Dispenser Machine from Online Shopping: A Review.

Lateb, N. B. A., & Md Yusof, S. A. (2020). The practice of halal concept among food premises in Perlis: The hygiene perspective. *International Journal of Supply Chain Management*.

Majid, Z. A., Kamarulzaman, N. H., Rahman, A. A., Jaafar, H. S., Rahman, N. A. A., & Mohammad, M. F. (2019). Halal integrity from logistics service provider perspective. *Int. J Sup. Chain. Mgt*, *8*(5), 1-9.

Mas'ad, M. A., & Abd Wakil, N. A. (2020). Halal industry and Islamic finance institution's role: Issues and challenges. *INSLA E-Proceedings*, *3*(1), 643-659.

Miskam, S., Othman, N., Hamid, N. A., Ager, S.N.S., Abdullah, M., Shahwahid, F. M., Wahab, N. A., Saidpudin, W. (2015). An Analysis of the definition of halal: Syari'ah vs statutes.

Ministry of Investment, Trade, and Industry. (2023). New Industrial Master Plan 2030: Halal Industry. e ISBN No.: 978-967-0020-19-8

Muhamad, N. S., Sulaiman, S., Adham, K. A. & Said, M. F., 2019. Halal Tourism: Literature Synthesis and Direction for Future Research. Pertanika J. Soc. Sci. & Hum, 27(1), pp. 729–745.

Muhammad, Z., Salleh, M. M., & Mahmood, A. M. (2008, August). Halal: Antara tuntutan agama dan strategi ekonomi. In *Seminar Pentadbiran Hal Ehwal Islam di Malaysia: Cabaran Semasa dan Perancangan Masa Depan*.

Muhammad, M. A., Elistina, A. B., & Ahmad, S. O. (2020). The challenges faced by halal certification authorities in managing the halal certification process in Malaysia. *Food Research*, *4*(1), 170-178.

Mursyidi, A. (2013). The role of chemical analysis in the halal authentication of food and pharmaceutical products. *Journal of Food and Pharmaceutical Sciences*, *1*(1).

Mustafa'Afifi, A. H., Mahyeddin, M. M., Wati, M. K., Asming, Y., Najib, S. O. S. M., Asmidah, A., ... & Ariff, M. M. I. (2013). Consumer protection of Halal products in Malaysia. *Middle East Journal of Scientific Research*, *13*, 22-28.

Nazim, N. A. M., & Yusof, S. M. (2023). Halal Legislation Enforcement of Food Premises in Malaysia. *Global Journal Al-Thaqafah*, 151-164.

Noordin, N., Noor, N. L. M., & Samicho, Z. (2014). Strategic approach to halal certification system: An ecosystem perspective. *Procedia-Social and Behavioral Sciences*, *121*, 79-95.

Pacific, A. (2010). Global halal industry: an overview. *Global Islamic Finance Report 2013*, 140-159.

Rejeb, A., Rejeb, K., Zailani, S., Treiblmaier, H., & Hand, K. J. (2021). Integrating the Interne of Things in the halal food supply chain: A systematic literature review and research agenda. *Internet of Things (Netherlands)*, *13*(2021), 100361. doi.org/10.1016/j.iot.2021.100361

Sadeeqa, S., Sarriff, A., Masood, I., Farooqi, M., & Atif, M. (2013). Evaluation of knowledge, attitude, and perception regarding Halal pharmaceuticals, among general medical practitioners in Malaysia. *Archives of Pharmacy Practice*, *4*(4-2013), 139-146.

Smith, C. J. (2020). Food safety and health-past problems and future solutions. *Engineering*, *6*(4), 384-388.

Sugibayashi, K., Yusuf, E., Todo, H., Dahlizar, S., Sakdiset, P., Arce, F. J., & See, G. L. (2019). Halal cosmetics: A review on ingredients, production, and testing methods. *Cosmetics*, *6*(3), 37.

Tarver, E. (2023, June 20). Islamic Banking and Finance Definition: Hisotry and Example. In M. James. Investopedia. https://www.investopedia.com/terms/i/islamicbanking.asp

Tighe, D. (2024). Global Muslim Market Size in 2021 and 2025. Statista. https://www.statista.com/statistics/796103

Yaacob, T. Z., Jaafar, H. S., & Rahman, F. A. (2016). A review of regulatory framework for halal meat supply chain: the case of halal meat-based food products in Malaysia. *J. Appl. Environ. Biol. Sci*, *6*(9S), 14-21.

Yahaya, N., Yahya, H., Yahya, H. N., & Fauzi, A. H. M. (2024). Emerging analytical techniques in food safety and biosecurity. In *Green Chemistry in Food Analysis* (pp. 343-383). Elsevier.

Zakaria, Z., Majid, M. A., Ahmad, Z., Jusoh, Z., & Zakaria, N. Z. (2017). Influence of Halal certification on customers' purchase intention. *Journal of Fundamental and Applied Sciences*, *9*(5S), 772-787.

Zarmani, N. F., Ramli, M. A., & Shaikh Mohd Salleh, S. M. S. (2014). The ethical aspects of halal certification of medical devices in Malaysia.

DETERMINANTS OF RESIDENTIALPROPERTY PRICE IN MALAYSIA

Wan Farhanim W Abdullah[i] & Muhammad Zaim Razak[ii,iii]

[i] Financial Mathematics Programme, Faculty of Science & Technology, Universiti Sains Islam Malaysia, wfarhanim01@raudah.usim.edu.my
[ii] (*Corresponding author*) Senior Lecturer, Financial Mathematics Programme, Faculty of Science & Technology, Universiti Sains Islam Malaysia, mzaim.razak@usim.edu.my
[iii] Risk Analytics Research Group, Faculty of Science & Technology, Universiti Sains Islam Malaysia

Abstract

The objective of this study is to examine the factors that affect house price in the Malaysian market. By using the quarterly observation from the year 1994 to the year 2022, the study reports the significant long-run relation between house prices and each of macroeconomic variable, that include inflation, GDP, interest rate and exchange rate. In the short-run, the previous quarter of each macroeconomic variable is detrimental to predict their contemporaneous house price, interest rate and exchange rate respectively. In the long-run relation, the study demonstrates the significance of long-run relation between inflation and exchange rate to the housing prices in the market. Nonetheless, GDP and interest rate were not significantly affect the house price, pertaining to development policies and government interventions in the property market.

INTRODUCTION

According to Zulkarnain and Nawi (2023), in Malaysia, there has been a significant fluctuation in residential prices or property values over the past ten years. Such choices obviously affect Malaysianswho choose to invest in real estate or purchase a home. In other words, buying a home can be seen as for investment and consumption purpose (Dietz & Haurin, 2003; Sinai & Souleles, 2005). According to Sinai & Souleles (2005), individuals are "short" on housing needs that they have to live somewhere for shelter. In this regard, individuals that do not own must rent. Homeowners that supply rental properties are buying homes for investment purposes are capable of taking a highly leverage position in mortgage financing (Khan & Xu, 2022; Damianov & Escobari, 2019). When viewed as consumption, homeownership provides a guarantee against fluctuations in rental price and continuous shelter with a known up-front price although by taking mortgages. In addition to that, home ownership allows households to upgrade their property ladder over their life (Damianov & Escobari 2019). For instance, a new start-up family may acquire an apartment as their first house. With price appreciation in the housing property market, the household can upgrade themselves into terrace house. Thus, the household is in a better position as compared to households that are currently renting.

Buyers frequently prioritise housing pricing over other aspects, regardless of the city where they want to purchase a residential unit (Zainon et al., 2017). Regional discrepancies can result from different regional variations in real estate price fluctuations. A considerable price increase may occur in some places because of factors like economic expansion and a shortage of available housing. In high-demand locations, this might make it difficult for people and families to find an affordable home. The rental market may be impacted by high property prices. More people might decide to rent as buying a home gets more expensive. Rent costs may rise because of more rental demand, which will cost tenants more money.

Developing residential homes can improve economic performance, which is why it makes a substantial contribution to overall production activities. Macroeconomy and the building of residential housing are strongly related. Since the Eighth Malaysian Plan (2001), the government's goal of shifting the country's growth strategy to domestic sources is aligned with the recognition of residential housing activities as a major engine of growth in Malaysia. More importantly, the development of residential properties in Malaysia is able to seek the balance between rapid pace in our country's economic growth and improve the quality of life for citizens through a proper housing. (Kabine, 2023; Trofimov et al.,2018). Related to this, affordable housing has been one of the big bolds in the national economic Madani agenda in the twelfth Malaysia plan (Kementerian Ekonomi,2023).

Nonetheless, in Malaysia, the rise in housing costs has outpaced the rise in disposable income. Since 2014, the price growth picked up speed in the wake of the 2008-2009 global financial crisis, whereby the house prices climbed up over 200% over a 15-year period (NAPIC, 2014). Based on Bank Negara Malaysia's Annual Report (2020), it is found that the median house price in Malaysia was more than four times, the median annual household income in 2019, suggesting affordability challenges for many Malaysians. Further evidence from Khazanah Research Institute (2019) shows the housing affordability worsened as median multiplier increase to 5.0, that exceed the threshold of affordability of 3.0. Therefore, the rapid increase in house price suggests that Malaysians are unable to afford the country's median housing price.

The recent statistics from National Property Information Centre (NAPIC) in the year 2022 shows the incoming new launches that comprise of 44% or 24,000 housing units for houses below RM300,000. The remaining 56% of new housing launches are houses above RM 300,000 where 31% new launches for houses between RM300,000 to RM500,000, 22% new houses with prices between RM 500,000 to RM 1Million and 3% for houses above RM 1 million. From another perspective, it is found that the unsold properties in the year 2022 indicates the house prices of RM 500,000 to RM 1M has the highest proportion, that is 32%. Thus, the findings indicate that imbalance in the incoming supply of properties and demands from prospective homeowners.

The house prices can be affected by many factors, thus determining the factors that affect the residential house price in Malaysia is crucial. Several studies

in the past have highlighted about inflation, (Haibin; 2004, Hussain and Malik; 2011, and Maguire et al.; 2013) suggested that building expenses impact house prices based on inflation, as rising costs of materials and construction lead to higher selling prices. Several research by Trofimov (2018), Kok(2018), Kamal et al. (2016), Guo and Wu (2013), and Tan (2010) that a drop in interest rates could resultin less expensive cost for home financing. Other than that, Duja and Supriyanto (2019), Bjrnland and Jacobsen (2010) suggesting that exchange rate, currency appreciation promotes house price rise Nonethless, Razali and Tan (2016), Trofimov et al. reported mixed evidence on GDP and residential property values in the market.

The purpose of the study is to determine the factors that affecting the residential property pricesin Malaysia. In particular, by following Kabine (2023), the study adopts the Auto Regressive Distributed Lag (ARDL) model to empirically analyse the short—run dynamics and long-term linkages between each factor that affect the house price in the Malaysian market. We use quarterly data from Q1 1994 to Q4 2022. Taken together, our study seeks to answer the following research questions:

- Are there any long-term linkages between each of the macroeconomic factors that affect residential property prices in Malaysian market?
- What are the factors that affect residential property prices in Malaysia in the long run?
- Does the past affect the current trends in house price and each of the macroeconomic factors?

The paper is organized as follows. In section 2, we review the related literature on factors that affect residential property prices. The data description and methodology used will be discussed in section 3. Section 4 presents the results and accompanying elaboration. Section 5 concludes.

RELATED LITERATURE

The cost-push inflation component was the reason behind the significant correlation between housing price and inflation shown in the studies by Hussain and Malik (2011) and Maguire et al. (2013). Construction-related factors such labour costs, cement prices, and the cost of machinery and equipmentraised the cost, which in turn impacted the price of residential properties. This finding was corroborated by Kamal et al. (2016), who observed that a major factor that could raise home prices is the rate of inflation. Therefore, a profit-driven developer would raise a home's selling price to offset the rise in building expenses. This implies that as inflation rises, house prices typically do as well.

In other context, Kok et al. (2018) contends that while the monetary policy is implemented to stabilise the macroeconomic environment, the quick increase in money supply has resulted in asset price inflation. The increase in money supply leads to an increase in demand for assets, which in turn stimulated economicgrowth.

Nonetheless, the inability of monetary policy to stabilise price levels will lead to an increase in asset prices.

Owning a home is heavily reliant on the financial system, particularly the interest rate. Low borrowing rates encourage the expansion of the housing market through mortgages. Agnello and Schuknecht (2011) suggested that low interest rates encourage the growth of credit and raise home prices. The low-interest rate environment not only causes houses to be as consumption assets, but rather as an investment tools. The early report in the past by Weeken (2004) and Ayuso and Restoy (2006), in the way that real interest rate and rental rate in England and Wales drive upthe price of property. The increase in demand for houses leads to increase in their prices in the market, consistent with the evidence of long-run relation between interest rate and house price (Ibrahim & Law, 2014).

Exchange rate also plays a key factor that affects residential property price in a country. When a currency of a country depreciates, it attracts prospective home buyers from foreign countries (Asal, 2018). Notwithstanding rapid purchases from foreigners indirectly contributes to appreciation of the local currency relative to foreign exchange rate . Hence, there is a positive linkage between exchange rate and property price (Duja and Supriyanto, 2019). The evidence can be seen from China, where Bjørnland and Jacobsen (2010) shows a positive association between house price increase and the real effective exchange rate as well as in Nairobi housing market (Njoroge, 2018). In addition to that, rapid expansion of credit across countries give rise to exchange rate which directly impact the housing market (Liu & Zhang, 2013). These reports highlight the importance of exchange rate in residential property marker, consistent with open economies in the rapid phase of globalisation.

Gross Domestic Product (GDP) GDP is a measure used to gauge economic growth, which play a significant factor to residential property market. But there is a mixed evidence on how GDP affects house prices. In one hand, increase in GDP reflects increase in job creation which necessitates the demand for housing. This positive outlook on GDP ascertains the increase in level of income of a nations. Thus, GDP positively contribute to increase in house prices in the market (Razali and Tan, 2016; Ong, 2013). However, GDP may negatively contribute to trends in house prices. The situation can occur pertaining to oversupply of properties, in view of the increase in GDP (Trofimov, 2018). Of particular relevance of this situation is the increase in GDP does not be translated to increase in income of households, with demand does not match supply of houses in the market (Trofimov, Aris and Xuan, 2018).

METHODOLOGY

Data

The study uses quarterly data from 1994 to 2022. The data on macroeconomic variables in the study include the interest rate, exchange rate, and GDP. The consumer price index is used as the proxy for inflation. This data are collected from Datastream. The data on house prices index has been sourced from Department of Statistics Malaysia. In toral, there 116 data points commenced from the first quarter of 1994 to the fourth quarter of 2022.

Model Specification

The relation between house price index and the macroeconomic model is analysed in the time-series regaression model. The house price index acts as the dependent variable and all macroeconomic variables are independent variables. The time series regression model for this study can be written mathematically as :

$$\text{LNH}PI_t = \beta0 + \beta1\text{LNCPI}_t + \beta_2\text{INTR}_t + \beta_3EXCR_t + \beta_4\text{GDP}_t + \mu_t \tag{1}$$

Where,

$\text{LNH}PI_t$	: Natural logarithm of house price index (HPI) at time t
LNCPI_t	: Natural logarithm of consumer price index (CPI) at time t
INTR_t	: Interest rate (INTR) at time t
$EXCR_t$	: Exchange rate (EXCR) at time t
GDP_t	: Gross domestic product (GDP) at time t
β_0	: A constant term
$\beta_{0,}\beta_1, \beta_2, \beta_3, \beta_4$	: Coefficients of variables LNCPI_t, INTR_t, EXCR_t, GDP_t,
μ_t	: Error term

The Autoregressive Distributed Lag Model (ARDL) will be used as the framework to estimate the above regression model. The above equation can be re expressed in ARDL form written as follows,

$$\tag{2}$$

$$\Delta LNHPI = \beta_0 + \beta_1 LNCPI_{t-1} + \beta_2 INTR_{t-1} + \beta_3 EXCR_{t-1} + \beta_4 GDP_{t-1} + \\ \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q}\alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \\ \sum_{t=1}^{q}\alpha_1 GDP_{t-i}$$

Where the α represent short run coefficients and β_n represent the long run coefficients.

From equation (2), The ARDL bound test will be conducted. The bound test serves as an indicator whether there exists the long-term relation between residential property prices with each of explanatory (independent) variable. In addition to that, the short-run mechanism that may exist between the variables, within the long-run relations. Thus, we can rewrite the equation (2) in error-correction model (ECM); with θ is the error-correction term:

$$\Delta LNHPI = \beta_0 + \sum_{t=1}^{q} \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q} \alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \qquad (3)$$
$$\sum_{t=1}^{q} \alpha_1 GDP_{t-i} + \theta ECM_{t-1} + \mu_t$$

Where the regression terms in the ECM representation can be expanded into:

$$\Delta LNHPI = \beta_0 + \sum_{t=1}^{q} \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q} \alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \qquad (4)$$
$$\sum_{t=1}^{q} \alpha_1 GDP_{t-i} + \beta_1 LNCPI_{t-1} + \beta_2 INTR_{t-1} + \beta_3 EXCR_{t-1} +$$
$$\beta_4 GDP_{t-1}$$

RESULTS AND DISCUSSIONS

Descriptive Statistics

Table 1 displays the descriptive statistics for the variables used in this study. The natural log of house price index have mean values of 0.6456, 4.5780, and 8.9232, respectively. Likewise, the GDP, interest rate, and exchange rate have respective mean values of 4.9221, 3.8026, and 3.5962. The data for housing price index ranges from 7.8527 to 9.6962, with a median of 9.0812. LNHPI and EXCR, are skewed to the left, whilst LNCPI and INTR skewed to the right.

Table 1: Descriptive statistics

	LNHPI	LNCPI	INTR	EXCR	GDP
Mean	8.9232	4.5780	3.8026	3.5962	4.9221
Median	9.0812	4.5737	3.3000	3.8000	5.4700
Maximum	9.6962	4.8750	11.1500	4.6410	10.0000
Minimum	7.8527	4.4011	1.9400	2.4395	-7.3600
Std.Dev.	0.4149	0.1119	1.7172	0.5428	3.9367
Skewness	-0.4230	0.7796	2.0754	-0.5460	-1.6413
Kurtosis	2.2145	3.3812	7.5406	2.5571	5.6836

Unit Root Test

As a prerequisite, unit root test is used to examine whether each variable is non-stationary. There are two unit root tests be adopted, that are Augmented Dickey Fuller (ADF) test and Philips Perron (PP) test. The test hypothesises that a variable data series is non-stationary and exhibits a unit root. It is found that, based on the two tests, the hypothesis is rejected for the case of DGP at levels. It implies the variable is stationary. Nonetheless, the other variables, HPI, CPI, INTR, EXCR, and POPG are stationary at the first difference. The findings on the unit root test on GDP suggested the variable is integrated at I(0) and the other variables are I(1). The different order of integration amongst variables suggested the applicability of the ARDL, as the framework to estimate the short- and long-run relation between the variables.

Table 2: Results of unit root test

Variables	ADF test		PP test		Stationary status
	Level	First differences	Level	First differences	
LNHPI	0.2948	0.0000	0.3726	0.0000	I (1)
LNCPI	0.2735	0.0000	0.5581	0.0000	I (1)
INTR	0.1461	0.0000	0.1902	0.0000	I (1)
EXCR	0.4221	0.0000	0.3856	0.0000	I (1)
GDP	0.0175	0.0000	0.0069	0.0000	I (0)

Bounds Cointegration Test and ARDL Long-run Coefficent

Prior to Auto Regressive Distributed Lag (ARDL) empirical estimation, the lag length test is performed. There are 5 lag length tests used, that are the sequential modified LR test statistic (LR), the final prediction error (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SC), and the Hannan-Quinn information criterion (HQ) to determine the optimal number of lags for the ARDL modelling. Each type of test choose sthe lag structure that minimises information criteria, that makes a trade-off between goodness of fit and model complexity. From table 2, lag 1 based on SC Based on HQ, lag 2 is recommended. However, lag 4 is suggested based on LR, FPE, and AIC. Therefore, lag 4 is used for the modelling of the ARDL estimation.

Table 3: Lag length test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-347.01	NA	2.20e-05	6.30	6.44	6.36
1	364.21	1333.54	1.28e-10	-5.75	-4.73*	-5.34
2	445.79	144.22	5.70e-11	-6.57	-4.67	-5.80*

3	482.76	61.40	5.67e-11	-6.59	-3.82	-5.46
4	529.70	72.92*	4.79e-11*	-6.78*	-3.14	-5.30

From there onwards, the bound test is conducted. Based on table 4, the reported F-statistic is higher than the critical values from the various significant levels from 1% to 10%. The findings are consistent across different levels of integration either I(0) or I(1). Given this situation, the bound test suggested the null hypothesis of no cointegration between variables is rejected. Thus, there is a long run cointegration relation between house price, GDP, inflation, interest rates, and exchange rates.

Table 4: F-Bound test

F-Bound Test			Null Hypothesis: No levels relationship	
Test statistic	Value	Signif.	I (0)	I(1)
F-statistic	6.9267	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Accordingly, the long-run relation between variables can be established with the house price as the dependent variable. The equation of the long run relation can be written as follows :

$$\Delta LNHPI = \beta_0 + 6.9669 LNCPI_{t-1} + 0.0305\beta_2 INTR_{t-1} + 0.7356\beta_3 EXCR_{t-1} - 0.0026 GDP_{t-1}$$

From Table 5, the coefficient of CPI, INTR, and EXCR are positives, but only the CPI and exchange rate coefficient is statically significant. While the coefficients of gross domestic product is negative and statistically insignificant.

The established long run relation between house prices and each of the macroeconomic variable can be interpreted economically as follows for 1% increase in the CPI, house prices should rise by 6.9669%. According to the interest rate results, a one unit change in INTR is predicted to result in a 0.0305% increase in house prices. The projected increase in the house price is 0.7356% for a one unit change in the exchange rate. The house price index is predicted to change by 0.26% for every unit change in GDP.

According to this study, there is a positive relation between changes in the consumer price index and changes in the prices of residential properties. This is consistent with past reports that the inflation of consumer goods positively contributes to the inflation of residential property prices (Pour et al., 2013). Meanwhile, housing is also a component of the CPI. Thus, there is a two-way relationship between housing prices and the CPI (Liu & Shen, 2005). The positive linkages reflect the effect of inflation, whereby the inflation in the house prices is related to rising cost of raw materials (Mansur et al,2016). The argument is consistent

with the common practice amongst property developers, where they will account for an additional 30% of each cost incurred in raw material as their profits (Razak et al.,2018).

This study found that the interest rate has an insignificant but positive effect on the house price index in Malaysia. The lack of importance of interest rates is in line with the findings of Geok & Lean (2017), who concluded that interest rates do not have the greatest impact on Malaysian housing prices and that raising interest rates would not be sufficient to stop the country's rising property prices. Notwithstanding, only families who wish to enter the property market are likely to be influenced by interestrates; households that currently own homes not likely to be affected (Riddle, 2004). The findings shed light on the availability of various mortgage scheme in Malaysia, where government servant can obtain home financing through Lembaga Pinjaman Perumahan Sektor Awam (LPPSA) home financing scheme. Whilst there is also other mortgage scheme that offered by conventional and Islamic banks; as well as financing scheme like Housing Credit Guarantee Scheme (HCGS) offered by government with financing up to RM 500,000 (SJKP,2023). The various mortgageschemes available reflect the abundance of credit available and that interest rate may not give impact toresidential property prices.

In this study, there is a significant and positive relation between exchange rate and shifts in the prices of residential properties. This result is in line with data presented by Asal (2018), who claimed that the exchange rate has a significant role in determining housing costs. The increase in the exchange rate indicates the local currency appreciates relative to the foreign currencies. Thus, the cost to buy a home by foreigners will increase as the local currency increase. After all, the increase in house prices does reflect the increase in demand for residential properties amongst prospective home owners from foreign countries. Consequently, there is a strong relationship between home prices and exchange rates.

Notwithstanding, there is a long-term negative relation between GDP and residential propertyvalues. According to Pour et al. (2013), one of the possibility of this circumstance occur due to persistent economic growth which overstimulate the building of homes. This action leads to an excess supply of homes which contributes to a decline in property prices. As reported by Bujang (2010), there was a significant property overhang in PeninsularMalaysia in 2005, with a total of 755,000 unsold units. In similar manner, Bank Negara Malaysia reports the excess supply of high-end residential properties (Ling et al., 2017). The situation indicates lower- and middle-class households are affected with insufficient supply of affordable housing within their income. Thus, this argument supported the earlier evidence of unmatched demand and supply of properties.

Table 5: ARDL Long-run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	P-value
LNCPI	6.9669	1.4171	-4.9164	0.0000***
INTR	0.0305	0.0348	-0.8750	0.3838

EXCR	0.7356	0.1783	-4.1255	0.0001***
GDP	-0.0026	0.0119	0.2209	0.8256

Note: *, **, *** refers to the significant level at 10%, 5%, and 1%.

Table 6 presents the short-run coefficients of each variable. The significance of short-run coefficients in the LNHPI suggested the previous quarter one Q1 and quarter 3 Q3 of house price able to predict the current property price in the market. The lagged interest rate from the previous quarters are significantly predict the interest rate. Meanwhile, the past exchange rate able to predict the prevailing exchange rate in the market.

In addition, the ARDL model estimation accounts for error correction, which incorporates the short term deviations into the long-term equilibrium (Nkoro & Uko, 2017). Accordingly, the findings of this study indicates the statistically significant and negative coefficients of the EC term. The negative value of the EC term implies that the deviation of each variable from the long-run equilibrium in a period, will be adjusted by 24.77%.

Table 6: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	P-value
D (LNHPI (-1))	-0.1609	0.0827	-1.9465	0.0546*
D (LNHPI (-2))	0.1113	0.0781	1.4258	0.1573
D (LNHPI (-3))	-0.1496	0.0779	-1.9197	0.0580*
D (INTR)	-0.0274	0.0184	-1.4869	0.1405
D (INTR (-1))	0.0596	0.0178	3.3461	0.0012***
D (INTR (-2))	0.0399	0.0165	2.4209	0.0174**
D (INTR (-3))	0.0441	0.0172	2.5657	0.0119**
D (EXCR)	-0.0458	0.0536	-0.8534	0.3956
D (EXCR (-1))	0.0449	0.0536	0.8362	0.4052
D (EXCR (-2))	-0.1634	0.0561	-2.9125	0.0045***
D (EXCR (-3))	-0.2430	0.0610	-3.9824	0.0001***
CointEq (-1) *	-0.2477	0.0363	-6.8310	0.0000***

Note: *, **, *** refers to the significant level at 10%, 5%, and 1%.

CONCLUSION

This study examines the long-run relation and short-term dynamics between house price and macroeconomic factors that include interest rate, inflation, GDP and exchange rate in an ARDL framework. By using quarterly observation from the first quarter Q1 1994 to fourth quarter Q4 2022, the study reported the significance of long-run relation between house price and macroeconomic variables. Accordingly, inflation and exchange rates significantly contribute to the increase in residential property prices. It is conjectured that increase in raw materials translated to higher cost of building, where the price has been transferred to prospective homeowners. The appreciation of our home currency in relative to foreign currency may

suggested properties in our country are less appealing to foreigners. After all, the stability of our currency must precede over the agenda of homeownership by foreigners. The insignificance of interest rate suggests to the government that their intervention in the property market through various financing initiative was not helpful to control property price. But rather, the government needs to mull incentive to promote construction of affordable housing as to control overbuilding of high-end houses in the market. This initiative may provide a better reflection of our GDP since people from various income group background are able to own property.

REFERENCES

Agnello, L. and Schuknecht, L. (2011), "Booms and busts in housing markets: determinants and implications", Journal of Housing Economics, Vol. 20 No. 3, pp. 171-190.

Asal, M. (2018). Long-Run Drivers and Short-Term Dynamics of Swedish Real House Prices. International Journal of Housing Markets and Analysis, 11, 45-72.

Ayuso, J. and Restoy, F. (2006), "House prices and rents: an equilibrium asset pricing approach", Journalof Empirical Finance, Vol. 13 No. 3, pp. 371-388.

Bjørnland, H. C., & Jacobsen, D. H. (2010). The role of house prices in the monetary policy transmission mechanism in small open economies. *Journal of Financial Stability*, *6*(4), 218– 229.

BNM Annual Report 2020. (2020). Retrieved from Bnm.gov.my website:

Bujang, A. (2010). The Relationship Between Demographic Factors and Housing Affordability. Malaysian Journal of Real Estate, 5, 49-58.

Damianov, D. S., & Escobari, D. (2021). Getting on and moving up the property ladder: Real hedging in the US housing market before and after the crisis. Real Estate Economics, 49(4), 1201-1237.

Dietz, R. D., & Haurin, D. R. (2003). The social and private micro-level consequences of homeownership. *Journal of Urban Economics*, *54*(3), 401–450.

Duja, B. and Supriyanto, H. (2019), "The influence of GDP, interest rate, wage, inflation and exchange rate on residential property price in Indonesia", Planning Malaysia, Vol. 17.

Eight Malaysian Plan, 2001 – 2005, Government Printer, Kuala Lumpur.

Guo, M. & Wu, Q. (2013). The empirical analysis of affecting factors of Shanghai housing prices.
International Journal of Business and Social Science, 4(14), 218-223.

Haibin, Z. (2004). What Drives Housing Price Dynamics: Cross-Country Evidence. BIS Quarterly Review.

Hussain, S. and Malik, S. (2011), "Inflation and economic growth: evidence from Pakistan", International Journal of Economics and Finance, Vol. 3 No. 5, pp. 262-276.

Ibrahim, M., & Law, S. (2014). House Price and Bank Credit in Malaysia: An Aggreate and Disaggregate Analysis. Habitat International, 42, 111-120.

Kabine, C. (2022). Determinants of house prices in Malaysia. *International Journal of Housing Markets and Analysis*. https://doi.org/10.1108/ijhma-09-2021-0105

Kamal, E., Hassan, H., & Osmandi, A. (2016). Factors Influencing The Housing Price: Developers' perspective. International Journal of Humanities and Social Science, 10(5), 1676-1682.

Kerajaan Malaysia (2023). Ringkasan eksekutif kajian separuh penggal: Rancangan Malaysia kedua belas. Percetakan Nasional Malaysia Berhad.

Khazanah Research Institute. (2015). Making housing affordable. Kuala Lumpur: Khazanah Research Institute.

Kok, S. (2018). The Sources of House Price Changes in Malaysia. International Journal of Housing Market and Analysis, 11(2), 335-355.

Kok, S.H., Ismail, N.W. and Lee, C. (2018), "The sources of house price changes in Malaysia", International Journal of Housing Markets and Analysis, Vol. 11 No. 2, pp. 335-355, doi: 10.1108/ ijhma-04-2017-0039.

Liu, H. & Shen, Y. (2005). Housing prices and general economic conditions: an analysis of Chinese new dwelling market. Tsinghua Science and Technology, 10(3), 334-343.

Liu, Y. and Zhang, S. (2013), "Econometric analysis on the relationship between RMB exchange rate and real estate price by VAR Model", International Conference on Science and Social Research, Atlantis Press, pp. 428-430.

Maguire, J., Burch, J., Merrigan, T. and Ong, S. (2013), Energy Savings and Breakeven Cost for Residential Heat Pump Water Heaters in the United States (No. NREL/TP-5500-58594), National Renewable Energy Lab (NREL), Golden, CO.

Mansur S. A., Abdul Hamid A. R., & Yusof N. A. (2016). Rising trend in construction cost and housing price. Journal of Advanced Research in Business and

Management Studies ISSN (online): 2462-1935 | Vol. 3, No. 1. Pages 94-104, 2016.

NAPIC. (2022). Property Market Q3 2022 Snapshots. National Property Information Centre.

National Property Information Centre/NAPIC. (2014). Annual property market report 2014. http://napic.jpph.gov.my/portal/web/guest/publication.

Njoroge, P.K., Aduda, J.A. and Mugo, C. (2018), "Investigating the existence of a bubble in the Kenyanreal estate market", International Journal of Data Science and Analysis, Vol. 4 No. 5, p. 89.

Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric methods*, *5*(4), 63-91.

Ong, T. S. (2013). Factors Affecting the Price of Housing in Malaysia. Journal of Emerging Issues in Economics, Finance and Banking., Vol. 1, No.5, pp 414 - 429.

Pour, M.S., Khani, P.N., Zamanian, G. and Barghandan, K. (2013), "Specifying the effective determinants of house price volatilities in Iran", Economic Review: Journal of Economics andBusiness, Vol. 11 No. 2, pp. 15-20.

Razak, M. Z., Khalid, H., & Mohamad, A. (2018). Speculative Behavior in Vacant Land Development:Evidence for Real Options in Malaysia. *The Developing Economies*, *56*(4), 245–266. https://doi.org/10.1111/deve.12184.

Razali, M., & Tan, A. (2016). The Dynamic House Price Volatility In Malaysia. Journal of Technology,Management and Business, 3(2), 14-35.

Sinai, T., & Souleles, N. S. (2005). Owner-occupied housing as a hedge against rent risk. Quarterly Journal of Economics, 120(2), 763–789.

Syarikat Jaminan Kredit Perumahan Berhad (SJKP). (2023). Retrieved January 6, 2024, from Syarikat Jaminan Kredit Perumahan Berhad website: https://www.sjkp.com.my/en/about-us/about-sjkp
Trofimov, I. (2018). Macroeconomic and Demographic Determinants of Residential Property Prices in
Malaysia. Munich Personal RePEc Archive, 1-24.

Trofimov, I. D., Aris, N. Md., & Xuan, D. C. D. (2018). Macroeconomic and Demographic Determinants of Residential Property Prices in Malaysia. Zagreb International Review of Economics and Business, 21(2), 71–96. https://doi.org/10.2478/zireb-2018-0015

Weeken, O. (2004), Asset Pricing and the Housing Market, Bank of England Quarterly Bulletin.

Zainon, N., Rahim, F.A.M., Samad, D. and Lou, E. (2017), "Malaysian affordability housing policies revisited", Open House International, Vol. 42 No. 1, pp. 44-51.

Zulkarnain, S. H., & Nawi, A. S. (2023). The relationship between macroeconomic variables on residential property price: case study in Malaysia before and during COVID-19. *International Journal of Housing Markets and Analysis.* https://doi.org/10.1108/ijhma-01-2022-0013.

RETHINKING ZAKAT INSTITUTIONS' SUPPORT: A CASE STUDY IN TERENGGANU, MALAYSIA

Hashim Ahmad Shiyuti [i], Fakhrul Anwar Zainol [ii], Alifah Hj Hamid [iii], Nur Amlya binti Abd Majid [iv] & Aida Zairina Ishak [v]

[i] (*Corresponding author*). Lecturer, Universiti Sains Islam Malaysia. hashim@usim.edu.my
[ii] Lecturer, Universiti Sultan Zainal Abidin. fakhrulanwar@unisza.edu.my
[iii] Lecturer, Universiti Sains Islam Malaysia. alifah@usim.edu.my
[iv] Lecturer, Universiti Sains Islam Malaysia. amlya@usim.edu.my
[v] Graduate Research Assistant, Universiti Sultan Zainal Abidin. Sl3909@putra.unisza.edu.my

Abstract

As a means to empower productive asnaf in earning money, several zakat institutions have implemented asnaf entrepreneurship initiatives. A range of entrepreneurial support approaches, including training, coaching, mentorship, funding, and product distribution, have been implemented. Nevertheless, the efficacy of these programs is subjective, as the success rates among asnaf suffer considerable variation. The objective of this study is to investigate the efficacy of various forms of entrepreneurship support that are seen by asnaf entrepreneurs as advantageous for their business performance. The results demonstrate that non-monetary support, such as the provision of goods and other resources, is especially successful in facilitating the expansion of market penetration for asnaf entrepreneurs. Moreover, these types of assistance bolster entrepreneurial abilities, drive, and practical business acumen through interactive activities. This study utilized a qualitative methodology, which included conducting interviews with accomplished asnaf entrepreneurs who have been beneficiaries of zakat organizations in Malaysia. In order to effectively assist asnaf entrepreneurs, this study proposes that zakat institutions and scholars should investigate alternate approaches to support, such as practical business tools and non-monetary aid, beyond traditional training and finance.

Keywords: *Asnaf, asnaf entrepreneur, products, zakat and zakat assistance and SMEs, poor and needy.*

INTRODUCTION

'Skim Bantuan Ekonomi' is an economic development initiative carried out by zakat institutions governed by MAIWP (Majlis Agama Islam Wilayah Persekutuan). According to Abdul Ghafar, Zakaria, Yusoff, Kamaludin, and Abdul Ghani (2017), this initiative include the provision of financial aid, consulting services, and business support to qualified asnafs.

Abdul Hamid (2013) said that the conversion success rate for all asnaf businesses varied between 30% and 60%, which indicates that 3 to 6 out of 10 individuals who previously held asnaf status successfully converted. The significance of this figure resides in the capacity of an individual entrepreneur to create a cascade of advantages. Key benefits encompass employment potential, growth prospects, economic development, and community support. The local multiplier effect is the

beneficial influence on the local economy resulting from the interdependence of expenditure processes (Karlsson, Gråsjö, & Wixe, 2015). It is not sufficient to only assess the conversion rate from asnaf to muzakkis to evaluate the effectiveness of this effort; it also includes other indirect impacts on the economy (Yusoff et al., 2019). The research undertaken by Kayed N & Hassan M (2011) clearly demonstrates that the true influence of entrepreneurship on the future economy is contingent upon the proficiency of the entrepreneurs (Tomczyk, Lee, & Winslow, 2013), the long-term viability of the firm, and the conducive environment (Wan Mohd Nazdrol Wan Mohd Nasir, 2013).

An experienced entrepreneur is distinguished by a heightened level of motivation to accomplish their goals, proficient planning abilities, enthusiasm, effective goal management, adaptability to challenges, and a greater degree of confidence and endurance (Abdul Halim, Said, & Syed Yusuf, 2012). These aforementioned elements are crucial for the attainment of success in the business, especially for asnaf entrepreneurs (Bin Yusoff et al., 2018).

The aim of this study is to examine the different types of entrepreneurial development support provided by zakat organizations to asnaf entrepreneurs. The present study investigates the effectiveness of support interventions in enhancing entrepreneurial skills, mentality, and experience. Therefore, this framework can provide zakat institutions with a means to thoroughly investigate the different types of non-monetary entrepreneurial assistance that have dual advantages: creating company prospects and promoting business sustainability.

LITERATURE REVIEW

In their study, Shiyuti and Al-Habshi (2019) highlighted the implementation of two types of entrepreneurial support for asnaf entrepreneurs by Lembaga Zakat Selangor, a zakat institution in Malaysia: financial resources and non-monetary contributions. Furthermore, LZS actively participates in partnerships with many agencies to provide additional entrepreneurial assistance (Yusoff et al., 2021), such as comprehensive training, promotion, and other associated services.

In contrast, Ibrahim, D., & RuziahGhazali (2014) categorized the beneficiaries of zakat into three specific groups: (1) individuals who are incapable of doing anything other than to support their own lives, (2) individuals who need one-time assistance to overcome their difficult circumstances, and (3) individuals who are currently facing challenges but have the ability to enhance, develop, and advance from the asnaf status (Ibrahim, D., & RuziahGhazali, 2014). The selection process for prospective participants in this asnaf entrepreneurship program is based on the second and third categories. However, Abdul Halim, Said, & Syed Yusuf (2012) suggested that the third group is the most appropriate choice for this programme.

However, Rahman & Ahmad (2011) expressed skepticism over the practicality of this program in attaining success. A program failure has the potential to endanger the monies designated for zakat. Hence, strategic selection of the productive asnaf, together with suitable support, can reduce the probability of failure (Azman A. R,

Mohamad Yazis Ali Basah, Mohammad Nooriz-zuddin Nooh, Mahdir Abdullah, 2016).

In the context of entrepreneurship, Banerjee & Duflo (2011) and Largoza (2016) observed that individuals have a tendency to overestimate their ability to generate profits, which ultimately results in the collapse of their enterprises. Furthermore, Largoza (2016) argued that entrepreneurship is shaped not only by physiological characteristics (Yusoff et al., 2021) but also by the cognitive and logical capacities of the mind. Entrepreneurial success is assessed based on the qualitative and quantitative results, referred to as company accomplishments.

Moreover, Muhamat et al. (2013) highlighted that the asnaf entrepreneur is a distinct cohort of persons with intrinsic impairments who do not possess essential competencies to pursue entrepreneurship. The factors contributing to his failure to obtain loans include inadequate competence, restricted business background, and lack of a professional image (Ismail et al., 2019). However, this is not the definitive conclusion, since there have been many cases of asnaf entrepreneurs who have attained success in their business and thereafter become contributors to zakat income.

METHODOLOGY

The present study employed a qualitative methodology, as recommended by Creswell (2014), which is considered appropriate for investigating and analyzing concepts and themes pertaining to social science subjects. The paradigm of qualitative research will evolve simultaneously with the exploration and inquiry process that directly involves the actual subject in real-time during the investigation. Put simply, the researcher directly addressed the experimental sample of the study. In contrast to conventional quantitative research, this study does not require the development of a hypothesis before the research processes.

In order to gain a more comprehensive understanding of the non-cash entrepreneurship support provided by the zakat institution in Wilayah Persekutuan to an asnaf entrepreneur whose products have achieved international market success in the United Kingdom, France, Brunei, Singapore, and a few other countries, this research employs a single case study approach (Gustafsson, 2017). Therefore, a deliberate approach is being employed in the selection of the informant.

The data gathering method employed in this study was the structured interview. The interview was carried out in person. Upon collecting the data, the researcher transcribed the interview and then sent it back to the informant for verification and validation. This forwarding approach shall be implemented as a means of triangulating the process, namely by gathering data from several sources for the same phenomena (Jick, 1998).

After the compilation of the data, it underwent analysis using two distinct approaches: (1) case study analysis and (2) theme analysis.

The in-depth interview session aims to achieve three primary objectives. The first segment of the interview session was to delineate the obstacles faced by asnaf entrepreneurs in Wilayah Persekutuan. Next, the identification of the alternative

entrepreneurship support obtained by the informant was followed by an analysis of the key factors that contributed to the success of the firm.

DATA ANALYSIS
Informant profile
Born in 1967, Mr. Z is a male entrepreneur of Asnaf descent. His most advanced level of schooling is a Technical Certificate obtained from Institut Kemahiran Malaysia. Beginning his professional journey as a technical instructor at GIAT MARA, he dedicated 16 years to the cushion area. Presently, this particular area has been transferred to the sewing section. With his resignation from GIAT MARA in 2006, Mr. Z embarked on his entrepreneurial career. Initially, he served as an operational partner to establish and manage a private training institute which offered technical certification under Majlis Latihan Vokasional Kebangsaan (MLVK). This enterprise was conducted at Raub, Pahang, on a 6-acre plot of land. In order to educate 250 pupils from Lim Kok Wing, Perbadanan Tabung Kemahiran (PTK) proposed and approved the scheme. The objective of this initiative was to provide technical skills training to unemployed graduate students. The curriculum comprised a 2-year duration, with 6 months allocated for level 1, 6 months for level 2, and 1 year for level 3. Nevertheless, this enterprise experienced ultimate failure after a span of four years as a result of misinterpretation among the investing partners. Following his departure from Raub, Mr. Z returned to Terengganu.

At Terengganu, Mr. Z and his wife became partners in his sister's firm to manage a furniture workshop, earning daily salaries of RM100 and RM50, respectively. In 2016, Mr. Z and his wife made the firm decision to establish their own workshop with an initial investment of RM4000. In that same year, he obtained assistance from MAIDAM over the acquisition of industrial sewing machines. Before embarking on this entrepreneurial endeavor (from 2010 to 2016), Mr. Z and his family were beneficiaries of monthly food aid from MAIDAM, specifically under the Muallaf category. His wife, who is of Chinese descent, converted to Islam.

Originally equipped with a single industrial sewing machine, Mr. Z now possesses four sewing machines, one of which is supplied by MAIDAM. Mr. Z has broadened his range of services to include custom cushioning for boats and ships. At his disposal, Mr. Z possesses seven boats/ships that are now undergoing construction. Furthermore, the workshop is functioning according to its regular operations.

The Challenges
Issues Mr. Z demonstrated that a little amount of capital does not hinder the possibility of success for an entrepreneur. He posits that the paramount capital for an entrepreneur to achieve success is willingness and excitement. Otherwise, the business will go out of existence. Mr. Z emphasized the difficulties faced by asnaf firms engaged in the sale of supplied business equipment, tools, or machinery. At the

time of application, the entrepreneur may possess complete dedication to managing the organization. Nevertheless, due to the extended duration of the process, several events will occur that could potentially alter the position. The entrepreneur thus loses enthusiasm for managing the business. Therefore, instead of allowing the equipment, tools, or machines to run idle, he/she opts to transform them into cash by selling them. Stated differently, this problem presents two obstacles: (1) a dearth of enthusiasm in the business sector and (2) the duration of the help application process.

Instances also existed where the circumstances faced by businesses were a direct consequence of the actions of others. An entrepreneur has the authority to grant permission for others to use their name for the purpose of owning and managing the firm. He/she may or may not derive any advantage from the firm, but in the event of any mishap, the owner of the name assumes entirely responsibility. Mr. Z cited several instances in which the owner of the name was subjected to blacklisting as a result of this criteria. Although he appears to be unsuitable for the aid based on his physical appearance and qualifications, the circumstances have caused him financial hardship and psychological strain. Any support that fails to recognize the underlying source of the problem may not effectively address the actual problem.

Moreover, Mr. Z emphasised the difficulty of operating a thriving enterprise in Terengganu. Given the restricted client base, entrepreneurs frequently engage in more intense competition based on pricing. Entrepreneurs often demonstrate a willingness to lower the price to the breakeven point, provided they are able to ultimately finalize the transactions. Consequently, these entrepreneurs endangered the quality of their products by opting for more affordable raw materials. One of the most challenging situations arises when inferior raw materials are acquired at an elevated cost as a result of the credit conditions offered by the supplier. Business owners often fail to recognize the concealed expenses, which can significantly reduce the breakeven point to a point of financial loss. When customers of this nature approach Mr. Z, they express dissatisfaction with the pricing, as Mr. Z provides high-end items, sourced from premium raw materials.

Mr. Z noted that all entrepreneurs concentrate on a solitary endeavor. Absence of activity results in the entrepreneur being idle and taking no action. The aforementioned circumstance results in entrepreneurs engaging in competition for clients. Mr. Z, drawing from his expertise, opts to manufacture furniture items that are readily available for sale in public markets. This implies that there is no unused time available for an entrepreneur.

Mr. Z underscored that challenges, trials, and adversities serve as reservoirs of fortitude for him to reach this point. He is of the opinion that adopting a positive mindset has altered his outlook on the various challenges that have consigned him to poverty. Mr. Z thinks that adequate entrepreneurial intention is a prerequisite for an entrepreneur to achieve success. Through the possession of this purpose, one can avoid any feelings of regret or loss of hope, so enabling them to persist in their endeavors in both life and business.

According to Mr. Z, entrepreneurship also presents a notable health related obstacle. It is crucial for entrepreneurs to prioritize their health, as the sustainability of the business relies on the well-being of the owner. This is particularly crucial for asnaf entrepreneurs, as the successful functioning of the business may depend on the entrepreneur's good health.

Alternative Entrepreneurship Support

Support for Alternative Entrepreneurship According to Mr. Z, the business ecology is of utmost importance. He suggested establishing a workshop facility to manufacture sofa and cushion-based products, employing members of the asnaf community. This facility plays a crucial role in providing training and enhancing the technical abilities of asnaf with the aim of improving their capacity and increasing their income. In his opinion, this method has the potential to assist productive asnaf who face entrepreneurial constraints, such as those who possess the ability to work but lack technical expertise or commercial acumen. Mr. Z volunteered himself and recommended any 'graduated asnaf' possessing appropriate technical skills to serve as mentors and trainers for this programme.

Furthermore, Mr. Z emphasized the crucial role of oversight and monitoring in ensuring the viability of this ecosystem. The monitoring should extend beyond the degree of completion of the program and should persist until the participants attain maturity and are capable of independent operation. According to him, their experience in GIAT MARA revealed that participants achieved success in establishing enterprises using funds contributed by their parents. Nevertheless, these enterprises were short-lived due to the absent entrepreneurial drive and abilities among the participants. Therefore, he proposed that this ecosystem has the potential to thrive if executed with appropriate participant selection and consistent monitoring and oversight.

Mr. Z emphasised the advantages of establishing a centralised production facility. According to him, thorough cooperation among asnaf enterprises, together with proper supervision, has the potential to provide high-quality and more affordable items. The concept is very similar to that of a factory, where large-scale procurement of raw materials, specialization in production operations, and professional management can be carried out. Concerning the market, the supply from this manufacturing facility is adequate to meet the demand in Terengganu. Any excess can be allocated to meet the demand of the eastern shore, specifically Kelantan and Pahang. At present, these specific requirements are met by external vendors located in Kuala Lumpur. The transportation cost is one of the elements that contribute to the price growth of the products.

Important Element That Made Business Success

A Crucial Factor Contributing to Business Success Mr. Z emphasised that the qualities of willingness to succeed (Al-Qawiyyu) and integrity (Al-Amin) are essential requirement for an entrepreneur to achieve success. He characterizes integrity as the

sense of fairness and proper rivalry. It is imperative to reduce the disparity between employer and employee interactions. The employee should exert diligent and intelligent effort to guarantee the performance of the firm, while the employer should prioritize the well-being of all the workers. This welfare program extends beyond meeting fundamental necessities to guaranteeing a desirable quality of life, with a minimal distance between the owner and the workforce.

Mr. Z underscored the significance of iman (faith) in the realm of an asnaf entrepreneur. It is imperative for an asnaf entrepreneur to strictly follow the principles of Islam, whether in interpersonal relationships (muamalat) or interactions with the Supreme Allah SWT (ibadah). Furthermore, he emphasized that patience is a fundamental internal quality for an asnaf entrepreneur. A fundamental and timeless aspect that should be deeply ingrained in the self-identity of an asnaf entrepreneur.

Mr. Z recounted an anecdote that involved managing a challenging client. A disgruntled client visited the business and physically assaulted a meticulously repaired sofa on the premises. The sofa structure remained encased in a rubber-padded cushion. The frame was rather rigid and inflicted potential injury to the customer's leg. Mr. Z experienced distress but retained his irritability. He calmly advised the customer against intentionally kicking the frame, since it was still in skeleton state and could cause injury to the customer's leg if kicked improperly. According to his explanation, if the frame was damaged, it could be restored; but, if the customer sustained injuries, the repair would not be worthwhile. Any topic can be deliberated of. Should Mr. Z be unable of completing the task, he would prefer not to receive any remuneration. Mr. Z stressed that he will not serve a customer again if he is unable to meet their specified service specifications. There may exist alternative workshops that can align with the preferences of the client. It might be asserted that Mr. Z's policy is to familiarise himself with customers.

Mr. Z emphasised that trust is the key attribute that an entrepreneur must uphold. It is imperative that trust remains unbroken under all circumstances. Occasionally, clients seek a quote by submitting photographs of a damaged sofa. While the photographs may seem that the conditions are not particularly poor, in actuality, they are far worse. Nevertheless, upon the issuance of the quotation, Mr. Z pledges to uphold the commitment, regardless of the issue of transparency and accurate disclosure. Without exception, he shall do maximum effort to uphold trust and refrain from violating any contractual agreements.

Mr Z holds a somewhat divergent viewpoint on the qualities that define a devout Muslim. According to him, perfection in entrepreneurship is not a prerequisite for being a devout Muslim. The outcome is contingent upon the individual's proficiencies, intentions, and circumstances. An exemplary Muslim should possess integrity, reliability, and strictly implement the tenets of Islam in every facet of life, including commercial matters. Yet, not everyone possesses the innate qualities necessary to become an entrepreneur. Certain individuals may demonstrate exceptional proficiency in other domains, like as education, healthcare, or public service, while nonetheless being regarded as morally upright Muslims.

He contends that although achieving entrepreneurial success can indicate diligent effort and commitment, it does not automatically indicate conformity to Islamic principles. Consistently upholding integrity, honesty, and faith is crucial in all pursuits, be it in business or any other domain. Mr. Z underscores that commercial expertise is really a secondary factor to character and intention in achieving success in entrepreneurship. He maintains that the paramount importance lies in making a constructive contribution to society, whether by means of entrepreneurship or other methods, while being faithful to Islamic principles.

Ultimately, Mr. Z's involvement as an asnaf entrepreneur has imparted him with immense insights on the significance of honesty, perseverance, and belief. Although he has encountered many obstacles, he has also cultivated a profound comprehension of the essential elements for achieving success in the entrepreneurial realm. His proposed alternative entrepreneurial support structure demonstrates his dedication to assisting others in the asnaf community in overcoming their own obstacles and attaining success. The narrative of Mr. Z serves as evidence of the potency of tenacity, faith, and a resolute sense of purpose when confronted with challenges.

FINDING

The following schedule delineates the notable achievements and activities in Mr. Z's entrepreneurial trajectory, elucidating his progression from a technical educator to a prosperous entrepreneur. Commencing in 1989, Mr. Z dedicated more than ten years to teaching technical expertise at GIAT MARA before embarking on business in 2006. He charted a trajectory characterized by early achievements, succeeded by obstacles such as corporate failure and financial hardship. With unwavering determination, Mr. Z moved to Terengganu, where he and his wife founded their own workshop, progressively growing their business. The timetable emphasizes significant events that influenced his professional trajectory, restating his dedication to excellence, honesty, and the welfare of his family and society. Furthermore, it demonstrates his progressive mindset, exemplified by his vision to establish a workshop facility with the purpose of developing asnaf businesses through training and cooperation.

Table 1

Time Period	Event/Action	Details
1989-2005	Technical Teaching Career	Worked as a technical teacher at GIAT MARA in the cushion section.
2006	Start of Entrepreneurship	Left teaching to start a private training institute in Raub, Pahang, offering technical certification.
2006-2010	Private Training Institute	Operated a business training 250 students with technical skills under MLVK, but business collapsed due to partner disputes.
2010-2016	Return to Terengganu	Joined sister's furniture workshop with his wife, working on daily wages.
2016	Own Workshop Establishment	Started a furniture and cushion business with RM4000 capital and support from MAIDAM (industrial sewing machines).
2016-Present	Business Expansion	Expanded services to include cushions for boats/ships; now operates with 4 sewing machines.
Ongoing	Entrepreneurial Challenges	Faced competition, pricing issues, and health challenges; emphasized integrity, trust, and health maintenance.
Future Proposal	Workshop Center Proposal	Suggested creating a workshop center for asnaf to produce sofa and cushion products, with a focus on training and collaboration.
Daily Operations	Focus on Quality and Integrity	Continues to maintain high product standards, transparency, and customer trust In all business operations.

The schedule below outlines the significant milestones and actions in Mr. Z's entrepreneurial journey, detailing his transition from a technical teacher to a successful business owner. Beginning in 1989, Mr. Z spent over a decade imparting technical skills at GIAT MARA before venturing into entrepreneurship in 2006. His path was marked by initial successes, followed by challenges such as business collapse and financial distress. Undeterred, Mr. Z relocated to Terengganu, where he and his wife established their own workshop, gradually expanding their business. The schedule highlights key moments that shaped his career, underscoring his commitment to quality, integrity, and the well-being of his family and community. It also reflects his forward-thinking approach, including his proposal to develop a workshop center aimed at empowering asnaf entrepreneurs through training and collaboration.

The study of Mr. Z's entrepreneurial journey reveals a series of valuable lessons that are essential for achieving long-term success in business. His experiences, from overcoming financial challenges to building a thriving workshop, illustrate the importance of core principles such as integrity, enthusiasm, and adaptability. These lessons, derived from real-world challenges and triumphs, highlight the critical role of personal qualities, ethical practices, and continuous learning in navigating the complex landscape of entrepreneurship. By examining Mr. Z's path, we gain insights into the key factors that contribute to sustained entrepreneurial success, particularly for those facing similar circumstances.

Lessons Toward Entrepreneurship Success:
  a) Integrity and Trust: Uphold honesty and reliability in all business dealings, even when faced with difficult situations.

b) Willingness and Enthusiasm: These are more important than capital; they are the driving forces behind sustaining a business.

c) Health and Well-being: Take care of personal health, as the success and continuity of the business depend on the entrepreneur's well-being.

d) Right Intention: Have the correct entrepreneurial intention, which helps in maintaining focus and resilience through challenges.

e) Adaptability and Resourcefulness: Be prepared to adapt and find alternative solutions, like Mr. Z's proposal for a collaborative workshop center to overcome limitations.

f) Continuous Learning and Supervision: Emphasize the importance of continuous training, monitoring, and mentoring to ensure long-term success.

These lessons highlight the significance of personal qualities, ethical practices, and a supportive business ecosystem in achieving long-term entrepreneurial success

CONCLUSION

This initiative is a novel strategy included into the zakat distribution system to enable industrious asnaf entrepreneurs to become autonomous sources of income for themselves, their families, and the broader society. A range of approaches, including financing, training, mentorship, and collaborative ecosystems, have been implemented, demonstrating different levels of effectiveness in producing outcomes. The analysis of Mr. Z's business trajectory underscores the significant obstacles encountered by asnaf entrepreneurs, namely in the domains of financial limitations, health concerns, and the necessity for ongoing assistance and oversight. Health was recognized as a significant obstacle that can endanger an individual's financial security and standard of living. During challenging periods, robust familial relationships were crucial in offering assistance. Meanwhile, the function of zakat institutions goes beyond providing cash assistance; they also contribute by enabling commercial prospects and establishing sustainable ecosystems.

Mr. Z's experience exemplifies that the determination to achieve success, honesty, and a conducive business environment are crucial factors for entrepreneurial viability. The concept for a workshop center for asnaf emphasizes the need of offering ongoing training, supervision, and mentorship to develop skills and maintain effective business operations. Moreover, his focus on honesty and confidence highlights the important of ethical standards in the realm of business.

Furthermore, the research highlights the need of a conducive business environment that provides alternative support systems such as manufacturing facilities, large-scale procurement, and cooperative entrepreneurial models. The implementation of these strategies has the potential to enhance the ability of asnaf businesses to surmount constraints and attain sustainability.

Potential future research could investigate alternative non-monetary entrepreneurship support techniques that could have a substantial influence on firm performance. Nevertheless, the task of duplicating these mechanisms in other zakat

organizations and diverse asnaf entrepreneurs must be approached with meticulous deliberation and planned execution.

REFERENCE

Book

Abdul Hamid, H. 2013. *Jejak-Jejak Kejayaan Asnaf: Pengalaman LZS Memperkasa Asnaf Zakat*. Lembaga Zakat Selangor.

Duflo, E., & Banerjee, A. 2011. *Poor economics* (Vol. 619). New York: PublicAffairs.

Creswell, J. W. 2014. *Research design: Qualitative, quantitative, and mixed method*. *Research design Qualitative quantitative and mixed methods approaches*.

Karlsson, C., Gråsjö, U., & Wixe, S. 2015. *Innovation and Entrepreneurship in the Global Economy: Knowledge, Technology and Internationalization*. Edward Elgar Publishing.

Kayed N, R., & Hassan M, K. 2011. *Islamic Entrepreneurship* (1st ed.). Abingdon, Oxon: Routledge Taylor & Francis Group.

Largoza, G. L. 2016. Measuring Entrepreneurial Aptitude : An Analytical (Not Psychological) Approach, *4*.

Journal

Abdul Ghafar, M. S., Zakaria, Z., Yusoff, R., Kamaludin, M. A., & Abdul Ghani, A. (2017). Model Pembangunan Usahawan Asnaf Maidam (PUASMA). *Proceedings of the International Conference on Islam, Development and Social Harmony in Southeast Asia*, 111–124.

Abdul Halim, H., Said, J., & Syed Yusuf, S. N. (2012). Individual Characteristics of the Successful Asnaf Entrepreneurs: Opportunities and Solutions for Zakat Organization in Malaysia. *International Business and Management*, *4*(2), 41–49.

Azman A. R, Mohamad Yazis Ali Basah, Mohammad Noorizzuddin Nooh, Mahdir Abdullah, A. A. M. F. & M. F. A. B. (2016). Program Usahawan Bagi Memperkasakan Ekonomi Golongan Asnaf: Pemantauan Dari Aplikasi Myema. *Pengurusan, Jurnal Fatwa, Penyelidikan*, *7*, 29–38.

Bin Yusoff, M.N.H., Al Mamun, A., Ibrahim, M.D., Hassan, H. (2018). Measuring and comparing functional business skills and knowledge among Asnaf community in Malaysia,Economics and Sociology, 11(2), pp. 229–247.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study. *Academy of Business, Engineering and Science Halmstad University, Sweden*, 1–15.

Ibrahim, D., & RuziahGhazali, D. (2014). Zakah as an Islamic Micro-Financing Mechanism to Productive Zakah Recipients. *Asian Economic and Financial Review, 4(1), 117-125.*, *4*(1), 117–125.

Ismail, M., Zainol, F.A., Yusoff, M.N.H., Rusuli, M.S.C. (2019). The driving force of the business sustainability model among co-operatives in Malaysia, Journal of Social Sciences Research, 5(3), pp. 826–829.

Jick, T. D. (1998). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Journal of Physics Condensed Matter*, *10*(45), 10241–10248.

Muhamat, A. A., Jaafar, N., Rosly, H. E., & Manan, H. A. (2013). An appraisal on the business success of entrepreneurial asnaf An empirical study on the state zakat. *Journal of Financial Reporting and Accounting*, *11*(1), 51–63.

Rahman, R. A., & Ahmad, S. (2011). Strategi Pembangunan Keusahawanan *Asnaf Fakir* dan *Miskin* melalui Agihan Bantuan Modal *Zakat*. *Jurnal Pengurusan*, *33*, 37–44. https://doi.org/10.17576/pengurusan-2011-33-03

Rosbi Abd Rahman, & Sanep Ahmad. (2011). Strategi Pembangunan Keusahawanan Asnaf Fakir dan Miskin melalui Agihan Bantuan Modal Zakat. *Jurnal Pengurusan*.

Shiyuti, H. A., & Al-Habshi, S. M. (2019). An Overview of Asnaf Entrepreneurship Program by Lembaga Zakat Selangor, Malaysia. *SSRN Electronic Journal*.

Tomczyk, D., Lee, J., & Winslow, E. (2013). Entrepreneurs' Personal Values, Compensation, and High Growth Firm Performance. *Journal of Small Business Management*, *51*(1), 66–82.

Yusoff, M.N.H. and F.A. Zainol (2014). The public business support services: Does it really works? . Asian Social Science, 10(14).

Yusoff, M.N.H.B., Zainol, F.A., Ismail, M., ...Razik, M.A., Afthanorhan, A. (2021). The role of government financial support programmes, risk-taking propensity, and self-confidence on propensity in business ventures, Sustainability (Switzerland), 13(1), pp. 1–16, 380.

Yusoff, M.N.H.B., Zainol, F.A., Ridzuan, R.H., Ismail, M., Afthanorhan, A. (2021). Psychological traits and intention to use e-commerce among rural micro-entrepreneurs in malaysia, Journal of Theoretical and Applied Electronic Commerce Research, 16(5), pp. 1827–1843.

Wan Mohd Nazdrol Wan Mohd Nasir. (2013). Performance: evidence from small and medium enterprises in Malaysia. *Wan Mohd Nazdrol Bin Wan Mohd Nasir B.A.*, 1–277.

PRELIMINARY STUDY ON THE PRESENCE OF MICROPLASTICS IN SEDIMENT TAKEN FROM SUNGAI BATANG BENAR, NILAI

Musa Ahmad[i] Muhammad Naqib Mohd Ruslan[ii]
Muhammad Syafiq Musa[iii] & Syaza Azahari[iv]

[i] (*Corresponding author*). Professor, Industrial Chemical Technology Programme, Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM). andong@usim.edu.my
[ii] Industrial Chemical Technology Programme, Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM).
[iii] Lecturer, Department of Earth Sciences and Environment, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM), Bangi. syafiqmusa@ukm.edu.my
[iv] Lecturer, Industrial Chemical Technology Programme, Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM). syaza@usim.edu.my

Abstract

A total of 30 sediment samples has been collected from 5 different sampling stations collected along Sungai Batang Benar, Nilai for microplastics assessment. A total of 4449 microplastics with different size, shape and colour were detected. A total of ten different colours of microplastic have been identified with black colour seem to be the most common. The most common shape of microplastics are fibre followed by fragment and film. The abundance of microplastics in the sediments was expected due to activities at the surrounding of the sampling stations such as industrial activities, urbanisation and littering.

Keywords: *Microplastic, sediment, pollution, health, surrounding.*

INTRODUCTION

Microplastics (MPs) are tiny pieces of plastic which is less than 5 mm in length. MPs result from the breakdown of larger plastic items or are manufactured as small particle in a variety of products such as cosmetics and synthetic clothing. Once in the environment, MPs can persist for a long time and pose risks to wildlife and ecosystems. MPs can spread out in the sea through water movements (Ng et al. 2006). MPs can also carry other pollutants that can cause damage inside the animals (Horton et al. 2017).

Studies on MPs in rivers and sediments in Malaysia were still lacking. Research in this topic should be done to increase community awareness among Malaysian since not many of them are fully aware about the threat of MPs to human health. Sungai Batang Benar is chosen in this study to assess the presence of MPs in the sediment because this river is exposed to pollution risks due to its proximity to industrial areas, livestock farms, and waste disposal sites. In 2020, The river has faced pollution problems caused by an organic compound known as dimethyl disulfide which led to water supply disruptions affecting a significant number of consumers in nearby areas. The route of Sungai Batang Benar which spans approximately 0.8 km passes through

tropical rainforest, making it a pleasant spot for hiking and enjoying nature. The major tributaries of Sungai Batang Benar include Sungai Anak Air Garam and Sungai Belihoi1. These tributaries contribute to the overall flow and ecosystem of Sungai Batang Benar.

METHODOLOGY

Sampling Stations

Along the stretch of Sungai Batang Benar, a total of 5 sampling stations have been chosen (Figure 1). Global positioning system (GPS) equipment was used to locate the position of each sampling stations. The sediment samples were collected using shovel or spade with 3 replicates in all stations and put into the plastic bag. The sampling process was conducted only 3 to 5 cm depth from the top of the sediment as the MPs usually presence there as the biofouling process make the MPs density higher than water. Concentrations of MPs by area of surface have been recorded in several investigations (Kumar et al. 2022).
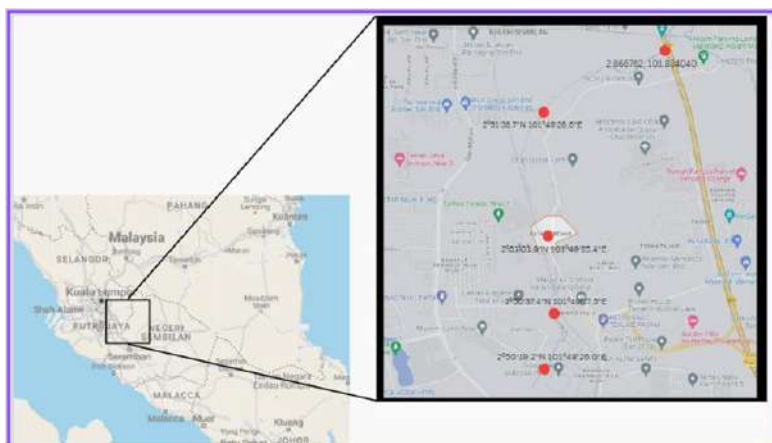
Figure 1: The sampling points locations (●) along the overall stretch of Sungai Batang Benar in Nilai, Negeri Sembilan.

Sample Preparations.

The collected sediment samples were dried in the oven with temperatures ranging from 40 °C to 100 °C. The use of higher temperatures is avoided in this study since it could caused some typical polymeric material such as such as polyester-based fibres, to melt or chemically degrade. As a result, MPs particles clump together to form sediment crops rendering further separation processes futile.

The dried samples were then weighed and recorded. A portion of the dried samples (200 g) were kept in the oven for 5-7 days at 45 °C (Scherer et al. 2020). After the complete drying process, 50g of dried sediment sample was taken and divided into two which was 25g each and put into the glass jar to avoid contamination. A total of 6 replicates of sediments for each sampling station has been prepared. Figure 2

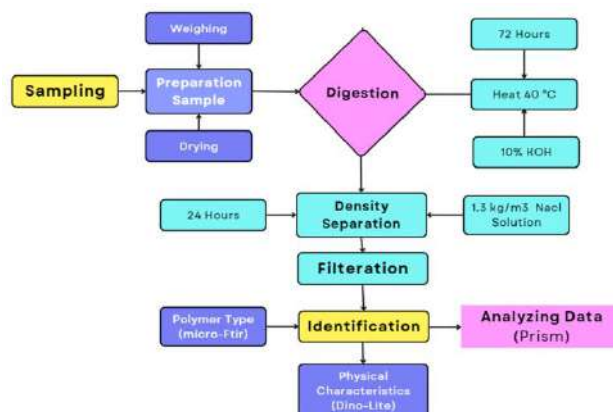shows the flow chart diagram for the overall research methodology conducted in this study.

Figure 2: The experiment flow chart for assessment of MPs presence in sediment taken from Sungai Batang Benar.

Sample Digestion.

The dried sediment samples were digested with 80 ml of 10% KOH. The solution was put into the jar with the samples then being swirl slowly and carefully. Then the jars were put into the oven and being heat for 72 hours at 40 °C temperature to digest the organic matter.

Breaking down the dried sediment sample with acid could affects the quality of plastics. For this purpose, MPs made from PE, PS, PP, PA and PVC (10 particles each) were incubated in 33 mL of the 10:1 mix of 30% H_2O_2 and 10% H_2SO_4 for 5 days at a temperature of 55 °C. Next, recovery rates was determined by looking at the number of particles and total surface area.

Density Separation and Filtration

The density separation process was done to separate MPs from sediment samples by using the sediment microplastic isolation (SMI) unit which was much easier than the classical procedure. It was using the column filled with solution of NaCl with density of 1.3 kg/m³ then the samples were put into the column and shacked slowly without spill it. After that the SMI unit was leaved for 24 hours for MPs going to the top of column and the sediments going downward.

The samples obtained during density separation were filtered using glass microfibre filters. A Whatman filter paper with size range of the 1.2 μm was used for this purpose. Filtration process was necessary to prepare the sample for MPs analysis and counting.

Physical Characteristics and Polymer Identification

MPs on the filter paper were visually inspected and photographed (30-50 magnification) with a digital handheld microscope (Dino-lite, AM3011T) and the

application of the Dino Capture 2.0 software. Images of suspicious nanoparticles were captured immediately on the screens.

About 100 MPs from the sample were collected randomly for spectroscopy analysis to confirm and identify the type of polymer. The collected particles were analyzed using Micro-Fourier Transform Infrared (μ-FTIR) spectroscopy to identify the functional groups associated with the polymer chemical properties. Before the analysis, the sample vial was rinsed a few times with the ultrapure water and filtered through 13 mm, 0.2 μm alumina oxide filter membrane and let it dried. μ-FTIR Spectroscopy (Nicolet iN 10, Thermo Fisher, USA) is used where it measures the infrared spectrum of the sample by subjecting the sample to the infrared radiation over a range of wavelengths.

Statistical Analysis

The statistical analysis was performed with GraphPad Prism 7.04 software (GraphPad Software Inc., USA). A simple t-test was conducted to compare MPs levels in sediment samples taken from 5 different locations along Sungai Batang Benar. This application of software was used to analyse the data that were collected either to observe the significant of the abundance of the MPs between sampling locations or the physical characteristics of the MPc such as their type, colour, and size range.

RESULTS AND DISCUSSION

A total of 4449 MPs were detected in the 30 samples of sediment that were collacted from 5 different locations along Sungai Batang Benar. The abundance of MPs in sediment samples is shown in Figure 4B. One-Way Anova test with Tukey's multiple comparison test ($p > 0.05$) indicated that the abundance of MPs at different sites seem not to be significant. The highest abundance was recorded at Station 4 (973) whereas the least abundance observed at Station 3 (873). The presence of MPs in Sungai Batang Benar is expected due to littering activites along the river particularly at the urban area.
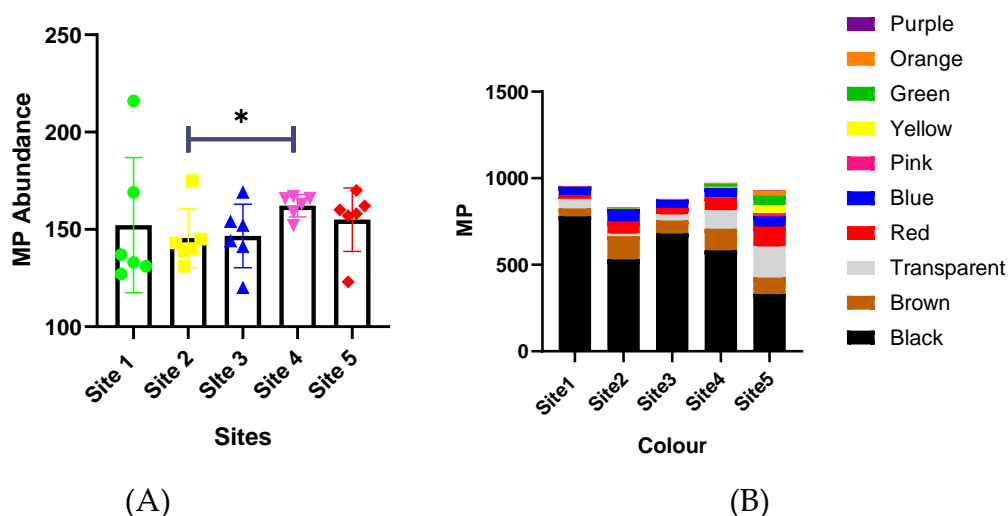

(A)

(B)

Figure 4: The abundance of MPs at different sampling site along Sungai Batang Benar according to number (A) and colour (B)

As shown in Figure 4B, there were 10 different colours of MPs that have been identified during the study, namely black, brown, transparent, red, blue, pink, yellow, green, orange, and purple. The black MPs seem to be dominant compared to other colour with distribution range of 35.59% (Station 5) to 85.54% (Station 1). Those colours might be influenced by the area around every each of the sites point. Su et al. (2016) also reported that the black colour of MPs is dominantly found in water ecosystems. The dark colour of MPs can be easily detected by the aquatic organisms and mistakenly as a food (Lusher, 2017). Figure 5 shows different colour and shape of MPs images when observed using digital microscope.
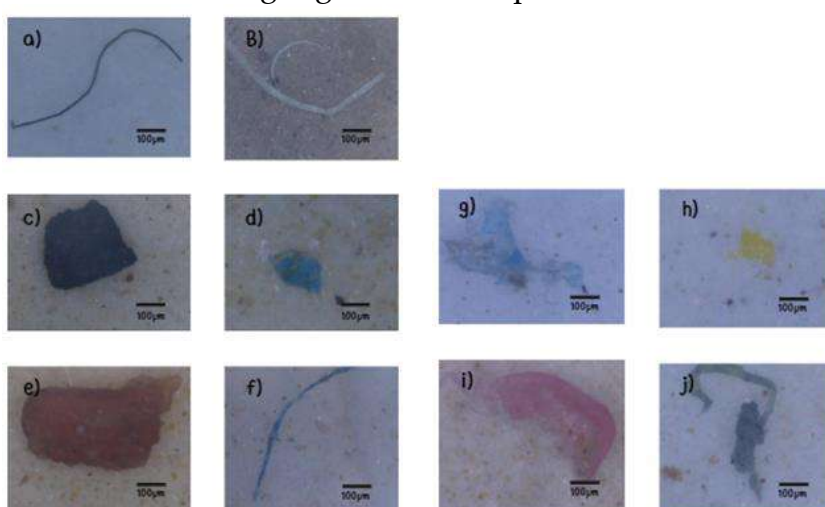
Figure 5: The shapes and colours among of MPs observed using digital microscope, a) black fibre, b) transparent fibre, c) black fragment, d) blue fragment, e) red fragment, f) blue fibre, g) blue film h) yellow fragment, i) pink film, j) green fibre.

In this study MPs have been categorized according to different size ranges A – F (Figure 6). MPs within size range of 0.001 – 0.500 mm (Class A) seem to be the dominant in all sites with abundance range of 67.91% (Station 1) to 88.38% (Station 5). This is followed by Class B with abundance range of 8.06% (Station 5) to 28.81% (Station 1). Class F shows the least abundance with only Station 4 recorded abundance of 0.1%. Based on research by Andrady (2011), MPs particles in smallest size range have been found as the most abundant in bivalve, gastropod and cephalopod. A few research has also shown that fibre MPs with the size range between 0.001 - 1.000 mm is the most detected in water ecosystem (Rochman et al., 2015).
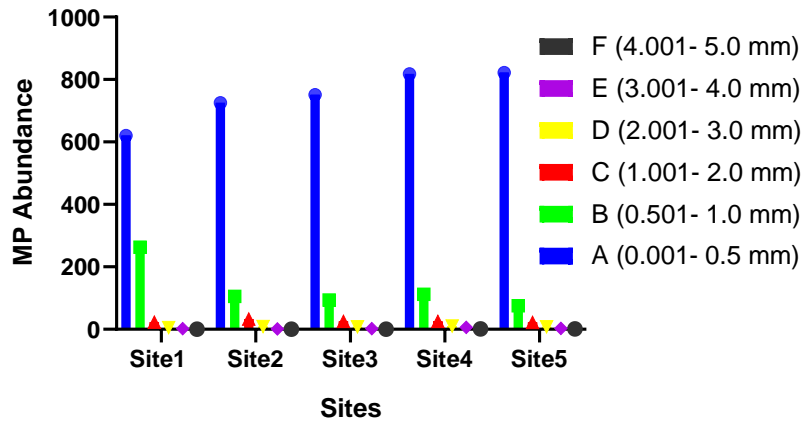
Figure 6: The abundance of MPs in sediment samples collected from different sites according to the size range (A to F).

Figure 7A shows that there were 3 types of MPs morphology, which have been found in the sediments of samples which are fibre, fragment, and film. In this study, the fibre morphology was the most common found in the sediment samples from all the sampling sites, with abundance range of 49.03% (Station 2) to 65.28% (Station 2). It was followed by fragments morphology and films with the least percentage. No foam-type or pellet-shaped morphology of MPs were found in this study. These results showed that the presence of MPs with fibres and fragments morphology were likely to source from the nearby industrial activities along the river. This type also has lower dense as the air bond can carry them away from the surrounding or polymer from the urban and industry into the river.

The study was also conducted to determine the polymeric materials of the MPs. As shown in Figure 7B, it was found that rayon (50%) which was semi-synthetic fibre thread and cellulose fibre thread is the most common type of polymer for MPs found in the sediment. Fibre polymer were spread widely into the river through human activities, such as the waste of washing water that can spread almost 700,000 fibre threads MPs from 6 kg of fabric clothes that usually contain the fibre polymer (Napper & Thompson 2016). Lusher et al. (2013) were reported on identification of rayon in gastrointestinal tract of the fish, whereas Woodall et al. (2015) concluded that the rayon was the type of fibre that dominantly debris into the ecosystem.
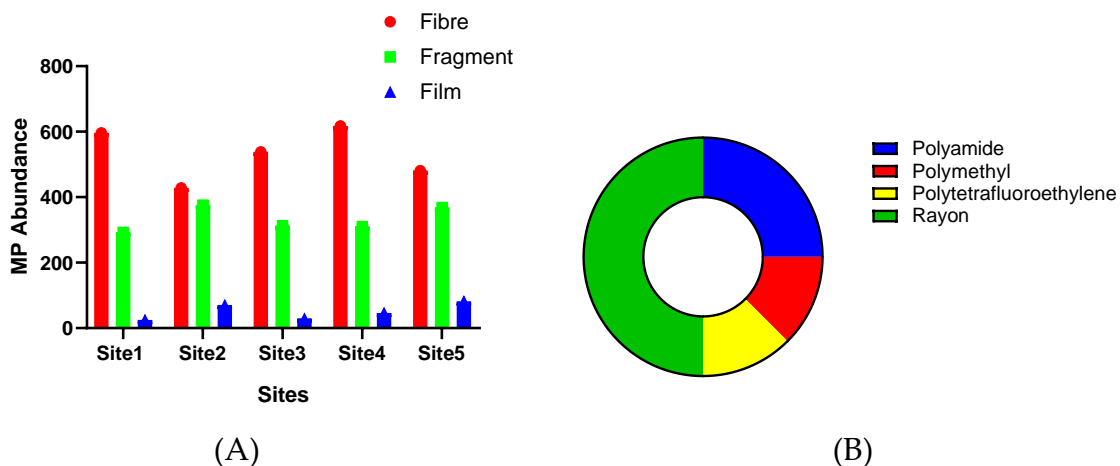
Figure 7: The abundance of MPs according to their type (A) and material (B)that presence between each site. Figure 4.5. 1:Type of polymer found in the sediment.

CONCLUSION

The presence of MPs along Sungai Batang Benar showed that the amount and features of these MPs (shape, size, colour, type) were depending on the location of the sampling stations. The black MPs seem to be dominant compared to other colour. In term of size, MPs with smallest size range of 0.001 – 0.500 mm seem to be the most common. The presence of MPs with fibres and fragments morphology were likely to source from littering activites along the river. Different industrial and human activities introducing different waste to the nearby water outlet such as household wastewater and factory discharge. Disposal of plastic waste a few decades ago to the neaby river is expected to be the main caused of MPs presence in water ways.

ACKNOWLEDGEMENT

REFERENCE

Andrady, A. L. (2011). Microplastics in the Marine Environment. *Marine Pollution Bulletin*, 62(8), 1596–1605.

Horton, A. A., Svendsen, C., Williams, R. J., Spurgeon, D. J. & Lahive, E. (2017). Large microplastic particles in sediments of tributaries of the River Thames, UK – Abundance, sources and methods for effective quantification. *Marine Pollution Bulletin*, 114(1), 218–226

Kumar, P., Inamura, Y., Bao, P. N., Abeynayaka, A., Dasgupta, R., & Abeynayaka, H. D. L. (2022). Microplastics in Freshwater Environment in Asia: A Systematic Scientific Review. *Water*, 14(11), 1737 – 1745.

Lusher, A., Hollman, P., & Mendoza-Hill, J. (2017). Microplastics in fisheries and aquaculture: status of knowledge on their occurrence and implications for aquatic organisms and food safety. *FAO Fisheries and Aquaculture Technical Paper*. No. 615. Rome, Italy.

Lusher, A. L., McHugh, M., & Thompson, R. C. (2013). Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Marine Pollution Bulletin*, 67(1-2), 94–99.

Napper, I. E., & Thompson, R. C. (2016). Release of Synthetic Microplastic Plastic Fibres from Domestic Washing machines: Effects of Fabric Type and Washing Conditions. *Marine Pollution Bulletin*, 112(1-2), 39–45.

Ng, K. L., & Obbard, J. P. (2006). Prevalence of microplastics in Singapore's coastal marine environment. *Marine Pollution Bulletin*, 52(7), 761–767.

Rochman, C. M., Tahir A., William S.L., Baxa D.V., Lam R., Miller J.T., Teh F.C.Werorilangi S. & Teh S.J. (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. *Scientific Reports*, 5, 14340.

Scherer, C., Weber, A., Stock, F., Vurusic, S., Egerci, H., Kochleus, C. & Reifferscheid, G. (2020). Comparative assessment of microplastics in water and sediment of a large European river. *Science of the Total Environment*, 738, 139866.

Su, L., Xue, Y., Li, L., Yang, D., Kolandhasamy, P., Li, D., & Shi, H. (2016). Microplastics in Taihu Lake, China. *Environmental Pollution*, 216, 711–719.

Woodall, L. C., Gwinnett, C., Packer, M., Thompson, R. C., Robinson, L. F., & Paterson, G. L. J. (2015). Using a forensic science approach to minimize environmental contamination and to identify microfibres in marine sediments. *Marine Pollution Bulletin*, 95(1), 40–46.

INTEGRATING ISLAMIC ACCOUNTING PRINCIPLES IN FINANCIAL ACCOUNTING CURRICULA FOR PRE-UNIVERSITY STUDENTS

Alifah binti Hj Hamid[i] Hashim bin Ahmad Shiyuti[ii] & Norman Zakiyy[iii]

[i] (*Corresponding author*). Tamhidi Teacher, Pusat Tamhidi, Universiti Sains Islam Malaysia.
alifah@usim.edu.my
[ii] Lecturer, Pusat Tamhidi, Universiti Sains Islam Malaysia. hashim@usim.edu.my
[iii] Lecturer, Faculty of Syariah and Law, Universiti Sains Islam Malaysia. zakiyy@usim.edu.my

Abstract

This research paper explores the effects of integrating Islamic accounting principles into financial accounting curricula. The study highlights the importance of incorporating Islamic accounting principles concepts alongside conventional financial accounting knowledge. The purpose is to provide a comprehensive understanding of accounting practices grounded in Islamic principles. By examining the potential benefits and challenges of merging Islamic accounting principles into the educational framework for pre-university students, this paper aims to enhance students' proficiency in accounting while fostering an appreciation for ethical and Sharia-compliant financial practices. The primary goal is to develop a comprehensive conceptual framework that effectively integrates Islamic accounting principles into financial accounting curricula, thus enriching the educational experience and strengthening the ethical foundation of pre-university students.

Keywords*: Integration,* i*slamic accounting principles*, *financial accounting,*

INTRODUCTION

In the modern landscape of global finance, business students must understand various accounting practices. One such practice that is increasingly gaining relevance is Islamic accounting principles. Mohammed and Bakar (2012) stated that the demand for professionals proficient in both conventional and Islamic accounting principles is rising as the financial sector becomes more globalized. The rapid growth of the Islamic finance industry, with assets projected to exceed USD 3.69 trillion by 2024 (Arab News, GCC Business News,ICD-PS), underscores the importance of integrating Islamic accounting principles into mainstream financial accounting curricula at the university level. According to Amalia (2023), incorporating Islamic ethics into accounting education can equip future accountants with the ethical tools necessary to navigate moral dilemmas, potentially reducing fraudulent behavior (Amalia, 2023). Therefore educational institutions play a vital role in shaping society by enhancing skills and knowledge (Universities New Zealand, 2012) and equipping graduates with the expertise needed, particularly in Islamic accounting principles and Finance education (Jamil et al., 2019). Several studies, such as those conducted by Bacheva et al., (2023), reveal a uniformity in higher education accounting programs. Tiago Cunha et al., (2022) criticize the current focus on technical skills in higher education curricula,

while Tunde et al., (2023) highlight the gap between the skills of university accounting programs and the needs of the industry. Despite numerous studies examining the integration of Islamic accounting principles into conventional accounting frameworks, these studies fail to address pre-university education, suggesting a potential area for further investigation (Bacheva et al., 2023). Therefore, a significant research gap exists regarding the integration of Islamic accounting principles into financial accounting specifically at the pre-university level.

This research explores the conceptual integration of Islamic accounting principles into financial accounting curricula. The study aims to develop a conceptual framework for integrating Islamic accounting principles into the financial accounting curricula for the Tamhidi of Accounting Muamalat pre-university program.

LITERATURE REVIEW
Financial Accounting and Islamic Accounting Principles
Traditional financial accounting focuses on recording, summarizing and reporting financial conditions to users to make an informed decision marking. This reporting must accordance with accounting standards; International Financial Reporting Standards (IFRS)/ Malaysian Financial Reporting Standards (MFRS) or Generally Accepted Accounting Principles (GAAP). These standards emphasize transparency, consistency, and accuracy (Nobes & Parker, 2016).

Meanwhile, Islamic accounting principles introduces additional principles derived from Sharia law, such as the prohibition of interest (riba) and the requirement for transactions to be asset-backed (Hamid & Lewis, 2007). Prohibition of interest is stated in the Holy Quran in Chapter 2 verse 275; "Those who consume interest cannot stand [on the Day of Resurrection] except as one stand who is being beaten by Satan into insanity. That is because they say, "Trade is [just] like interest." But Allah has permitted trade and has forbidden interest". By avoiding interest-based transactions, Islamic accounting principles principels practices promote financial fairness and ensure that business operations align with Islamic values.

Furthermore, Iqbal and Mirakhor (2007) state that Islamic accounting principles emphasize ethical considerations and social responsibility, aligning financial practices with Islamic moral values. In conclusion, Islamic accounting principles offer a unique perspective compared to conventional financial accounting, which often lacks consideration of Islamic ethical dimensions (Hassan, 2009). Meanwhile, Husin et. Al., (2024) states that Islamic accounting courses should focus on enhancing students' competencies and optimizing business processes, preparing them for real-world applications. Therefore, based on previous studies, it is important to integrate Islamic accounting principles into financial accounting curricula.

The Importance of Integration of Islamic Accounting Principles in Financial Accounting

The integration of Islamic accounting principles into conventional accounting systems is increasingly recognized for its potential to enhance ethical standards and trust in financial reporting. This integration has been explored by several studies with different perspectives such as studies conducted by Jannah (2023), Nasution (2022), and Parte et. al., (2022). Based on previous studies, the significance of integrating Islamic accounting principles into financial accounting is highlighted by the following points:

i)   **Alignment with Islamic ethics.**

Islamic accounting principles are deeply rooted in Islamic ethics, which emphasize the values of truthfulness, fairness, and transparency. These values are aligned with accounting practices and promote ethical behavior and financial responsibility (Jinan et al., 2024). Meanwhile, Jannah (2023) argues that the ethics deficits pervading conventional accounting practice underscore a need to inculcate Islamic values within accountancy education. This approach involves incorporating religious practices such as group prayers and Quranic readings to foster a moral framework among students (Jannah, 2023). Likewise, a different study conducted by Nasution (2022) reveals the significance of Islamic accounting principles as a trust-reinforcing tool specifically in cases where conventional accountancy neglects moral issues.

ii)   **Promoting Financial Justice**

Financial justice is a cornerstone of Islamic accounting principles which aims to ensure fairness in financial reporting by adhering to key ethical guidelines derived from Shariah law such as justice, transparency, and accountability. These principles are important because they structure the way financial statements should be prepared and presented to show an entity's true financial position, thus avoiding any deceptive or manipulation. Research highlights that the principle of justice (adl) in Islamic accounting principles ensures the equitable distribution of profits among stakeholders which is central to maintaining fairness in financial practices (Amar et al., 2023). Furthermore, according to Wahyuni-TD et al.,(2018) all relevant information in financial statements must be disclosed completely to prevent fraud and build trust among stakeholders.

(iii)   **Ethical Investment and Profit Sharing**

Islamic accounting principles also emphasize ethical investment and profit-sharing mechanisms such as mudarabah (profit-sharing) and musharakah (joint venture). The investment made by investors should be in halal (permissible) activities, avoiding interest (riba), gambling, and alcohol (Minhat et al., 2021) while ensuring that financial

transactions are conducted equitably and ethically. This approach prevents exploitation and fostering financial justice (Amar et al., 2023), ensuring that profits are equitably distributed based on contributions and risk (based on mutual cooperation and risk-sharing).

iv) Transparency and Accountability

The principle of accountability (Hibsah) requires that financial statements be clear and honest, reflecting the actual financial conditions of the company without any manipulation. According to Ahmad et al. (2017), principles such as justice, trust, and righteousness are essential for ensuring accountability and transparency in financial reporting. Meanwhile, according to Suryanto and Ridwansyah (2016), the inclusion of Islamic principles such as Amanah (trust) and Ihsaan (benevolence) helps prevent fraud and other unethical activities, ensuring that the financial information presented is reliable and truthful.

v) Social Responsibility

Focusing on ethical investment not only promotes fairness but also enhances the social responsibility of financial institutions. Financial activities should contribute positively to society and promote communal welfare. For instance, donation, s*adaqah, waqf* or *zakat* redistribute wealth to those in need. This approach aligns with the teaching of the Quran (2:177).

"Righteousness does not consist in turning your faces towards the east ortowards the west; true righteousness consists in believing in Allah and the Last Day, the angels, the Book and the Prophets, and in giving away one's property in love of Him to one's kinsmen, the orphans, the poor and the way farer, and to those who ask for help, and in freeing the necks of slaves, and in establishing Prayer and dispensing the Zakah. True righteousness is attained by those who are faithful to their promise once they have made it and by those who remain steadfast in adversity and affliction and at the time of battle (between Truth and falsehood). Such are the truthful ones; such are the God-fearing".

By incorporating Islamic accounting principles, financial institutions can ensure that their operations are not solely profit-driven but also emphasize responsible business practices. This approach fosters trust and sustainability in financial markets, particularly in regions where Islamic values are deeply embedded in the culture and legal system.

Based on the discussion of previous studies, it can be concluded that introducing the integration of Islamic accounting principles into financial accounting becomes increasingly significant. For pre-university students with an Islamic education background such as Tamhidi of Accounting and Muamalat Universiti Sains Islam Malaysia (USIM), incorporating these two elements is not merely beneficial but essential. This approach could provide a more comprehensive educational

background, preparing them to navigate both conventional and Islamic financial systems effectively (Khan & Bhatto, 2008).

CONCEPTUAL FRAMEWORK
Curriculum Content Integration
There has been limited integration of Islamic accounting principles in financial accounting curricula. According to Mohd Salleh et al., (2011), Islamic accounting principles are a well-established practice, however, it is not extensively covered in pre-university curricula and exposure to Islamic accounting principles for undergraduate students is insufficient (Grassa et al., 2022).

The integration of Islamic accounting principles into financial accounting curricula is increasingly vital as it ensure that students are not only proficient in accounting practices but also grounded in ethical values, preparing them to navigate the complexities of the financial world responsibly (Rahma et al., 2024). Furthermore, the incorporation of these principles not only enhances students' ethical awareness (Al-Aidaros et al. 2013) but also helps them appreciate the differences and similarities between Islamic and conventional accounting (Mohamed & Syed Agil, 2016). This comprehensive approach leads to a more robust understanding of global financial systems and equips students to apply these concepts in real-world scenarios.

Curriculum content integration involves blending Islamic accounting principles with conventional financial accounting topics. This integration should encompass the standards developed by the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI). Alhabshi et al. (2021) underscore the importance of specialized courses dedicated to AAOIFI's distinctive frameworks. Other studies also emphasize that incorporating AAOIFI guidelines into financial accounting curricula ensures that students are thoroughly prepared in Sharia-compliant accounting practices (Alhabshi et al., 2021). Collectively, these studies highlight that embedding AAOIFI standards within financial accounting education curricula can develop qualified employees equipped with both Islamic and conventional accounting systems.

Pedagogical Approaches
Different methods of teaching should be employed to help in the teaching of the integrated curriculum. This includes every possible approach employed by the educators in their efforts to improve strategies for teaching and learning. Effective pedagogies involve a range of techniques, including whole-class and structured work, guided learning and individual activity. All these approaches are important in creating great learning experiences and in meeting the current educational demands.

The integration of Islamic accounting principles into financial accounting education requires innovative pedagogical approaches to effectively bridge traditional accounting practices with Islamic ethical principle. Rahman et al. (2024) stress the necessity of tailoring Islamic accounting principles education to the specific

characteristics of the Alpha Generation, advocating for the use of modern technology together with other Islamic teaching methods for better engagement and moral capacity. Previous studies have examined the effectiveness of various pedagogical approaches in teaching and learning activities. For example, Zaky and Warsono (2022) reveal that the Quranic approach significantly enhances learning outcomes compared to traditional methods. Meanwhile, another study by Alia and Zaini (2017), found that collaborative learning where students work together on an Islamic accounting principles project, fosters a better understanding of the subject and encourages critical thinking. Furthermore, Ahmad (2019) highlights to implement of instructional approaches that align with the cultural and religious beliefs of the students (Ahmad, 2019).

To enhance teaching and learning processes, it is crucial to innovate the strategies used in teaching Islamic accounting principles, particularly within the context of financial accounting to meet the needs of the modern Muslim professionals. Educators can implement approaches such as case studies, problem-based learning and interactive discussion among students to explore about the Islamic accounting principles topics. The importance of these methods cannot be overemphasized especially in the development of a new Muslim professional cadre that will be sufficiently equipped to deal with the modern practices in the area of financial accounting and meet the regulatory requirements in Islam.

Faculty Development

The successful integration of Islamic accounting principles into the curriculum also depends on faculty development. This suggest that educators should undergo knowledge and skill to enable them teach the Islamic accounting principles concepts effectively. As highlighted by Abdul Rahman and Nor (2018), there is a need for the professional development programs of the faculty members, especially those in Islamic finance and accounting. Such programs may include workshops, seminars and certification courses that are aimed at providing educators with necessary information about Islamic accounting principles and how it can be enforced. Ahmad et. al (2017), suggest that faculty development should include training in ethical principles to foster the moral development of students.

Jamil et al. (2019) highlight the critical role of faculty in embedding sustainability within Islamic accounting principles education, noting that current efforts are insufficiently comprehensive. They suggest that faculty development should focus on incorporating contemporary financial technologies and sustainability concepts to enhance the relevance of Islamic accounting principles education.

Meanwhile, Kibiya et al. (2022) highlight that it is vital for faculty to develop curricula that effectively differentiate Islamic accounting principles from conventional accountingby providing educators with training in both content knowledge and pedagogical strategies. Therefore, by providing continuous professional practice ensures that instructors are always in touch with relevant current trends in Islamic finance and ensure convergence in their training practice.

Curriculum Assessment and Revision

Regular curriculum reviews are essential to incorporate new knowledge and adapt to changing educational demands (Hays et al. 2024) and align with the evolving needs of the students in the industry. One of the mechanisms to measure the relevance and effectiveness of the curriculum is by conducting regular assessments and revisions. Curriculum assessment and revision are critical processes that ensure educational programs meet the evolving needs of students and society. Feedback from students, faculty, and industry professionals can provide valuable insights into areas that require improvement.

The integration of Islamic accounting principles into financial accounting curricula requires a thorough assessment and revision to ensure alignment with both educational and industry standards. Septyan et al. (2023) state that curricula must reflect the holistic nature of Islamic accounting principles, which moves beyond traditional financial accounting frameworks. For example, a study by Ahmad et al. (2019) found that to develop ethical accountants, the curriculum should be revised to integrate Islamic ethics into accounting education. Similarly, Kibiya et al. (2022) suggest that curriculum revision should include Islamic accounting principles courses, such as Zakat, Waqf, and Shariah auditing. Jamil et al. (2019) stress the importance of sustainability in Islamic accounting principles education, particularly in the context of emerging financial technologies. Their findings suggest that curriculum revisions should include elements of sustainability and fintech to ensure that Islamic accounting principles education remains relevant and effective.

As a conclusion, the integration of Islamic accounting principles should be reviewed periodically to ensure that it continues to meet educational and professional standards.

Proposed Implementation Strategies

Implementing Islamic accounting principles within financial accounting education requires comprehensive strategies that consider both theoretical and practical aspects. Several strategies can be proposed to integrate Islamic accounting principles into financial accounting curricula.

Firstly, a phased approach to curriculum integration can be adopted, beginning with the inclusion of basic Islamic accounting principles concepts and gradually introducing more complex topics. Lubis and Ima (2023) emphasize the importance of understanding the ontological and epistemological foundations of Islamic accounting principles to ensure that its implementation aligns with Islamic principles and enhances the overall educational framework. They suggest starting with a deep exploration of Islamic accounting principles concepts, ensuring they are philosophically sound and practically applicable. Additionally, Lawson et al. (2014) discuss the integration of competency-based frameworks into accounting education, recommending that the implementation of Islamic accounting principles include defining clear competencies that students must achieve. This strategy involves

developing curriculum objectives that encompass both accounting skills and Islamic ethical principles, ensuring that graduates are well-prepared for the professional demands of Islamic finance.

Secondly, collaboration with Islamic financial institutions can provide students with practical insights and real-world experience. Radjak and Hiola (2020) highlight the importance of implementing Islamic accounting principles guidelines within specific institutions, such as Islamic boarding schools, emphasizing the need for tailored training and support to ensure successful adoption. Their study underscores the importance of human resources readiness and suggests that implementation strategies should include comprehensive training programs for staff to manage the unique aspects of Islamic accounting principles.

Thirdly, developing partnerships with other educational institutions that have successfully integrated Islamic accounting principles can offer valuable lessons and best practices. Patimbangi and Darwis (2023) explore the implementation of independent learning concepts within Islamic accounting principles curricula, emphasizing the importance of flexibility and practical application through programs like student exchanges and community service. This approach supports the idea that curriculum design should accommodate diverse learning pathways and real-world experiences.

Finally, involving stakeholders, including educators, students, and industry professionals, in the curriculum development process ensures that the curriculum meets the needs of all parties involved. Meng (2019) suggests that integrating financial and management accounting is essential for the effective implementation of Islamic accounting principles. This approach involves training accountants to manage both financial and managerial aspects under the umbrella of Islamic principles, thereby enhancing the coherence and efficiency of accounting processes. Fadzil and Rababah (2012) focus on the role of top management and the adoption of advanced information technologies to facilitate the implementation of new accounting systems, including Islamic accounting principles. They propose strategies that emphasize top management support, technological adoption, and continuous education as critical factors for successful implementation.

CONCLUSION

Integrating Islamic principles into financial accounting education for pre-university students is essential for fostering a strong ethical foundation and ensuring that future accountants are equipped to navigate both the financial and moral dimensions of their profession.

By blending conventional accounting practices with Islamic financial principles, pre-university students gain a comprehensive understanding that prepares them for a diverse and evolving financial landscape. This article provides a framework for creating an effective and sustainable curriculum by focusing on Curriculum Content Integration, Pedagogical Approaches, Faculty Development, Curriculum Assessment and Revision, and Proposed Implementation Strategies.

Future research should explore the long-term impact of such integration on students' academic performance and professional success.

REFERENCE

Abdul Rahman, A., & Nor, P. M. (2018). Professional development for Islamic accounting educators: A critical need. *Journal of Education for Business*, 93(4), 157-162.

Ahmad, N. L. B., Yusof, R. B., Mustaffa, W. S. B. W., Wahid, H. B. A., & Halim, H. B. A. (2019). Developing Ethical Accounting Students through Incorporating Islamic Ethics into Accounting Curriculum: The Educator's Perspectives. *International Journal of Academic Research in Business and Social Sciences*, 9(1).

Ahmad, N. L., Ahmed, H., & Mustaffa, W. S. W. (2017). The significance of Islamic ethics to quality accounting practice. *International Journal of Academic Research in Business and Social Sciences*, 7(10).

Ahmad, R. (2019). Pedagogical approaches in teaching Islamic accounting principles: A case study in Malaysia. I*nternational Journal of Islamic and Middle Eastern Finance and Management,* 12(2), 231-245.

Al-Aidaros, A. H., et al. (2013). The importance of ethics in Islamic accounting principles. *Journal of Islamic Accounting Principles and Business Research*, 4(2), 117-127.

Ali, M., & Zaini, A. (2017). Collaborative learning in Islamic finance education: Opportunities and challenges. *Journal of Islamic Finance,* 6(1), 101-113.

Alshater, M.M., Hassan, M.K., Sarea, A. & Samhan, H.M. (2022). Islamic accounting principles research between 1982 and 2020: a hybrid review. *Journal of Islamic Accounting Principles and Business Research,* Vol. 13 No. 8, pp. 1176-   1196.

Amalia, E., & Srimaya,L,S. (2022). Mengintegrasikan Etika Islam Dalam Dilema Etis Dan Pendidikan Akuntansi.*Jurnal Akademi Akuntansi(JAA)*, 5(4), 531-546

Amar, S. S., Putri, D. L. P., & Rahmawati, R. (2023). Pendidikan Prinsip Keadilan dalam Akuntansi Syariah. *Fikrotuna: Jurnal Pendidikan Dan Manajemen Islam*.

Azah Abdul Jalil, N., Haron, H., & Bin Muda, M. (2019). The Impact of Islamic Based Accounting Education on Professional Conduct among Accountants: A Conceptual Review. *KnE Social Sciences*, 3(22), 712–725.

Bacheva, S., Feschiyan D., & Pozharevska R. & Savova, K. (2023) Accounting Education in France, *Godishnik na UNSS, University of National and World Economy,Sofia, Bulgaria*, issue 2, pages 57-73, December.

Cunha, T., Martins, H., Carvalho, A. and Carmo, C. (2022). Not Practicing What You Preach: How Is Accounting Higher Education Preparing the Future of Accounting. *Educ. Sci.*, *12*, 432.

Fadzil, F., & Rababah, A. (2012). Management Accounting Change: ABC Adoption and Implementation. *Journal of Accounting and Auditing Research & Practice*, 1–17.

GCC Business News. *Refinitiv & ICD 2020 Report: Global Islamic Finance Assets Expected to Hit $ 3.69 trillion in 2024* https://icd-ps.org/en/news/refinitiv-icd-2020-report-global-islamic-finance-assets-expected-to-hit-369-trillion-in-2024

Grassa, R., Khlif, H., & Khelil,I.(2022).The development of Islamic accounting principles education in the UAE and its challenges :an institutiona perspective. *Journal of Financial Reporting and Accounting*.

Hamid, S., & Lewis, M. (2007). *Islamic accounting principles: A Practical Guide.* Routledge.

Hassan, R., & Haron, H. (2017). Assessing the effectiveness of Islamic accounting principles curriculum: A case study in Malaysia. *Journal of Accounting Education*, 39(1), 45-57 16(02), 270–282.

Hays, R. B., Wilkinson, T., Green-Thompson, L., McCrorie, P., Bollela, V., Nadarajah, V. D., Anderson, M. B., Norcini, J., Samarasekera, D. D., Boursicot, K., Malau-Aduli, B. S., Mandache, M. E., & Nadkar, A. A. (2024). Managing assessment during curriculum change: Ottawa Consensus Statement. Medical Teacher, 46(7), 874–884.

Husain, F., Aisyah, M. R., & Musa, N. (2024). Exploring The Meaning Of Islamic Accounting Courses For Students: A Phenomenological Approach. *JAS (Jurnal Akuntansi Syariah)*, *8*(1), 17-36.

Iqbal, Z., & Mirakhor, A. 2007. *An Introduction to Islamic Finance; Theory and Practice*: Wiley.

Jamil, N., Seman, J., & Ramli, N. (2019). Does the Islamic accounting principles and finance education sufficiently sustainable?. International Journal Of Business and Economy,1(1),20-35.

Jannah, B. S. (2023). Is It Important To Integrate Islamic Values In Accounting Education?. *JAS (Jurnal Akuntansi Syariah)*, *7*(1), 30-41.

Jinan, M. R., Syapiuddin, M., & Nasri, U. (2024). Holistic Integration: Syariah Finance Principles in Islamic Education Management. *Jurnal Ilmiah Profesi Pendidikan*, 9(2), 1343–1350.

Kibiya, I.U., Usman, M., Kurfi, S.A. & Hamid, K.T. (2023). Awareness and knowledge of Islamic accounting principles system among accounting students in the

Nigerian universities. *Journal of Islamic accounting principles and Business Research*, Vol. 14 No. 7, pp. 1106-1120.

Lawson, R. A., Blocher, E. J., Brewer, P. C., Morris, J. T., Stocks, K. D., Sorensen, J. E., Stout, D. E., & Wouters, M. J. F. (2015). Thoughts on competency integration in accounting education. *Issues in Accounting Education*, 30(3), 149–171.

Lubis, M. S. I., & Ima, I. (2023). Ontology of accounting education in the study of accounting education in the study of accounting implementation. *Dharmawangsa: International Journal of the Social Sciences Education and Humanitis*, 4(3), 93–97.

Meng, M. (2019). *Analysis of Effective Strategies for the Integration of FinancialAccounting and Management Accounting.*

Minhat, M., Dzolkarnaini, N. & Abdullah, M. (2021). The Integrity of Islamic Finance. In: Minhat, M., Dzolkarnaini, N. (eds) *Ethical Discourse in Finance. Palgrave Studies in Impact Finance. P*algrave Macmillan, Cham.

Mohamed, S., & Syed Agil, S. O. (2016). Islamic accounting principles education in Malaysia: History and challenges. *International Journal of Economics, Management and Accounting*, 24(1), 73-90.

Mohammed, M., & Bakar, N.A. (2012). Islamic Finance and the Global Financial Crisis: A Review. *International Journal of Islamic and Middle Eastern Finance and Management*, 5(2), 135-147.

Mohd-Salleh, N., et al. (2011). The incorporation of Islamic accounting principles Principles into Accounting Education. *Accounting Education: An Internationla Journal*, 20(2), 137-158.

Nasution, L. (2022). Akutansi Syariah sebagai media informasi dalam meningkatkan kepercayaan pengguna. *Al-Bay Journal of Sharia Economic and Business*, 1(2), 78–91.

Parker, R. H. (2016). Thirteen not out: Nobes & Parker, Comparative International Accounting, 1981–2016. *Accounting History*, *21*(4), 512–521.

Parte, L., Garvey, A. M., McNally, B., & Gonzalo-Angulo, J. A. (2022). True and fair view/fair presentation as a nexus between conventional accounting, sustainability accounting and Islamic accounting principles: unifying three frameworks? *Economic Research-Ekonomska Istraživanja, 36*(2).

Patimbangi, A., & Darwis, R. (2023). Merdeka Belajar Kampus Merdeka Based Curriculum Design for the Sharia Accounting Study Program at Islamic University.*AL-ISHLAH: Jurnal Pendidikan, 15*(4), 4852-4867.

Radjak, L. I ., & Hiola, Y. (2020). Accounting Guidelines Implementation: A Study on Economic Development of Islamic Boarding Schools. *Journal of Asian Multicultural Research for Economy and Management Study*, 1(2), 54-60.

Rahman, N. A., Deni, M. I. M., & Kharuddin, K. '. M. (2024). Islamic accounting principles education for alpha generation: a conceptual paper. *International Journal of   Modern Education, 6*(21), 277–288.

Septyan, K., Triyuwono, I., Rosidi, R., Mulawarman, A., & Setiawan, A. (2022). Islamic household accounting: romance discussion in accounting curriculum. *Journal of Islamic accounting principles and Finance Research, 4*(2), 209-238.

Tunde, O., Enofe, A., & Adekunle, E. S. (2023). Recent development in accounting education and accounting practice. *Cognizance Journal of Multidisciplinary Studies, 3*(9), 107–125.

Wahyuni-TD, I. S., Fernando, Y., Hasnita, E., & Hasnita, E. (2018). Role of Islamic ethics towards ethucal accounting practice. *Journal of Governance and Integrity, 2*(1), 23–27.

Zaky,A. & Warsono, S. (2023). Understanding Islamic accounting principles: a Quranic approach. *Journal of Islamic accounting principles and Business Research,* Vol. 14 No. 7, pp. 1048-1064.

VALIDITY AND RELIABILITY OF ISLAMIC PSYCHOSPIRITUAL SELF-CARE MODULE TO ENHANCE WELL-BEING AMONGST UNDERGRADUATES

Fathiah Shamsuddin[i], Siti Nubailah Mohd. Yusof[ii] & Nurhafizah Mohd. Sukor[iii]

[i] (*Corresponding author*). PhD Candidate, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. fathiahshamsuddin@raudah.usim.edu.my
[i] PhD Candidate, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. fathiahshamsuddin@raudah.usim.edu.my
[ii] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. nubailah@usim.edu.my
[iii] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. nurhafizah@usim.edu.my

Abstract

Despite progress on a global scale, the overall state of well-being has experienced a decline. The Covid-19 pandemic has exacerbated mental health challenges, particularly among university undergraduates. Research suggests that self-care practices can serve as a preventive measure against mental health symptoms, particularly when viewed through Islamic paradigms, fundamentally grounded in the doctrines of the Al Quran and Sunnah, that underscore the importance of prevention and resilience. Nonetheless, the concept of self-care as an Islamic intervention remains underdeveloped, highlighting a significant gap in research on Islamic psychospiritual methodologies. Therefore, this research aims to evaluate an Islamic Psychospiritual Self-care Module (iPScM) targetted at university undergraduates to bolster resilience and coping mechanisms, thereby contributing to enhanced well-being and societal advancement. A validity assessment was conducted, incorporating evaluations from experts in counselling, psychology, and Islamic psychology. The findings indicate that the iPScM module and its respective content are acceptable and suitable for the intended demographic. A reliability assessment involving thirty first-year students at a local Islamic public university yielded a high overall reliability coefficient, with a Cronbach Alpha of .894. Respondents' feedback concerning the module was positive. This indispensable Islamic-centred self-care approach possesses significant potential to cultivate self-resilience as well to mitigate and prevent a range of emotional and psychological challenges, including depression, anxiety, and stress, among undergraduates. Hence, this will enable them to focus on academic success and personal growth for their future contribution to societal and national advancement.

Keywords: *Islamic counselling, islamic psychology, psychospirituality, self-care, module, well-being, mental issues*.

INTRODUCTION

Despite global technological progress and improved living standards, mental health has significantly declined due to various factors. Factors such as increased software employment, occupational stress, and economic pressures have negatively impacted mental health and overall well-being (Hariharan & Kapoor, 2020). The Covid-19

pandemic has exacerbated this issue, leading to increased attention on mental health disorders (Masruri et al., 2022; Mustapha et al., 2023; Thomas & Barbato, 2020; Wong et al., 2023). Tahir (2020) contends that the prevalence of materialism, consumerism, and social media, alongside perceived threats from technological advancements, has fostered disconnection, dissatisfaction, existential crises, and increased mental health issues. Arguably, the declining influence of religion and morality as protective mechanisms has led to greater fear, insecurity, and a rise in psychological disorders, aggravated by Western cultural influences (Saper, Daud, & Ahmad, 2016). In a similar vein, Hassan (2021) asserts that challenges in societies arise from a superficial understanding of Islam, resulting in a limited application of Islamic principles in Muslim communities.

STATEMENT OF THE PROBLEM

University undergraduates are essential for national progress; however, rising stress, anxiety, and depression levels among them negatively affect their well-being and academic outcomes (Bahiroh & Madjid, 2022; Zhang, Litson, & Feldon, 2022). This issue correlates with increased college dropout rates and impedes students' emotional and social growth (The et al., 2015). Depression not only induces emotional distress but also heightens the risk of suicidal thoughts (Dein et al., 2010; Hunt & Eisenberg, 2010). Therefore, there is a critical need for effective interventions to address this crisis and lessen its impact (Amanvermez et al., 2020; Baetens et al., 2022; Luttenbacher, Breukel, & Adamson, 2021). In fact, McGorry and Mei (2018) highlight that 75% of mental health disorders manifest before age 25, with significant barriers faced by youth aged 12 to 25 in accessing mental health care.

Beames et al. (2021)indicate that timely execution of prevention and early detection programs yields positive outcomes. Nonetheless, there remains ambiguity regarding the essential elements of these interventions. Tackling mental health challenges in university students necessitates the development or refinement of youth mental healthcare models that integrate preventive and early intervention strategies (Colizzi, Lasalvia, & Ruggeri, 2020; Rith-Najarian, Boustani, & Chorpita, 2019; Shamsuddin, Yusof, & Sukor, 2022; Singh, Kumar, & Gupta, 2022). These models ought to surpass rudimentary preventive approaches by equipping students with coping mechanisms, resilience, and psychological resources essential for navigating university life and and subsequent endeavours. Nevertheless, global efforts to implement effective mental health services have been limited, primarily due to an overwhelming focus on physical health.

Nonetheless, research indicates that self-care is effective in preventing mental health symptoms (Shamsuddin et al., 2022), supported by the National Institute of Mental Health and The Society for the Advancement of Psychotherapy. It enables individuals to cultivate coping mechanisms for the complexities of the modern VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environment. Furthermore, the BANI (Brittle, Anxious, Nonlinear, Incomprehensible) framework post-Covid-19 emphasizes the necessity of self-care and coping strategies for enhancing emotional

resilience. The World Health Organization advocates self-care interventions to address increasing mental health challenges and healthcare expenditures (WHO, 2022).

Islamic psychology and counselling prioritize self-care, emphasizing holistic mental well-being over mere treatment of mental health issues. In fact, Islamic mental health perspectives incorporate preventive strategies and advocate for societal transformation through "Amr bil Maruf Nahi Munkar," enjoining good, forbidding evil (Idris, 2023). However, the exploration of self-care as an Islamic intervention remains underdeveloped (Shamsuddin et al., 2022), potentially due to the view of self-care as an individual endeavour (Ghanbari & Bahadorimonfared, 2020). Consequently, Marzband and Zakavi (2017) identify a deficiency in scholarly literature from Islamic perspectives on self-care, highlighting a critical research gap for further investigation into Islamic psychospiritual practices. Hence, this study aims to assess the effectiveness of an Islamic psychospiritual self-care module for university students, fostering resilience and effective coping mechanisms to improve their mental, psychological, and spiritual well-being, while promoting contributions to societal and national development.

Consequently, several research questions are formulated, including: What is the validity coefficient value of the module? What are the validity coefficient values of the sub-modules? What is the overall reliability coefficient value for the module? And what are the reliability coefficient values for the sub-modules?

ISLAMIC PSYCHOSPIRITUAL SELF-CARE MODULE (iPScM)

A module comprises a structured series of autonomous learning units aimed at fulfilling specified objectives (Noah & Ahmad, 2005). The Islamic Psychospiritual Self-Care Module (iPScM) exemplifies psychoeducation grounded in Russell's Module development Model (Russell, 1974). It empowers undergraduate students with coping strategies for mental health issues, including depression, anxiety, and stress, while promoting their psychospiritual well-being through Islamic psychospiritual self-care practices. The strategy's primary aim is to enhance psychospiritual attributes such as God-centeredness, the Hereafter-focused, altruism, and personal reformation.

This improvement in psychological and spiritual well-being fosters resilience to the challenges faced during undergraduate studies and the transition to adulthood; preparing them as future parents and leaders. Islamic psychospiritual self-care is crucial for both preventative measures and coping strategies, as it harmonizes emotional, mental, physical, and spiritual development while improving treatment adherence and efficacy (Ekhtiari et al., 2017).

The iPScM Module underpins al-Ghazali's Theory of the Soul (Al-Ghazali, 2015), focusing on the purification of the soul, "tazkiyatun an-nafs"; through cleansing spiritual ailments within oneself via "muhajadah al-nafs", which involves abandoning evil from the heart, "Takhalli", and cultivating spirituality and good character, "tahalli" (Hamjah, 2016). This approach fosters a serene soul by improving various aspects of well-being, ultimately drawing individuals closer to Allah SWT and

promoting a life of peace in alignment with Al-Quran and Prophetic teachings, rather than relying on secular Western solutions (Hassan, 2020).

Consequently, it is essential to meticulously adhere to module development protocols and conduct comprehensive validity and reliability assessments to ensure the development of effective modules. In this study, the researcher utilized Russell's development framework, which provides a thorough process for selecting pertinent modules, deemed the most advantageous. Russell advocates for the flexibility and modularization of existing resources, prompting the researcher to modify a pre-existing module through a careful selection process. A pilot study was executed to assess the iPScM module's effectiveness in fulfilling the research goals. Upon concluding the effectiveness assessment, the module is prepared for implementation. The subsequent diagram in Figure 1 illustrates the development process of the iPScM module according to Russell's module development model (Russell, 1974).
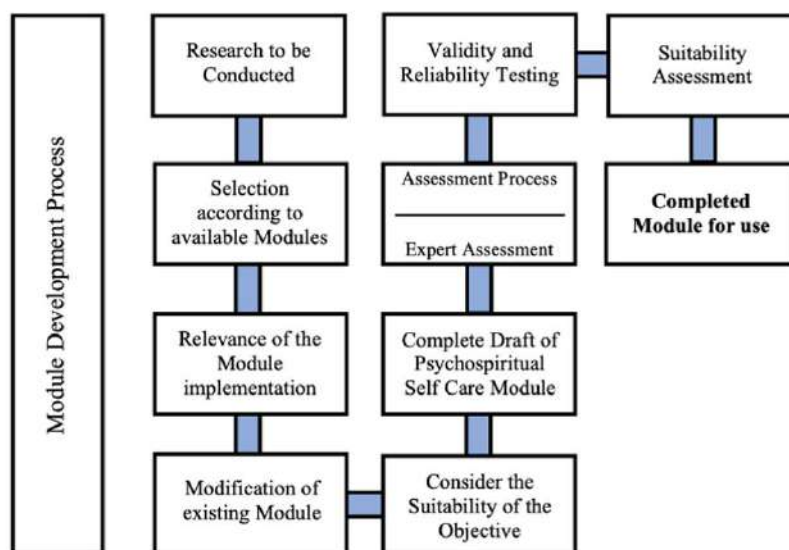

Figure 1: The module development process model for the Islamic Psychospiritual Self-Care Module
(Source adaptation of Russell Module Development Model: James D. Russell, 1974)

METHODOLOGY

This research employs a quantitative quasi-experimental design with repeated measures to assess the validity and reliability of a draft module for first-year undergraduates at the Islamic Science University of Malaysia (USIM). The objective is to derive validity values through expert questionnaires and reliability values via written responses from the sample group.

Dimopoulus and Prantis (2013), as referenced in Darusalam and Hussin (2021), stipulate the necessity of at least three experts in relevant fields for content validation. For this study, three experts in counselling, psychology, and Islamic tassawuf were selected to appraise the construct validity and module content. This included scholars

from public universities, such as an Emeritus Professor in Counselling, an Associate Professor in Islamic psychospirituality or "tassawuf", and a counselling psychology professional. The expert panel's profiles are outlined in Table 1:

Name		Position and Qualification (Lecturer/Doctor of Philosophy/Department)	Expertise
Expert 1	Universiti Sultan Abd Halim Mu'adzam Shah International Islamic Universiti (UniSHAMS), Kuala Ketil, Kedah	Prof. Emeritus Malaysian Board of Counsellors (LKM)	Counselling
Expert 2	Program of Dakwah & Islamic Management, Faculty of Leadership & Management, Universiti Sains Islam Malaysia (USIM), Nilai, Negri Sembilan	Associate Prof. USIM	Islamic Dakwah & Tassawuf
Expert 3	Faculty of Business, Economics and Social Development, Universiti Malaysia Terengganu (UMT), Kuala Nerus, Terengganu	Senior Lecturer, Universiti Malaysia Terengganu	Counselling Psychology

Table 1: Content Validity Experts for IPSCM Module

RESULTS

The Validity Of iPScM

The validity assessment for this research module involves two methodologies: i) face validity, and ii) content validity. Mahmud et al., (2022) asserts that content validity pertains to the module's capacity to accurately measure both its instrument and relevant content. While, Arip (2018) indicates that content validity can be validated by achieving a 70% threshold or above, reflecting robust validity. A score falling below 70% signifies insufficient content validity. The content validity of the questionnaire is evaluated using the formula depicted in Figure 2, as suggested by Noah and Ahmad (2005).

$$\frac{\text{Total Experts' Scores (X)}}{\text{Total Overall Scores}} \times 100\% = \% \text{ Module Content Validity}$$

Figure 2: Formula to determine Content Validity (Source: Sidek & Jamaluddin, 2005)

The content validity of this module has been assessed by three experts who evaluated material suitability, including language and sentence structure (Darusalam and Hussin, 2021). The evaluation utilized a Likert scale survey adapted from Russell (1974), ranging from one to ten, from strongly disagree to strongly agree. Successful module validity encompasses five criteria: i) meeting target demographic, ii) smooth execution, iii) timeframe adherence, iv) change-inducing potential through the four constructs used, and v) empowerment for psychospiritual well-being. Meeting these criteria signifies module success and goal attainment.

For the content validity questionnaire, each sub-construct and activity follows a format established by Arip (2018). The questionnaire assesses module suitability concerning the sub-constructs: i) God-centredness, ii) the-Hereafter-focused, iii) Care for others, and iv) Reformation. These sub-constructs are systematically linked to their corresponding activities. A semantic scale from zero (strongly disagree) to ten (strongly agree) is utilized. The resulting data underwent descriptive analysis to quantify expert consensus. The benchmark for acceptable content validity is 70%, as stated by Noah and Ahmad (2005), Arip (2018), Mahmud (2017). Data analysis focused on deriving expert agreement percentages, with a minimum acceptable content validity threshold of 70% or higher, according to Shah (2018) and designated to evaluate the module's content validity utilize a questionnaire developed by Arip (2018), based on Russell (1974). The experts' evaluations, as delineated in Table 2, revealed a minimum percentage of 93%, indicating significant suitability for application. The content items achieved a maximum percentage of 96%, demonstrating the module's capability to assess Islamic psychospiriual well-being through the four sub-constructs (Mahmud, 2017).

The findings of the study indicated an overall score of 94.8% with a content validity coefficient of .948 > .70, affirming high content validity. An evaluation of sub-constructs and activities was performed using an adapted questionnaire by Arip (2018). Table 3.8 illustrates that the overall content validity of the sub-constructs and activities is 94.5%, with a content validity coefficient of 0.945, surpassing the acceptable threshold of .70. In summary, the content validity for the sub-constructs and activities is deemed good and acceptable.

The findings of the module validity assessment carried out by the appointed experts are examined in accordance with Russell's module content validity questionnaire (Russell, 1974), which has been adapted to assess the content quality of the iPScM module. Consequently, the validity values for the comprehensive content of the iPScM module are presented in the following Table 2:

	iPSCM module Features	Percentage	Expert Evaluation
1.	The contents of iPScM meet the target demographic	93	Acceptable
2.	The contents of iPScM can be implemented smoothly	96	Acceptable

3.	The contents of iPScM adhere to the timeframe	93	Acceptable
4.	The content of iPScM has potential for change-inducing through the four sub-constructs	96	Acceptable
5.	The contents of iPScM can empower individuals for psychospiritual well-being	96	Acceptable

Table 2: Content Validity Value Based on Expert Evaluation

Table 2 illustrates that the minimum percentage value is 93% for the module content aligning with the target demographic and adhering to the designated timeframe. Conversely, the maximum percentage is 96% for module content that can be executed smoothly, possesses the capacity to foster reformative change, and enhances individuals' psychospiritual well-being. Overall, the results indicate that the content of the iPScM module is both commendable and suitable for the designated target audience.

The findings pertaining to the expert validity values based on the sessions and activities are presented in the following Table 3:

Main Module	iPScM Sub-Module/Session	Percentage	Expert Evaluation
Part A: Introduction	Session 1: Getting-to-know and Building Group Rapport	93	Accepted
Part B **Dimension 1:** God-centredness	Session 2: Introduction on Islamic Theory of the Soul and the Purpose of Creation	96	Accepted
	Session 3: Gratitude/Thinking	93	Accepted
	Session 4: Spirituality/Increase	93	Accepted
Dimension 2: Akhirah-focused	Session 5: Akhirah-focused/Supply	95	Accepted
	Session 6: Picturizing/Receiving	96	Accepted
Dimension 3: Care for others	Session 7: Contribution/Prosperity	96	Accepted
	Session 8: Communication/Forgiveness	96	Accepted

	Session 9: Positivity/Allowing	93	Accepted
Dimension 4: Reformation	Session 10: Action/Sacrifice	93	Accepted
	Session 11: Education/Success	96	Accepted
Overall		94.5	

Table 3: Expert Validity Value based on iPScM Module Sessions and Activities

Based on Table 3, the overall percentage of iPSCM module sessions and activities surpasses 90% for each session and activity. The minimum percentage of 93% pertains to the activities of building group rapport, gratitude/thinking, spirituality/increase, positivity/allowing, and action/selflessness. Conversely, the maximum percentage of 96% pertains to the module introduction on Islamic theory of the soul and the purpose for creation, contribution/prosperity, communication/forgiveness, and education/success. This indicates that the level of validity of the iPScM module is reliable. Overall, based on the feedback from the content experts on the sub-constructs of the module, it is evident that the iPScM module fulfills the specified objectives.

The Reliability Of iPScM

The assessment of module reliability is essential for ascertaining expert approval (Russell 1974). A reliability coefficient of $\alpha = 0.7$ or higher indicates module appropriateness for the intended respondents. Module reliability evaluation depends on participant comprehension of the content (Russell, 1974). Creswell and Creswell (2018) posits that module reliability assessment parallels that of questionnaires or instruments. The calculation approach is analogous, as both tools serve distinct purposes. A pilot study is executed on the module, utilizing a sample selection method that mirrors the actual research, focusing on participants with homogeneous characteristics (Noah & Ahmad, 2005).

The reliability questionnaire's item construction aligns with the module's identified objectives for each activity (Ahmad, 2002). Five objectives from the 13 activities guide the development across five sub-constructs within the module. A 10-point Likert scale is employed for the agreement scale, ranging from 0 (strongly disagree) to 10 (strongly agree), as recommended by (Arip, 2018). Data collection and descriptive analysis show a significant overall agreement of 89.45%.

Subsequently, a pilot study conducted on first-year university undergraduates at USIM, Nilai campus exhibited homogeneity with the actual research population. Hertzog (2008) advocates for a sample size of 25 to 48 for experimental design studies. Therefore, the researcher selected 30 participants who completed the Islamic Psychospiritual Self-Care Module, consisting of 9 sessions over 13.5 hours across 2 days. Following the programme, respondents filled out a reliability questionnaire for

the module. The reliability analysis employed a minimum Cronbach's Alpha coefficient of 0.70, as per Fraenkel, Wallen, and Hyn (2012). Thus, the reliability coefficient for the module was α = 0.894 (89.45%), affirming its effectiveness and suitability for the actual research.

The results of reliability evaluation predicated on iPScM module sessions and activities is conducted on respondents utilizing Cronbach's alpha analysis as follows:

Module	α Value
Islamic Psychospiritual Self-Care Module (iPScM)	.894

Table 4: Overall iPScM Module Reliability Value

Main Module	iPScM Sub-Module/Session	α Value
Part A: Introduction	Session 1: Getting-to-know and Building Group Rapport	.884
Part B **Dimension 1:** God-centredness	Session 2: Introductory Module on Islamic Theory and Purpose of Creation Session 3: Gratitude/Thinking Session 4: Spirituality/ Increase	.825
Dimension 2: Akhirah-focused	Session 5: Akhirah-focused /Supply Session 6: Picturizing/Receiving	.848
Dimension 3: Care for Others	Session 7: Contribution/Prosperity Session 8: Communication/Forgiveness	.952
Dimension 4: Reformation	Session 9: Positivity/Allowing Session 10: Action/Selflessness Session 11: Education/Success	.914

Table 5: Reliability Value of iPScM Module Sessions and Activities

According to the iPScM pilot study, the overall reliability coefficient is significantly above the .70 threshold, recorded at .894. The maximum alpha coefficient is .952 for contribution/prosperity and communication/forgiveness, while the minimum alpha coefficient is .825 for gratitude/thinking and spirituality/increase sub-constructs. The results indicate that the iPScM module can be regarded as valid and reliable, and may be employed in interventions aimed at enhancing psychospiritual well-being.

DISCUSSION

This research aims to evaluate the effectiveness of an Islamic psychospiritual self-care module (iPScM) in enhancing the psychological and spiritual well-being among university undergraduate students. The application of a self-care methodology is imperative given the surging and rapid prevalence of mental health issues, necessitating a preventive and proactive strategy through psychoeducational programmes. The iPScM module is conceived through a modification procedure by integrating and Islamicizing the module content to incorporate Islamic doctrines from the Al Quran and the teachings of the Prophet SAW into the original personal excellence curriculum. The Russell Module Development Model (Russell, 1974), which facilitates the transformation of existing materials into a modular structure, is employed as the underpinning for integrating the original personal excellence curriculum into an Islamic psychospiritual self-care module to enhance the well-being of undergraduates who are young adults contending with the prevailing mental health adversities.

Rooted in Imam al-Ghazali's Theory of the Soul (Al-Ghazali, 2015), this methodology establishes a structured framework for the purification, refinement, and disciplining of the human soul, aiming to achieve contentment and well-being in both this worldly life and the Hereafter. Both the American Psychological Association (APA) and the American Counseling Association have underscored the significance of recognizing and accepting religion as an essential aspect of counseling and psychotherapy. In fact, the Bryant (2024) recognizes religion as a pivotal factor influencing the functionality of human existence and has categorized religion in the 36th division of psychology.

The iPscM module is considered to be suitable and accurate for use in assessing the effectiveness of the module on the university undergraduate sample demographic. The module development conforms to the stages proposed by Russell (1974) and Noah and Ahmad (2005), encompassing the stage of draft preparation, the trial or pilot stage, and the module assessment stage to ascertain its effectiveness. Furthermore, a commendable module is also delineated by its capacity to evaluate three principal dimensions, namely the content validity, reliability, and effectiveness of the module (Noah & Ahmad, 2005). These dimensions facilitate the module's deployment with confidence and certainty, given its substantiated effectiveness and credibility. The content validity of this module has been established to be high and acceptable through expert evaluation of sub-modules and activities; validated by module content experts

who are authorities in their respective domains. Furthermore, the module's reliability has been confirmed to be both high and acceptable. These results align with previous studies carried out by Mahmud et al. (2022), Yurayat and Seechaliao (2021), and Saper et al. (2016) that implemented comparable content validation methodologies as those employed in the present research.

Simultaneously, a pilot study has been executed on the IPSCM module utilizing a sample that exhibits homogeneous characteristics with the actual population. The outcomes of this study have unveiled a significant degree of reliability throughout the module, sub-module, and activity. These findings correspond with prior research conducted by Rahman et al. (2021), Awang and Jais (2020), Saper et al. (2016), Mahmud (2017) which also demonstrated a high degree of reliability, thereby suggesting the efficacy of the module and its appropriateness for application in an actual study.

CONCLUSION

Consequently, the iPscM module serves as a psychoeducational approach for early intervention and resilience-building in undergraduates, thus enhancing their psychospiritual well-being. This Islamic-centered self-care approach, rooted in the doctrines of Al Quran and Sunnah, significantly aids in alleviating emotional and psychological issues like depression, anxiety, and stress.

Moreover, this research provides opportunities for future researchers to explore aspects of development and personal growth of undergraduates. The Islamic psychospiritual Self-Care Module exhibits high validity and reliability, underscoring its effectiveness in enhancing psychospiritual well-being. This research corroborates previous studies suggesting that counselling focused on the psychospiritual well-being of university students can facilitate positive changes, enabling them to concentrate on academic success and personal growth. Ultimately, such initiatives equip students with vital leadership capabilities for their professional pursuits, fostering national advancement.

REFERENCE

Book

Al-Ghazali, M. M. 2015. *Essential Iḥyāʾ ʿUlūm al-Dīn - The Revival of the Religious Sciences* (F. Karim, Trans. Vol. 3). Petaling Jaya: Islamic Book Trust (IBT).

Arip, M. A. S. M. 2018. *Pembinaan dan pengujian modul*. Selangor: I Psychology and Counselling Academy.

Creswell, J. W., & Creswell, J. D. 2018. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. Thousand Oaks: SAGE Publications Inc.

Darusalam, G., & Hussin, S. 2021. *Metodologi Penyelidikan Dalam Pendidikan: Amalan dan Analisis Kajian* (4th ed.). Kuala Lumpur: Penerbit Universiti Malaya.

Fraenkel, J. R., Wallen, N. E., & Hyn, H. H. 2012. *How to Design and Evaluate Research in Education* (8th ed.). New York: Mc Graw Hill.

Hamjah, S. H. 2016. *Pendekatan Kaunseling Spiritual Menurut Al-Ghazali*. Kuala Lumpur: Dewan Bahasa & Pustaka.

Noah, S. M., & Ahmad, J. 2005. *Pembinaan Modul Bagaimana Membina Modul Latihan dan Modul Akademik*. Serdang: Penerbit Universiti Putra Malaysia.

Russell, J. D. 1974. *Modular Instruction*. Minneapolis: Burgess Publishing Company.

WHO, W. H. O. 2022. *WHO guideline on self-care interventions for health and well-being, 2022 revision: web annex B: GRADE tables*. Geneva: World Health Organization.

Journal

Amanvermez, Y., Rahmadiana, M., Karyotaki, E., de Wit, L., Ebert, D. D., Kessler, R. C., & Cuijpers, P. (2020). Stress management interventions for college students: A systematic review and meta-analysis. *Clinical Psychology: Science and Practice, 30*(4), 423-444.

Awang, S., & Jais, S. M. (2020). Reliability of the Tazkiyatun NAFS Module. *International Journal of Academic Research in Business and Social Sciences, 10*(2), 69–82.

Baetens, I., Vanderfaeillie, J., Soyez, V., Vantilborgh, T., Meersschaut, J. V. D., Schotte, C., & Theuns, P. (2022). Subjective wellbeing and psychological symptoms of university students during the COVID-19 pandemic: Results of a structured telephone interview in a large sample of university students. *Front. Psychol, 13*, 889503.

Bahiroh, S., & Madjid, A. (2022). Group Guidance Model to Improve Students' Resilience in the Covid-19 Era. *Jurnal Basicedu, 6*(3), 5435–5446.

Beames, J. R., Kikas, K., O'Gradey-Lee, M., Gale, N., Werner-Seidler, A., Boydell, K. M., & Hudson, J. L. (2021). A New Normal: Integrating Lived Experience Into Scientific Data Syntheses. *Front Psychiatry, 12*, 763005.

Colizzi, M., Lasalvia, A., & Ruggeri, M. (2020). Prevention and early intervention in youth mental health: is it time for a multidisciplinary and trans-diagnostic model for care? *International Journal of Mental Health Systems, 14*(1), 23.

Dein, S., Cook, C. C. H., Powell, A., & Eagger, S. (2010). Religion, spirituality and mental health. *The Psychiatrist, 34*(2), 63-64.

Ghanbari, S., & Bahadorimonfared, A. (2020). Self-care from the Perspective of Islam. *Journal of Pizhuhish dar dīn va salāmat, 6*(2), 1-6.

Hariharan, K., & Kapoor, R. (2020). Impact of practicing spirituality on psychological well-being. *Indian Journal of Positive Psychology, 11*(3), 252-257.

Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. *Res Nurs Health, 31*(2), 180-191.

Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *J Adolesc Health, 46*(1), 3-10.

Luttenbacher, I., Breukel, J. S., & Adamson, M. M. (2021). The Mediating Role of Rumination in the Relationship between Loneliness and Depression in University Students during the COVID-19 Pandemic. *COVID, 1*(2), 447-457.

Mahmud, M. I., Sawai, J. P., Sawai, R. P., Mahazir, M., & Sharif, S. (2022). Content Validity of the Islamic Emotional Regulation Module. *International Journal of Academic Research in Business and Social Sciences, 12*(1), 1968–1978.

Marzband, R., & Zakavi, A. A. (2017). A Concept Analysis of Self-Care Based on Islamic Sources. *International Journal of Nursing Knowledge, 28*(3), 153-158.

Masruri, M., Borham, A. S., Rahim, M. H. A., Chakim, S., & Faiz, M. (2022). The Approach of Revelation of the Quran and al-Sunnah to Dealing with Soul and Mental Disorders After the COVID-19 Outbreak. *International Journal of Academic Research in Business and Social Sciences, 12*(8), 605-617.

McGorry, P. D., & Mei, C. (2018). Early intervention in youth mental health: progress and future directions. *Evidence Based Mental Health, 21*(4), 182-184. doi:10.1136/ebmental-2018-300060

Mustapha, R., Paris, T. N. S. T., Mahmud, M., Musa, M. S., Zaini, A. A., & Zakaria, J. (2023). Managing students' mental health: The use of NGT and FDM to generate a concrete solution. *International Journal of Asian Social Science, 11*(2), 89-100.

Rahman, M. A. A., Ghani, F. A., Mustapha, R., Suparman, S. L. H. H., Sajat, N. M., & Bohari, N. M. (2021). Validity and Reliability of Modul Islah in Managing Students at Risk. *Psychology And Education Journal, 58*(2), 8671-8679.

Rith-Najarian, L. R., Boustani, M. M., & Chorpita, B. F. (2019). A systematic review of prevention programs targeting depression, anxiety, and stress in university students. *Journal of Affective Disorders, 257*, 568-584.

Saper, M. N., Daud, N. A. M., & Ahmad, N. (2016). Kesahan dan Kebolehpercayaan Modul I-Sc (Islamic Spiritual Counseling) ke atas Pelajar Bermasalah Tingkah Laku. *International Journal of Islamic Thought, 9*, 32-43.

Singh, V., Kumar, A., & Gupta, S. (2022). Mental Health Prevention and Promotion-A Narrative Review. *Front Psychiatry, 13*, 898009.

Teh, C. K., Ngo, C. W., Zulkifli, R. A., Vellasamy, R., & Suresh, K. (2015). Depression, Anxiety and Stress among Undergraduate Students: A Cross Sectional Study. *Open Journal of Epidemiology, 5*(4), 260-268.

Thomas, J., & Barbato, M. (2020). Positive Religious Coping and Mental Health among Christians and Muslims in Response to the COVID-19 Pandemic. *Religions, 11*(10), 498.

Wong, S. S., Wong, C. C., Ng, K. W., Bostanudin, M. F., & Tan, S. F. (2023). Depression, anxiety, and stress among university students in Selangor, Malaysia during COVID-19 pandemics and their associated factors. *PLoS One, 18*(1), e0280680.

Yurayat, P., & Seechaliao, T. (2021). Effectiveness of Online Positive Psychology Intervention on Psychological Well-Being Among Undergraduate Students. *Journal of Education and Learning, 10*(4), 143-155.

Zhang, F., Litson, K., & Feldon, D. F. (2022). Social predictors of doctoral student mental health and well-being. *PLoS One, 17*(9), e0274273.

Book Section

Ekhtiari, H., Rezapour, T., Aupperle, R. L., & Paulus, M. P. (2017). Neuroscience-informed psychoeducation for addiction medicine: A neurocognitive perspective. In T. Calvey & W. M. U. Daniels (Eds.), *Progress in Brain Research* (Vol. 235, pp. 239-264): Elsevier.

Conference Papers

Hassan, M. K. (2020, 12 November). *Psychological Disorders and the Spiritual Perspective of the Qur'an and the Sunnah.* Paper presented at the The Symposium on Psychological Disabilities Organised by Counselling Centre, International Islamic University Malaysia.

Shamsuddin, F., Yusof, S. N. M., & Sukor, N. M. (2022). *Islamic Psychospiritual Self-Care as a Counselling Intervention to Enhance Well-Being of Mental Health Clients A Conceptual Paper*. Paper presented at the E-Proceeding SAIS 2022 Seminar Antarabangsa Islam dan Sains 2022, USIM, Negeri Sembilan.

Internet

Bryant, T. (2024). *The Psychology of Religion and Spirituality*. https://youtu.be/Q_kEoNXMSos

Hassan, M. K. (2021). *The Spiritual Core of the Insan Sejahtera Personality*. https://www.iium.edu.my/media/71489/THE%20SPIRITUAL%20CORE%20OF%20THE%20INSAN%20SEJAHTERA%20PERSONALITY.pdf

Idris, K. A. (2023). *Integrating Islamic Spirituality in Mental Health Treatment*. https://www.ikim.gov.my/new-wp/index.php/2023/01/31/integrating-islamic-spirituality-in-mental-health-treatment/

Tahir, R. (2020). *In Hardship and in Ease: How to Rely on God* https://yaqeeninstitute.org/read/post/how-to-rely-on-god

Thesis

Ahmad, J. (2002). *Validity, reliability and effectiveness of self-development program modules on achievement motivation among Selangor secondary school students.* (Doctor of Philosophy). Universiti Putra Malaysia, Serdang.

Mahmud, M. I. (2017). *Kesan program kerjaya psiko-pendidikan Cognitive Information Processing terhadap ketidakfungsian pemikiran kerjaya dan efikasi kendiri kerjaya pelajar di sebuah universiti awam.* (Doctor of Philosophy). Universiti Putra Malaysia, Serdang.

FACTORS AFFECTING THE POVERTY LEVEL IN DEVELOPED AND DEVELOPING COUNTRIES

Nur Syahidah Mohd Sidek[i] & Noor 'Adilah Ibrahim[ii]

[i]Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan.
[ii] (*Corresponding author*). Lecturer, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan. nooradilah@usim.edu.my

Abstract

The high rate of poverty shows that government development initiatives, especially those aimed at reducing it, have not been successful. Poverty is influenced by many physiological aspects, but different nations respond to poverty in different ways. The aimed of this study is to determine the effect of unemployment, population, gross domestic product (GDP), government spending and income per capita on poverty rate of 6 countries categorized as developed and developing countries. This study used panel data regression model from year 2010-2019 by using Stastistics and data (STATA) to generate the result for each analysis. Based on the results obtained, we found that the unemployment, GDP and income per capita are significant to poverty rate in developing countries, while for developed countries unemployment, government spending and income per capita are significant towards poverty rate. The finding is beneficial to investors to predict their poverty rate research and for country to main resilient and against any financial circumstance.

Keywords: *Poverty rate, unemployment, population, GDP, government spending, income per capita*

INTRODUCTION

Country's development is a process that aims to bring prosperity to society through economic development. For developed and developing countries, the benchmarks for the success of country's development can be seen from the economic growth, economic structure, and inequality between populations, regions, and sectors (Asrol and Ahmad ,2018). The main objective of economic development is to create the maximum growth and reduce poverty, income inequality, and unemployment. According to United Nations, the developed country is one that has a high industrial and human development index compared to other countries. Along with having a highly developed economy, it also needs a technologically advanced infrastructure. Meanwhile, developing country is one that has a low standard of life, a lack of industrial development, and a moderate to low Human Development Index (HDI). Poverty is a rising issue influenced by various factors including number of populations,economic growth, unemployment, government spending and Income per capita. This issue has not been resolved optimally due to various and complex causes of poverty.

As stated by United Nations, it has been observed that poverty has increased in developed countries, particularly in Europe. Over 300 million people were predicted to be living in poverty in industrialized nations in 2012 by the International Labor Organization. This increase is related to the large influx of migrants into Europe in recent years. The effects of poverty are greatest on women and children. More than half of all children under 15 live in extreme or moderate poverty in emerging and developing nations. 36 percent of children worldwide live in wealthy nations below the relative poverty level (United Nations).

According to American Psychological Association, there are other factors that affect poverty level such as population, economic growth, government spending and income per capita. In developed and developing countries, poverty has been a major focus of research in the past study. Despite decades of improving economic development, poverty remain a formidable challenge to the government and international community. This indirectly has induced a severe long-term impacts on the economy, including high rates of youth unemployment globally.

Therefore, the aim of this study is to measure the relationship between unemployment, population, economic growth, government spending, income per capita and poverty rate in developed and developing countries by using panel data regression analysis. The data consist of 6 developing countries and 6 developed countries from year 2010 until 2019. All the data from the world bank and Our World in Data. The finding of this study may benefit researchers especially people in developed and developing countries to analyze the factors effecting the poverty level in developing countries. Even though there still have limitations and problems in this study, but it may be useful for others and may inspire deeper insights research on this topic.

Research on the relationship between unemployment and poverty in Indonesian countries has been conducted and examined by Feriyanto et al (2020). Using panel data regression, the analysis revealed that the unemployment had a significant and negatively relationship with poverty rate. The study by Muhammad and David (2015) also concluded that even though Nigeria was ranked 158th on the list of the most developed countries in the world, unemployment was a major contributor to poverty in the country because of Nigeria had a relatively high standard of living. The same case is also examined by Oriaifoh and Omagbon (2016) in Nigeria. According to research, Nigeria is the strongest economic country in Africa. Eventhough Nigeria's economy is expanding rapidly, many issues remain unsolved, including high unemployment, inequalities in income, and poverty.

The other study Asymmetric impact of inflation and unemployment on poverty in Pakistan was conducted by Meo et al (2018) in Pakistan. The ARDL method was utilised in this research study, and data were collected from each of Pakistan's states. The findings of the research indicate that there is a significant relationship between unemployment, inflation, and the reduction of poverty. The high unemployment rate contributes to a significant income disparity between individuals, which in turn results in significant socioeconomic inequality.

Research on the relationship between population and poverty in Uganda countries has been examined by Klasen et al (2013). Using panel data regression, the analysis revealed that the population had a insignificant and negatively relationship towards poverty rate. Meanwhile, according to Ukpong (2013) population growth has a positive and significance on poverty in Nigeria by using Ordinary Least Square (OLS). This can be supported by Asrol and Ahmad (2018) discovered that population has a positively significant effect poverty in Indonesia and Bengkulu, respectively. Both studies use multiple regression analysis. These studies stated that increasing in large numbers of people living in an area, along with a high level of education and other available human resources, can lead to increased levels of labour productivity, which can help lower levels of poverty. Hence, from these five finding studies, the major result which is the population significant effect to poverty.

The relationship between poverty and economic growth has been examined by many studies. For example, Agrawal (2015) stated in his study, economic growth has a negative and significant effect on poverty by using econometric regression analysis in Kazakhstan. Economic growth helped reduce poverty by increasing employment and higher real wages. However, Feriyanto (2020) stated that economic growth had negative and significant to poverty in urban and rural area in Indonesia. Thus, it can be concluded that this study is expected to get negative and insignificant effect between economic growth and poverty based on major finding from these six journals.

Some previous study assess relationship between poverty and government spending such as Anderson et al. (2018) with Meta-regression Analysis method to measure relationship between government spending and income poverty with focus on low and middle countries. The result indicated that government spending negatively significant effect to poverty. The study from Yusri (2020) with Synthetic Control Method (SCM) method in Aceh, Indonesia also identified government spending negative and statistically significant to poverty.

Furthermore, Mehmood and Sadiq (2010) found that government spending negative and insignificant effect to poverty. This study using ECM model Johnson Cointegration model. The study also supported by Alamanda (2020) indicate that the government spending has a negative correlation not significant effect to poverty. These studies use panel data to measure different types of government spending effect to poverty in Indonesia and time series data to measure the impact government spending on poverty reduction in Pakistan, respectively. Another study by Asrul and Ahmad (2018) stated a negative and insignificant relationship between government spending and poverty by using multiple regression Analysis in Indonesia. Thus, it can be summarized that this study is expected to get negative and insignificant effect between government spending and poverty based on major finding from these journals.

Many researchers had examined the relationship between poverty and income per capita as proof like Islam et al. (2017) stated that income per capita has positive and significant effect to poverty by using Ordinary Least Square (OLS) method in

Rokan Hulu Regency, Indonesia, and Pakistan, respectively. Meanwhile, the study by Araujo et al (2017) which is to measure income concentration effects on poverty in Brazil identified a result negatively significant. This can be supported by Park and Mercado (2015) and Tombolotutu (2018) indicate income per capita negative and significant by using the Generalized Method of Moments (GMM) and panel data analysis, respectively. Hence, it can be concluded that this study is expected to get negative and significant effect between income per capita and poverty based on major finding from these five previous studies.

METHODOLOGY

The dataset in this empirical study consists of 6 countries which are Brazil, Australia, Malaysia, South Africa, Mexico and Turkey from each continent in developing countries. Meanwhile, the developed countries chosen are Japan, Mauritius, United States, France, Chile and New Zealand. We use 10-years time period from 2010 to 2019 for both developing and developed countries. All data are collected from the World Bank data and Our World in Data.

Multicollinearity

A model could have issues with multicollinearity if the variables have a strong correlation with one another. We use Variance Inflation Factors (VIF) test to assess the possible multicollinearity problem, where VIF > 10 is considered high risk of multicollinearity.

Panel Data Analysis

Since we have six different countries involved, Panel Data Analysis is appropriate. The findings of each analysis in this study were generated using STATA. There are three different models of Panel Data Analysis which are Pooled OLS, Fixed Effect and Random Effect.

a) Pooled OLS Regression Model:

$$POV_{it} = \beta_0 + \beta_1 UNEM_{it} + \beta_2 LNPOPU_{it} + \beta_3 GDP_{it} + \beta_4 GOVER_{it} + \beta_5 LNINCO_{it} \quad (1.1) + u_{it}$$

where
$POV_{it} =$ poverty rate
β_i where $i = 1, \dots, 5$, are the estimated coefficient of independent variables
$UNEM_{it} =$ unemployment rate
$LNPOPU_{it} =$ log of population rate
$GDP_{it} =$ Gross Domestic Product
$GOVER_{it} =$ government spending

$LNINCO_{it}$ = log of income per capita
u_{it} = the error terms

b) Fixed Effect Model:

There are two versions of the Fixed Effect Model, namely the Within-groups Fixed Effect and the Least Square Dummy Variable (LSDV) variables. Firstly, the least square dummy variable (LSDV) Fixed Effect. This model allows for heterogeneity among subjects by allowing each entity to have its own intercept value. Meanwhile, the within group fixed effect model is able to eliminate the fixed effect. According to Nwakuya and Ijomah (2017), the LSDV is the simplest method of isolating individual or time-specific effect in a regression model.

On the other hand, one of its drawbacks is that it is not feasible when the number of explanatory variables is high. It is common practise to use the within-group fixed effect model when attempting to estimate a model with a large number of individuals. The effect of variables that do not vary over the time period cannot be determined using the fixed effect estimator since it is dependent on the within variations. However, if there a large number of individuals (N), using the LSDV method directly is not a practical proposition, given the need for a large number of dummy variables.

Hence, this study used Within -groups Fixed Effect Model given as:

$$POV_{it} = \beta_0 + \beta_1 UNEM_{it} + \beta_2 LNPOPU_{it} + \beta_3 GDP_{it} + \beta_4 GOVER_{it} + \beta_5 LNINCO_{it} \qquad (1.2)$$
$$+ u_{it}$$

c) Random Effect Model

According to Stephen (2011), the random effects model is an alternate technique for estimating a model. The constants for each section are handled as random parameters rather than fixed ones in the random effects method, which is different from the traditional fixed effects approach. Hence, the variability of the constant for each section comes from:

$$POV_{it} = \beta_{0i} + \beta_1 UNEM_{it} + \beta_2 LNPOPU_{it} + \beta_3 GDP_{it} + \beta_4 GOVER_{it} + \beta_5 LNINCO_{it} \qquad (1.3)$$
$$+ u_{it}$$

Instead of treating β_0 as fixed, we assume that it is a random variable and can be expressed as

$$\beta_{0i} = \beta_0 + \epsilon_i$$

where ϵ_i is a random error term. Thus, we have

$$POV_{it} = \beta_0 + \beta_1 UNEM_{it} + \beta_2 LNPOPU_{it} + \beta_3 GDP_{it} + \beta_4 GOVER_{it} + \beta_5 LNINCO_{it} + u_{it} + \epsilon_i$$

$$POV_{it} = \beta_0 + \beta_1 UNEM_{it} + \beta_2 LNPOPU_{it} + \beta_3 GDP_{it} + \beta_4 GOVER_{it} + \beta_5 LNINCO_{it} + w_{it} \quad (1.4)$$

where

$$w_{it} = \epsilon_i + u_{it}$$

In general, the fixed effects model implies that each country differs in its intercept term, while the random effects model assumes that each country differs in its error term. It stands to reason that the fixed effects model will perform better when the panel is complete (including all available cross-sectional data). The random effects model may be more applicable in other situations where there are few observations of the existing cross-sectional units in the sample. Random effect model assume that the slope coefficient is constant, but the intercept varies over firms and over time.

Test
a) Hausman Test
Based on Gujarati and Porter (2009), the Hausman test is being tested to assist in making a choice between fixed effect model and random effect model to be applied in this study.

H_0 : Fixed Effect Model and Random Effect Model estimators do not differ substantially.
H_1 : Fixed Effect Model and Random Effect Model estimators do differ substantially.

H_0 refers to random effects while H_1 refers to fixed effects. If the null hypothesis is rejected, then the fixed effect model is more appropriate. If the null hypothesis is accepted, the random effect model will be more appropriate to use in this study.

b) Breusch Pagan Test
According to Gujarati (2009) stated that Breusch Pagan test is to test the hypothesis that there are no random effects. Thats means this test follow these hypotheses:

H_0 : There are no random effects.
H_1 : There are random effects.

If the p-value is less than 5%, then the study can reject the null hypothesis, H_0. This means random effect model is appropriate. If the null hypothesis is failed to reject, the study does not have random effect.

RESULTS AND DISCUSSION
Descriptive Statistics
Several statistical tests are utilised in this part to examine the distribution of data that describe the factors affecting poverty rate in developed and developing countries.

Table 4.1.1 :Summary Data for developing countries

Variable	POV	UNEM	LNPOPU	GDP	GOVER	LNINCO
Mean	4.3092	9.7167	17.9896	3.2771	16.0086	9.2408
Std. Dev	6.4275	7.7854	0.7585	2.5829	3.1576	0.7023
Min	0.0052	2.8800	16.9080	-3.5458	11.4052	8.3656
Max	19.6718	28.4700	19.1747	11.2001	20.3793	10.8953

Table 4.1.2 :Summary Data for developed countries

Variable	POV	UNEM	LNPOPU	GDP	GOVER	LNINCO
Mean	0.5188	6.4768	17.0573	2.4704	17.4562	10.0758
Std. Dev	0.3494	2.0889	1.9303	1.3814	3.7528	0.6354
Min	0	2.4000	14.0390	0.0238	11.9135	8.8042
Max	1.2499	10.3500	19.6095	6.1109	24.1259	10.9227

For developing countries, the average poverty rate (Mean) is 4.3092, and the Standard Deviation is 6.4275, the minimum is 0.0052, the maximum is 19.6718 while developed countries the average poverty rate (Mean) is 0.5188, and the Standard Deviation is 0.3494, the minimum is 0.0000 and the maximum is 1.2499..For independent variable, the average unemployment (Mean) is 9.7167, and the Standard Deviation is 7.7854, the minimum is 2.8800, the maximum is 28.4700 in developing countries but for developed countries the average unemployment (Mean) is 6.4768, and the Standard Deviation is 2.0889, the minimum is 2.4000, the maximum is 10.3500. Meanwhile, For ln population variable in developing countries, the average (Mean) is 17.9896, and the Standard Deviation is 0.7585, the minimum is 16.9080 and the maximum is 19. 1747. For GDP, the average (Mean), standard deviation, minimum and maximum are 3.2771,2.5829,-3.5458 and 11.2001 respectively. For ln population variable in developed countries, the average (Mean) is 17.0573, and the Standard Deviation is 1.9303, the minimum is 14.0390 and the maximum is 19. 6095.For GDP, the average (Mean), standard deviation, minimum and maximum are 2.4704,1.3814,0.0238 and 6.1109 respectively. Government spending in developing countries also stated that result for mean, standard deviation, minimum and maximum are 16.0086,3.1576,11.4052 and 20.3793 respectively meanwhile government spending in developed countries stated that result for mean, standard deviation, minimum and maximum are 17.4562,3.7528,11.9135 and 24.1259 respectively. Finally for ln income per capita variables, the mean is 9.2408, standard deviation is 0.7023, minimum is 8.3656 and maximum is 10.8953 and for developed countries, ln income per capita variables, the mean is 10.0758, standard deviation is 0.6354, minimum is 8.8042 and maximum is 10.9227.

In addition, since none of the coefficients in Tables 4.1.3 and 4.1.4 demonstrate a serious correlation between the independent variables, this study includes all of the independent variables in the regression. Additionally, multicollinearity was analyzed and evaluated in this study. When the independent variables in the regression model have a high correlation with one another, a concept known as multicollinearity might

occur. The results of the variance inflation factor (VIF), which are presented in tables 4.1.5 and 4.1.6, demonstrate that both developed and developing countries have values that are less than 10, which means that there is no multicollinearity detected among the independent variables. Hence, the result of VIF further approved the inclusion of all variables into the model.

Table 4.1.3 :Correlation Matrix developing countries

	POV	UNEM	LNPOPU	GDP	GOVER	LNINCO
POV	1.0000					
UNEM	0.9225	1.0000				
LNPOPU	0.1027	0.0825	1.0000			
GDP	-0.3621	-0.3011	-0.2497	1.0000		
GOVER	0.4709	0.5519	0.0390	-0.487	1.0000	
LNINCO	-0.4829	-0.4326	-0.4763	0.0013	0.2684	1.0000

Table 4.1.4 :Correlation Matrix developed countries

	POV	UNEM	LNPOPU	GDP	GOVER	LNINCO
POV	1.0000					
UNEM	-0.4834	1.0000				
LNPOPU	0.3402	-0.1241	1.0000			
GDP	0.1143	0.0862	-0.5114	1.0000		
GOVER	-0.4558	0.2102	0.2532	-0.583	1.0000	
LNINCO	0.3428	-0.2114	0.7301	-0.502	0.5374	1.0000

Table 4.1.5 :Variance Inflation factor(developing countries)

Variable	VIF	1/VIF
UNEM	3.97	0.2521
LNPOPU	1.84	0.5432
GDP	1.41	0.7089
GOVER	3.85	0.5432
LNINCO	3.97	0.2517
Mean VIF	3.01	

Table 4.1.6 :Variance Inflation factor(developed countries)

Variable	VIF	1/VIF
UNEM	3.64	0.2744
LNPOPU	2.88	0.3469
GDP	2.65	0.3769
GOVER	2.09	0.4787
LNINCO	1.36	0.7341
Mean VIF	2.53	

Panel Regression Analysis

Model panel data is used to meet the first and second objective of the study which are to identify the relationship between poverty rate, unemployment, population, gdp,government spending and income per capita in both developing countries and developed countries.

Table 4.2.1: Panel regression Analysis (developing countries)

	POV		
	Pooled OLS	RANDOM	FIXED
UNEM	0.6676	0.6676	0.2995
	(0.000)*	(0.000)*	(0.000)*
LNPOPU	-0.6837	-0.6837	0.3894
	(0.223)	(0.218)	(0.875)
GDP	-0.3338	-0.3338	0.1679
	(0.023)*	(0.019)*	(0.002)*
GOVER	0.0183	0.0183	0.2533
	(0.925)	(0.924)	(0.180)
LNINCO	-1.5903	-1.5903	0.0521
	(0.076)	(0.071)	(0.960)
Constant	25.6180	25.6180	-10.6926
	(0.100)	(0.094)	(0.822)
Countries(effect)			
Malaysia		-1.59E-11	
Australia		3.45E-11	
Brazil		-6.34E-12	
South Africa		1.27E-10	
Mexico		2.11E-10	
Turkey		-3.50E-10	
F-test	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = (0.000)*(OLS vs Random)		
Hausman test		p-value =(0.000)*(Random vs Fixed)	
R-squared	0.8744	0.8744	0.7609

Note: *significance at 5% level

Table 4.2.2: Panel regression Analysis (developed countries)

	POV		
	Pooled OLS	RANDOM	FIXED
UNEM	-0.2465	-0.2465	-0.0632
	(0.089) **	(0.083) **	(0.017) *
LNPOPU	-0.0068	-0.0068	-1.1595
	(0.764)	(0.763)	(0.146)
GDP	0.0063	0.0063	0.0185
	(0.240)	(0.814)	(0.396)
GOVER	-0.0772	-0.0772	-0.0269
	(0.000)*	(0.000)*	(0.478)
LNINCO	0.4383	0.4383	-0.9473
	(0.000)*	(0.000)*	(0.000)*
Constant	-2.2901	-2.2901	30.6742
	(0.000)*	(0.000)*	(0.000)*
Countries(effect)			
Japan		9.82E-13	
USA		1.40E-12	
Mauritius		1.23E-12	
Chile		-2.75E-12	
France		-1.36E-12	
New Zealand		5.05E-13	
F-test	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = (0.000)* (OLS vs Random)		
Hausman test		p-value =(0.000)*(Random vs Fixed)	
R-squared	0.7126	0.7126	0.0972

Note: *significance at 5% level**significance at 10 % level

The result in Table 4.2.1 shows that in developing countries, for the pooled OLS model, the variable unemployment and GDP is significant at 5% significance level but ln population, government spending and income per capita are not significant at 5 % significance level. F test value is significance and value shows 87.44% of the independent variables are explaining the dependent variable. The result in Table 4.2.2 shows that in developed countries, for the pooled OLS model, the variable unemployment, government spending and ln income per capita are significant at 5% significance level but ln population and GDP are not significant at 5 % significance level.

In table 4.2.1 the common intercept value is 26. 6180.The intercept value for 6 countries are stated in the random table. The random effect for each countries in developing countries like Malaysia, Australia,Brazil,South Africa ,Mexico and Turkey stated that the intercept value are -1.59e-11,3.45e-11,-6.34e-12,1.27e-10,2.11e-10 and -

3.50e-10 respectively or 15.3220,-1.6219,-29.2339,-6.5478,-4.2644 and -19.5140. Firstly, for Malaysia has intercept value 15.3220 lower than common intercept 26.6180, the actual intercept value is (26.6080-15.3220) or 11. 2959.For other countries the calculation actual intercept value is the same like Malaysia and the value for each country are 6.2399, -2.6159,13.1658,10.8824 respectively. For developed countries the common intercept value is-2.2901. The intercept value for each country like Japan, United States, Muritius, Chile, France and New Zealand stated that coefficient effect are 9.83e-13,1.40e-12,1.23e-12, -2.75e-12,1.36e-12 and 5.05e-13 accordingly. To make easier calculation, the value intercept for each country is 13.7207, -8.1944,-8.6565,-19.4752,-8.3031and 0.7273. The intercept value for Japan is higher by 9.83e-13 than common intercept value -2.2901, the actual intercept value is (-2.2901+13.7207) or 11. 4306.For other countries like United states, Mauritius, Chile and France the actual value for each countries by the same calculation in Japan the study identified the value are -10.4845,-10.9466,-21.7653,-10.5933 respectively . For New Zealand the actual intercept value is (-2.2901-0.7273) or -3.0174 because the intercept value for this country is lower than the common intercept. The existing of intercept value for six countries which is differential intercept make differentiate between other model which are pooled OLS and fixed random effect.

The F test score, which indicates significance, demonstrates that 71.26% of the independent variables explain the dependent variable. As a result, the developing model and developed model are both appropriate for the analysis. However, because the dataset consists of panel data, further analysis is required to measure the individual effect of the cross-sectional analysis. To determine whether there is a random effect, the Lagrange Multiplier (LM) test of Breusch and Pagan (1980) is employed.

Both random and fixed effect models are compared to OLS to evaluate which model can increase the goodness of fit while simultaneously reducing measurement error. In Breusch Pagan Lagrance Multiplier test, the null hypothesis is there are no random effects and alternative hypothesis is there are random effects. Based on Table 4.2.1 and 4.2.2 the null hypothesis is rejected since the LM test probability value is 0.000, which is less than 5% significant level. This means, both model in developed and developing countries have random effects and so the random effect model is recommended.

Since this study use of panel data that may contain cross-sectional, time-series, or both effects, it is necessary to perform some crucial tests to deal for the possibility of heterogeneity or individual effects. These effects can be either fixed or random. To verify the situation, Hausman test will be conducted by contrasting the random effect model to a fixed effect model. The result for Hausman test is as in Table 4.2.1 and 4.2.2 indicates that the fixed effect model is more appropriate in both developed and developing model for this dataset since the p-value is less than 5%, hence the null hypothesis be rejected.

From the Lagrange Multiplier (LM) test of Breusch and Pagan, the result stated that the random effect model is recommended and for result hausman test, the result

stated that the fixed model is more appropriate for both developed and developing countries. From these two results, the fixed effect model is more appropriate.

Through the result, the fixed-effect Model for developing countries is as follows:

$$POV_{it} = -10.6926 + 0.2996UNEM_{it} + 0.3894LNPOPU_{it} + 0.1679GDP_{it}$$
$$+0.2533GOVER_{it} + 0.0521LNINCO_{it}$$

(0.1)

The fixed-effect Model for developed countries is as follows:

$$POV_{it} = 30.6742 - 0.0632UNEM_{it} - 1.1595LNPOPU_{it} + 0.01846GDP_{it}$$
$$-0.0269GOVER_{it} - 0.9474LNINCO_{it}$$

(0.2)

The results of the fixed effect model for developing countries are presented in Table 4.2.1. At the 5% and 10% significant level, the variables unemployment, GDP, and Ln Income per capita are significant, whereas Ln population and government spending are not significant. The F-value is significance and the R-squared identifies 76.09% of the independent variables could explained the dependent variable. Despite the that Ln Population and government spending are not significant, this study would like to continue with diagnostics testing in order to test the goodness of the model.

In addition, the results of table 4.3.4 show that for developed countries, the variables unemployment and Ln Income per capita are significant at the 5% significant level, but Ln population, GDP, and government spending are not significant. The F-value is a measure of statistical significance, and the R-squared coefficient determines that 9.72% of the independent variables could be relevant for explaining the dependent variable. Despite the fact that Ln Population and government spending are not significant, this study would still like to proceed with diagnostics testing in order to assess how reliable the model is. The problems of autocorrelation and heteroskedasticity will be examined in this study's diagnostic tests. These tests will be conducted on both developed and developing countries.

Firstly, the Wooldridge test has been implemented in panel-data models in order to examine the possibility of serial correlation. As Wooldridge's method uses the residuals from a regression in first differences, the result in developing countries shows that the null hypothesis of no first-order autocorrelation is rejected with a p-value of 0.000, which is less significance level is less than 5%. As a result, this study has first-order autocorrelation. Meanwhile, the findings indicate that the null hypothesis that there is no first-order autocorrelation cannot be rejected for developed countries because of the p-value of 0.1373, which is more than 5% significant. This is shown by the fact that the null hypothesis cannot be rejected. As a result, this model has no first-order autocorrelation.

Finally, a modified Wald test is used to determine whether groupwise heteroskedasticity present in the residuals of the fixed effect regression. The p-value for the Wald test in developing countries is 0.000, while the p-value in developed countries is 0. 0071.Based on these confidence level, this also leads to a significant rejection of the null hypothesis. As a result, unrestricted heteroskedasticity exists in

these data, which confirms that heteroskedasticity problem for both developed and developing countries.

Table 4.2.3: Fixed Effect Model with FGLS regression (developing countries)

Independent Variable	FIXED
UNEM	0.6676
	(0.000)*
LNPOPU	-0.6837
	(0.194)
GDP	-0.3338
	(0.014)*
GOVER	0.0183
	(0.920)
LNINCO	-1.5903
	(0.057)**
Constant	25.6180
	(0.077)**
Wald test	0.0000*
Panels	Homokedastic
Estimated autocorrelations	0

Note: *significance at 5% level,**significance 10 %

Table 4.2.4: Fixed Effect Model with FGLS regression (developed countries)

Independent Variable	FIXED
UNEM	-0.0246
	(0.068)**
LNPOPU	-0.0068
	(0.750)
GDP	0.0063
	(0.804)
GOVER	-0.0772
	(0.000)*
LNINCO	0.4383
	(0.000)*
Constant	-2.2901
	(0.000)*
Wald test	0.0000*
Panels	Homokedastic

Estimated autocorrelations	0

According to the results of the diagnostics tests, the fixed effect model for developing countries had two significant issues, namely a serial correlation problem and a heteroskedasticity problem, whereas the fixed effect model for developed countries just had a heteroskedasticity problem. In order to prevent producing spurious findings, it is necessary to discover solutions to the issues of autocorrelation and heteroskedasticity. As a result, to overcome the problems brought by the fixed Model, a fixed GLS regression was carried out, and the outcomes are presented in Tables 4.2.3 and 4.2.4.

After resolving through the problems of serial correlation and heteroskedasticity, tables 4.2.3 and 4.2.4 present the Fixed effect Model in their respective tables. After corrections, the coefficients for all of the variables in developing countries are significant, with the exception of Ln population and government spending, both of which were found to be insignificant. The corrected this Model also has significance values with no autocorrelation and homoscedasticity problem detected.

Therefore, the model is good for further elaboration. The final results for Fixed Effect Model is as follows:

$$POV_{it} = 25.6180 + 0.6676UNEM_{it} - 0.6837LNPOPU_{it} - 0.3338GDP_{it} \\ + 0.0183GOVER_{it} + 1.5903LNINCO_{it}$$
(0.3)

For developed countries, the coefficient for all variables are significant except of Ln population and GDP which were insignificance after corrections have been made. The corrected this Model also has significance values with no autocorrelation and homoscedasticity problem detected. Therefore, the model is good for further elaboration. The final results for Fixed Effect Model is as follows:

$$POV_{it} = -2.2901 - 0.0246UNEM_{it} - 0.0068LNPOPU_{it} + 0.0063GDP_{it} \\ - 0.0772GOVER_{it} + 0.4383LNINCO_{it}$$
(0.4)

The final Fixed effect Model reveals that the coefficients for developing countries have mixed magnitudes. Only two of the variables, namely unemployment and government spending, have magnitudes that are positive, whereas the remaining variables all have magnitudes that are negative (ln population, GDP and ln Income Per Capita). The positive magnitudes show that the increment in the 1% unit of unemployment and the spending by the government will both contribute to an increase in the poverty rate of 66.76% and 1.83% respectively. On the other hands, 1% increments in ln population, GDP and ln Income per capita will reduce poverty rate by 68.37%, 33.38% and 159.03% respectively.

For developed countries, the final Fixed effect Model reveals that the coefficients have mixed magnitudes. Only two of the variables, namely Gross Domestic Product and ln Income per capita, have magnitudes that are positive, whereas the remaining variables all have magnitudes that are negative (unemployment, ln population and government spending). The positive magnitudes show that the increment in the 1% unit of gross domestic product, and ln income per capita will both contribute to an increase in the poverty rate of 0.63% and 43.83% respectively. On the other hands, 1% increments in unemployment population, and government spending will reduce poverty rate by 2.46%, 0.63% and 7.72% respectively.

To summarize, the studies made in developing countries indicates that unemployment significant and positive effect to poverty but for developed countries, unemployment is significantly negative effect to poverty. In developing countries, the result is in line with study by Meo et.al (2018). This implies that an increase in unemployment will lead to a waste of labor resources as well as a reduction in revenue. The decrease in revenue tends to reduce the extent to which the requirements and wants of the economy may be met. Consequently, the level of poverty is likely to increase.

Meanwhile, the result in developed countries supported by Feriyanto et.al (2020). The author indicated that the government need to work on lowering the unemployment rate. The implementation of a strategy aimed at increasing the number of job possibilities, followed by increased labor absorption, will influence the overall rate of unemployment. For population, both developed and developing countries stated result negatively insignificant effect to poverty. This result is line with study by Asrol and Ahmad (2018). They stated that if there is not an accompanying development in other areas of the economy that are able to boost the standard of living for the country's population, then a reduction in population growth will not be enough to bring about a reduction in the level of poverty there.

Next, for GDP variables, the result revealed that GDP negatively significant to poverty in developing countries and the result in line with study Feriyanto(2018) that discovered if the real GDP can be increased by a large amount, this would generate a stronger investment climate, which will open up greater job possibilities, boost welfare, and decrease poverty in the provinces of Indonesia. But for developed countries GDP positively insignificant to poverty as growth should be increased through the creation of a conducive investment climate and labour-intensive environment (Asrol,2018). The result stated that government spending negatively significant to poverty in developing countries. Thus, the result aligned with the previous study that when increase the infrastructure spending tend to decrease poverty level (Alamanda,2020).

While in developed countries the result revealed government spending positively insignificant to poverty. Government spending associated with a suitable source of funding, specialised subsidies for a specified time period, are effective and productive. It may boost private investment, employment prospects, and human

capital by investing in health and education, which decreases poverty (Mehmood ,2010). Lastly, income per capita in developing countries showed that income per capita negatively significant to poverty but for developed countries the result stated income per capita positively effect to poverty. These finding aligned with study Tobolotutu et.al(2018) mention that not only are aspects of a country's revenue capacity related to poverty levels, but also the equitable distribution of a region's public money is linked to poverty levels.

CONCLUSION

This study is carried out to measure the relationship between unemployment, population, economic growth, government spending, income per capita and poverty rate. As explained previously, this study uses five variables to indicate the factors affecting poverty rate in developed and developing countries, which are unemployment, population, economic growth, government spending, income per capita. From this study suggests all of the variables namely unemployment, GDP and ln income per capita are significantly giving impact to poverty rate in various magnitude in developing countries. Except ln population and government spending. In developed countries, all of the variables namely unemployment, government spending and ln income per capita are significantly giving impact to poverty rate in various magnitude. Except ln population and GDP.

The study has a few limitations, which are subject to future improvement. Firstly, the data is slightly limited to get pre and post covid. Due to this limitation, this study cannot do further, and the data only get from year 2010 until 2019 only. Lastly, there are many more factors that will affect poverty, but this study failed to include factor like education because of limitation data.

Based on this finding study, the following recommendation are made. The subsequent research could be carried out on post-covid 19 data over a longer period of time, which would allow for the completion of a more comprehensive investigation. In addition, additional independent variables that impact poverty, such as inflation and climate change, can be included to the research in order to make it more comprehensive in the future.

In general, the findings of this research provided an answer to the questions that were posed in Chapter 1 on the factors that affect the levels of poverty in developed countries and developing countries. The data will be helpful to investors in their research of the factors that influence the poverty and impact the level of poverty. In addition, the outcomes of the variable might be of assistance to the nations in monitoring the extent to which they are exposed to rates of poverty in order to guarantee their continued existence.

REFERENCE

Agrawal, P. (2007). Economic growth and poverty reduction: Evidence from Kazakhstan. *Asian Development Review*, 24(2), 90.

Alamanda, A. (2020). The effect of government expenditure on income inequality and poverty in Indonesia. *Info Artha*, 4(1), 1-11.

Anderson, E., d'Orey, M. A. J., Duvendack, M., & Esposito, L. (2018). Does government spending affect income poverty? A meta-regression analysis. *World Development*, 103, 60-71.

Araujo, J. A., Marinho, E., & Campêlo, G. L. (2017). Economic growth and income concentration and their effects on poverty in Brazil. *CEPAL Review*.

Asrul, A., & Ahmad, H. (2018). Analysis of factors that affect poverty in Indonesia. *Revista Espacios*, 39(45).

Feriyanto, N., El Aiyubbi, D., & Nurdany, A. (2020). The impact of unemployment, minimum wage, and real gross regional domestic product on poverty reduction in provinces of Indonesia. *Asian Economic and Financial Review*, 10(10), 1088-1099.

Islam, R., Ghani, A. B. A., & Mahyudin, E. (2017). Carbon dioxide emission, energy consumption, economic growth, population, poverty and forest area: Evidence from panel data analysis. *International Journal of Energy Economics and Policy*, 7(4), 99.

Klasen, S., & Lawson, D. (2007). *The impact of population growth on economic growth and poverty reduction in Uganda* (No. 133). Diskussionsbeiträge.

Mehmood, R., & Sadiq, S. (2010). The relationship between government expenditure and poverty: A cointegration analysis. *Romanian Journal of Fiscal Policy (RJFP)*, 1(1), 29-37.

Meo, M. S., Khan, V. J., Ibrahim, T. O., Khan, S., Ali, S., & Noor, K. (2018). Asymmetric impact of inflation and unemployment on poverty in Pakistan: new evidence from asymmetric ARDL cointegration. *Asia Pacific Journal of Social Work and Development*, 28(4), 295-310.

Muhammad, U. F., & David, J. (2019). Relationship Between Poverty and Unemployment in Niger State. Signifikan: Jurnal Ilmu Ekonomi. Vol. 8(1): 71 – 78

Oriaifoh, A. E. C. L., & Omagbon, P. (2016). Poverty and unemployment and corruption in Nigerian public sector. *IIARD International Journal of Economics and Business Management.* ISSN 2489-0065, 2(2).

Park, C. Y., & Mercado, R. (2015). Financial inclusion, poverty, and income inequality in developing Asia. *Asian Development Bank Economics Working Paper Series*, (426).

Škare, M., & Družeta, R. P. (2016). Poverty and economic growth: a review. *Technological and Economic development of Economy*, *22*(1), 156-175.

Tombolotutu, A. D., Djirimu, M. A., Lutfi, M., & Anggadini, F. (2018, May). Impact of life expectancy, literacy rate, opened unemployment rate and gross domestic regional income per capita on poverty in the districts/city in Central Sulawesi Province. In *IOP Conference Series: Earth and Environmental Science* (Vol. 157, No. 1, p. 012058). IOP Publishing.

Ukpong, I. G. (2013). Cointegration inferences on issues of poverty and population growth in Nigeria. Journal of Development and Agricultural Economics, 5(7): 277 – 283.

Yusri, A. (2022). Does Government Expenditure Affect Poverty, Health, and Education? Evidence from Aceh, Indonesia. *Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning*, *6*(1), 1-20.

EXAMINING THE IMPACT OF GENDER ON ARABIC LANGUAGE ANXIETY

Wan Muhammad Shaker bin Wan Adnan[i], Azlan bin Shaiful Baharum[ii] & Mohd Nizwan bin Musling[iii]

[i] (*Corresponding author*). Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
shaker.wanmd@gmail.com
[ii] Lecturer, Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
azlan_arab@usim.edu.my
[iii] Lecturer, Faculty of Major Language Studies, Universiti Sains Islam Malaysia.
mohdnizwan@usim.edu.my

Abstract

Foreign language anxiety (FLA) is a feeling of nervousness or fear faced by learners when they are learning a second language. Students who faced a severe level of language anxiety will led to negative consequences on their academic performance and their well-being. Some of the consequences are lowered self-esteem, reduced participation in language class and avoidance behaviour. This phenomenon is commonly found in arabic language classes as the arabic language is considered to be one of the hardest language to learn for non-native speakers according to the Foreign Service Institute. The objective of this study is to examine the relations between gender and arabic language anxiety. To this end, a 33 items questionnare from Foreign Language Class Anxiety Scale (FLCAS) with a five Likert-type scale was distributed to one hundred and nine study samples consisting of twenty four males and eighty five females. The study sample (N=109) *was selected from first-year students of the Bachelor of Education (Islamic Education), Faculty of Major Language Studies (FPBU) at Universiti Sains Islam Malaysia (USIM). The data was then analysed by using the independent T-test on IBM SPSS Statistics 26. The result of the study shows that there is a significant relation between gender on arabic language anxiety with a value of .001. In conlusion, males student have a lower level (moderate) of language anxiety than females (high) in learning the arabic language.*

Keywords: *Gender, effect, language anxiety, arabic.*

INTRODUCTION

Foreign language anxiety (FLA) is a state of restlessness, nervousness and easily agitated experienced by a student when learning or using a second or foreign language. According to Horwitz (1986), FLA is best defined as a "distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process". This state will affect a student's journey in mastering a new language related to all the language skills (speaking skill, writing skill, listening skill, reading skill) (Zhou et al. 2023). Therefore, it is clear that a moderate or high level of FLA will delay the student's academic achievement in learning a new language.

Previous studies have been conducted to determine the effects of FLA on students such as an investigation from Oruç et al (2020) on the relation between classroom engagement, foreign language anxiety and English language proficiency. The study was done on a number of 605 students to examine the mediating role of classroom engagement. It shows that FLA affects negatively and partially on student's engagement in class which led to poor language proficiency. The result aligned with a statement from Afzali et al. (2021) in their reseach which stated that students with low engagement in classroom will faced negative effects on their learning process. Other effect of foreign language anxiety is low self confidence among learners (Hu et al. 2024). Language learners with a moderate level of language anxiety tend to have a fear of making mistakes in language class, feeling less capable and afraid of being criticised by friends. These concerns are more likely to make them more anxious and prevent them from learning a new language effeciently (Ozdemir, 2022). So, undoubtedly that FLA is found to have a negative impact on language learners and therefore needed to be explore thoroughly.

The relations between foreign language anxiety and a number of mediators have been researched as the topic of language anxiety is broad and usually brings out different outcomes depending on the mediators such as; teaching method (Chen. 2024), classrooms' emotions (Dewaele et al. 2020) learners' educational background (Kobul, 2020). Besides, gender is also one of the variable that has been researched and paired with foreign language anxiety. A study from Razak et al. (2017) had investigate the gender differences in terms of anxiety among Yemeni university EFL (English Foreign Language) learners. The study was done on 155 students in the English department of the university through stratified random sampling. The results shows that females students experienced a higher level of language anxiety than males students but the difference were not significant. A recent study from Piniel et al. (2022) suggested that females tended to have higher levels of anxiety most of the times but the data compiled in the research stated that the differences failed to reach significance. Meanwhile a study suggested that gender was found to be related to foreign language anxiety, indicating that females had higher levels of anxiety than males (Dordinejad et al. 2014).

The impact of gender on arabic language varied on different researches as some shows a significance difference between male and female while some do not. A research by Yusoff et al. (2020) concluded that there is no significant difference between gender and arabic language anxiety. Meanwhile, the findings from Anandi et al. (2023) showed that students' anxiety level when learning and practicing Arabic differed depending on their gender. The results insisted that females students have a higher level of language anxiety than males students. A study from Jamain et al. (2023) claimed that studies on gender variable on language anxiety are seen as lacking and does not receive attention from researchers. So, this study will focus on the impact of gender on arabic language anxiety to emphasize on the importance of understanding language learners in order to help them master a second language efficiently.

OBJECTIVE

This study aims to:
1- Determine the relationship between gender and arabic language anxiety.

SAMPLE STUDIES

This study is conducted on a sample of one hundred and nine (n=109) first-year students from the Education Programme (Islamic Education), Faculty of Major Language Studies (FPBU). The sample are chosen using the quota sampling method as the researcher gathered the sample based on predefined traits which is those who are learning the Arabic Language, specifically Syntax 1 in session 2023/2024 A231 from the Education Programme (Islamic Education) at Universiti Sains Islam Malaysia (USIM). The gender breakdown is as follows:

Table 1: Sample Studies's Gender

No	Gender	Sample Size	Percentage
1.	Male	24	22.02%
2.	Female	85	77.98%
Total		109	100%

METHODOLOGY

The research was conducted by distributing the Foreign Language Classroom Anxiety Scale (FLCAS) questionnaire that was developed by Horwitz (1986). The questionnaire consists of 33 items, measured on a five-point Likert scale, where 5 indicates the highest level of anxiety, while 1 indicates the lowest level of anxiety. All of these items (33 items) are scored directly, where some of the coded items were reverse-coded. The researcher divided the language anxiety scores based on the degree of anxiety determined by previous studies (Gusdian, 2020), as follows:

Table 2: Level of Anxiety

Questionnaire Scales	Level of Anxiety
33 – 75	Low
76 – 119	Moderate
120 – 165	High

A low level of anxiety is a normal reaction for a learner because it can be a catalyst to fullfill a task in language class perfectly (Katharina, 2024). However, high and severe levels of anxiety can have a negative consequences on a person's daily life and tasks especially for learners who are trying to learn a new language.

417

The researcher list down all the items from the FLCAS questionnaire in a google form and shared the questionnaire's link to the sample studies. The researcher then explain each items thoroughly in class to ease the understanding of the components and request students' submission at the end of the session.

The data were then analysed using the independent T-test on IBM SPSS Statistics 26 to find the means values and their significance in the study to obtain the objective of the research.

RESULTS AND DISCUSSION

In order to determine whether gender differences exist in the level of arabic language anxiety among Education Programme (Islamic Education students, the researcher computed the means and standard deviations of the questionnaires' data for the male and female students, which is made up of twenty four male and eighty five female students.

The "independent samples t-test" was then employed to compare the level of arabic language anxiety in males and females. The mean, standard deviations, and t-values for male and female students are made clear in Table 3 below:

Table 3: Result of Independent Samples t-test

Gender	Mean	N	Std. Deviation	Df	t-value	Sig. (2-tailed)
Male	110.42	24	19.29	107	-3.50	.001
Female	126.19	85	19.57			
Total	118.31	109	19.43			

Table 3 shows the means, standard deviations, T–Value and level of significance for the male and female. The total mean values for male is 110.42 with a standard deviation of 19.29, meanwhile the mean values for female is 126.19 with a standard deviation value of 19.57. In terms of language anxiety levels, the male students are categorised under 'moderate level anxiety' as their value is between 76 to 119, while the female are put under 'high level anxiety' because the value is between 120 to 165.

The research shows that there is a difference number of values between male and female, specifically a value of 15.77. But in order to determine whether the differences made is signifficant or not, a look at the level of significance. The table shows that the value is less than 0.05 (.001) which defines that the research does reject the null, interpreting that there is a significance difference between the level of language anxiety between the two gender, insisting that females students have a higher level of language anxiety than males students in learning the arabic language.

The result of this analysis is parallel with some of the previous studies such as Dewaele & MacIntyre (2014) with a sample study of 1746 learners from around the world. The study used a measure of FLE (Foreign Language Enjoyment), based on Likert scale ratings of 21 items (Dewaele & MacIntyre, 2014), and a measure of FLCA (Foreign Language Classroom Anxiety) based on 8 items extracted from the FLCAS (Horwitz, Horwitz, & Cope, 1986). The FLE and FLCA scores of the female individuals were higher. Thus, in the FL class, the female participants felt greater positive and negative emotions.

The result also justify the statement from Anandi et al. (2023) stating that females student have a higher level of language anxiety in learning the Arabic Language. The same hypothesis was made by Tercan & Dikilitaş (2015) when they are determining the impact of anxiety on gender in EFL students. 159 students completed the Foreign Language Speaking Anxiety (FLSA) scale. The findings show that compared to male students, those female students experience higher levels of anxiety.

CONCLUSION

From the previous studies relating to impact of gender on language anxiety, we can conclude that the results are different and does not made up a clear hypothesis. Some of the study insisted that there are no effect of gender on language anxiety, but those who found that there is a significance shows that the female tend to have a higher language anxiety than male. Nonetheless this statement does not proves that female are having a hard time in foreign language classes, in fact some studies shows otherwise (Dewaele & MacIntyre, 2014). One of the justification found in a study (Haron et al., 2023) is due to the differences in behaviour of male and female, where female students usually expose their vulnerable side (anxiety) to others while the male students usually keep it for themselves.

The finding of this study shows that from 109 students consisting of 24 males and 85 females, female students have a higher level of arabic language anxiety with a mean value of 126.19 which is considered as high level anxiety, while the male students have a lower level of language anxiety (moderate) with a mean value of 110.42. The result also shows that there is a significant difference with a value of .001. However, more studies need to be made on this particular topic especially in the arabic language course as we are seeing a lack of information on this problem. The researcher would like to suggest that future research to find a balance sample studies from the male and females to gain a better comparison.

REFERENCE

Journal

Afzali, Z., & Izadpanah, S. (2021). The Effect of the Flipped Classroom Model on Iranian English Foreign Language Learners: Engagement and Motivation in English Language Grammar. *Cogent Education*, 8(1), 1870801.

Chen, Y. C. (2024). Effects of Technology-Enhanced Language Learning on Reducing EFL Learners' Public Speaking Anxiety. *Computer Assisted Language Learning*, 37(4), 789-813.

Dewaele, J.-M., & MacIntyre, P. D. (2014). The Two Faces of Janus? Anxiety and Enjoyment in the Foreign Language Classroom. *Studies in Second Language Learning and Teaching*, 4, 237e274. https://doi.org/10.14746/ssllt.2014.4.2.5.

Dewaele, J. M., & Dewaele, L. (2020). Are Foreign Language Learners' Enjoyment and Anxiety Specific to the Teacher? An Investigation into the Dynamics Of Learners' Classroom Emotions. *Studies in Second Language Learning and Teaching*, 10(1), 45-65.

Dordinejad, F. G., & Ahmadabad, R. M. (2014). Examination of the Relationship between Foreign Language Classroom Anxiety and English Achievement among Male and Female Iranian High School Students. *International Journal of Language Learning and Applied Linguistics World*, 6(4), 446-460.

Gusdian, R. I., & Nurhidayah, S. (2020). Speaking Skill's Language Anxiety Experienced by Freshers of English Language Education Department. *Schemata: Jurnal Pasca Sarjana IAIN Mataram*. 9 (2), pp. 247-256.

Haron, N. A., & Mustapha, M. (2023). Perbezaan Gender dan Status Sosioekonomi terhadap Kebimbangan Bahasa Asing dalam Kalangan Pelajar Universiti Awam di Sabah. *Journal of Southeast Asia Psychology (SAPJ)*, 11(2), 13-13.

Horwitz, E. K., Horwitz, M. B., and Cope, J. (1986). Foreign Language Classroom Anxiety. *Mod. Lang. J*. 70, 125–132. doi: 10.1111/j.1540-4781.1986.tb05256.x.

Hu, X., Zhang, X., & McGeown, S. (2024). Foreign Language Anxiety and Achievement: A Study of Primary School Students Learning English in China. *Language teaching research*, 28(4), 1594-1615.

Kobul, M. K., & Saraçoğlu, İ. N. (2020). Foreign Language Teaching Anxiety of Non-Native Pre-Service and in-Service EFL Teachers. *Journal of History Culture and Art Research*, 9(3), 350-365.

Oruç, E., & Demirci, C. (2020). Foreign Language Anxiety and English language Achievement in Higher Education: *The mediating role of student engagement. European Journal of Education Studies*.

Ozdemir, E., & Papi, M. (2022). Mindsets as sources of L2 speaking anxiety and Self-Confidence: *The case of international teaching assistants in the US. Innovation in Language Learning and Teaching*, 16(3), 234-248.

Piniel, K., & Zólyomi, A. (2022). Gender Differences In Foreign Language Classroom Anxiety: Results of a Meta-Analysis. *Studies in Second Language Learning and Teaching,* 12(2), 173-203.

Tercan, G., & Dikilitaş, K. (2015). EFL Students' Speaking Anxiety: A Case from Tertiary Level Students. *ELT Research Journal*, 4(1), 16-27

Yusoff, A., Yusoff, N. M. R. N., & Baharuddin, H. (2020). Efikasi Kendiri dan Kebimbangan Bahasa Dalam Kelas Pembelajaran Bahasa Arab di Sekolah Agama: Self Efficacy and Language Anxiety in the Arabic Language Classroom at Religious School. *Attarbawiy: Malaysian Online Journal of Education*, 4(1), 35-47.

Zhou, L., Xi, Y., & Lochtman, K. (2023). The Relationship Between Second Language Competence and Willingness to Communicate: The Moderating Effect of Foreign Language Anxiety. *Journal of Multilingual and Multicultural Development*, 44(2), 129-143.

Internet

Katharina Star (2024 May 2). *The Benefits of Anxiety and Nervousness.* https://www.verywellmind.com/benefits-of-anxiety-2584134

DESIGN AND IMPLEMENTATION OF A GENETIC ALGORITHM-BASED BLOCK CIPHER FOR ENHANCED CRYPTOGRAPHIC SECURITY

Nur Hafiza Zakaria[i]

[i] Senior Lecturer, Universiti Sains Islam Malaysia. mzhafiza@usim.edu.my

Abstract

With the increasing sophistication of cyber threats, existing encryption standards like the Advanced Encryption Standard (AES) face challenges in maintaining robust security. This study addresses the critical problem of enhancing cryptographic resilience against advanced cryptanalysis techniques by introducing a novel block cipher algorithm that integrates genetic algorithms (GAs) with traditional encryption frameworks. The proposed algorithm leverages GA operations such as crossover and mutation to improve the confusion and diffusion processes, crucial for securing encrypted data. The research methodology involved a comprehensive evaluation using the NIST Statistical Test Suite and avalanche effect analysis to test the cipher's performance. Results demonstrate that the proposed cipher offers superior resistance to linear and differential cryptanalysis compared to AES, providing a more secure alternative for protecting digital communications. These findings highlight the potential of GA-based cryptographic methods in strengthening encryption against modern cyber threats.

Keywords: *Cryptography, block cipher, genetic algorithm, security analysis, NIST*

INTRODUCTION

The increasing reliance on digital communication and data storage has heightened the importance of cryptographic security. Traditional block ciphers like the Advanced Encryption Standard (AES) have been widely adopted due to their proven effectiveness. However, the rapid advancement of computing power and cryptanalysis techniques necessitates the continuous development of more secure cryptographic algorithms. This paper proposes a novel block cipher based on genetic algorithms (GAs) to enhance cryptographic security. By incorporating GA principles such as crossover and mutation, the proposed algorithm aims to provide superior confusion and diffusion properties, which are essential for secure encryption.

Block Cipher

Block ciphers are the cornerstone of symmetric key cryptography, which encrypts fixed-size blocks of plaintext into ciphertext using a secret key . The security of block ciphers is based on their ability to provide confusion and diffusion, two essential properties introduced by Claude Shannon in 1949. Confusion refers to making the relationship between the ciphertext and the encryption key as complex as possible, while diffusion spreads the influence of a single plaintext bit across many ciphertext

bits. This ensures that minor changes in the plaintext or key result in significant changes in the ciphertext, thereby thwarting attempts at cryptanalysis .

Advanced Encryption Standard (AES)
AES as in Figure 1, developed by Daemen and Rijmen, is currently the most widely used block cipher . It operates on 128-bit blocks of data, with key sizes of 128, 192, or 256 bits, and employs a substitution-permutation network (SPN) structure. AES runs on a 4x4 column-major order matrix of bytes, termed the state. The key size used for an AES cipher specifies the number of repetitions of transformation rounds that convert the input, called the plaintext, into the final output which is we called the ciphertext. The numbers of cycles of repetition are as below:

i.   10 cycles of repetition for 128-bit keys.

ii.   12 cycles of repetition for 192-bit keys.

iii.   14 cycles of repetition for 256-bit keys.

AES is renowned for its security and efficiency, having withstood extensive cryptanalysis since its adoption. However, the evolving landscape of cryptographic attacks, including side-channel attacks and quantum computing threats, necessitates continuous exploration of alternative encryption methods .

Genetic Algorithms in Cryptography

Genetic algorithms (GAs) are optimization techniques inspired by the process of natural selection. They have been applied to various cryptographic problems, such as key generation, cryptanalysis, and cipher design . GAs operate by evolving a population of candidate solutions through selection, crossover, and mutation, guided by a fitness function. In cryptography, GAs can generate complex transformations that enhance the security of encryption algorithms by introducing additional layers of randomness and complexity.

METHODOLOGY

Genetic algorithms are optimization techniques inspired by the principles of natural selection and genetics. They operate on a population of potential solutions, iteratively applying selection, crossover, and mutation to evolve towards an optimal solution. In the context of cryptography, GAs can be used to generate complex transformations that enhance the security of encryption algorithms .

Cipher Design

The proposed block cipher operates on 128-bit blocks and uses a 128-bit key. The encryption process consists of multiple rounds, each involving the following steps:

Figure 2: Encryption and Decryption of the Proposed Block Cipher

1. Substitution: The substitution step uses S-boxes derived through affine transformations, which are designed to maximize nonlinearity and resistance to differential cryptanalysis .

2. Crossover and Mutation: These genetic operations are applied to introduce randomness and increase the algorithm's resistance to cryptanalysis . The crossover function swaps portions of the data between different blocks, while the mutation function alters bits within the blocks based on predefined probabilities.

3. Permutation: A permutation function reorders the bits within the block to further enhance diffusion.

Figure 3: Sequence of Steps of Proposed Block Cipher Algorithm

Figure 3 shows the sequence of steps of the proposed block cipher algorithm. The fundamental concepts of confusion and diffusion as identified by Shannon are the foundations of any cipher system. The S-boxes are an integral part of symmetric key cryptosystems. Their basic purpose is to provide the necessary confusion. They are used for obscuring the relationship between the plaintext and the ciphertext. They are essentially non-linear mapping which take as input a certain number of bits and convert them into some number of bits. The security of systems using the S-boxes depends on the great deal of their proper selection.

RESULTS AND DISCUSSION

Preliminary Test
The order of the application of the tests in the NIST statistical test suite is arbitrary. However, it is recommended that the frequency test be run first, since this supply the

most basic evidence for the existence of non-randomness in a sequence, sprcifically, non-uniformity. If this test fails, the likelihood of other tests failing is high. The focus of frequency test is the proportion of zeroes and ones for the entire sequence. The purpose of this test is to determine whether the number of ones and zeroes in a sequence are approximately the same as would be expected for a truly random sequence. The test assesses the closeness of the fraction of ones to 1/2, that is the number of ones and zeroes in a sequence should be about the same. All subsequent tests depend on the passing of this test. If the computed p-value is < 0.01, then conclude that the sequence is non-random. Otherwise, conclude that the sequence is random. The results reported in Table 6.1 shows that p-value for all rounds are ≥ 0.01. So, we can conclude that the sequence is random.

Table 6.1: Frequency test result over a low-density input

n^{th} round	p-value
1	0.317311
2	0.317311
3	0.077100
4	0.723674
5	0.051830
6	1.000000
7	0.595883
8	0.077100
9	0.077100
10	0.215925

CONCLUSION

This paper presents an enhance block cipher that leverages genetic algorithms to enhance cryptographic security. The proposed algorithm has concluded that the properties and elements in the genetic algorithm can be applied to create a new structure and permutation functions in a symmetric block cipher. The new feature and function is inspired from crossover and mutation in genetic algorithm. The new proposed block cipher should satisfy all the security requirements such as randomness test. Randomness test is one of the security analyses which measures confusion and diffusion properties of the new symmetric block cipher. The

experiments were made using NIST Test Suite application based on the statistical test guideline.

REFERENCE

Nik Azura Nik Abdullah , Nur Hafiza Zakaria, Azni Haslizan Ab Halim, Farida Hazwani Mohd Ridzuan, Azuan Ahmad, Kamaruzzaman Seman and Suriyani Ariffin. (2022). A Theoretical Comparative Analysis of DNA Techniques Used in DNA Based Cryptography, *Journal of Sustainability Science and Management.*

Daemen, J., & Rijmen, V. (2002). *The design of Rijndael: AES—the Advanced Encryption Standard*. Springer Science & Business Media.

Nagaraj, S., Raju, D.S.V.P., Bhamidipati, K. (2013). A New Substitution Block Cipher Using Genetic Algorithm. Proceedings of the International Conference on Frontiers of Intelligent Computing: Theory and Applications (FICTA).

Satapathy, S., Udgata, S., Biswal, B. (eds) *Advances in Intelligent Systems and Computing,* vol 199. Springer, Berlin, Heidelberg.

Schneier, B., & Ferguson, N. 2001. *Practical cryptography*, Wiley.

Shannon, C. E. (1949). Communication theory of secrecy systems, *Bell System Technical Journal*, 28(4), 656-715.

Thirer, N. (2013). *A pipelined fpga implementation of an encryption algorithm based on genetic algorithm*. SPIE Proceedings.

THE STRUCTURAL STUDIES OF LAWSONE IN HENNA: THE FIRST PRINCIPLE APPROACH

Ahmad Nazrul Rosli[i]

[i] Lecturer, Energy Material Consortium (EMC), Computational Physics Lab, Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM), 71800 Nilai, Negeri Sembilan, Malaysia. anazrul84@usim.edu.my

Abstract

Henna is a popular dye material used for skin art and hair colouring. The reddish and yellowish colours come from the lawsone molecules with the chemical formula $C_{10}H_6O_3$. Understanding Lawsone's structural properties will give us a starting point to study the capability of henna and other dye chemicals to react with water. The density functional theory (DFT) calculates molecules' optimised energy and studies the structural properties of lawsone molecules. The calculation was done using Gaussion 09W and optimized using functional B3LYP. The energy gap between HOMO and LUMO shows that the highly reactive material of lawsone which easy to create a new bond. This study will be a starting point for understanding the Lawsone in henna and the capability of henna.

Keywords: *Henna*, lawsone, DFT, energy gap.

INTRODUCTION

Henna, or Lawsonia inermis, is a leaf traditionally used in treatment, dye, and makeup. The extract of henna leaves has antibacterial, antioxidant, anti-inflammatory, wound healer, and cooling agent properties (Karcz, 2023). Studies have been done on applying henna to lower the glucose level in the human body and treat cancer (Hassanien et al., 2023; Orabi et al., 2023).

While the application of henna covers the area of medicine, henna is traditionally used in cosmetics and hair dye. In regions like India, Malaysia and Indonesia, henna will be used as a material to decorate, especially for the bride in the wedding ceremony(Alebeid et al., 2015). Henna is also widely used as a dye for hair, especially for grey hair. In Islam, henna has been known as an acceptable material for hair colouring because of the characteristic of henna to absorb water.

Henna contains lawsone as a red-orange dye in the henna leaves (Ostovari et al., 2009). Lawsone, with the chemical formula $C_{10}H_6O_3$ (Iyyappa Rajan et al., 2018), will penetrate the hair shaft and bind with the keratin in the hair to create a natural colouring pigment (Wong, 2019). The cuticle, which is the outer layer of hair, is transparent (Palmer, 2023. The colour of the hair comes from the melanin in the cortex inside the hair. Meanwhile, the modern technique will bleach the melanin before the colour dye enters the cuticle. This will ruin the structure of hair compared to the henna.

Another concern is the ability of the material used in dye to absorb water since it is related to the Islamic way of cleaning ourselves. While henna was permissible for colouring hair, Muslims were concerned about the order dye technique. Interestingly, many think henna allows water to enter the hair structure, but literature studies show henna has hydrophobic characteristics (Adnan, 2020).

In this paper, we study the structure of lawsone (the chemical in henna) using density functional theory. This simulation helps us understand the structure of lawsone and will help us further this research.

METHODOLOGY

This calculation has been done using the Gaussian 09W module (Frisch et al., 2016). The structure of Lawsone has been optimized to the ground state energy using the density functional theory (DFT) method. The basis set is 3-21g with a trial function of wave functions iterated by a self-consistent field (SCF) before the structure stops the calculation. The hybrid exchange-correlation function, B3LYP, has been chosen because of the accuracy of the result (Khadtare et al., 2015). The highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) are produced at the optimized energy, and the vibration of atoms shows in the IR spectrum.

Figure 1: The optimized structure of lawsone molecules, $C_{10}H_6O_3$. Dark grey, light grey, and red represent carbon, hydrogen and oxygen atoms, respectively.

RESULTS AND DISCUSSION

The structure of Lawsone has been optimized to the minimum energy using B3LYP exchange-correlation. Figure 1 shows the structure of Lawsone after optimization. The bond length for single carbon bonding appears between 1.392 and 1.503Å, with the right side of molecules (refer to Figure 1) mostly below 1.400Å, while the left side starts

with 1.463Å and above. The bond length range is in agreement with other calculations. Details of the bond length values are shown in Table 1.

Table 1: The bond length of optimized lawsone molecules

No.	Bonding	Bond Length, Å	
		This study	Literature [Mohr et al, 2015]
1	C – C (left side)	1.463, 1.486, 1.494, 1.503	1.400, 1.4092, 1.4883
2	C – C (right side)	1.395, 1.392, 1.394	1.3947
3	C = C	1.388, 1.389, 1.402, 1.347	1.3542
4	C = O	1.222, 1.213	1.2213
5	C – O	1.343	1.365
6	O – H	0.966	0.972
7	C – H	1.082(2), 1.083 (2), 1.085	1.084

The molecular orbital for HOMO and LUMO (Figure 2) shows the small gap between both orbitals. A difference between HOMO and LUMO is 0.1484 a.u. and 4.041 eV when the value of the energy gap in a.u times 27.2114 eV. This calculation is comparable with Han et al. (2015) calculation using B3LYP/6-31G with an energy gap of 4.09 eV and the calculation done by Said et al. (2021) using B3LYP/6-31G with an energy gap of 3.98 eV. This small gap shows the high reactivity of this molecule, which is essential for henna when applied to the skin or hair. Meanwhile, the negative value of HOMO explains the energy needed to remove an electron from that orbital. With a small energy gap value, the electron can quickly jump to a higher orbital. The negative value of LUMO shows that the electron would still be bound to the molecules when added to the orbital.

HOMO E_{GAP} = 0.1484 a.u   LUMO

Figure 2: The image of HOMO, LUMO and energy orbital (in Hartree, a.u) for optimized lawsone molecule. The isosurface is set to 0.02.

The IR spectrum calculated the vibration frequency of each bond in the lawsone molecule. All bonding is shown in the IR peak in Figure 3. The single bond of O-H has the highest frequency at 3800 cm^{-1}. Double bonding of C=C and C=O shows the highest intensities at frequencies 1656 and 1736 cm^{-1}, respectively. The comparison is shown in Table 2, and the result is in accordance with the experimental data (Devi et al., 2020).

Table 2: Comparison of frequency from IR Spectrum and FTIR from experimental result.

No.	Bonding	IR Spectrum, cm^{-1}	Experimental FTIR, cm^{-1}		
		This study	[Devi et al, 2020]	[Monem et al, 2024]	[Musa et al, 2019]
1	C = C	1656	16244.44	-	1510
2	C = O	1736	1776.17	1735	1712, 1632
3	O – H	3800	3409.24	3600	3311

Figure 3: The IR spectrum of optimized lawsone molecule.

CONCLUSION

The calculation to study the structural properties of Lawsone molecules found in henna has been successful. Compared with the literature, the result shows that the B3LYP can be calculated accurately. Based on this study, we found that Lawsone has high reactive energy and is suitable for use as a dye. Further studies need to be done to understand the ability of lawsone molecules to react with water, bond with protein

or creatine, and absorb water as part of the cleanliness of Islam. A detailed study can be done to understand the effect of chemical dye on hair and compare it with Lawsone.

REFERENCE

Journal

Adnan, S. A., Zainuddin, F., Ahmad Zaidi, N. H., Zulkeply, N. A., Adzali, N. M. S., & Che Daud, Z. (2020). The effects of henna fillers on the properties of polyurethane foam composites. *Materials Science Forum*, *1010 MSF*, 520–525.

Alebeid, O. K., Tao, Z., & Seedahmed, A. I. (2015). New approach for dyeing and UV protection properties of cotton fabric using natural dye extracted from henna leaves. *Fibres and Textiles in Eastern Europe*, *23*(5), 60–65.

Devi, N. R., Karthiga, N., Keerthana, R., Umasankareswari, T., Krishnaveni, A., Singh, G., & Rajendran, S. (2020). Extracts of leaves as corrosion inhibitors – An overview and corrosion inhibition by an aqueous extract of henna leaves (Lawsonia inermis). *International Journal of Corrosion and Scale Inhibition*, *9*(4), 1169–1193.

Frisch, M. J.; Trucks, G. W.; Schlegel, H. B.; Scuseria, G. E.; Robb, M. A.; Cheeseman, J. R.; Scalmani, G.; Barone, V.; Petersson, G. A.; Nakatsuji, H.; Li, X.; Caricato, M.; Marenich, A. V.; Bloino, J.; Janesko, B. G.; Gomperts, R.; Mennucci, B.; Hratchian, H. P.; Ortiz, J. V.; Izmaylov, A. F.; Sonnenberg, J. L.; Williams-Young, D.; Ding, F.; Lipparini, F.; Egidi, F.; Goings, J.; Peng, B.; Petrone, A.; Henderson, T.; Ranasinghe, D.; Zakrzewski, V. G.; Gao, J.; Rega, N.; Zheng, G.; Liang, W.; Hada, M.; Ehara, M.; Toyota, K.; Fukuda, R.; Hasegawa, J.; Ishida, M.; Nakajima, T.; Honda, Y.; Kitao, O.; Nakai, H.; Vreven, T.; Throssell, K.; Montgomery, J. A., Jr.; Peralta, J. E.; Ogliaro, F.; Bearpark, M. J.; Heyd, J. J.; Brothers, E. N.; Kudin, K. N.; Staroverov, V. N.; Keith, T. A.; Kobayashi, R.; Normand, J.; Raghavachari, K.; Rendell, A. P.; Burant, J. C.; Iyengar, S. S.; Tomasi, J.; Cossi, M.; Millam, J. M.; Klene, M.; Adamo, C.; Cammi, R.; Ochterski, J. W.; Martin, R. L.; Morokuma, K.; Farkas, O.; Foresman, J. B.; Fox, D. J. (2016). Gaussian 16, Revision C.01, Gaussian, Inc., Wallingford CT.

Han, M. W., Ekanayake, P., Ming, L. C., & Yoong, V. N. (2015). DFT/TD-DFT Studies on the Lawsone (Henna) as a Photosensitizer for Dye-Sensitized Solar Cells. *Applied Mechanics and Materials*, *789–790*, 56–60.

Hassanien, A. E., Abd EL-ghani, G. E., & Elbana, G. G. (2023). Synthesis, DFT Studies, and Biological Applications of Some Novel Compounds Containing Lawsone by Using Halo-Reagents. *Polycyclic Aromatic Compounds*, *43*(2), 1378–1394.

Iyyappa Rajan, P., Judith Vijaya, J., Jesudoss, S. K., Kaviyarasu, K., Lee, S. C., John Kennedy, L., Jothiramalingam, R., Al-Lohedan, H. A., & Mahamad Abdullah, M. (2018). Investigation on preferably oriented abnormal growth of cdse nanorods along (0002) plane synthesized by henna leaf extract-mediated green synthesis. *Royal Society Open Science*, *5*(3).

Karcz, W., Burdach, Z., & Rudnicka, M. (2023). The Effects of 1,4-Naphthoquinone (NQ) and Naphthazarin (5,8-Dihydroxy-1,4-naphthoquinone, DHNQ) Individually and in Combination on Growth and Oxidative Stress in Maize (Zea mays L.) Seedlings. *Plants*, *12*(4).

Khadtare, S. S., Ware, A. P., Salunke-Gawali, S., Jadkar, S. R., Pingale, S. S., & Pathan, H. M. (2015). *Dye Sensitized Solar Cell with Lawsone Dye Using ZnO Photoanode: Experimental and TD-DFT Study. RSC Adv., 5, 17647-17652.*

Mohr, T., Aroulmoji, V., Ravindran, R. S., Müller, M., Ranjitha, S., Rajarajan, G., & Anbarasan, P. M. (2015). DFT and TD-DFT study on geometries, electronic structures and electronic absorption of some metal free dye sensitizers for dye sensitized solar cells. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, *135*, 1066–1073.

Monem, A., Habibi, D., & Goudarzi, H. (2024). A new DES-mediated synthesis of Henna-based benzopyranophenazines and benzoxanthenetriones. *Scientific Reports*, *14*(1).

Musa, M. S. M., Sulaiman, W. R. W., Majid, Z. A., Majid, Z. A., Idris, A. K., & Rajaei, K. (2019). Application of henna extract in minimizing surfactant adsorption on quartz sand in saline condition: A sacrificial agent approach. *SN Applied Sciences*, *1*(8).

Orabi, M. A. A., Orabi, E. A., Awadh, A. A. al, Alshahrani, M. M., Abdel-Wahab, B. A., Sakagami, H., & Hatano, T. (2023). New Megastigmane and Polyphenolic Components of Henna Leaves and Their Tumor-Specific Cytotoxicity on Human Oral Squamous Carcinoma Cell Lines. *Antioxidants*, *12*(11).

Ostovari, A., Hoseinieh, S. M., Peikari, M., Shadizadeh, S. R., & Hashemi, S. J. (2009). Corrosion inhibition of mild steel in 1 M HCl solution by henna extract: A comparative study of the inhibition by henna and its constituents (Lawsone, Gallic acid, α-d-Glucose and Tannic acid). *Corrosion Science*, *51*(9), 1935–1949.

Said, M., Datti, Y., Nuhu, A. A., Buhari, T. R., & Ahmed, A. B. (2021). Computational Study of Lawsonia Inermis as Potential and Promising Candidate for Production of Solar Cell. *European Journal of Advanced Chemistry Research*, *2*(1), 21–27.

Internet

Palmer, J. (2023 January). *Know Your Hair Structure And Anatomy*. https://www.hairknowhow.com/know-your-hair-structure

Wong, M. (2019 April 21). How Do Different Types of Hair Dye Work? The Science. https://labmuffin.com/how-does-hair-dye-work/

OVERVIEW OF THE DIFFERENT HALAL CERTIFICATION SCHEME IN MALAYSIA

Ainil Hawa Mohamad Fauzi[i] , Dzulfadli Rosli[ii], Mohd Sukri Hassan [iii] & Mohd Fared Abdul Khir[iv]

[i] Universiti Sains Islam Malaysia. ainilhmf@raudah.usim.edu.my
[ii] Universiti Sains Islam Malaysia. dzulfadli@usim.edu.my
[iii] Universiti Sains Islam Malaysia. mohdsukri@usim.edu.my
[iv] (*Corresponding author*). Universiti Sains Islam Malaysia. fared.khir@usim.edu.my

Abstract

Malaysia is a pioneer in establishing halal assurance system. Efforts included intiating halal control management systems with standards and guidelines for key players. This paper aims to review the different halal schemes available in Malaysia to differentiate and find underlying issues. Today, nine halal certification schemes are available namely food and beverages, food premise, consumer goods, cosmetics) pharmaceuticals, logistics, slaughterhouse, original equipment manufacturing (OEM), and medical devices. Each scheme has the potential to contribute to the halal industry and bring great returns to the economy. Based on the literature, issues with the halal industry includes the complexity of the halal ecosystem and halal status assurance and authentication. These two issues can be problematic but cosntant work is carried out to find solutions. Harmonization between the different components in the ecosystem has to take place. Methods of authentication for various products and services can help verify the halal status of products and services while traceability and Internet of Things can facilitate the entire process. Future work has to factor in possible new areas that would require a unique halal certification scheme to be developed. The understanding of halal in totality is encouraged so that halal assurance matters can bring benefit to all.

Keywords: *Halal assurance, Halal certification, Halal ecosystem, Halal authentication.*

INTRODUCTION

What is permissible and prohibited in Islam is defined and guided by Allah through Quran and hadiths (Doi, 2007). Al-Qaradawi (1960) stated that the Shariah law or Islamic ruling is a system that is aimed for the good of mankind. It is to guide Muslims in their day-to-day activities in all living aspects. The concept of halal and haram is part of the Shariah law. The word halal is an Arabic word meaning permissible, lawful, allowed, and permitted. The opposite of the word halal is the word haram which means forbidden, unlawful, and not allowed. Halal is also defined as actions, conducts, objects, or item that is permitted without restrictions in any other form and permissible by Allah through Shariah law (Miskam et al., 2015; Al-Qaradawi, 1960). It is compulsory for Muslims to ensure that their daily activities are halal as instructed by Allah through various Ayat in the Quran. The concept of halal is not limited to individualistic needs, but it also encompasses the societal needs in all aspects of life.

There has been rising demand for halal products and services with an estimated worth of USD 5 trillion by 2030 (Frost & Sullivan, 2022). In 2021, the Muslim community spent around USD 2 trillion dollars on food, pharmaceutical, cosmetics, fashion, travel, and entertainment (Tighe, 2024). Several factors have been identified to contribute to the increasing demands. Firstly, the Muslim population is continuously rising and makes up about 28.7% of the global population (Islamic Services of America, 2023). This naturally increases the demand for halal products and services as more practicing Muslims observe their faith. Secondly, there is a rise in awareness and acceptance of halal products and services among Muslims and non-Muslims where halal is associated to have high quality standards, promotes good values and ethics, and emphasizes economic and social fairness (Rejeb et al., 2021; Pacific, 2010). The current Muslim demographic have higher levels of education and awareness creating the demand for the halal market (Ahmad et al., 2023). Thirdly, Muslims spending power and economic advantage has increased leading to higher affordability of products and services (Azam et al., 2019). For example, there is an increase in spending that contributes to the halal industry revenue through tourism, food industry, and financial services (Azam et al., 2019). The term halal tourism is used to describe tourism activities that accommodates the Muslim's needs such as having access to halal food and praying facilities (Muhamad et al., 2019; Henderson, 2009). The halal food industry is the largest contributor in the halal industry market with an estimated spending of USD 1.2 trillion in 2017 for food and beverages to an estimated USD 1.9 trillion by 2023 (Aneesh & Khadar, 2022) and USD 2 trillion by 2024 (Izza & Rusydiana, 2023). Islamic finance in the halal industry have attracted interest in halal compliant financial products and services where Muslims can be assured that all financial activities are guided by Islamic principles (Mas'ad & Abd Wakil, 2020) and non-Muslims can benefit from these principles that are considered fair and transparent (Tarver, 2023).

The expansion of halal industry has seen developments and changes in various industries including but not limited to food, finance, cosmetics, and logistics (Muhammad et al., 2008). Malaysia is a pioneer in the halal industry and has actively put an emphasis on their commitment to strengthen and maximize the potential of the halal industry. This is apparent in the New Industrial Master Plan 2030 (NIMP 2030) where halal industry is one of the focused sectors (Ministry of Investment, Trade, and Industry (MITI), 2023). The growth and success of the halal industry involves several key players in the form of business corporations and enterprises, relevant ministries and government agencies, regulatory bodies, competitors, and consumers (Abd Mubin et al., 2022). These key players may be involved directly and indirectly in the implementation of halal which requires standards, regulations, policies, and certifications in place based on the respective parties involved.

As of 2020 in Malaysia, nine different halal schemes have been established that exists at different stages of maturity in terms of regulation and implementation. For example, the food and beverage scheme are one of the earliest established since the 1970s, while the medical device scheme was only recently added in the Malaysian

Halal Certification Procedure Manual (Domestic) 2020 (MPPHM 2020) (Jabatan Kemajuan Islam Malaysia (JAKIM), 2020). Additionally, the different schemes are usually investigated separately to put focus on each relevant sector. To have an overall view of the halal industry scene, this paper aims to review the different halal schemes available in Malaysia. The objective of this study is to differentiate the different halal schemes available and to explore some issues in the implementation of the halal schemes. The significance of this work is to foster understanding of the different scheme available, provide a clear overview of each halal scheme and its elements, and identify underlying issues.

METHODOLOGY

This work applies a qualitative method in literature review analysis as the main method. The literature considered included articles, reviews, conference proceedings, books, reports, and legislative documents. A thematic method with an inductive approach was taken to review the relevant sources to find significant themes and topics present.

RESULTS AND DISCUSSION

Different Halal Certification Scheme in MPPHM 2020.

In the MPPHM 2020, there are nine certification schemes which are 1) food and beverages, 2) food premise, 3) consumer goods, 4) cosmetics, 5) pharmaceuticals, 6) logistics, 7) slaughterhouse, 8) original equipment manufacturing (OEM), and 9) medical devices. The last two schemes (8 and 9) are new addition that was added to the updated MPPHM 2020. These new additions show that the importance of these sectors are acknowledged and considered for proper regulation because there is high demand for the product and a need to ensure its halal status. Based on the NIMP 2030, the Malaysian halal market sees greatest return from three core sectors namely food and beverages (75.88%), cosmetics and personal care (10.23%), and pharmaceutical (4.97%). The remaining 8.92% is from other sectors in the halal market such as consumer goods, logistics and supply chain, medical devices, medical tourism, and modest fashion (HIMP, 2030).

Food and Beverages
Food and beverages are defined as any food and beverage products produced for human consumption. It is apparent from the beginning of the halal assurance establishment that products and services related to food and beverages are most scrutinized. This could be due to its significance and relatability in consumer's daily life. Halal awareness in food and beverages can be influenced by religious beliefs, exposure to halal assurance and certification system, and the perception of health and quality of life (Ambali & Bakar, 2013). Islam puts emphasis on food choice and consumption in daily life as highlighted in Islamic dietary laws (Kassam & Robinson, 2014). The quest for halal food is considered obligatory and an act of worship in Islam

which has been the ultimate motivation for halal assurance of food and beverages (Biglari et al., 2020). Thus, it is crucial that the halal status of food and beverages are compliant and assured for consumption.

Food Premise

The certification for food premise is a separate scheme from food and beverages. Food premise is any space or structure that is permanent or temporary used in preparing, serving, and selling food products. The different type of food premises is restaurants or café, canteen, bakery, food chains, central kitchen, food truck, food court, and kiosks (JAKIM, 2020). In food consumption, halal is not limited to the food item but also considers the condition of the food premise that needs to adhere to the objective of Islamic rulings (Nazim & Yusof, 2023). A halal food premise is expected to maintain good hygiene by maintaining the cleanliness of the premise, ensure proper sanitation and waste management, and free from pollutant and harmful matters (Lateb & Yusof, 2020). As food and drink items will be in direct contact with the premise, contamination must be avoided to ensure that the halal status of the products is well maintained.

Consumer Goods

Consumer goods cover products that are not food and drinks. This could be an array of products and services ranging from banking and financial services, tourism, fashion and apparel, (Khan et al., 2017; Zakaria et al., 2017). The ISA (2021) also lists down several non-consumables like cleaning products, filtration systems, sanitizers, packaging materials and industrial products that requires halal certification too. Azman et al. (2024) highlighted that a Muslim must find what is good and avoid what is bad for the body physically and spiritually. It is important that these goods and services are halal and can be used with confidence that they are free from any contaminants, pollutants, and matter that are non-halal and harmful (Azman et al., 2024). For instance, the halal status of water filtration system was questioned when the common carbon filters in the system can be sourced from bovine or porcine (Komar et al., 2023). For apparels and accessories, the halal status of the product considers the source of the material, the processing methods, and the business ethics (Mustafa'Afifi et al., 2013). As part of the halal industry, Islamic banking and finance can ensure that all financial activities are according to Islamic rulings that could benefit all parties involved (Mas'ad & Abd. Wakil). With halal assurance measures and certification implementation, due process can be taken to ensure the halal status of all the goods and services available.

Cosmetics

Cosmetics are any substance or preparation intended to be placed in contact with various external parts of the human body. The primary purpose could range from cleaning, perfuming, changing their appearance, correcting body odours, protection, cleanliness. Ultimately, halal cosmetics must be free from but not limited to pig and

pig-derived materials, human parts, blood, carrion, and harmful and dirty substances (Hashim & Mat Hashim, 2013). Muslims demand halal cosmetics due to their faith. For non-Muslims, the appeal of halal cosmetics is attributed to ethical consumerism, high quality standards, and product safety (Sugibayashi et al., 2019). The production of halal cosmetics encompasses the ingredients, the manufacturing process, and conformance to guidelines and standards imposed by authorities.

Pharmaceuticals

Pharmaceuticals include prescription and non-prescription medicines for human use. In Malaysia, it could be in the form of bio-pharmaceutical, radio-pharmaceutical, traditional medicine, supplements, and investigational medicine registered with the Drug Control Authority under MOH. Studies have shown that halal pharmaceuticals are positively accepted from pharmacists and medical practitioners (Sadeeqa et al., 2013). The halal status and assurance system are similar to halal cosmetics except that the National Pharmaceutical Regulatory Agency (NPRA) holds authority on regulations. Due to the nature of the commodity, strict regulations and legal framework is required in obtaining and maintaining the halal status of the products (Ramli et al., 2018).

Logistics

Halal logistics refers to the services related to transportation, delivery, storage and warehousing, and retail activities for consumer goods, food, and beverages. The demand for halal logistics stems from the demand for halal goods and services (Talib & Hamid, 2014) where it is important to maintain the halal status of products from producers to consumers. The participation in halal logistics from logistic service providers shows that there is a commitment to support the initiative (Ab Talib et al., 2020). Attention to the regulation, financial incentives, taxation, infrastructure, knowledge transfer, and guidance should be given to logistic service providers (Ab Talib et al., 2020). The authority and regulatory bodies have an important role to play in ensuring that halal logistics are not overlooked to preserve the halal supply chain.

Slaughterhouse

For Muslim consumption, halal meat is obtained from animal that have been slaughtered according to Islamic rulings. Slaughterhouses are premises where animals are slaughtered and processed. In Malaysia, the Department of Veterinary Services (DVS) handles all regulatory affairs related to livestock and poultry. Halal compliance at a slaughterhouse is necessary to ensure that halal meat is supplied. Regulations include conforming to rules and technical specifications on location, equipment and instruments used, processing methods, personnel's hygiene and safety practices, cleaning and sanitation procedures, and effluent treatments (Hashim et al., 2019). In this sense, halal assurance encompasses the pre-slaughter, slaughter, and post-slaughter process to ensure that the meat produced is genuinely halal (Yaacob et al., 2016).

Original Equipment Manufacturing (OEM),

Halal certification scheme for OEM is relatively new as it was recently added in the MPPHM 2020. OEM is a manufacturing company that offers manufacturing services to other companies. Upon request, the OEM may produce parts or whole products for other companies to sell under their own branding. For example, one OEM that is halal certified is OEM Brand Manufacturing Sdn. Bhd., a company that produces health-based food and drink products for other small trades. Although the literature on the subject is scarce, an example of a successful implementation shows that the sector is viable. The interest in halal OEM could originate from the desire of small entrepreneurs that has the idea and drive to market halal products without the need to have individual facilities.

Medical Devices

In the MPPHM 2020, medical device was listed as a new scheme under halal certification. The medical device industry is growing with the advancement of technology. Malaysia's medical device export has seen an increase over the years (AMMI, 2014). Medical devices are any medical equipment, instruments, tools, implement, machine, and appliance to be used on humans for medicinal purposes. This differs from pharmaceuticals because it does not involve any metabolic, immunological, and pharmacological reactions. In Malaysia, there is sufficient legal framework that oversees the regulation of medical devices in relation to halal certification (Zarmani et al., 2014). To certify halal medical devices involves regulation and standards, manufacturing licensing, guidelines on import and export, monitoring of operation and application of the medical device that includes usage and disposal procedures. This relatively new area in halal assurance has the potential to grow extensively. Further discussion on the implementation and promotion of halal medical device is necessary in order to for it to bring impact the halal industry.

Issues Related to Halal Certification Schemes

Complex ecosystem of the Halal Industry

In the establishment of the halal assurance system, a complex halal ecosystem materialized. In the Halal Industry Masterplan 2030 (MIHP 2030) that was launched in April 2024 (Bernama, 2024), the Malaysian Halal Ecosystem is described as a network of all the components involved in the growth, delivery, and success of halal products and services. This complex network in the halal ecosystem presents challenges on multiple levels (Arif et al., 2024). As outlined by the NIMP 2030, challenges include lack of standardization in certification and regulation, narrow talent pool, restricted research and development, under-utilized facilities and limited participation from micro, small, and medium enterprises (MSMEs) (MITI, 2023). All the components in the ecosystem have separate roles but are dependent on each other. The halal ecosystem was introduced as a conceptual view to illustrate the complexity

of the process (Ahmad Hishamuddin, 2007). The considerable size and network in the ecosystem illustrate the complexity consisting of numerous legal frameworks, regulatory bodies, enforcement authorities, federal government, state government, industry players, local and international corporations and enterprises, and consumers (Noordin et al., 2014). This network requires appropriate segregration of duties, harmonization of regulations, agreement on policies, and teamwork on administration. The overwhelming components to the halal industry should not be perceived as a limitation. One of the focuses of MIHP 2030 is to create a strong and sustainable relationship between all the components.

Halal Status Assurance and Authentication

It is apparent that Malaysia is dedicated in providing halal assurance to consumers local and international. Several factors that could impede the success of halal assurance are lack of manpower, inadequate knowledge and understanding, low awareness, and lack of accountability (Muhammad et al., 2020; Ahmad et al., 2017). With halal assurance system in place, cases of fraud may still affect the halal status of goods and services. Food fraud such as adulteration, contamination, substitution, and unethical practices could present itself in any goods and services at any stage of the process (Yahaya et al., 2024). Proper legislation and enforcement can be a deterrence to fraud, but it requires an empirical and analytical methods of assessments (Smith, 2020). For example, immense food authentication efforts are carried out to find the most optimum method to detect and validate the components of food and beverages (Yahaya et al., 2024). The importance of halal authentication of cosmetics and pharmaceutical products are equally crucial (Mursyidi, 2013). Methods that have been used to investigate product's authentication includes spectroscopy, chromatography, DNA analysis, electronic nose, immunoassay, and imaging (Yahaya et al., 2024; Mursyidi, 2013). A major part in managing halal assurance is traceability which could be applied to all the halal schemes available. Through traceability in the various industries involved in the halal schemes, the halal process can be evaluated and assessed thoroughly. The halal integrity of halal logistics is also key in ensuring the halal status of the supply chain can be guaranteed (Majid et al., 2019). The application of the Internet of Things (IoT) in halal assurance is also believed to help in traceability of products, authentication of halal status, monitoring of halal certifications, enhance supply chain efficiency, and facilitate livestock management (Rejeb et al., 2021).

CONCLUSION

In more than 50 decades, Malaysia has spearheaded the halal assurance system efforts by establishing world class systems in place. The process started with awareness and the motivation to find best practices to fulfill the Muslim's need in ensuring that all aspect of life is halal and within the confines of Islamic rulings. As of 2020, nine halal certification schemes are available for relevant parties. The different halal schemes shows that the halal industry is diverse and constantly evolving to fit the need of the

current world. In order to stay ahead, Malaysia has to focus on new and emerging niche area that could possibly be part of the halal industry. Additionaly, the pre-existing areas still has to be revised and updated to ensure its relevance and growth. It should be acknowledged that the halal ecosystem is a complex environment and it should be managed objectively to achieve the goal for Malaysia to become the world leader in halal matters. Despite having regulations to control halal products and services, threat to the halal status still exists in the form of fraud that manipulates and abuse halal products and services. Therefore, it is also important to have methods in place to authenticate and validate the halal status of products and services. Future work has to anticipate the possibility of additional areas that might require its own halal certification scheme to be developed. Discussion and investigations should continute in matters related to halal for total understanding.

ACKNOWLEDGEMENT

REFERENCE

Ab Talib, M. S., & Bakar Abdul Hamid, A. (2014). Halal logistics in Malaysia: a SWOT analysis. *Journal of Islamic Marketing*, *5*(3), 322-343.

Ab Talib, M. S., Pang, L. L., & Ngah, A. H. (2020). The role of government in promoting Halal logistics: a systematic literature review. *Journal of Islamic Marketing*, *12*(9), 1682-1708.

Abd Mubin, N., Abd Rahman, A., Kamarulzaman, N. H., & Yusof, R. N. R. (2022). Readiness and Stakeholders Influence for Halal Logistics Practices Implementation towards Supply Chain Performance. *International Journal of Asian Social Science*, *12*(1), 26-42.

Ahmad Hishamuddin. (2007). Community Participation and Empowerment: An Approach for JAKIM Halal Verification and Feedback Mechanism. Unpublished master's thesis, University Teknologi Mara, Malaysia.

Ahmad, A. N., Rahman, R. A., Othman, M., & Abidin, U. F. U. Z. (2017). Critical success factors affecting the implementation of halal food management systems: Perspective of halal executives, consultants and auditors. *Food control*, *74*, 70-78.

Ahmad, Z., Mafaz, M. N. A., & Rahman, M. M. (2023). Harmony in halal: Understanding stakeholder views analyzing products and evaluating policies in Malaysia. *West Science Business and Management*, *1*(05), 495-508.

Ambali, A. R., & Bakar, A. N. (2013). Halal food and products in Malaysia: people's awareness and policy implications. *Intellectual Discourse*, *21*(1), 7.

Aneesh, A., & Khadar, A. (2022). Halal Food Industry in World: Opportunity and Challenges. *Available at SSRN 4153508*.

Arif, S., Fazila, N. S., Sidek, S., Mat, Z., & Ismail, N. (2024). A Conceptual Stakeholder-Based Model of Malaysia Halal Food Control System. *Journal of Electrical Systems*, *20*(4s), 1747-1762.

Azam, M. S. E., Abdullah, M. A., & Razak, D. A. (2019). Halal tourism: definition, justification, and scopes towards sustainable development. *International Journal of Business, Economics and Law*, *18*(3), 23-31.

Biglari, H., Dargahi, A., Vaziri, Y., Ivanbagha, R., Hami, M., & Poursadeqiyan, M. (2020). Food safety and health from the perspective of Islam. *Journal of Pizhūhish dar dīn va salāmat*, *6*(1), 131-143.

Doi, A.R.I. (2007), Shari'ah: The Islamic Law, A.S. Doordeen, Kuala Lumpur.

Frost & Sullivan. (2022, Jul 29). Global Halal Economy Growth Opportunities. https://store.frost.com/global-halal-economy-growth-opportunities.html

Hammad, A. Z. (1994). The lawful and the prohibited in Islam. Translated by K. Helbawy, M.M. Siddiqui, S. Shukry. Indiana, American Trust Publications.

Hashim, P., & Mat Hashim, D. (2013). A review of cosmetic and personal care products: Halal perspective and detection of ingredient. *Pertanika Journals of Science and Technology*, *21*(2), 281-292.

Hashim, H., Saad, N. M., Khalid, H., & Laluddin, H. (2019). Halal compliance in poultry industry: A review of regulatory system in Malaysia. *International Journal of Academic Research in Business and Social Sciences*.

Henderson, J. C. (2009). Islamic tourism reviewed. Tourism Recreation Research, 34(2), 207–211.

Islamic Services of America. (2021, March 23). Why Halal Certification Matters for Non-Consumables. https://www.isahalal.com/news-events/blog/why-halal-certification-matters-non-consumables

Islamic Services of America. (2023, February 23). A Glimpse into The Global Halal Industry. https://www.isahalal.com/news-events/blog/glimpse-global-halal-industry-2023

Izza, N. N., & Rusydiana, A. S. (2023, March). A qualitative review on halal food: NVivo approach. In *Proceedings of Femfest International Conference on Economics, Management, and Business* (Vol. 1, pp. 90-106).

Jabatan Kemajuan Islam Malaysia. (2020). Manual Prosedur Pensijilan Halal Malaysia (Domestik) 2020.

Kassam, Z., & Robinson, S. E. (2014). Islam and food. *Encyclopedia of food and agricultural ethics*, 1282-1291.

Khan, M. M., Asad, H., & Mehboob, I. (2017). Investigating the consumer behavior for halal endorsed products: Case of an emerging Muslim market. *Journal of Islamic Marketing*, *8*(4), 625-641.

Komar, M. A. A. N., Makazan, W. F. N. W., & Hashim, A. Issues on Activated Carbon Filter in Halal Water Dispenser Machine from Online Shopping: A Review.

Lateb, N. B. A., & Md Yusof, S. A. (2020). The practice of halal concept among food premises in Perlis: The hygiene perspective. *International Journal of Supply Chain Management*.

Majid, Z. A., Kamarulzaman, N. H., Rahman, A. A., Jaafar, H. S., Rahman, N. A. A., & Mohammad, M. F. (2019). Halal integrity from logistics service provider perspective. *Int. J Sup. Chain. Mgt*, *8*(5), 1-9.

Mas'ad, M. A., & Abd Wakil, N. A. (2020). Halal industry and Islamic finance institution's role: Issues and challenges. *INSLA E-Proceedings*, *3*(1), 643-659.

Miskam, S., Othman, N., Hamid, N. A., Ager, S.N.S., Abdullah, M., Shahwahid, F. M., Wahab, N. A., Saidpudin, W. (2015). An Analysis of the definition of halal: Syari'ah vs statutes.

Ministry of Investment, Trade, and Industry. (2023). New Industrial Master Plan 2030: Halal Industry. e ISBN No.: 978-967-0020-19-8

Muhamad, N. S., Sulaiman, S., Adham, K. A. & Said, M. F., 2019. Halal Tourism: Literature Synthesis and Direction for Future Research. Pertanika J. Soc. Sci. & Hum, 27(1), pp. 729–745.

Muhammad, Z., Salleh, M. M., & Mahmood, A. M. (2008, August). Halal: Antara tuntutan agama dan strategi ekonomi. In *Seminar Pentadbiran Hal Ehwal Islam di Malaysia: Cabaran Semasa dan Perancangan Masa Depan*.

Muhammad, M. A., Elistina, A. B., & Ahmad, S. O. (2020). The challenges faced by halal certification authorities in managing the halal certification process in Malaysia. *Food Research*, *4*(1), 170-178.

Mursyidi, A. (2013). The role of chemical analysis in the halal authentication of food and pharmaceutical products. *Journal of Food and Pharmaceutical Sciences*, *1*(1).

Mustafa'Afifi, A. H., Mahyeddin, M. M., Wati, M. K., Asming, Y., Najib, S. O. S. M., Asmidah, A., ... & Ariff, M. M. I. (2013). Consumer protection of Halal products in Malaysia. *Middle East Journal of Scientific Research*, *13*, 22-28.

Nazim, N. A. M., & Yusof, S. M. (2023). Halal Legislation Enforcement of Food Premises in Malaysia. *Global Journal Al-Thaqafah*, 151-164.

Noordin, N., Noor, N. L. M., & Samicho, Z. (2014). Strategic approach to halal certification system: An ecosystem perspective. *Procedia-Social and Behavioral Sciences*, *121*, 79-95.

Pacific, A. (2010). Global halal industry: an overview. *Global Islamic Finance Report 2013*, 140-159.

Rejeb, A., Rejeb, K., Zailani, S., Treiblmaier, H., & Hand, K. J. (2021). Integrating the Interne of Things in the halal food supply chain: A systematic literature review and research agenda. *Internet of Things (Netherlands)*, *13*(2021), 100361. doi.org/10.1016/j.iot.2021.100361

Sadeeqa, S., Sarriff, A., Masood, I., Farooqi, M., & Atif, M. (2013). Evaluation of knowledge, attitude, and perception regarding Halal pharmaceuticals, among general medical practitioners in Malaysia. *Archives of Pharmacy Practice*, *4*(4-2013), 139-146.

Smith, C. J. (2020). Food safety and health-past problems and future solutions. *Engineering*, *6*(4), 384-388.

Sugibayashi, K., Yusuf, E., Todo, H., Dahlizar, S., Sakdiset, P., Arce, F. J., & See, G. L. (2019). Halal cosmetics: A review on ingredients, production, and testing methods. *Cosmetics*, *6*(3), 37.

Tarver, E. (2023, June 20). Islamic Banking and Finance Definition: Hisotry and Example. In M. James. Investopedia. https://www.investopedia.com/terms/i/islamicbanking.asp

Tighe, D. (2024). Global Muslim Market Size in 2021 and 2025. Statista. https://www.statista.com/statistics/796103

Yaacob, T. Z., Jaafar, H. S., & Rahman, F. A. (2016). A review of regulatory framework for halal meat supply chain: the case of halal meat-based food products in Malaysia. *J. Appl. Environ. Biol. Sci*, *6*(9S), 14-21.

Yahaya, N., Yahya, H., Yahya, H. N., & Fauzi, A. H. M. (2024). Emerging analytical techniques in food safety and biosecurity. In *Green Chemistry in Food Analysis* (pp. 343-383). Elsevier.

Zakaria, Z., Majid, M. A., Ahmad, Z., Jusoh, Z., & Zakaria, N. Z. (2017). Influence of Halal certification on customers' purchase intention. *Journal of Fundamental and Applied Sciences*, *9*(5S), 772-787.

Zarmani, N. F., Ramli, M. A., & Shaikh Mohd Salleh, S. M. S. (2014). The ethical aspects of halal certification of medical devices in Malaysia.

DETERMINANTS OF RESIDENTIALPROPERTY PRICE IN MALAYSIA

Wan Farhanim W Abdullah[i] & Muhammad Zaim Razak[ii,iii]

[i] Financial Mathematics Programme, Faculty of Science & Technology, Universiti Sains Islam Malaysia, wfarhanim01@raudah.usim.edu.my
[ii] (*Corresponding author*) Senior Lecturer, Financial Mathematics Programme, Faculty of Science & Technology, Universiti Sains Islam Malaysia, mzaim.razak@usim.edu.my
[iii] Risk Analytics Research Group, Faculty of Science & Technology, Universiti Sains Islam Malaysia

Abstract

The objective of this study is to examine the factors that affect house price in the Malaysian market. By using the quarterly observation from the year 1994 to the year 2022, the study reports the significant long-run relation between house prices and each of macroeconomic variable, that include inflation, GDP, interest rate and exchange rate. In the short-run, the previous quarter of each macroeconomic variable is detrimental to predict their contemporaneous house price, interest rate and exchange rate respectively. In the long-run relation, the study demonstrates the significance of long-run relation between inflation and exchange rate to the housing prices in the market. Nonetheless, GDP and interest rate were not significantly affect the house price, pertaining to development policies and government interventions in the property market.

INTRODUCTION

According to Zulkarnain and Nawi (2023), in Malaysia, there has been a significant fluctuation in residential prices or property values over the past ten years. Such choices obviously affect Malaysianswho choose to invest in real estate or purchase a home. In other words, buying a home can be seen as for investment and consumption purpose (Dietz & Haurin, 2003; Sinai & Souleles, 2005). According to Sinai & Souleles (2005), individuals are "short" on housing needs that they have to live somewhere for shelter. In this regard, individuals that do not own must rent. Homeowners that supply rental properties are buying homes for investment purposes are capable of taking a highly leverage position in mortgage financing (Khan & Xu, 2022; Damianov & Escobari, 2019). When viewed as consumption, homeownership provides a guarantee against fluctuations in rental price and continuous shelter with a known up-front price although by taking mortgages. In addition to that, home ownership allows households to upgrade their property ladder over their life (Damianov & Escobari 2019). For instance, a new start-up family may acquire an apartment as their first house. With price appreciation in the housing property market, the household can upgrade themselves into terrace house. Thus, the household is in a better position as compared to households that are currently renting.

Buyers frequently prioritise housing pricing over other aspects, regardless of the city where they want to purchase a residential unit (Zainon et al., 2017). Regional discrepancies can result from different regional variations in real estate price fluctuations. A considerable price increase may occur in some places because of factors like economic expansion and a shortage of available housing. In high-demand locations, this might make it difficult for people and families to find an affordable home. The rental market may be impacted by high property prices. More people might decide to rent as buying a home gets more expensive. Rent costs may rise because of more rental demand, which will cost tenants more money.

Developing residential homes can improve economic performance, which is why it makes a substantial contribution to overall production activities. Macroeconomy and the building of residential housing are strongly related. Since the Eighth Malaysian Plan (2001), the government's goal of shifting the country's growth strategy to domestic sources is aligned with the recognition of residential housing activities as a major engine of growth in Malaysia. More importantly, the development of residential properties in Malaysia is able to seek the balance between rapid pace in our country's economic growth and improve the quality of life for citizens through a proper housing. (Kabine, 2023; Trofimov et al.,2018). Related to this, affordable housing has been one of the big bolds in the national economic Madani agenda in the twelfth Malaysia plan (Kementerian Ekonomi,2023).

Nonetheless, in Malaysia, the rise in housing costs has outpaced the rise in disposable income.Since 2014, the price growth picked up speed in the wake of the 2008-2009 global financial crisis, whereby the house prices climbed up over 200% over a 15-year period (NAPIC, 2014). Based on Bank Negara Malaysia's Annual Report (2020), it is found that the median house price in Malaysia was more than four times, the median annual household income in 2019, suggesting affordability challenges for many Malaysians. Further evidence from Khazanah Research Institute (2019) shows the housing affordability worsened as median multiplier increase to 5.0, that exceed the threshold of affordability of 3.0. Therefore, the rapid increase in house price suggests that Malaysians are unable to afford the country's median housing price.

The recent statistics from National Property Information Centre (NAPIC) in the year 2022 shows the incoming new launches that comprise of 44% or 24,000 housing units for houses below RM300,000. The remaining 56% of new housing launches are houses above RM 300,000 where 31% new launches for houses between RM300,000 to RM500,000, 22% new houses with prices between RM 500,000 to RM 1Million and 3% for houses above RM 1 million. From another perspective, it is found that the unsold properties in the year 2022 indicates the house prices of RM 500,000 to RM 1M has the highest proportion, that is 32%. Thus, the findings indicate that imbalance in the incoming supply of properties and demands from prospective homeowners.

The house prices can be affected by many factors, thus determining the factors that affect the residential house price in Malaysia is crucial. Several studies

in the past have highlighted about inflation, (Haibin; 2004, Hussain and Malik; 2011, and Maguire et al.; 2013) suggested that building expenses impact house prices based on inflation, as rising costs of materials and construction lead to higher selling prices. Several research by Trofimov (2018), Kok(2018), Kamal et al. (2016), Guo and Wu (2013), and Tan (2010) that a drop in interest rates could resultin less expensive cost for home financing. Other than that, Duja and Supriyanto (2019), Bjrnland and Jacobsen (2010) suggesting that exchange rate, currency appreciation promotes house price rise Nonethless, Razali and Tan (2016), Trofimov et al. reported mixed evidence on GDP and residential property values in the market.

The purpose of the study is to determine the factors that affecting the residential property pricesin Malaysia. In particular, by following Kabine (2023), the study adopts the Auto Regressive Distributed Lag (ARDL) model to empirically analyse the short−run dynamics and long-term linkages between each factor that affect the house price in the Malaysian market. We use quarterly data from Q1 1994 to Q4 2022. Taken together, our study seeks to answer the following research questions:

- Are there any long-term linkages between each of the macroeconomic factors that affect residential property prices in Malaysian market?
- What are the factors that affect residential property prices in Malaysia in the long run?
- Does the past affect the current trends in house price and each of the macroeconomic factors?

The paper is organized as follows. In section 2, we review the related literature on factors that affect residential property prices. The data description and methodology used will be discussed in section 3. Section 4 presents the results and accompanying elaboration. Section 5 concludes.

RELATED LITERATURE

The cost-push inflation component was the reason behind the significant correlation between housing price and inflation shown in the studies by Hussain and Malik (2011) and Maguire et al. (2013). Construction-related factors such labour costs, cement prices, and the cost of machinery and equipmentraised the cost, which in turn impacted the price of residential properties. This finding was corroborated by Kamal et al. (2016), who observed that a major factor that could raise home prices is the rate of inflation. Therefore, a profit-driven developer would raise a home's selling price to offset the rise in building expenses. This implies that as inflation rises, house prices typically do as well.

In other context, Kok et al. (2018) contends that while the monetary policy is implemented to stabilise the macroeconomic environment, the quick increase in money supply has resulted in asset price inflation. The increase in money supply leads to an increase in demand for assets, which in turn stimulated economicgrowth.

Nonetheless, the inability of monetary policy to stabilise price levels will lead to an increase in asset prices.

Owning a home is heavily reliant on the financial system, particularly the interest rate. Low borrowing rates encourage the expansion of the housing market through mortgages. Agnello and Schuknecht (2011) suggested that low interest rates encourage the growth of credit and raise home prices. The low-interest rate environment not only causes houses to be as consumption assets, but rather as an investment tools. The early report in the past by Weeken (2004) and Ayuso and Restoy (2006), in the way that real interest rate and rental rate in England and Wales drive upthe price of property. The increase in demand for houses leads to increase in their prices in the market, consistent with the evidence of long-run relation between interest rate and house price (Ibrahim & Law, 2014).

Exchange rate also plays a key factor that affects residential property price in a country. When a currency of a country depreciates, it attracts prospective home buyers from foreign countries (Asal, 2018). Notwithstanding rapid purchases from foreigners indirectly contributes to appreciation of the local currency relative to foreign exchange rate . Hence, there is a positive linkage between exchange rate and property price (Duja and Supriyanto, 2019). The evidence can be seen from China, where Bjørnland and Jacobsen (2010) shows a positive association between house price increase and the real effective exchange rate as well as in Nairobi housing market (Njoroge, 2018). In addition to that, rapid expansion of credit across countries give rise to exchange rate which directly impact the housing market (Liu & Zhang, 2013). These reports highlight the importance of exchange rate in residential property marker, consistent with open economies in the rapid phase of globalisation.

Gross Domestic Product (GDP) GDP is a measure used to gauge economic growth, which play a significant factor to residential property market. But there is a mixed evidence on how GDP affects house prices. In one hand, increase in GDP reflects increase in job creation which necessitates the demand for housing. This positive outlook on GDP ascertains the increase in level of income of a nations. Thus, GDP positively contribute to increase in house prices in the market (Razali and Tan, 2016; Ong, 2013). However, GDP may negatively contribute to trends in house prices. The situation can occur pertaining to oversupply of properties, in view of the increase in GDP (Trofimov, 2018). Of particular relevance of this situation is the increase in GDP does not be translated to increase in income of households, with demand does not match supply of houses in the market (Trofimov, Aris and Xuan, 2018).

METHODOLOGY

Data

The study uses quarterly data from 1994 to 2022. The data on macroeconomic variables in the study include the interest rate, exchange rate, and GDP. The consumer price index is used as the proxy for inflation. This data are collected from Datastream. The data on house prices index has been sourced from Department of Statistics Malaysia. In toral, there 116 data points commenced from the first quarter of 1994 to the fourth quarter of 2022.

Model Specification

The relation between house price index and the macroeconomic model is analysed in the time-series regaression model. The house price index acts as the dependent variable and all macroeconomic variables are independent variables. The time series regression model for this study can be written mathematically as :

$$\text{LNH}PI_t = \beta0 + \beta1\text{LNCPI}_t + \beta_2\text{INTR}_t + \beta_3EXCR_t + \beta_4\text{GDP}_t + \mu_t \tag{1}$$

Where,

$\text{LNH}PI_t$	: Natural logarithm of house price index (HPI) at time t
LNCPI_t	: Natural logarithm of consumer price index (CPI) at time t
INTR_t	: Interest rate (INTR) at time t
$EXCR_t$	: Exchange rate (EXCR) at time t
GDP_t	: Gross domestic product (GDP) at time t
β_0	: A constant term
$\beta_{0,}\beta_1, \beta_2, \beta_3, \beta_4$	: Coefficients of variables LNCPIt, INTRt, EXCRt, GDPt,
μ_t	: Error term

The Autoregressive Distributed Lag Model (ARDL) will be used as the framework to estimate the above regression model. The above equation can be re expressed in ARDL form written as follows,

$$\tag{2}$$

$$\Delta LNHPI = \beta_0 + \beta_1 LNCPI_{t-1} + \beta_2 INTR_{t-1} + \beta_3 EXCR_{t-1} + \beta_4 GDP_{t-1} + \\ \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q}\alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \\ \sum_{t=1}^{q}\alpha_1 GDP_{t-i}$$

Where the α represent short run coefficients and β_n represent the long run coefficients.

From equation (2), The ARDL bound test will be conducted. The bound test serves as an indicator whether there exists the long-term relation between residential property prices with each of explanatory (independent) variable. In addition to that, the short-run mechanism that may exist between the variables, within the long-run relations. Thus, we can rewrite the equation (2) in error-correction model (ECM); with θ is the error-correction term:

$$\Delta LNHPI = \beta_0 + \sum_{t=1}^{q} \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q} \alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \tag{3}$$
$$\sum_{t=1}^{q} \alpha_1 GDP_{t-i} + \theta ECM_{t-1} + \mu_t$$

Where the regression terms in the ECM representation can be expanded into:

$$\Delta LNHPI = \beta_0 + \sum_{t=1}^{q} \alpha_1 LNCPI_{t-i} + \sum_{t=1}^{q} \alpha_1 INTR_{t-i} + \sum_{t=1}^{q} \alpha_1 EXCR_{t-i} + \tag{4}$$
$$\sum_{t=1}^{q} \alpha_1 GDP_{t-i} + \beta_1 LNCPI_{t-1} + \beta_2 INTR_{t-1} + \beta_3 EXCR_{t-1} +$$
$$\beta_4 GDP_{t-1}$$

RESULTS AND DISCUSSIONS

Descriptive Statistics

Table 1 displays the descriptive statistics for the variables used in this study. The natural log of house price index have mean values of 0.6456, 4.5780, and 8.9232, respectively. Likewise, the GDP, interest rate, and exchange rate have respective mean values of 4.9221, 3.8026, and 3.5962. The data for housing price index ranges from 7.8527 to 9.6962, with a median of 9.0812. LNHPI and EXCR, are skewed to the left, whilst LNCPI and INTR skewed to the right.

Table 1: Descriptive statistics

	LNHPI	LNCPI	INTR	EXCR	GDP
Mean	8.9232	4.5780	3.8026	3.5962	4.9221
Median	9.0812	4.5737	3.3000	3.8000	5.4700
Maximum	9.6962	4.8750	11.1500	4.6410	10.0000
Minimum	7.8527	4.4011	1.9400	2.4395	-7.3600
Std.Dev.	0.4149	0.1119	1.7172	0.5428	3.9367
Skewness	-0.4230	0.7796	2.0754	-0.5460	-1.6413
Kurtosis	2.2145	3.3812	7.5406	2.5571	5.6836

Unit Root Test

As a prerequisite, unit root test is used to examine whether each variable is non-stationary. There are two unit root tests be adopted, that are Augmented Dickey Fuller (ADF) test and Philips Perron (PP) test. The test hypothesises that a variable data series is non-stationary and exhibits a unit root. It is found that, based on the two tests, the hypothesis is rejected for the case of DGP at levels. It implies the variable is stationary. Nonetheless, the other variables, HPI, CPI, INTR, EXCR, and POPG are stationary at the first difference. The findings on the unit root test on GDP suggested the variable is integrated at I(0) and the other variables are I(1). The different order of integration amongst variables suggested the applicability of the ARDL, as the framework to estimate the short- and long-run relation between the variables.

Table 2: Results of unit root test

| Variables | ADF test | | PP test | | |
	Level	First differences	Level	First differences	Stationary status
LNHPI	0.2948	0.0000	0.3726	0.0000	I (1)
LNCPI	0.2735	0.0000	0.5581	0.0000	I (1)
INTR	0.1461	0.0000	0.1902	0.0000	I (1)
EXCR	0.4221	0.0000	0.3856	0.0000	I (1)
GDP	0.0175	0.0000	0.0069	0.0000	I (0)

Bounds Cointegration Test and ARDL Long-run Coefficent

Prior to Auto Regressive Distributed Lag (ARDL) empirical estimation, the lag length test is performed. There are 5 lag length tests used, that are the sequential modified LR test statistic (LR), the final prediction error (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SC), and the Hannan-Quinn information criterion (HQ) to determine the optimal number of lags for the ARDL modelling. Each type of test choose sthe lag structure that minimises information criteria, that makes a trade-off between goodness of fit and model complexity. From table 2, lag 1 based on SC Based on HQ, lag 2 is recommended. However, lag 4 is suggested based on LR, FPE, and AIC. Therefore, lag 4 is used for the modelling of the ARDL estimation.

Table 3: Lag length test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-347.01	NA	2.20e-05	6.30	6.44	6.36
1	364.21	1333.54	1.28e-10	-5.75	-4.73*	-5.34
2	445.79	144.22	5.70e-11	-6.57	-4.67	-5.80*

3	482.76	61.40	5.67e-11	-6.59	-3.82	-5.46
4	529.70	72.92*	4.79e-11*	-6.78*	-3.14	-5.30

From there onwards, the bound test is conducted. Based on table 4, the reported F-statistic is higher than the critical values from the various significant levels from 1% to 10%. The findings are consistent across different levels of integration either I(0) or I(1). Given this situation, the bound test suggested the null hypothesis of no cointegration between variables is rejected. Thus, there is a long run cointegration relation between house price, GDP, inflation, interest rates, and exchange rates.

Table 4: F-Bound test

F-Bound Test			Null Hypothesis: No levels relationship	
Test statistic	Value	Signif.	I (0)	I(1)
F-statistic	6.9267	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Accordingly, the long-run relation between variables can be established with the house price as the dependent variable. The equation of the long run relation can be written as follows :

$$\Delta LNHPI = \beta_0 + 6.9669 LNCPI_{t-1} + 0.0305 \beta_2 INTR_{t-1} + 0.7356 \beta_3 EXCR_{t-1} - 0.0026 GDP_{t-1}$$

From Table 5, the coefficient of CPI, INTR, and EXCR are positives, but only the CPI and exchange rate coefficient is statically significant. While the coefficients of gross domestic product is negative and statistically insignificant.

The established long run relation between house prices and each of the macroeconomic variable can be interpreted economically as follows for 1% increase in the CPI, house prices should rise by 6.9669%. According to the interest rate results, a one unit change in INTR is predicted to result in a 0.0305% increase in house prices. The projected increase in the house price is 0.7356% for a one unit change in the exchange rate. The house price index is predicted to change by 0.26% for every unit change in GDP.

According to this study, there is a positive relation between changes in the consumer price index and changes in the prices of residential properties. This is consistent with past reports that the inflation of consumer goods positively contributes to the inflation of residential property prices (Pour et al., 2013). Meanwhile, housing is also a component of the CPI. Thus, there is a two-way relationship between housing prices and the CPI (Liu & Shen, 2005). The positive linkages reflect the effect of inflation, whereby the inflation in the house prices is related to rising cost of raw materials (Mansur et al,2016). The argument is consistent

with the common practice amongst property developers, where they will account for an additional 30% of each cost incurred in raw material as their profits (Razak et al.,2018).

This study found that the interest rate has an insignificant but positive effect on the house price index in Malaysia. The lack of importance of interest rates is in line with the findings of Geok & Lean (2017), who concluded that interest rates do not have the greatest impact on Malaysian housing prices and that raising interest rates would not be sufficient to stop the country's rising property prices. Notwithstanding, only families who wish to enter the property market are likely to be influenced by interestrates; households that currently own homes not likely to be affected (Riddle, 2004). The findings shed light on the availability of various mortgage scheme in Malaysia, where government servant can obtain home financing through Lembaga Pinjaman Perumahan Sektor Awam (LPPSA) home financing scheme. Whilst there is also other mortgage scheme that offered by conventional and Islamic banks; as well as financing scheme like Housing Credit Guarantee Scheme (HCGS) offered by government with financing up to RM 500,000 (SJKP,2023). The various mortgageschemes available reflect the abundance of credit available and that interest rate may not give impact toresidential property prices.

In this study, there is a significant and positive relation between exchange rate and shifts in the prices of residential properties. This result is in line with data presented by Asal (2018), who claimed that the exchange rate has a significant role in determining housing costs. The increase in the exchange rate indicates the local currency appreciates relative to the foreign currencies. Thus, the cost to buy a home by foreigners will increase as the local currency increase. After all, the increase in house prices does reflect the increase in demand for residential properties amongst prospective home owners from foreign countries. Consequently, there is a strong relationship between home prices and exchange rates.

Notwithstanding, there is a long-term negative relation between GDP and residential propertyvalues. According to Pour et al. (2013), one of the possibility of this circumstance occur due to persistent economic growth which overstimulate the building of homes. This action leads to an excess supply of homes which contributes to a decline in property prices. As reported by Bujang (2010), there was a significant property overhang in PeninsularMalaysia in 2005, with a total of 755,000 unsold units. In similar manner, Bank Negara Malaysia reports the excess supply of high-end residential properties (Ling et al., 2017). The situation indicates lower- and middle-class households are affected with insufficient supply of affordable housing within their income. Thus, this argument supported the earlier evidence of unmatched demand and supply of properties.

Table 5: ARDL Long-run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	P-value
LNCPI	6.9669	1.4171	-4.9164	0.0000***
INTR	0.0305	0.0348	-0.8750	0.3838

EXCR	0.7356	0.1783	-4.1255	0.0001***
GDP	-0.0026	0.0119	0.2209	0.8256

Note: *, **, *** refers to the significant level at 10%, 5%, and 1%.

Table 6 presents the short-run coefficients of each variable. The significance of short-run coefficients in the LNHPI suggested the previous quarter one Q1 and quarter 3 Q3 of house price able to predict the current property price in the market. The lagged interest rate from the previous quarters are significantly predict the interest rate. Meanwhile, the past exchange rate able to predict the prevailing exchange rate in the market.

In addition, the ARDL model estimation accounts for error correction, which incorporates the short term deviations into the long-term equilibrium (Nkoro & Uko, 2017). Accordingly, the findings of this study indicates the statistically significant and negative coefficients of the EC term. The negative value of the EC term implies that the deviation of each variable from the long-run equilibrium in a period, will be adjusted by 24.77%.

Table 6: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	P-value
D (LNHPI (-1))	-0.1609	0.0827	-1.9465	0.0546*
D (LNHPI (-2))	0.1113	0.0781	1.4258	0.1573
D (LNHPI (-3))	-0.1496	0.0779	-1.9197	0.0580*
D (INTR)	-0.0274	0.0184	-1.4869	0.1405
D (INTR (-1))	0.0596	0.0178	3.3461	0.0012***
D (INTR (-2))	0.0399	0.0165	2.4209	0.0174**
D (INTR (-3))	0.0441	0.0172	2.5657	0.0119**
D (EXCR)	-0.0458	0.0536	-0.8534	0.3956
D (EXCR (-1))	0.0449	0.0536	0.8362	0.4052
D (EXCR (-2))	-0.1634	0.0561	-2.9125	0.0045***
D (EXCR (-3))	-0.2430	0.0610	-3.9824	0.0001***
CointEq (-1) *	-0.2477	0.0363	-6.8310	0.0000***

Note: *, **, *** refers to the significant level at 10%, 5%, and 1%.

CONCLUSION

This study examines the long-run relation and short-term dynamics between house price and macroeconomic factors that include interest rate, inflation, GDP and exchange rate in an ARDL framework. By using quarterly observation from the first quarter Q1 1994 to fourth quarter Q4 2022, the study reported the significance of long-run relation between house price and macroeconomic variables. Accordingly, inflation and exchange rates significantly contribute to the increase in residential property prices. It is conjectured that increase in raw materials translated to higher cost of building, where the price has been transferred to prospective homeowners. The appreciation of our home currency in relative to foreign currency may

suggested properties in our country are less appealing to foreigners. After all, the stability of our currency must precede over the agenda of homeownership by foreigners. The insignificance of interest rate suggests to the government that their intervention in the property market through various financing initiative was not helpful to control property price. But rather, the government needs to mull incentive to promote construction of affordable housing as to control overbuilding of high-end houses in the market. This initiative may provide a better reflection of our GDP since people from various income group background are able to own property.

REFERENCES

Agnello, L. and Schuknecht, L. (2011), "Booms and busts in housing markets: determinants and implications", Journal of Housing Economics, Vol. 20 No. 3, pp. 171-190.

Asal, M. (2018). Long-Run Drivers and Short-Term Dynamics of Swedish Real House Prices. International Journal of Housing Markets and Analysis, 11, 45-72.

Ayuso, J. and Restoy, F. (2006), "House prices and rents: an equilibrium asset pricing approach", Journalof Empirical Finance, Vol. 13 No. 3, pp. 371-388.

Bjørnland, H. C., & Jacobsen, D. H. (2010). The role of house prices in the monetary policy transmission mechanism in small open economies. *Journal of Financial Stability*, *6*(4), 218– 229.

BNM Annual Report 2020. (2020). Retrieved from Bnm.gov.my website:

Bujang, A. (2010). The Relationship Between Demographic Factors and Housing Affordability. Malaysian Journal of Real Estate, 5, 49-58.

Damianov, D. S., & Escobari, D. (2021). Getting on and moving up the property ladder: Real hedging in the US housing market before and after the crisis. Real Estate Economics, 49(4), 1201-1237.

Dietz, R. D., & Haurin, D. R. (2003). The social and private micro-level consequences of homeownership. *Journal of Urban Economics*, *54*(3), 401–450.

Duja, B. and Supriyanto, H. (2019), "The influence of GDP, interest rate, wage, inflation and exchange rate on residential property price in Indonesia", Planning Malaysia, Vol. 17.

Eight Malaysian Plan, 2001 – 2005, Government Printer, Kuala Lumpur.

Guo, M. & Wu, Q. (2013). The empirical analysis of affecting factors of Shanghai housing prices.
International Journal of Business and Social Science, 4(14), 218-223.

Haibin, Z. (2004). What Drives Housing Price Dynamics: Cross-Country Evidence. BIS Quarterly Review.

Hussain, S. and Malik, S. (2011), "Inflation and economic growth: evidence from Pakistan", International Journal of Economics and Finance, Vol. 3 No. 5, pp. 262-276.

Ibrahim, M., & Law, S. (2014). House Price and Bank Credit in Malaysia: An Aggreate and Disaggregate Analysis. Habitat International, 42, 111-120.

Kabine, C. (2022). Determinants of house prices in Malaysia. *International Journal of Housing Markets and Analysis*. https://doi.org/10.1108/ijhma-09-2021-0105

Kamal, E., Hassan, H., & Osmandi, A. (2016). Factors Influencing The Housing Price: Developers' perspective. International Journal of Humanities and Social Science, 10(5), 1676-1682.

Kerajaan Malaysia (2023). Ringkasan eksekutif kajian separuh penggal: Rancangan Malaysia kedua belas. Percetakan Nasional Malaysia Berhad.

Khazanah Research Institute. (2015). Making housing affordable. Kuala Lumpur: Khazanah Research Institute.

Kok, S. (2018). The Sources of House Price Changes in Malaysia. International Journal of Housing Market and Analysis, 11(2), 335-355.

Kok, S.H., Ismail, N.W. and Lee, C. (2018), "The sources of house price changes in Malaysia", International Journal of Housing Markets and Analysis, Vol. 11 No. 2, pp. 335-355, doi: 10.1108/ ijhma-04-2017-0039.

Liu, H. & Shen, Y. (2005). Housing prices and general economic conditions: an analysis of Chinese new dwelling market. Tsinghua Science and Technology, 10(3), 334-343.

Liu, Y. and Zhang, S. (2013), "Econometric analysis on the relationship between RMB exchange rate and real estate price by VAR Model", International Conference on Science and Social Research, Atlantis Press, pp. 428-430.

Maguire, J., Burch, J., Merrigan, T. and Ong, S. (2013), Energy Savings and Breakeven Cost for Residential Heat Pump Water Heaters in the United States (No. NREL/TP-5500-58594), National Renewable Energy Lab (NREL), Golden, CO.

Mansur S. A., Abdul Hamid A. R., & Yusof N. A. (2016). Rising trend in construction cost and housing price. Journal of Advanced Research in Business and

Management Studies ISSN (online): 2462-1935 | Vol. 3, No. 1. Pages 94-104, 2016.

NAPIC. (2022). Property Market Q3 2022 Snapshots. National Property Information Centre.

National Property Information Centre/NAPIC. (2014). Annual property market report 2014. http://napic.jpph.gov.my/portal/web/guest/publication.

Njoroge, P.K., Aduda, J.A. and Mugo, C. (2018), "Investigating the existence of a bubble in the Kenyanreal estate market", International Journal of Data Science and Analysis, Vol. 4 No. 5, p. 89.

Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric methods*, *5*(4), 63-91.

Ong, T. S. (2013). Factors Affecting the Price of Housing in Malaysia. Journal of Emerging Issues in Economics, Finance and Banking., Vol. 1, No.5, pp 414 - 429.

Pour, M.S., Khani, P.N., Zamanian, G. and Barghandan, K. (2013), "Specifying the effective determinants of house price volatilities in Iran", Economic Review: Journal of Economics andBusiness, Vol. 11 No. 2, pp. 15-20.

Razak, M. Z., Khalid, H., & Mohamad, A. (2018). Speculative Behavior in Vacant Land Development:Evidence for Real Options in Malaysia. *The Developing Economies*, *56*(4), 245–266. https://doi.org/10.1111/deve.12184.

Razali, M., & Tan, A. (2016). The Dynamic House Price Volatility In Malaysia. Journal of Technology,Management and Business, 3(2), 14-35.

Sinai, T., & Souleles, N. S. (2005). Owner-occupied housing as a hedge against rent risk. Quarterly Journal of Economics, 120(2), 763–789.

Syarikat Jaminan Kredit Perumahan Berhad (SJKP). (2023). Retrieved January 6, 2024, from Syarikat Jaminan Kredit Perumahan Berhad website: https://www.sjkp.com.my/en/about-us/about-sjkp
Trofimov, I. (2018). Macroeconomic and Demographic Determinants of Residential Property Prices in
Malaysia. Munich Personal RePEc Archive, 1-24.

Trofimov, I. D., Aris, N. Md., & Xuan, D. C. D. (2018). Macroeconomic and Demographic Determinants of Residential Property Prices in Malaysia. Zagreb International Review of Economics and Business, 21(2), 71–96. https://doi.org/10.2478/zireb-2018-0015

Weeken, O. (2004), Asset Pricing and the Housing Market, Bank of England Quarterly Bulletin.

Zainon, N., Rahim, F.A.M., Samad, D. and Lou, E. (2017), "Malaysian affordability housing policies revisited", Open House International, Vol. 42 No. 1, pp. 44-51.

Zulkarnain, S. H., & Nawi, A. S. (2023). The relationship between macroeconomic variables on residential property price: case study in Malaysia before and during COVID-19. *International Journal of Housing Markets and Analysis*. https://doi.org/10.1108/ijhma-01-2022-0013.

EXPLORING GREEN CHEMISTRY VIA QUANTUM MECHANICAL SIMULATIONS OF ENZYMATIC REACTION MECHANISMS

Muhammad Qadri Effendy Bin Mubarak[i]
[i] Senior Lecturer, Fakulti Sains dan Teknologi, Universiti Sains Islam Malaysia.
qadri.mubarak@usim.edu.my

Abstract

Green chemistry aims to design chemical processes that reduce or eliminate the use and generation of hazardous substances, making sustainability a core focus in modern research. Enzymatic reactions offer a natural and environmentally friendly pathway for catalysis, yet understanding their mechanisms at a fundamental level remains a challenge. This study explores the application of quantum mechanical (QM) simulations to model enzymatic reaction mechanisms, providing insights into their catalytic efficiency and potential for green chemistry applications. Using the QM cluster models, we simulate the active sites of enzymes to elucidate the electronic factors governing their catalytic behavior. These models allow for the detailed examination of reaction pathways, transition states, and energy barriers, offering a molecular-level understanding of how enzymes achieve such high specificity and efficiency in promoting reactions. By leveraging the accuracy of QM simulations, we investigate the potential of enzyme-catalyzed processes to replace traditional chemical methods, which often rely on toxic solvents and harsh conditions. The results of this research underscore the importance of quantum mechanical modeling in identifying and optimizing enzymatic reactions for green chemistry. Through this approach, we demonstrate how QM simulations can be a powerful tool in the design of eco-friendly catalytic processes, paving the way for more sustainable industrial practices. Ultimately, this study contributes to the broader goal of integrating green chemistry principles into the development of next-generation catalytic systems.

Keywords: *Green chemistry, Quantum mechanical simulations, cluster model*

INTRODUCTION

Green chemistry emphasizes the design of chemical products and processes that minimize the generation of hazardous substances, has become a cornerstone in the pursuit of sustainable chemical practices. Among the approaches aligned with green chemistry principles, enzymatic catalysis stands out due to its exceptional efficiency and selectivity under mild reaction conditions. Enzymes, as natural biocatalysts, have the potential to replace traditional chemical catalysts in various industrial processes, thereby reducing the environmental impact of these reactions. However, a detailed understanding of the mechanisms by which enzymes catalyze reactions is crucial for optimizing their use.

Thus, Quantum mechanical (QM) simulations have proven to be a powerful tool for investigating the mechanistic details of enzymatic reactions. These simulations enable the exploration of electronic structures and reaction pathways at the molecular level, providing insights that are often inaccessible through experimental methods alone. The integration of QM simulations with molecular mechanics (QM/MM) has further enhanced our ability to model enzymatic processes, allowing for the detailed

analysis of enzyme active sites within the context of their broader protein environments.

Recent studies have demonstrated the value of QM simulations in advancing our understanding of enzyme catalysis. Previous study had utilized large-scale electronic structure simulations to reveal the quantum mechanical effects that play a critical role in enzyme catalysis, highlighting the importance of electronic interactions in determining catalytic efficiency (de Visser et al, 2024). Similarly, Pan et al. (2023) employed QM/MM simulations to perform a free energy profile decomposition analysis, which provided insights into the individual contributions of enzyme residues to reaction energy barriers. These findings underscore the potential of QM simulations to uncover the molecular mechanisms underlying enzymatic catalysis, thereby facilitating the design of more efficient and environmentally friendly catalytic processes.

In this research, we aim to explore the application of quantum mechanical simulations to enzymatic reaction mechanisms within the framework of green chemistry. By focusing on the detailed molecular interactions that drive enzyme-catalyzed reactions, this study seeks to identify strategies for optimizing these processes to achieve greater sustainability and efficiency in chemical production.

METHODOLOGY

This study employs computational methods previously validated and proven effective in replicating experimental results by using quantum chemistry approach (Cantú Reinhard, Faponle, and de Visser, 2016). Density Functional Theory (DFT) calculations were conducted using the Gaussian-09 software (Frisch, Hratchian, and Nielsen, 2009). Two unrestricted DFT methods, the hybrid UB3LYP (Lee, Yang, and Parr, 1988; Becke, 1993) and UBP86 (Perdew, 1986; Becke, 1988) were used for all geometry optimizations, scans, and frequency calculations.

We focus on the chemical properties and methane hydroxylation activity of the μ-nitrido bound diruthenium(IV)-oxo porphyrazine (Pz) complex, $^{2,4,6}[O=Ru^{IV}(Pz^{+\bullet})NRu^{IV}(Pz)]^0$ (or $^{2,4,6}[O=Ru^{V}(Pz)NRu^{IV}(Pz)]^0$) where will be label as **1**. Geometry optimizations and potential energy scans were performed with the LACVP basis set including core potential for ruthenium and 6-31G for other atoms (Ditchfield, Hehre, and Pople, 1971; Hay and Wadt, 1985). All optimized structures and transition states were validated with an analytical frequency analysis, confirming the presence of a single imaginary frequency in the transition states. Solvent effects were included using a polarized continuum model (CPCM), mimicking acetonitrile with a dielectric constant of $\varepsilon = 35.688$. To enhance accuracy, single-point energy calculations were carried out with an LACV3P+ basis set for ruthenium and 6-311+G* for other atoms for basis set BS2. These methods have been rigorously tested in previous studies and shown to accurately reproduce experimentally determined free energies of activation (Cantú Reinhard, Faponle, and de Visser, 2016; Cantú Reinhard et al., 2017).

RESULTS AND DISCUSSION

1.952 (1.805) [1.806] {1.847 (˩1.816]}

1.832 (2.313) [2.321] {1.909 (2.164) [2.189]}
1.732 (1.725) [1.736] {1.747 (1.717) [1.737]}

$\Delta E+ZPE$ = 0.0 (11.1) [40.0]
{0.0 (14.8) [44.2]}

^{2}**1** (^{4}**1**) [^{6}**1**]

Figure 1. Optimized geometries of complexes ^{2,4,6}**1** containing ^{2,4,6}[O=Ru^{IV}(Pz$^{+•}$)NRu^{IV}(Pz)]^{0} as obtained in Gaussian-09. Bond lengths are in angstroms and relative energies in kcalmol^{-1}. Data for ^{2,4,6}**1** and taken from previous work (Mubarak et al., 2017)

In this study, we examine the chemical properties and reactivity of the μ-nitrido diruthenium(IV)-oxo porphyrazine (Pz) complex^{2,4,6}[O=Ru^{IV}(Pz$^{+•}$)Ru^{IV}(Pz)]^{0} (or ^{2,4,6}[O=Ru^{V}(Pz)NRu^{IV}(Pz)]^{0})], denoted as complex 1. Using UB3LYP and UBP86 density functional theory methods, this study analyze this neutral complex across its doublet, quartet, and sextet spin states, and compare its properties to diiron(IV)-oxo complexes to gain insights into differences in the reactivity and stability (Silaghi-Dumitrescu *et al.*, 2011; Ansari *et al.*, 2015; Quesne *et al.*, 2016). The structural analysis indicated that the Ru$_1$–O and Ru$_2$-μ-N bonds in the ruthenium complexes are significantly elongated compared to those in diiron counterparts, consistent with the heavier nature of ruthenium. Notably, the Ru$_1$–O bond is longer than the Ru$_2$–μ-N bond, suggesting different bonding characteristics. Additionally, molecular orbital analysis highlighted distinct π-interactions in the xz and yz planes, differentiating the Ru–O and Ru–N interactions from those typical of mononuclear heme systems.

The analysis revealed that the free energies calculated with both B3LYP and BP86 are notably similar, particularly for the transition states, with analogous structures also observed. This suggests that the choice of density functional method has minimal impact on the structural and energetic outcomes of the reaction mechanism. In contrast to the spin-state ordering and relative energies seen in mononuclear iron and manganese-oxo complexes, where results can vary significantly depending on the method used, especially the amount of Hartree-Fock exchange

included (Sainna, Sil, *et al.*, 2015; Cantú Reinhard, Faponle and de Visser, 2016; Yang *et al.*, 2016).

Energy comparisons across different spin states of complex [2,4,6]1 as shown in Figure 2 revealed that the doublet spin state is the ground state, with the quartet and sextet spin states lying more than 10 kcal mol^{-1} higher in energy. This suggests that the reaction is most likely will occur via a single-state reactivity pathway on the doublet state surface. However, the multi-state reactivity often observed in iron(IV)-oxo systems, which involve closely lying spin states (Hirao *et al.*, 2006; Visser, 2006). Thus the ability of the ruthenium to stabilize low-lying spin states positions could make it as a promising alternative in enzymatic systems that require stability. The predictable and controllable reaction outcomes afforded by single-state reactivity in ruthenium complexes are a significant advantage over other transition metals. In the case of iron, where different spin states can complicate reaction mechanisms of the enzyme itself. This stabilization has the potential to inspire the design of innovative catalysts that emulate natural enzymes, leading to more efficient and sustainable chemical transformations.
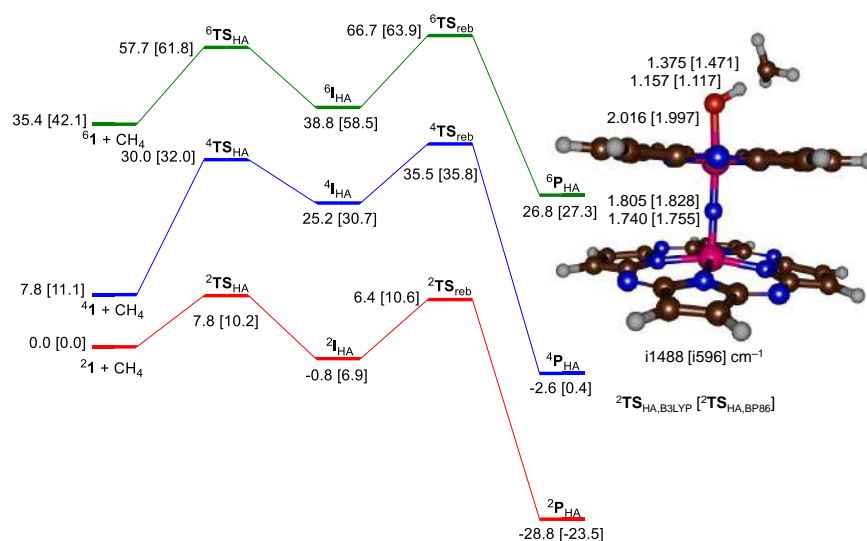
Figure 2. Potential energy landscape of methane hydroxylation by [2,4,6]1 as obtained with DFT using UB3LYP [UBP86] level of theory. Free energies (at BS2 level of theory) are in kcal mol^{-1} with solvent, thermal, entropic and ZPE corrections included. Optimized geometries give bond lengths in angstroms and the imaginary frequency in cm^{-1}.

Figure 2 provides the energy profile for methane hydroxylation catalyzed by the diruthenium complex. The mechanism starts via a stepwise mechanism beginning with hydrogen atom abstraction through the transition state of **TS$_{HA}$**, forming a radical intermediate (**I$_{HA}$**), followed by an OH rebound step via **TS$_{reb}$** leading to the formation of the alcohol product complex (**P$_{HA}$**). This mechanism mirrors iron(IV)-oxo complexes but with a notably lower activation barrier for hydrogen atom abstraction,

indicating that the diruthenium complex is a more efficient oxidant. Optimized geometries of the rate-determining doublet spin transition states (^{2}**TS**$_{HA}$) show late transition states with long C–H distances (1.375 Å and 1.471 Å at the B3LYP and BP86 levels of theory, respectively) and shorter O–H distances (1.157 Å and 1.117 Å), correlating with high energy barriers. Previous studies have demonstrated that the height of hydrogen atom abstraction barriers correlates with the strength of the C–H bond being broken, with stronger C–H bonds leading to more product-like transition states (Latifi et al. 2012). The strong C–H bond strength in methane with the bond dissociation energy of 101.6 kcal mol^{-1} at the UB3LYP level of theory explains the high hydrogen atom abstraction barriers observed. The rate-determining step of hydrogen atom abstraction for complex ^{2}1 has a free energy of activation of 7.8 kcalmol^{-1}, significantly lower than the 15.7 kcalmol^{-1} found for analogous μ-nitrido bridged diiron(IV)-oxo phthalocyanine complexes (Quesne *et al.*, 2016). This reduction in the activation barrier by nearly 8 kcalmol^{-1} suggests a rate enhancement of over 10^6, further supporting the conclusion that the diruthenium(IV)-oxo species is a considerably more efficient oxidant.

CONCLUSION

The analysis of the μ-nitrido diruthenium(IV)-oxo porphyrazine complex has provided significant insights into its chemical properties and reactivity. Our study demonstrates that the diruthenium complex exhibits a pronounced preference for the doublet spin state, with the quartet and sextet spin states being considerably higher in energy. This stabilization of the low-spin state facilitates single-state reactivity, which is a key factor in the complex's enhanced catalytic efficiency.

The structural and electronic properties of the diruthenium complex reveal elongated Ru$_1$–O and Ru$_2$–μ-N bonds, indicative of the unique bonding characteristics of ruthenium. These structural features, combined with the distinct π-interactions within the complexes were observed in the molecular orbitals and might contribute to the complex's ability to stabilize the low-spin state and lower the activation barrier for hydrogen atom abstraction during methane hydroxylation.

Our findings suggest that the diruthenium(IV)-oxo species is a significantly efficient oxidant than its diiron(IV)-oxo counterpart, resulting in a potential rate enhancement. The ability of ruthenium complexes to maintain a stable low-spin state and exhibit single-state reactivity makes them promising candidates for catalytic applications that require high efficiency and selectivity.

Overall, the unique electronic structure and reactivity of the diruthenium complex highlight its potential as an alternative catalyst in enzymatic systems, offering advantages in terms of both efficiency and predictability. Future research could explore the development of ruthenium-based catalysts that mimic natural enzymes, potentially leading to more sustainable and environmentally friendly chemical processes.

REFERENCE

Ansari, M., Vyas, N., Ansari, A. and Rajaraman, G., 2015. "Oxidation of Methane by an N-Bridged High-Valent Diiron-Oxo Species: Electronic Structure Implications on the Reactivity." *Dalton Transactions*, 44(34), pp.15232-15243. https://doi.org/10.1039/c5dt01060h.

Becke, A. D., 1988. "Density-Functional Exchange-Energy Approximation with Correct Asymptotic Behavior." Physical Review A 38 (6): 3098–3100. https://doi.org/10.1103/PhysRevA.38.3098.

Becke, A. D., 1993. "Density-functional Thermochemistry. III. The Role of Exact Exchange." The Journal of Chemical Physics 98 (7): 5648–52. https://doi.org/10.1063/1.464913.

Cantú Reinhard, F.G., Barman, P., Mukherjee, G., Kumar, J., Kumar, D., Kumar, D., Sastri, C.V. and de Visser, S.P., 2017. "Keto-Enol Tautomerization Triggers an Electrophilic Aldehyde Deformylation Reaction by a Nonheme Manganese(III)-Peroxo Complex." *Journal of the American Chemical Society* 139 (50): 18328–38. https://doi.org/10.1021/jacs.7b10033.

Cantú Reinhard, F.G., Faponle, A.S. and de Visser, S.P., 2016. Substrate sulfoxidation by an iron (IV)-oxo complex: Benchmarking computationally calculated barrier heights to experiment. *The journal of physical chemistry A*, 120(49), pp.9805-9814.

De Visser, S. P., Wong, H., Zhang, Y., Yadav, R., & Sastri, C., 2024. Quantum Mechanical Cluster Models for Calculations on Enzymatic Reaction Mechanisms: Set-Up and Accuracy. *Chemistry–A European Journal*, e202402468.

Ditchfield, R.H.W.J., Hehre, W.J. and Pople, J.A., 1971."Self-Consistent Molecular-Orbital Methods. IX. An Extended Gaussian-Type Basis for Molecular-Orbital Studies of Organic Molecules." The Journal of Chemical Physics 54 (2): 724–28. https://doi.org/10.1063/1.1674902.

Frisch, M.J., Hratchian, H.P. and Nielsen, A.B., 2009. Gaussian 09: Programmer's Reference. gaussian.

Hay, P.J. and Wadt, W.R., 1985. "Ab Initio Effective Core Potentials for Molecular Calculations. Potentials for the Transition Metal Atoms Sc to Hg." *The Journal of Chemical Physics* 82 (1): 270–83. https://doi.org/10.1063/1.448799.

Hirao, H., Kumar, D., Que Jr, L. and Shaik, S., 2006. "Two-State Reactivity in Alkane Hydroxylation by Non-Heme Iron-Oxo Complexes." *Journal of the American Chemical Society* 128 (26): 8590–8606. https://doi.org/10.1021/ja061609o.

Latifi, R., Valentine, J.S., Nam, W. and de Visser, S.P., 2012. "Predictive Studies of H-Atom Abstraction Reactions by an Iron(IV)-Oxo Corrole Cation Radical Oxidant." Chemical Communications 48 (29): 3491–93. https://doi.org/10.1039/c2cc30365e.

Lee, C., Yang, W. and Parr, R.G., 1988. "Development of the Colle-Salvetti Correlation-Energy Formula into a Functional of the Electron Density." Physical Review B 37 (2): 785–89. https://doi.org/10.1103/PhysRevB.37.785.

Mubarak, M. Q. E., Sorokin, A. B., & de Visser, S. P., 2019. Properties and reactivity of μ-nitrido-bridged dimetal porphyrinoid complexes: how does ruthenium compare to iron?. *JBIC Journal of Biological Inorganic Chemistry*, 24, 1127-1134.

Pan, X., Van, R., Pu, J., Nam, K., Mao, Y., & Shao, Y., 2023. Free Energy Profile Decomposition Analysis for QM/MM Simulations of Enzymatic Reactions. *Journal of Chemical Theory and Computation*, *19*(22), 8234-8244.

Perdew, J.P., 1986. "Density-Functional Approximation for the Correlation Energy of the Inhomogeneous Electron Gas." *Physical Review B* 33 (12): 8822.

Quesne, M.G., Senthilnathan, D., Singh, D., Kumar, D., Maldivi, P., Sorokin, A.B. and de Visser, S.P., 2016. "Origin of the Enhanced Reactivity of -Nitrido-Bridged Diiron(IV)-Oxo Porphyrinoid Complexes over Cytochrome P450 Compound I." *ACS Catalysis* 6 (4): 2230–43. https://doi.org/10.1021/acscatal.5b02720.

Sainna, M.A., Sil, D., Sahoo, D., Martin, B., Rath, S.P., Comba, P. and de Visser, S.P., 2015. "Spin-State Ordering in Hydroxo-Bridged Diiron(III)Bisporphyrin Complexes." *Inorganic Chemistry* 54 (4): 1919–30. https://doi.org/10.1021/ic502803b.

Silaghi-Dumitrescu, R., Makarov, S.V., Uta, M.M., Dereven'kov, I.A. and Stuzhin, P.A., 2011. "Redox Non-Innocence of a Nitrido Bridge in a Methane-Activating Dimer of Iron Phthalocyanine." *New Journal of Chemistry* 35 (5): 1140–45.

Visser, S. P. D., 2006. "Substitution of Hydrogen by Deuterium Changes the Regioselectivity of Ethylbenzene Hydroxylation by an Oxo-Iron-Porphyrin Catalyst." Chemistry - A European Journal 12 (31): 8168–77. https://doi.org/10.1002/chem.200600376.

Yang, T., Quesne, M.G., Neu, H.M., Cantú Reinhard, F.G., Goldberg, D.P. and de Visser, S.P., 2016. "Singlet versus Triplet Reactivity in an Mn(V)-Oxo Species: Testing

Theoretical Predictions Against Experimental Evidence." Journal of the American Chemical Society 138 (38): 12375–86. https://doi.org/10.1021/jacs.6b05027.

STUDENTS PERCEPTION TOWARDS i-Stams: WEB BASED TASK MANAGEMENT SYSTEM WITH INAQ FOR STUDENTS IN UNIVERSITI SAINS ISLAM MALAYSIA

Halimaton Sa'adiah Ariffin[i], Aiza Azrin Mohd Zain[ii], Muhammad Izuddin bin Norkas Purahman [iii] & Nur Sabrina Mohd Shukri[iv]

[i] (*Corresponding author*). Guru Tamhidi, Pusat Tamhidi, Universiti Sains Islam Malaysia. halimaton@usim.edu.my
[ii]Guru Tamhidi, Tamhidi Centre, Universiti Sains Islam Malaysia. aiza@usim.edu.my
[iii] Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia. judeng29@raudah.usim.edu.my
[iv] Faculty of Engineering and Built Environment, Universiti Sains Islam Malaysia. sabrinashukri@raudah.usim.edu.my

Abstract

i-Stams: Web-Based Task Management System with INAQ is a web based system especially developed for students in Universiti Sains Islam Malaysia. This web application system is used to assist students in managing the time for assignments and tasks. The goal of creating this application is to address the issue of time management and raise awareness of its significance. The Object-Oriented Software Development (OOSD) Model is used as a standard and guide throughout the system development process. i-Stams was developed using Agile methodology methodology with Scrumban methodology. This web-based system was developed using PHP Script and mySQL as building platform. All in all, this web-based system comprises a to-do list, items to be mindful of, and a collection of tasks and zikr. It can help students become more adept at managing their time, which will enhance their academic achievement. The primary goal for students is to allow students to monitor the progress of task and be a good muslim. The aim of this paper is to determine the perception of students towards i-Stams. Participants were 96 students from Tamhidi Programme in Universiti Sains Islam Malaysia. There are ten questions to be answered by the students that related to the i-Stams which is about time management and organization, academic performance and task priority.

Keywords: *Web-Based System, Task Management System, Agile Methodology, Naqli and Aqli Knowledge (INAQ).*

INTRODUCTION

Task management systems are commonly employed by project development teams to monitor the progress of their tasks from start to finish, assign subtasks to team members, and establish deadlines to ensure timely completion of projects. It enhances students' productivity and efficiency. The aim of this project is to develop a

web-based student task management system that will assist students in effectively organizing their assignments and ensuring that they are completed before the deadline. The system has task tracking and recommendation functionalities to facilitate efficient task management for students. It enables them to priorities and tackle the most significant or urgent activities first. The Student Task Management System is developed using PHP frameworks and MySQL for both the frontend and backend. The system follows the Agile process in system development. The implementation of the Web-based Student Task Management System effectively addressed the issue of managing students' tasks, resulting in increased productivity and efficiency in their studies. Additionally, it aimed to foster the development of students' Islamic values.

The success of students in a course or subject is determined by the proficiency with which they complete their tasks. Consequently, certain students take notes as a means of consistently recalling their tasks. Utilizing tangible items such as notes or calendars may assist students in effectively organizing their tasks. However, individuals often fail to remember and may inadvertently misplace their task and assessments or neglect to retrieve them. (Anastasia, 2013).

Given the increasing amount of time that students currently devote to gadgets and other devices such as laptops, tablets, and PCs, it would be advantageous to have a task management website that may assist in organizing their tasks. The task management system is designed to assist not just students with their personal projects or assignments. Additionally, it assists pupils in their collaborative assignments. This is because the task management system will be packed with capabilities that enable students to organize and monitor their group tasks. The task management system is anticipated to enhance their learning productivity.

The aim of this paper is to determine the perception of students towards i-Stams. Participants were 96 students from Tamhidi Programme in Universiti Sains Islam Malaysia. There are ten questions to be answered by the students that related to the i-Stams which is about time management and organization, academic performance and task priority. In the other hand, this paper also introduces about i-Stams, the interfaces of i-Stams and the methodology of i-Stams.

LITERATURE REVIEW

The concept of time management as it is used now relates to the process of planning how much time people spend on particular tasks (E.Ho and C.Woods, 2015). In the business world, time management entails developing procedures and tools that improve efficiency and productivity (S. Ward, 2016). Academic time management helps students to avoid procrastinating by efficiently allocating their time to a variety of activities, including schoolwork, projects, social interactions, and other commitments. Students who are good at managing their time can devote more time to their interests and extracurricular activities while also improving their academic

performance by focusing more time on critical courses. According to E. Kee (2016), efficient time management can thereby reduce time wasting, reduce stress and anxiety, and moderate poor performance.

The results further our knowledge of how task management systems at Malaysian higher education institutions might improve student productivity and academic success. (Tan, L.K.; Ahmad, S., 2019). examines the particular needs and preferences of Malaysian students with regard to platforms and tools for task management. It covers topics including integration with current instructional tools, accessibility, and usability. finds ways to innovate and make improvements in the creation and application of task management systems specifically suited for higher education in Malaysia. The information supplied is intended to help with the creation of more practical and efficient ways to assist learning and academic achievement for Malaysian students. Wong, C.H., Y. 2021).

Overall, this task web-based management system helps students to manage their time in completing the task and assessments. Thus, this research focuses on the development of a web-based system known as i-Stams to manage time for task and assessment for every course field for foundation student at Tamhidi Centre, Universiti Sains Islam Malaysia.

OBJECTIVES OF i-Stams
- To maintain all the essential tasks in one place.
- To improve time management with efficiency and help students organize.
- Provide an interactive & user-friendly platform.
- Assist students utilizing time management.
- Students can review current progress as well as add, remove and update their task easily. Notification feature included if the due date approaching.
- To be an alternative references or sources for motivation and doa/zikr.

METHODOLOGY
i-Stams developed using Agile methodology methodology with Scrumban methodology. This web-based system was developed using PHP Script and mySQL as a building platform.

Agile Methodology is depicted in Figure 1, with planning, user design and input, construction, and finalization being outlined. Agile development is used because it offers the benefit of having a fallback method in case the process is unable to meet the required standards. The Scrumban technique, on the other hand, aids in breaking down the development process into several sprints and breaks down each system need into smaller components. This enables developers to focus on one component at a time and move on to other sections after a task is completed. Due to these factors, the Scrumban methodology combined with the agile development process is

very appropriate for small projects developed by one person or small groups of individuals.
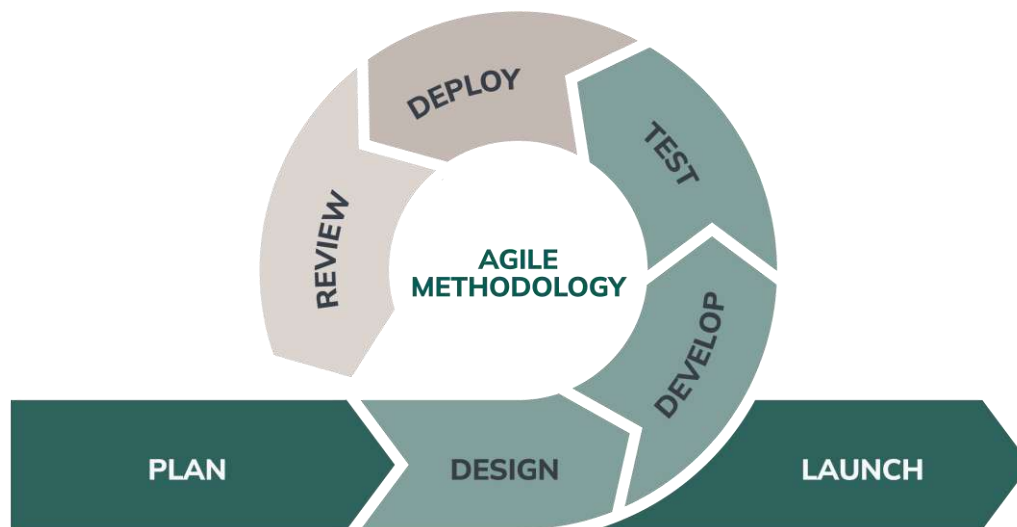
Figure 1. Agile Methodology (Source: asana.com, 2024)

Figure 1 illustrates the Agile Methodology. The Agile software development lifecycle is a straightforward, systematic software methodology. When followed and implemented properly, Agile helps teams deliver high-quality software on time and within budget.

Agile includes the five stages of the software development lifecycle (SDLC):
1. Ideation
2. Development
3. Testing
4. Deployment
5. Operations

INTERFACE

This web-based system project is implemented for Tamhidi Programme students in Universiti Sains Islam Malaysia. Figure 2 shows the sign in page of i-Stams. Students can sign in login page in https://puterijauhari.com/iStams where the registered user can enter username and password to be able to access the i-Stams.
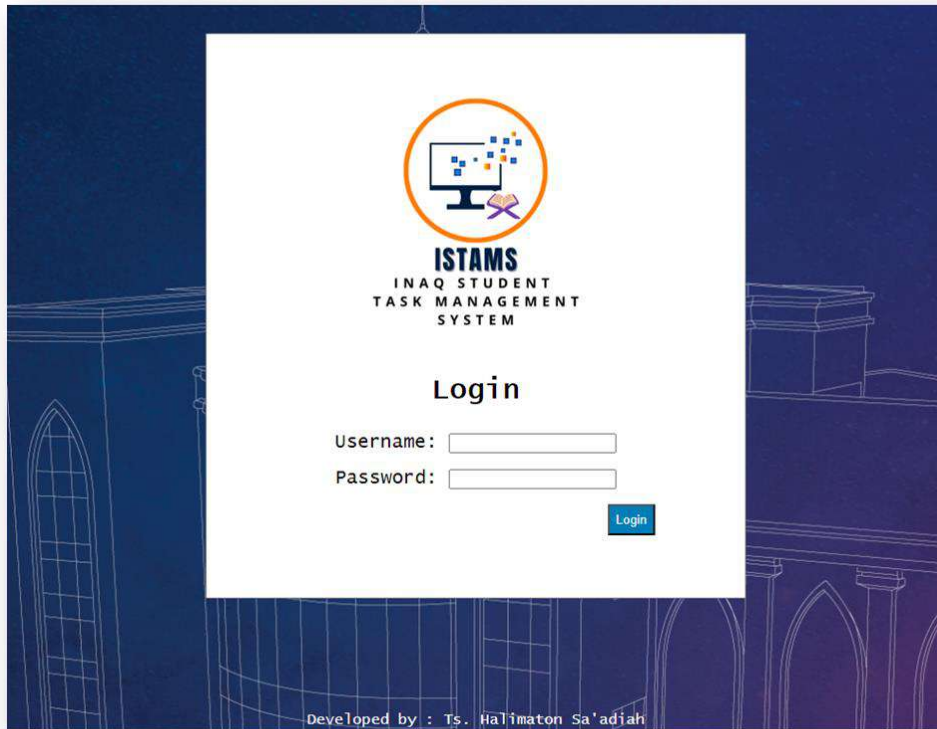
Figure 2. Login Page

The course list is displayed in Figure 3. Using the Add Course button, students can add the course. Students can also alter the course list by using the edit and remove buttons.

Figure 4 displays the Task List. Using the Add Task button, students can add the task. They have the option to select a task's In Progress, Pending, or Completed status. When students are able to control the assignment and notify the status of each task, this is very helpful to them.

Figure 4. List of Task

Figure 5. Things To Do

Things To Do in Figure 5 shows that Students are able to add activities. Things To Do is a really useful tool where students can motivate themselves and remember what needs to be done for a certain activity.
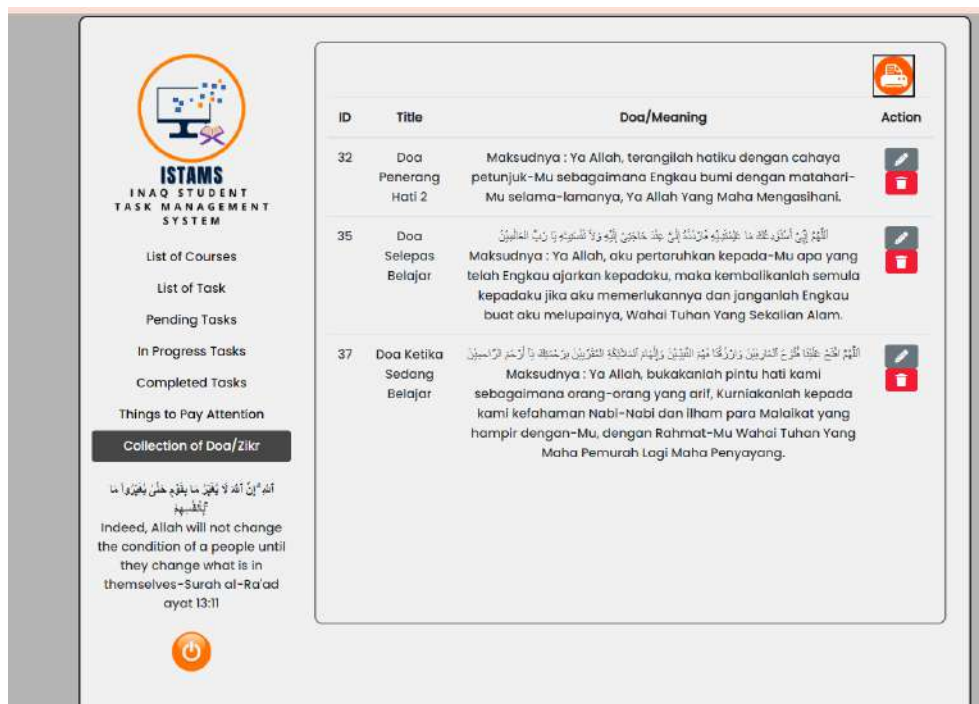
Figure 6. Collection of Doa/Zikr

Students can add and collect doa/zikr in the system, which makes i-Stams unique. Figure 6 illustrates it. When completing the assignment, they can always refering the doa and zikr. This is the best practice for students to be a good muslim.

RESULTS AND DISCUSSION

Participants were 96 students from Tamhidi Programme in Universiti Sains Islam Malaysia, comprising 66 female students and 30 male students. There are 10 items to be answered by the students that related to the i-Stams which is about time management and organization, academic performance and task priority. A five-point Likert scale is used to indicate frequency. The Likert scale are 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree. Table 1 shows the Responses of Students Perception Towards i-Stams.

Table 1: Responses of Students Perception Towards i-Stams

Items	Statement	Strong Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)
1	I feel that learning management is more structured throughout the semester with the use of i-Stams.	3 (3.1%)	0 (0%)	1 (1%)	14 (14.6%)	78 (81.3%)
2	I feel great when I can organize well all the tasks, assignments and tutorials throughout the semester when using i-Stams.	3 (3.1%)	0 (0%)	1 (1%)	16 (16.7%)	76 (79.2%)
3	All assignments, tasks, and tutorials can be completed within the specified time frame with the help of the i-	3 (3.1%)	0 (0%)	2 (2.1%)	25 (26%)	66 (68.8%)

Stams system.

4	I found that the use of i-Stams help me to manage time effectively.	3 (3.1%)	0 (0%)	1 (1%)	22 (22.9%)	70 (72.9%)
5	i-Stams can be accessed anywhere and anytime only by using a gadget (mobile phone, tablet, laptop etc.).	3 (3.1%)	0 (0%)	2 (2.1%)	18 (18.8%)	73 (76%)
6	The Quran verses, prayers and propositions in i-Stams helps to motivate students better throughout the semester.	3 (3.1%)	0 (0%)	0 (0%)	12 (12.5%)	81 (84.4%)
7	Using i-Stams helps student to be more disciplined to complete their tasks and assignments.	3 (3.1%)	0 (0%)	1 (1%)	21 (21.9%)	71 (74%)
8	i-Stams help students to improve their academic performance by tracking their academic performance progress.	3 (3.1%)	0 (0%)	1 (1%)	23 (24%)	69 (71.9%)
9	The use of i-Stams helps students organize assignments, and knows important dates according to priority.	3 (3.1%)	0 (0%)	0 (0%)	19 (19.8%)	74 (77.1%)
10	i-Stams system helps me to focus on completing priority tasks first.	3 (3.1%)	0 (0%)	0 (0%)	13 (13.5%)	80 (83.3%)

According to the results in Table 1, item 1 which state that I feel that learning management is more structured throughout the semester with the use of i-Stams, there are 81.3% or 78 respondents who say they strongly agree while 14 respondents or 14.6% agreed, 1 respondent or 1% neutral and 3.1% or 3 respondents were strongly disagreed with the statement. Item 2, which is a statement of I feel great when I can organize well all the tasks, assignments and tutorials throughout the semester when using i-Stams, there are 79.2% or 76 respondents who say they strongly agree while 16 respondents or 16.7% agreed, 1 respondent or 1% neutral and 3.1% or 3 respondents were strongly disagreed. For item 3, All assignments, tasks, and tutorials can be completed within the specified time frame with the help of the i-Stams system 66 respondents or 68.8% expressed strong agreement, 25 or 26% agreed, 2 respondents or 2.1% neutral while 3 or 3.1% respondents expressed strongly disagreed. Indeed, items 1, 2 and 3 correspond to the respondents' perception that this i-Stams is one of the platforms to well organized their assessment like assignment, task, tutorial, quiz, examination during the semester.

We know that time management is the act of planning the amount of the time students spends to manage their time in school while having tasks, projects and social life. Therefore, time management can prevent poor performance, stress, pressure, and the waste of time. For item 4, which is I found that the use of i-Stams help me to manage time effectively there are 72.9% or 70 respondents who say they strongly agree while 22 respondents or 22.9% agreed, 1 respondent or 1% neutral and 3.1% or 3 respondents were strongly disagreed. Item 5, i-Stams can be accessed anywhere and anytime only by using a gadget (mobile phone, tablet, laptop etc.) shows that 73 respondents or 76% expressed strong agreement, 18 or 18.8% agreed, 2 respondents or 2.1% neutral while 3 or 3.1% respondents expressed strongly disagreed. Item 4 and 5 shows that the majority of respondent says that i-Stams can helps them to manage their time effectively, anywhere and anytime.

Academic performance is important for students as a result of educational experience in determining students' success in their future careers. Item 6, 7 and 8 evaluate about motivated, dicipline and how to improve the academic performance. Refer to the results, item 6 which state that The Quran verses, prayers and propositions in i-Stams helps to motivate students better throughout the semester, there are 84.4% or 81 respondents who say they strongly agree while 12 respondents or 12.5% agreed and 3.1% or 3 respondents were strongly disagreed with the statement. Next item 7, Using i-Stams helps student to be more disciplined to complete their tasks and assignments shows that 71 respondents or 74% expressed strong agreement, 21 or 21.9% agreed, 1 respondent or 1% neutral while 3 or 3.1% respondents expressed strongly disagreed. Item 8, which is i-Stams help students to improve their academic performance by tracking their academic performance progress there are 71.9% or 69 respondents who say they strongly agree while 23 respondents or 24% agreed, 1 respondent or 1% neutral and 3.1% or 3 respondents

were strongly disagreed. The results of item 6, 7, and 8 showed that i-Stams can increase motivation, dicipline and improve the academic performance.

Next, item 9 and 10 focus on task priority students. Item 9 asked about The use of i-Stams helps students organize assignments, and knows important dates according to priority. The result are that 74 respondents or 77.1% expressed strong agreement, 19 or 19.8% agreed while 3 or 3.1% respondents expressed strongly disagreed. The last item 10, which is i-Stams system helps me to focus on completing priority tasks first, there are 83.3% or 80 respondents who say they strongly agree while 13 respondents or 13.5% agreed and 3.1% or 3 respondents strongly disagreed. The result for item 9 and 10 showed majority agreed that i-Stams can helps student smart plan the work according to the priority and due date.

According to the result in item 1 until 10, students showed a positive perception about i-Stams. All the total result agreed and strongly agreed above 80%. Only 3% or 3 respondents indicated strongly disagree and 1 or 2 respondents in neutral situation.

CONCLUSION

In this study, we aimed to investigate Students Perception Towards i-Stams: Web-Based Task Management System with INAQ is a web based system especially developed for students in Universiti Sains Islam Malaysia. The result showed the positive perception from students. i-Stams is an application that can help students to have a better time management, well organize their assessment, improve the academic performance and focus on completing priority tasks before the due date.

The advantage of the i-Stams application is user friendly, easy to use, can manage their time effectively, anywhere and anytime using any gadget. In addition, the application i-Stams have an Islamic element (INAQ) that can motivate students.

In conclusion, i-Stams have achived its objective its objective to maintain all the essential tasks in one place, to improve the efficiency and help student organize, provide an interactive & user-friendly platform,assist students utilizing the time management, student can review current progress as well as add, remove and update their task easily. Notification feature included if due date approaching and to be an alternative references or sources for motivation and doa.

REFERENCE

E. Ho and C. Woods, "*What is Time Management? - Definition, Examples & Studies - Video & Lesson Transcript | Study.com*", Study.com, 2016. [Online]. Available:http://study.com/academy/lesson/what-is-time. managementdefinition-examples-studies.html. [Accessed: 11- Oct- 2015].

S. Ward, *"Time Management: What It Is, Why It Is and How to Use It"*,About. com Money, 2016. [Online]. Available: http://sbinfocanada.about.com/od/ timemanagement/g/timemanagement.htm. [Accessed: 11- Oct- 2015].

E. Kee, *"College Skills: Time Management | #TheGuide"*,Openlab.citytech. cuny.edu, 2016. [Online]. Available: https://openlab.citytech.cuny.edu/ theguide/2013/10/30/college-skills-time-management-3/.

Ahmad, S.; Tan, L.K (2019) *"Exploring Student Task Management Systems in Malaysian Higher Education: A Review"*

W.Y.; Wong, C.H (2021) *"Designing Task Management Systems for Malaysian Higher Education: Perspectives and Challenges"*.

Anastasia C. (2022). *"Goals – The most important part of task management. FacileThings Blog"*. Retrieved from https://facilethings.com/blog/en/goals-and-task-management on 20 May 2022.

Bellotti, V., Dalal, B., Good, N., Flynn, P., Bobrow, D. G. & Ducheneaut, N. (2004). *"What a to-do: studies of task management towards the design of a personal task list manager"*.CHI, 6 (1), 735-742. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.464.5718&rep=rep 1&type=pdf on 2 february 2022.

INTERACTIVE LEARNING EXPERIENCE THROUGH SULAM PROJECT BY INTEGRATING SUSTAINABLE ENVIRONMENT ACTIVITIES WITH INAQ

Hatika Kaco[i], Mohd Hafiz Abu Hassan[ii],   Khairunneezam Mohd Noor[iii], Najwa Hayaati Mohd Alwi[iv], Siti Salhah Othman[v] & Siti Nazurah Md Jusoh[iv]

[i] (*Corresponding author*). Lecturer, Kolej PERMATA Insan, Universiti Sains Islam Malaysia, 71800, Nilai, Negeri Sembilan, Malaysia. hatikakaco@usim.edu.my
[ii] Lecturer, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Nilai, 71800, Negeri Sembilan, Malaysia. mhafiz.a.h@usim.edu.my, najwa@usim.edu.my
salhah@usim.edu.my, nazurah@usim.edu.my
[iii] Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia, Nilai, 71800, Negeri Sembilan, Malaysia. neezam@usim.edu.my

Abstract

The SULAM Program for the STREAM Mentoring Course with the theme of "From Waste to Wealth: Creative Sustainability" and Integration of Naqli and Aqli Knowledge (INAQ was a collaboration between Universiti Sains Islam Malaysia (USIM) and Sekolah Menengah Kebangsaan Dato' Shahardin (SMKDS), Labu, Negeri Sembilan. Despite the vital role of Malaysia Education Blueprint 2013-2025 in the national agenda, the delivery of science, technology, engineering, and math (STEM) education is far behind our national transformation education's trajectory. Considering STEM appealing to our students is yet approachable, the consequence could threaten our sustainable development and the new economy. Hence, the urgent need to improve the student's interest in STEM elements through translational science and cultivating empathy are critical exercises that can contribute to a sense of purpose among students. The essential of developing empathy in STEM-related issues can be carried out with translational modules focusing on recycling for environment purposes and adapted with revolutionary approaches. The module developed based on the use of recycled materials selected for this program. The main objectives are to explain to school students the relationship between the use of recycled materials and the Quran, as well as to encourage school students to innovate in maintaining the sustainability of the environment created by Allah SWT while attracting the school students in STEM interest. This recycled materials module is divided into six activities, namely i) Journey Through the Digestive Tract, ii) Crafting Chalk from Eggshells, iii) Magical Color-Shift Paints, iv) Clean Water Challenge: DIY Filtrati on, v) Eco-Friendly Paper Making with Banana Stem, and vi) Science of Fire Safety. The developed module was implemented to the secondary schools students for and the effectiveness of the module was quantified through a set of survey questions after the program. Ergo, this platform will be a key starting point in establishing translational research and expanding the pool of talent at the university level, which is in line with the key principles of Malaysia's Shared Prosperity Vision 2030 and Sustainable Development Goals 2030 by the United Nations.

Keywords: *STREAM, STEM, SDG, INAQ, recycled materials, SULAM*

INTRODUCTION

The Malaysian government, in its effort to align with global standards and advance its innovation and development strategy, has emphasized the importance of Science,

Technology, Engineering, and Mathematics (STEM) education through policies like the National Scientific and Technology Enrolment Policy of 1970 and the Malaysia Education Blueprint 2013-2025. These initiatives aim to maintain a 60:40 ratio of Science/Technical to Arts education, a policy that has been in place since 1967.[1-6] However, despite these efforts, STEM enrolment remains below expectations, with only 29% of students pursuing STEM fields in 2012. [7-8] This shortfall presents a significant challenge to the nation's goal of producing at least 500,000 science stream workers by 2020, which is crucial for Malaysia's aspiration to become a leading country in the industrial world.[9]Addressing the lack of interest among students in STEM is therefore critical to achieving the country's long-term objectives. The Malaysian Blueprint 2013-2025 aims to provide students with better knowledge and skills to meet the demands of a rapidly changing industrial world. [2,10,11]

Recently, the Ministry of Higher Education (KPT) is concerned about the lack of student interest in STEM fields, which could affect the workforce needs in high-tech sectors. This concern is justified as data shows that only 22.8% of fourth form students are taking the science stream, with Sabah recording the lowest percentage at 12.35%. This has led to a decline in applications for STEM courses at the higher education level, which in turn reduces the number of graduates available for high-tech sectors. [12]

Hence, to attract student interest in STEM, the KPT also has implemented several initiatives. Among them is the MySTEM Ambassador program at higher education institutions (IPTs), which promotes STEM to school students. Additionally, KPT supports the establishment of the National STI Talent Committee, which will analyze the demand and supply of talent in the fields of science, technology, and innovation (STI). Collaboration with the Ministry of Education Malaysia (KPM) is also crucial in efforts to increase student participation in STEM at the school level as preparation for entry into IPTs. These efforts are expected to boost student interest and participation in STEM fields, ensuring that the country does not face a shortage of talent to meet the needs of high-tech industries, such as Microsoft's investment in cloud infrastructure and artificial intelligence (AI). [13]

This approach is associated with the integration of knowledge, skills, and values of STEM education towards today's individual lifestyle, society, and environment. The dedicated module was designed for the student-oriented activity where students must be able to explore and understand problem-solving issues related to the environment, especially recycling. Student's interest can become more synergetic with sustainability awareness and engaging problem-solving activities by thinking creatively and innovatively towards lifelong education, communication skills, and collaboration. Transformation in the education system is inevitable to sustain strong social engagement and spur investment in a country. The new frameworks of education will influence student's behavior, which will have an impact on their level of accomplishment and involvement. Malaysian commitment to Sustainable Development Goal 4 (SDG4), ensures inclusive and equitable education and promotes lifelong learning opportunities for all by 2030. [14-16]

Therefore, in response to the government's policies, students of the STREAM Mentoring Course for Secondary School Laboratories have recognized the importance of empowering STEM through the Integration of Naqli and Aqli Knowledge (INAQ) at USIM. This course emphasizes this integration, which forms the STREAM approach (Science, Technology, Religiosity, Engineering, Artistry & Mathematics) at USIM. This approach highlights the crucial role of science in every aspect of life, as knowledge that is produced through a profound and systematic scientific process and specifically for a sustainable environment through recycling waste from surroundings. According to the Islamic concept, science is an exploration that leads humanity towards scientific discoveries while acknowledging the greatness of Allah SWT and adhering to Islamic values. [17-18]

STREAM aims to strengthen students' awareness of the connection between scientific knowledge and the Quran in daily life, while providing a holistic impact on the development of Science and Islamic knowledge through Service Learning Malaysia - University for Society (SULAM) pedagogical approach. The primary goal of implementing the SULAM program is to ensure the achievement of the learning outcomes of academic courses, which involve the organization of community service projects by university's students.

METHODOLOGY
Innovative Eco-Friendly Science and INAQ Module Development
Thirty-five students enrolled in the STREAM Mentoring course, where the main requirement was the development of a STREAM module. The chosen theme for this module was "From Waste to Wealth: Creative Sustainability", with a focus on integrating content from the Secondary School Science Syllabus. The students were divided into six groups, each responsible for creating one of the six activities to be included in the module. Each group had the freedom to select and develop their activity, ensuring it aligned with both the recycling theme and the science syllabus. A series of discussions were held to finalize the activities and develop the module, which was titled 'Innovative Eco-Friendly Science and INAQ,' designed for secondary school students. The selected activities are summarized in Figure 1:

Figure 1. Innovative Eco-Friendly Science and INAQ Module

Engagement Session with the Target Community

At the phase of community engagement, all 35 students in the STREAM Mentoring course participated in a series of discussion sessions to identify the community they wanted to assist. Working in small groups, they determined the specific needs of the community. As a result of these discussions, Sekolah Menengah Kebangsaan Dato' Shahardin (SMKDS) was selected as the target community. Subsequently, multiple consultations were held with the school administration to reach a mutual agreement between the school and the STREAM Mentoring students.

Module Implementation

Innovative Eco-Friendly Science and INAQ" module was implemented at Sekolah Menengah Kebangsaan Dato' Shahardin (SMKDS) as part of an initiative led by students from the STREAM Mentoring course. This project aimed to integrate environmental sustainability into the secondary school science curriculum. SMKDS, selected as the target community through discussions and consultations, collaborated closely with the mentoring students to align the module with the school's educational objectives. The module was designed to engage students in practical science activities that explore the principles of recycling and eco-friendly practices.

The implementation was carried out in three phases: first, the introduction of the module, where educators (among STREAM Mentoring course students) from each activity provided a theoretical background and an overview of the module's and their objectives of activities developed to the school's students. This was followed by the hands-on phase, where school students participated in six different activities, each developed by the mentoring groups, to apply scientific concepts selected to real-world

environmental issues by adapting Science syllabus. Each activity also explained the connection between scientific principles and tawhidic concepts within its development. The final phase involved evaluating the module's effectiveness through feedback and surveys from both students and teachers. This assessment focused on the students' understanding of sustainability and their ability to apply what they learned in practical contexts. The results of this evaluation will guide future improvements to the module and inform its potential expansion to other schools. The summary of implementation was presented in Figure 2.
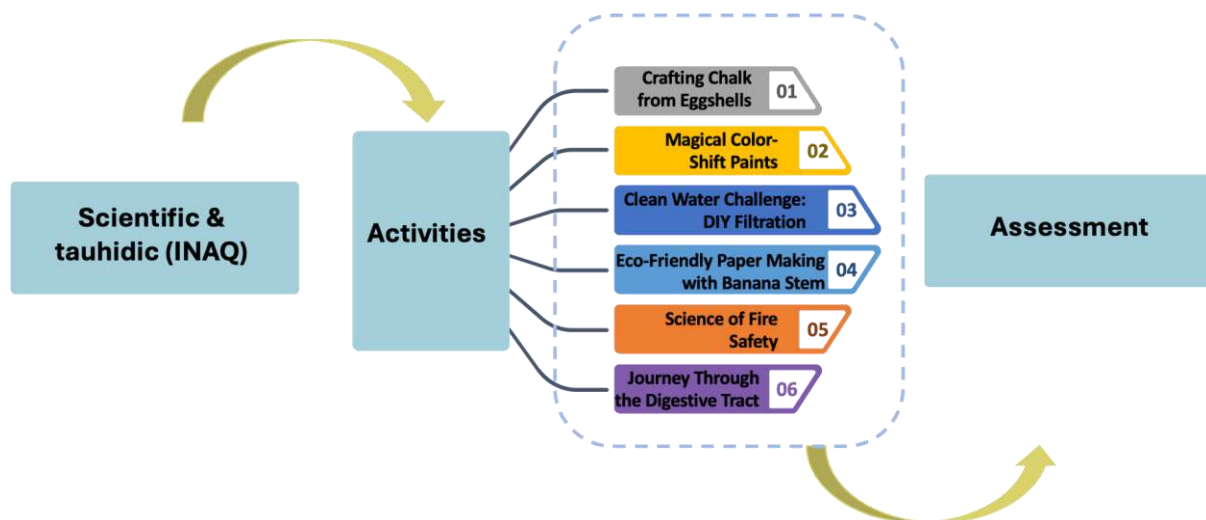
Figure 2. Correlation between activities during implementation of module

Assessments

Assessment was conducted based on a set of questionnaires designed specifically for the effectiveness of the program. In addition, each activity also provides a set of questionnaires to analyze the effectiveness of each activity conducted. The assessment criteria, focused on participant understanding, the effectiveness of the module, the success of the program, and suggestions for future improvements. Analysis was performed using the Likert scale, with the highest percentage selected by participants, which helped in drawing inferences and establishing relationships between different aspects of the module. This process ultimately provides valuable insights for educators to refine and enhance the module's functionality and the activities developed.

RESULTS AND DISCUSSION

Innovative Eco-Friendly Science and INAQ Module

Table 1 illustrates the intricate relationship between scientific theories and Tawhidic (INAQ) principles across various activities conducted within SULAM. By defining Tawhidic (INAQ) as the integration of Islamic principles with scientific inquiry, the activities, ranging from educational projects to research initiatives, apply and

reconcile scientific theories with these principles. It also highlights specific examples where scientific theories are aligned with Tawhidic values, showing both synergies and potential conflicts. This integration not only enhances educational outcomes but also deepens the understanding of how science and Islamic principles can complement each other. Moving forward, further exploration could reveal additional insights into this relationship and suggest ways to strengthen the alignment between scientific and Tawhidic perspectives. [17-19]

Table 1.

Activity	Scientific Theory	Tawhidic (INAQ)
Journey Through the Digestive Tract	The organs of the digestive system consist of the oral cavity (mouth), pharynx, esophagus, stomach (ventricle), appendix, large intestine (colon), and rectum (Sukiniarti, 2009) as explained in the verses of the Qur'an regarding the digestive organs in humans.	**Surah Al-Mu'minun (23:13-14):** Then We placed him as a drop of fluid in a firm lodging. Then We developed the drop into a clinging clot, and of that clot We made a (fetus) lump. Then We developed the lump into bones, and We covered the bones with flesh. Then We caused him to grow and come into being. So blessed is Allah, the best of creators. This passage describes the process of human development from conception to a fully formed being, including aspects of nourishment and growth. Tafsir Ibn Kathir explains that this verse encompasses the miraculous process of human creation and development, which implicitly includes the role of the digestive system in nurturing the growing fetus.[20]
Crafting Chalk from Eggshells	Eggshells serve as an alternative material in the production of chalk by applying chemical processes which support the concept of creating new materials from recycled substances.	**Surah Ar-Rum (30:46):** Allah is the One who sends the winds so that they raise clouds, and We drive them to a dead land and give life thereby to the earth after its lifelessness. Thus is the resurrection. In Tafsir Ibn Kathir, this verse is interpreted to highlight how Allah brings life and transformation to the

		earth by sending rain and causing it to become fertile. This verse can be metaphorically related to the concept of recycling and transforming materials. Just as Allah revives the earth and transforms it into a productive state, humans are capable of transforming and repurposing materials (like eggshells into chalk) to create new, useful products. This reflects the broader principle of renewal and beneficial change in the natural world.
Magical Color-Shift Paints	The concept of science can be integrated with the concept of art. There are also natural materials that can be used as universal indicators, such as the butterfly pea flower, which reacts with acidic and alkaline substances.	**Surah Al-An'am (6:99):** It is He Who sends down rain from the sky, and We produce thereby various crops of different colors. And among the mountains are streaks white and red, of varying colors and (some) very black. According to Tafsir Ibn Kathir, in this verse, Allah points out the diversity in creation that reflects His majesty. The rain that He sends down from the sky is a source of life and nourishment, resulting in the growth of crops with a multitude of colors. Similarly, the mountains have different colors due to the minerals and rocks within them. This diversity serves as a testament to Allah's creative power and wisdom. It demonstrates that everything in creation is designed with purpose and complexity, urging people to reflect on these signs as evidence of Allah's existence and attributes. [21]
Clean Water Challenge : DIY Filtration	This activity utilizes plastic bottles as recyclable materials and essential substances such as sand, stones, and activated charcoal. Water filtration can	**Surah Al-Mu'minun (23:18):** And We have sent down from the sky water in measure and settled it in the

	occur effectively through physical adsorption by the materials used.	earth. And indeed, We are able to take it away. In Tafsir Ibn Kathir, this verse is interpreted as a reflection on the role of water as a vital resource and its controlled distribution by Allah. The verse highlights the significance of water and its provision, implying that humans are given the means to use and manage resources effectively. The use of materials for filtration aligns with the principle of utilizing Allah's provisions wisely and responsibly.
Eco-Friendly Paper Making with Banana Stem	This project aims to explore sustainable alternatives in paper manufacturing by using banana stems as the main material. Banana stems, often considered an agricultural byproduct, have the potential to be utilized as a primary material to replace wood fibers in the paper industry.	**Surah Al-An'am (6:99):** And it is He who sends down rain from the sky, and We produce thereby various plants of different colors. And in the mountains are streaks white and red of varying colors and [others] very black. Tafsir Ibn Kathir explains that this verse illustrates the diversity and abundance of natural resources created by Allah. It emphasizes the variety and usefulness of different elements provided by Allah, which can be utilized in numerous ways.
Science of Fire Safety	The fire extinguisher module involves a mixture of baking soda and vinegar in a closed container with an attached balloon. When the mixture reacts, carbon dioxide is produced, inflating the balloon. This simple project illustrates the principle of using carbon dioxide as a fire extinguisher and promotes understanding of fire safety mechanisms to students.	**Surah Al-Mulk (67:15):** He it is Who made the earth manageable for you, so traverse in its tracks and partake of the sustenance He has provided. But unto Him will be the resurrection. In Ibn Kathir's tafsir, the verse is interpreted to mean that Allah has made the earth subservient and easy for humans to live on, providing them with the ability to walk, cultivate, and utilize its resources. The command to "traverse in its tracks" indicates that humans

should explore and work on the earth, benefiting from its provisions such as food, water, and other resources that sustain life.

Activities Effectiveness

Activity 1: Journey Through the Digestive Tract

Assessment was conducted on 145 students, consisting of 84 females and 61 males. The results based on the Journey Through the Digestive Tract activity which focuses on the Human Digestive System, revealed that 86.21% of students stated that this module helped them remember the names of the organs in this system. Meanwhile, 84.83% indicated that the module assisted them in applying the knowledge in their studies, as shown in Table 2. Through this project, students were able to create a model of the human digestive system, which indirectly helped them recognize and remember the organs within the human digestive system.

Table 2. Effectiveness feedback for Journey Through the Digestive Tract Activity

Question	Likert Scale				
	1	2	3	4	5
Journey Through the Digestive Tract helps me remember the names of the organs in the human digestive system.	0.69 %	2.76%	10.34%	44.14%	42.07%
Positive feedback Percentage				**86.21%**	
Human Digestive System model developed is suitable for helping me apply it in my studies.	1.38%	0.00%	13.79%	38.62%	46.21%
Positive feedback Percentage				**84.83%**	

Activity 2: Crafting Chalk from Eggshells

Table 3 shows that 83.45% chose Likert scale 4 and 5, indicating that they agree and strongly agree that the eggshell chalk activity module was enjoyable for students. Additionally, this module also helped increase their knowledge in producing chalk from eggshells, which is one of the waste materials found at home. Furthermore, 88.28% who selected scales 4 and 5 also believed that this activity is an interesting method to enhance students' knowledge in the field of science. This activity indirectly

stimulates students' interest and increases their inclination towards science in the future.

Table 3. Effectiveness feedback for Crafting Chalk from Eggshells Activity

Question	Likert Scale				
	1	2	3	4	5
I found the eggshell chalk experiment fun to do	0 %	0 %	16.55%	25.52%	57.93%
	Positive feedback Percentage			**83.45%**	
I found the eggshell chalk activity to be an interesting way to increase knowledge about science	0.69%	0.69%	10.34%	42.07%	46.21%
	Positive feedback Percentage			**88.28%**	

Activity 3: Magical Color-Shift Paints

Based on the findings for the Magical Color-Shift Paints activity, Table 4, there were two items discussed regarding the module used in teaching the human digestive system. It was found that 82.76% of students chose Likert scale 4 and 5. This indicates that the majority of students agree and strongly agree that this module was effective in helping them apply the concepts of acids and alkalis. However, the remaining 17.24% of students chose Likert scale 1, 2, and 3. This means that they either disagreed, were unsure, or had less positive views on the effectiveness of this module. These respondents may have faced difficulties in understanding the content of the module or may have a different learning style that does not align with the module's approach. Additionally, 84.43% of students chose Likert scale 4 and 5, indicating that the majority of students agree and strongly agree that they were able to connect science and art. Meanwhile, the remaining 15.57% of respondents chose Likert scale 1, 2, and 3, indicating that they either disagreed, were unsure, or had less positive views on the suitability and effectiveness of the module in linking science and art.

Table 4. Effectiveness feedback for Magical Color-Shift Paints Activity

Question	Likert Scale				
	1	2	3	4	5
I can identify acidic and alkaline substances used in everyday life	1.38 %	2.76 %	13.10%	25.52%	57.93%
	Positive feedback Percentage			**83.45%**	
I was able to learn about the relationship between art and science.	1.38%	0.69%	10.34%	42.07%	46.21%
	Positive feedback Percentage			**88.28%**	

Activity 4: Clean Water Challenge: DIY Filtration

Table 5 shows the feedback after the DIY Water Filter Activity Module. The findings indicate that 95.17% of students chose a Likert scale of 4 and 5. This shows that the majority of students agree and strongly agree that creating a DIY water filter helps them understand the water filtration process. It is likely that they agree because this DIY activity provides them with hands-on experience and self-directed learning that clarifies the concept of water filtration, which might be difficult to grasp through theory alone. This activity may also attract students' interest and increase their engagement in learning. Furthermore, 88.96% of students chose a Likert scale of 4 and 5. This indicates that the majority of students agree and strongly agree that they gained benefits and new knowledge from the DIY water filter activity. It is likely that they agree because this activity not only provides theoretical knowledge but also practical applications that are useful in everyday life. This activity may have also introduced them to new concepts in science and technology that they were previously unaware of.

Table 5. Effectiveness feedback for Clean Water Challenge: DIY Filtration Activity

Question	Likert Scale				
	1	2	3	4	5
Creating this DIY water filter helped me understand the water filtration process.	0 %	0 %	4.83%	33.79%	61.38%
	Positive feedback Percentage			**95.17%**	

I gained benefits and new knowledge from the DIY water filter.	0 %	0 %	11.03%	32.41%	56.55%
	Positive feedback Percentage			**88.96%**	

Activity 5: Eco-Friendly Paper Making with Banana Stem

Banana stem paper is a type of paper made using fibers from the stem of the banana plant. This paper is often used in the creation of handicraft products, greeting cards, gift wraps, and other items that require specialty paper. In addition to being an eco-friendly alternative due to the use of organic waste materials, this paper also has a unique texture and an aesthetically appealing appearance. Therefore, the results from Activity 5, which involves producing paper from banana stems, show that 92.41% agree that this module helps enhance students' knowledge in producing paper from banana stems, as shown in Table 6. This activity likely provides students with direct experience in the process of making paper from banana stems. Practical experiences like this are often more effective in helping students understand concepts and processes because they can observe and participate in every step of production, focusing on experiential learning. Meanwhile, 88.27% agree that this module indirectly aids understanding in the field of science. The activity involves various aspects of science, including biology (structure and function of plants), chemistry (filtration and paper production processes), and ecology (use of organic waste materials). This interdisciplinary teaching helps students see how different science concepts are interconnected, while also raising awareness of the importance of environmental conservation, which is relevant to daily life.

Table 6. Effectiveness feedback for Eco-Friendly Paper Making with Banana Stem Activity

Question	Likert Scale				
	1	2	3	4	5
This paper making activity helped increase my knowledge about paper production.	0.69 %	1.38 %	5.52%	31.72%	60.69%
	Positive feedback Percentage			**95.17%**	
I feel that this activity can help me improve my understanding of science	0.69 %	0.69 %	10.34%	37.24%	51.03%
	Positive feedback Percentage			**88.96%**	

Activity 6: Science of Fire Safety

Activity 6, which is the fire extinguisher module, is an activity that introduces various types of fire extinguishers with different functions. The activity also adopted an approach where students created fire extinguishers based on theoretical learning in the classroom and applied it outside the classroom. Table 7 shows that 87.59% of students agreed that the fire extinguisher they created was easy to make, and 87.58% of students agreed that this tool contained various useful information for them. The outcome of this activity helps students understand the basic concepts of fire and its extinguishment, as well as provides them with knowledge and skills that are useful for their safety and the safety of others in emergency situations, in addition to producing fire extinguishers from recycled materials.

Table 7. Effectiveness feedback for Science of Fire Safety Activity

Question	Likert Scale				
	1	2	3	4	5
This paper making activity helped increase my knowledge about paper production.	0.00 %	0.69 %	11.72%	25.52%	62.07%
Positive feedback Percentage				**87.59%**	
I feel that this activity can help me improve my understanding of science	0.69 %	2.76 %	8.97%	31.72%	55.86%
Positive feedback Percentage				**87.58%**	

Program Effectiveness

Overall reflection on the students' interest in the STEM field at the school shows that there is still not much difference between students who are interested in STEM and those who are not. This is shown in Figure 3(a), where 56.55% of students are interested in the STEM field compared to 43.45% of students who are not. Students interested in STEM have listed their career choices as shown in Figure 3(b). Among the chosen careers are doctor, engineer, scientist, teacher, computing, and several other fields. Meanwhile, students who are not interested in STEM stated that they find the field difficult and that it does not offer high salaries. Therefore, it is hoped that STEM-based activity modules can cultivate interest in more students in the future to pursue STEM, thereby contributing to the development of technology and innovation that will benefit society in the future.

Interest Level in STEM (%)

STEM Field	Percentage (%)
Doctor	44
Scientist	33
Computer & Technology	9.3
Engineer	8
Etcetera	6
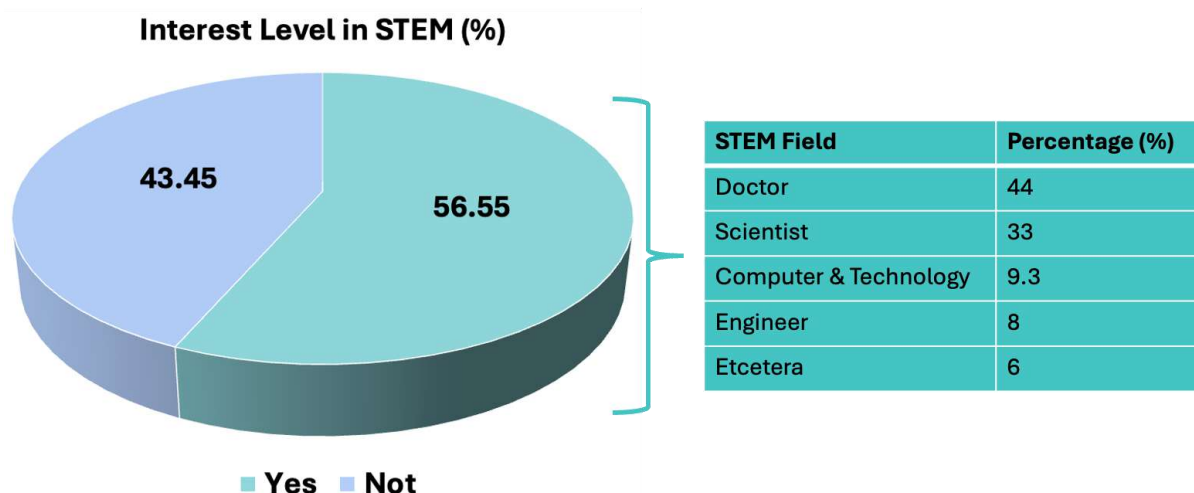
Figure 3. (a) Percentage of students choosing STEM fields and (b) Career choices

Impact

The impact of this program on USIM students includes an increased understanding that everything happens for a reason and through a process. As a result, this program will be the starting point for individuals to continually impart knowledge and do good for the community, helping to shape knowledgeable individuals. Through this program also, we realize that USIM students were able to plan the design of materials or learning activities, select reusable items, and create creative solutions to improve problems or face challenges in their studies by integrating the STREAM and INAQ concepts.[14]

The community also benefited from the program, as it helped to create a society that understands how His creations came to be on this earth. Additionally, this program helped raise students' awareness of recyclable materials and the importance of preserving a green environment. Through this practical experience, students were able to utilize reusable materials to facilitate their learning. The activities conducted also stimulated critical and creative thinking among students and fostered the ability to find new solutions.

CONCLUSION

Overall, the STREAM Mentoring Course with the theme of "From Waste to Wealth: Creative Sustainability" had successfully achieved its goals of increasing student engagement and enhancing creative skills. The interactive learning experience gained through this program not only enriched students' academic knowledge but also instilled noble values and soft skills. With the proposed improvements, this program has the potential to make an even greater impact in the future, helping to produce a generation that is knowledgeable, creative, and morally upright.

REFERENCE

Mohd Faez Mohd Shah & Noor Naemah Abdul Rahman. (2014). Kepentingan kaedah penyelidikan moden dalam fatwa semasa. *Jurnal Pengurusan dan Penyelidikan Fatwa,* 4, 1242-1256. Penerbit Universiti Sains Islam Malaysia.

Liew Yon Foi, & Teoh Hong Kean. (2022). STEM education in Malaysia. An organizational development approach. *International Journal of Advanced Research in Future Ready Learning and Education*, 29 (1),1-19. Akademia Baru Publishing (M) Sdn Bhd.

Sarala Thulasi Palpanadan, & Venosha Ravana. (2022). Future Trajectories in Teaching-Learning Practices for STEM Education in Malaysian Secondary Schools: A Scoping Review. *Asia Proceedings of Social Sciences*, 9(1), 169–170. Connecting Asia Research Network.

Ministry of Education Malaysia (MOE). (2013). Malaysia Education Blueprint 2013-2025. Putrajaya: Malaysian Ministry of Education.

Shahali, E. H.M., Ismail, I. & Halim, Lilia. (2017). STEM education in Malaysia: Policy, Trajectories and Initiatives. Science and Technology Trends, *Policy Trajectories and Initiatives in STEM Education*, 122-133. Asian Research Policy.

Shahril Sabudin, Azlin Norhaini Mansor, Subahan Mohd. Meerah & Azliza Muhammad. (2018). Teacher-Level Factors that Influence Students' Science and Technology Culture: HLM Analysis. *International Journal of Academic Research in Business and Social Sciences*, 8(5), 977–985. Human Resource Management Academic Research Society.

Nurul Asyikin Mohamed Radzi & Suhaila Sulaiman. (2018). Measuring students' interest towards engineering in technical school: A case study. *Journal of Technology and Science Education*, 8(4), 231-237. OmniaScience.

Fatin Aliah Phang, Mohd Salleh Abu, Mohammad Bilal Ali & Salmiza Salleh. (2012). Faktor penyumbang kepada kemerosotan penyertaan pelajar dalam aliran sains: Satu analisis sorotan tesis, *Sains Humanika*, 2(4), 63-71. UTM Publisher.

Chew Cheng Meng, Noraini Idris & Leong Kwan Eu. (2014). Secondary Student's Perceptions of Assessments in Science, Technology, Engineering, and Mathematics (STEM). *Eurasia Journal of Mathematics, Science, & Technology Education*, 10(3), 219-227.

Ministry of International Trade and Industry (MITI). 2017. Mini Report.

Cynthia Miller-Idriss & Elizabeth Hanauer. (2011). Transnational higher education: offshore campuses in the Middle East. *Comparative Education*, 47(2), 181–207.

Rohaida Mohd Saat & Hidayah Mohd Fadzil. (2022). Enhancing STEM Education in Malaysia through Scientist–Teacher–Student Partnerships (STSP). In: Cheng, M.M.H., Buntting, C., Jones, A. (eds) *Concepts and Practices of STEM Education in Asia*. Springer, Singapore.

Izwan Abdullah. (2024, Julai 17). *KPT bimbang graduan sektor berteknologi tinggi tak mencukupi. Harian Metro.* https://www.hmetro.com.my/mutakhir/2024/05/1086617/kpt-bimbang-graduan-sektor-berteknologi-tinggi-tak-mencukupi

Mohamed Azmi Mohd Rasheed Khan. (2024). 'Remajakan' pendidikan STEM sesuai keadaan mampu tarik minat pelajar. Berita Harian. https://api.bharian.com.my/rencana/lain-lain/2024/06/1263867/remajakan-pendidikan-stem-sesuai-keadaan-mampu-tarik-minat-pelajar

Wafry Khairul Ziad, Muhammad Fadhly Ahlamie Md Nor'Azam, Hatika Kaco*, Fadzidah Mohd Idris, Nor Raihan Zulkefly, Siti Munirah Mohd, Nur Hidayah Mohamad Jan. (2021). An evaluation of student's perception towards learning physics at lower secondary school. *Jurnal Pendidikan Sains dan Matematik Malaysia*, 11, 94-106. UPSI Press

Zaher Atwa, Rosseni Din & Muhammad Hussin. (2016). Effectiveness of flipped learning in physics education Palestinian high school students' achievement. *Journal of Personalized Learning*, 2(1), 73–85.

Malak Abou Faour & Zalpha Ayoubi. (2018). The effect of using virtual laboratory on grade 10 students' conceptual understanding and their attitudes towards physics. *Journal of Education in Science, Environment and Health*, 4(1), 54–86.

Zarkasih, Kadar M. Yusuf, Hasanuddin & Susilawati. (2019). Integration of Naqli And Aqli Knowledge In Islamic Science University of Malaysia: Concept And Model. *Jurnal Kependidikan Islam*, 5(2), 123-143.

Mohamed Akhiruddin Ibrahim, Azniwati Abdul Aziz, Wan Amir Nudin Wan Ishak , Sanusi Shariff, Rasmina Hasbullah & Irwan Mohd Subri. (2017). The Intergration

Concept Of Naqli And Aqli Knowledge: Study On Students' Perception. *International E-Journal of Advances in Social Sciences*, 3(8), 582-590.

Zanaton H. Iksan, Md Noor Saper & Zetty Nurzuliana Rashed. (2016). Integration of Tawhidic Science through Lesson Study Approach in teaching and learning Science or Islamic Study. *Tinta Artikulasi Membina Ummah*, 2(1), 40-50.

Liza Nopita Sari & Putri Bintang. (2022). Konsep Sistem Pencernaan Pada Manusia Berdasarkan Alqur`An dan Hadits. *Jurnal Penelitian, Pendidikan dan Pengajaran*, 3 (3), 244-251.

Siti Nurwanis Mohamed, Munirah Abd Razzak & Najihah Mohd Hashim. (2020). Elemen Keindahan dalam Tumbuhan Menurut al-Quran dan al-Hadith: Satu Tinjauan Awal. *Jurnal al-Turath*, 5(2), 1-10.

SUSTAINABLE FOOD PRODUCT DEVELOPMENT USING FRUIT SEEDS: A HALALAN THAYYIBAN PERSPECTIVE FROM RUBBER, LYCHEE, AND SACHA INCHI

Mansor Syamila[i], Siti Nurraihan Azli Zulhasanain[ii], Nurin Aireen Adlina Hamdan[iii], Sa'iedatul Najihah Azman[iv] & Ismatul Nurul Asyikin[v]

[i](*Corresponding author*). Senior Lecturer, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan. syamila.mansor@usim.edu.my
[ii,iii, iv] Students, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan
[v]Senior Lecturer, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan. ismatul.ismail@usim.edu.my

Abstract

This review examines the current state of research regarding the innovative utilization of three significant seed types - rubber seed (Hevea brasiliensis), lychee seed (Litchi chinensis), and sacha inchi seed (Plukenetia volubilis) - in sustainable food product development that are carried out a small scale food products development project in Universiti Sains Islam Malaysia (USIM). The innovative utilization of fruit seeds in sustainable food products aligns with the Halalan Thayyiban approach, emphasizing ethical and health-conscious practices in food production through the lens of Madani's Principle in Malaysia and Islamic Science.

Keywords: *Fruit seeds, Halalan thayyiban, Sustainable food innovation, Rubber seeds, Madani Principle*

INTRODUCTION

The growing global population and increasing environmental concerns have prompted researchers and food industry professionals to explore alternative, sustainable food sources. Fruit seeds, traditionally considered waste products, have emerged as a promising candidate for food applications because of their nutritional composition and particularly promising seeds: rubber seed, lychee seed, and sacha inchi seed. By promoting the use of these seeds, a more sustainable food system that respects the environment can be fostered. In addition, to prevent food wastage, this could also apply to the industrial production of novel foods. On top of that, this paper describes the application of seeds focusing on rubber tree seeds, lychee seeds and sacha inchi seeds as novel food ingredient following halalan thayyiban principles that combine safety, quality and Islamic ethical aspect.

METHODS

This review employed a systematic literature search approach using multiple academic databases, including Science Direct, Web of Science, and Google Scholar. The search covered peer-reviewed articles published between 2010 and 2024, using combinations of keywords related to the three seed types and their applications in food products and Islamic perspectives. The selected literature was categorized based on common themes and methodological approaches.

For the application of the seeds in each project executed, the seeds were got from local providers, especially for the rubber seeds which are got from the rubber tree plantations in East Malaysia. Each seeds processing method on the three seeds in this review (Figure 1), however, is written as general processing methods which allow for safe consumption for humans. It is important to take note that variability in processing methods can lead to inconsistent nutrient profiles and physicochemical properties.

a)   b)

c)
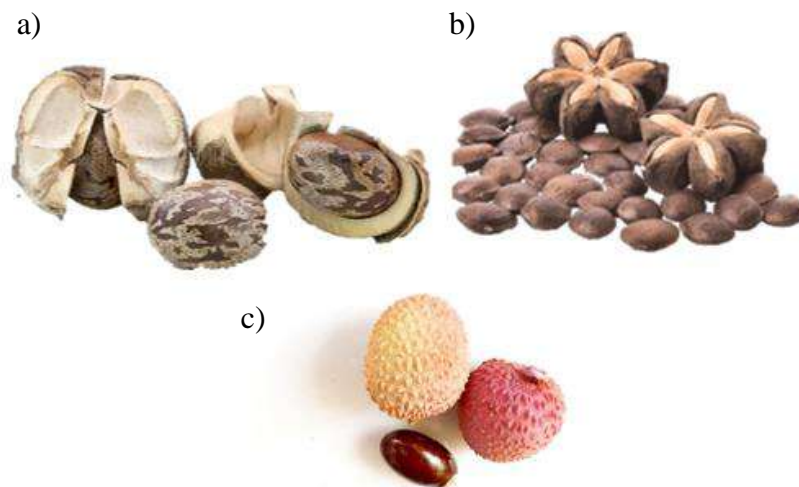
Figure 1. The images of a) Rubber, b) Sacha Inchi, and c) Lychee fruits and its seeds.

Rubber seeds have cyanogenic glycosides which can liberate poison hydrogen cyanide. The enterolignan content of the seeds can be detoxified by proper processing methods such as roasting, boiling, fermenting, among others to make them safe for human consumption. Researchers have explored various techniques, such as soaking, boiling, and fermentation, to reduce the levels of cyanogenic glycosides and other anti-nutrients in rubber seeds (Agbai et. al., 2021) context of rubber seed include heat treatments (toasting, boiling, roasting), storage (2–4 months) at ambient temperature (Eka, Tajul Aris & Wan Nadiah, 2010; Udo, Ekpo & Ahamefule, 2018; Oluodo et al., 2018; Farr et al., 2019), enzymatic reaction, absorbent (Oluodo et al., 2018), and fermentation (Syhruddin, Herawaty & Ningrat, 2014; Oluodo et.al., 2018; Farr et al., 2019).

Lychee seeds must be cleaned and given heat treatment or fermentation to reduce saponin. These methods can enhance the nutritional profile and reduce antinutrient content through processes like roasting (Lu et al., 2023).

Sacha inchi seeds are usually considered safe but they are commonly roasted or cold-pressed to improve flavor and retain their nutritional profile (Goyal et al., 2022; Kim & Joo, 2019). Hot water washing of sacha inchi seeds followed by roasting (<120 °C) and detected a prominent reduction in saponins (from 6.3 to 13.7 to < 0.05–2.5 mg/kg) and total alkaloids (from 11.20 to 17.30 to < 0.1–3.20 mg/kg).

RESULTS AND DISCUSSION

1. Halalan Thayyiban, Islamic Science and Madani's Principle

The Halalan Thayyiban concept emphasizes food that is not only permissible but also safe, pure and wholesome. This approach ensures that food products meet ethical, environmental, and health standards, fostering a sustainable food culture. In Islam, halalan thayyiban protects Muslim dietary rules from unhealthy food. Islamic Science supports the mandatory and ethical use of natural resources which persuades food processing in a sustainable way to comeback innovation. Halal food needs to pass strict security demands because of the concern related to ethics around resource management, cleanliness in production and contamination prevention.

In Malaysia, the Madani Principle similarly leans on converging interests in sustainable development and ethical governance amongst its mass of Muslim consumers, especially regarding halal in the food industry. Madani's Principles emphasize the importance of environmental stewardship, social responsibility, and economic prosperity, aligning with the sustainable and ethical production of halalan and thayyiban food products.

Islamic ethics guide the evaluation of biotechnological practices, including genetic modification of fruit seeds, emphasizing the need for safety and environmental stewardship. Although fruit seeds have the potential health benefits, they must undergo a critical process to ensure their safety. For example, the seeds of various fruits (e.g., rubber and lychee seeds) naturally have compounds that are toxic or interfere with nutrient absorption, such as the cyanogenic glycosides. Ensuring compliance with Halal standards and safety regulations can pose challenges for the commercialization of products derived from fruit seeds (Ngah et al., 2023). Hence, implementation to emphasized on its halalan thayyiban concept, it is crucial and recommended for each type of seeds to undergo sufficient food processing before being converted into a food product and being tested for its known toxicity to be reduced to a safe concentration that suits human consumption.

2. Sustainability and Circular economy

The shift towards a circular bioeconomy emphasizes minimizing waste and maximizing resource efficiency. There is a growing trend towards utilizing agricultural waste, including fruit seeds, to create sustainable food products, driven by consumer demand for eco-friendly options (Kumar et al., 2024).

Fruit seeds, often discarded, are now recognized for their potential to produce value-added products, such as functional foods and nutraceuticals (Kumar et al., 2024; Allaqaband et al., 2022). It is popular opinion that the versatility of fruit seeds allows for various applications in food, cosmetics, and pharmaceuticals, promoting a circular economy (Kumar et al., 2024).

By efficiently using food wastes, such as vegetable and fruit by-products, could be a way to increase food sustainability, and in line with the United Nations Sustainable Development Goal (SDG) to ensure sustainable consumption and production patterns. This principle is also in line with the Madani Principle of Malaysia, as inferred from ethical and sustainable resources management.

Integrating scientific knowledge with Islamic teachings promotes a balanced understanding of ethical implications in agricultural practices (Budiyono et al., 2024). Therefore, educational frameworks that combine Islamic values with scientific disciplines encourage students to appreciate the ethical dimensions of their work, fostering responsible innovation.

Reflecting this Madani principle, which Malaysia envisions for sustainable development, then the use of local resources and innovation be to increase national food security. Through the more sustainable use of fruit seeds, the value for waste reduction and locally grown produce will get a new meaning, along with creating new markets for food products that are even less destructive. This approach fosters a holistic perspective that emphasizes the moral responsibilities of humans as stewards of the earth, ensuring that scientific advancements contribute positively to society and the environment.

3. Nutritional Composition of Fruit Seeds

The nutritional contents of fruit seeds (rubber, lychee, and sacha inchi) are remarkably diverse. Rubber seeds are rich in protein, oil and essential fatty acids especially linoleic acid which is good for the heart. Lychee seeds contain carbohydrates, proteins and bioactive compounds including polyphenols and tannins with antioxidant property (Bishayee et al., 2024; Al Juhaimi & Özcan, 2018). Meanwhile, sacha inchi seeds are a reliable source of omega-3 and omega-6 fatty acids, protein, and numerous bioactive components which can be integrated into functional food products (Goyal et al., 2022). On regard of the nutritional values, the nutritional and bioactive content of fruit seeds can vary significantly based on factors such as species, extraction methods, and environmental conditions, complicating standardization (Jaramillo et al., 2024).

Many papers utilize in vitro assays to evaluate the biological properties of fruit seed extracts, such as antioxidant and antihypertensive activities. The sacha inchi seed extracts showed promising results in radical scavenging assays (Jaramillo et al., 2024).

Studies often employ nutritional profiling and phytochemical characterization to assess the health benefits of fruit seeds. Fruit seeds are rich in bioactive compounds such as polyphenols, carotenoids, and proteins, which can be harnessed for functional foods and nutraceuticals, offering health benefits like antioxidant and anti-inflammatory properties (Allaqaband et al., 2022). Hence, the extraction of these compounds can lead to the development of new food products that align with health-conscious consumer trends. The formulation of nutraceuticals from fruit seeds is a growing trend, with research focusing on their application in food products to enhance health benefits (Allaqaband et al., 2022).

4. Fruit Seeds as New Food Products

It is fascinating to see that the fruit seeds can be used for different food applications apart from just protein which was proved in few of the studies and innovations taken place till now. The projects involving food product development using rubber seeds, lychee seeds and sacha inchi in the Universiti Sains Islam Malaysia (USIM) were currently protected as intellectual properties of USIM.

Rubber Seed Innovations

Rubber seed meal has been reported to have considerable amounts of absorbable nutrients than many conventional seed meals as high amount of protein content (19.40–30.68%) which mainly consist of glutamic acid (16.13%), crude fat (42.50–54.17%) carbohydrates (11.58–29%) had been reported from earlier studies (Eka, Tajul Aris & Wan Nadiah, 2010; Onwurah et al., 2010; Sharma, Saha & Saha, 2014; Hossain et al., 2015; Suprayudi et al., 2015; Lalabe, Olusiyi & Afolabi, 2017; Agbai et al., 2021; Aguihe et al., 2017; Udo, Ekpo & Ahamefule, 2018). A significant discovery is the invention of rubber seed oil, which can be used in cooking and food fortification. Rubber seed protein isolates are also produced to serve as a new plant-based protein source for health concern consumers.

In Malaysia, rubber seeds were only known to be an ingredient of authentic local cuisines in certain areaas specifically in Pahang as '*gulai asam rong*' that commonly combined with other protein and vegetables such as chicken, *siput sedut* or *belitung*, sweet potatoes, aubergine and many more.

In USIM, Zulhasanain (2024) completed a project on converting rubber seeds into a novel and new source of *tempeh* or fermented seeds without using a soybean to enrich the applications of underutilized rubber seeds has been done. The rubber seeds tempeh was successfully made and has a nutty flavour, which is suitable for snacking without

complications of phytoestrogen from the soybean. Eventhough the techniques to process the rubber seeds tempeh is registered as an intellectual property at Research and Innovation Management Centre (RIMC), Universiti Sains Islam Malaysia, the work to enhance the processing and fermentation and nutritional variables in on going.

On top of that, ongoing research by Azman (2024) has been done on applying the rubber seeds oil as an alternative for the oil in chocolate spread, and found that the by-product of the oil extraction which is the used rubber seed or rubber seed cake have the potential to be the alternative for nuts as it contain nutty flavour.

Lychee Seed Flour as Gluten Free Alternative
Research on starches isolated from unconventional seeds such as lychee, mango, pine and durian were proven to be comparable with unconventional seeds (Chacon et al, 2023).

In USIM, a project on utilization of lychee seed flour by Hamdan (2024) to impart certain amount of its flour into a gluten free bread. The idea of the work is to add variety on gluten free options as gluten is known to cause inflammatory health problems such as celiac disease, gluten intolerance and wheat allergy. Gluten free options were also high in carbohydrates and exceptionally low in other macronutrients. On the other hands, lychee seed flour that is also gluten-free, is a sustainable and offers more protein, fiber and antioxidants than traditional gluten-free grains.

Work has been done in USIM to determine the suitability of 5 to 15% of lychee seeds flour to be incorporated in gluten free bread and shown that the bread contain significantly higher composition of protein and ash compared to the control without the addition of lychee seed flour (Hamdan, 2024). Gluten Hand Washing Analysis also supported that lychee seeds flour does not held gluten. Hence, lychee seeds can be utilized to produce gluten-free flour that is attractive for gluten-sensitive consumers made up of baked goods and snacks.

Sacha Inchi Superfood and Plant Oil
The seeds of sacha inchi are a prized nutrient source used to produce vegan oils and protein powders. Because of their high nutrient-quality and plant-based origins, these products have become hugely popular with health-conscious consumers (Goyal et al., 2022). Sacha Inchi oil for salad dressings, cooking oils and dietary supplements, Sacha inchi protein powder used in smoothies, bars and other functional foods.

In USIM, a project on fortifying a freeze-dried protein yogurt with sacha inchi powder has ensure effortless snacking that is high in micronutrients and probiotics. For future works, the concentration of probiotics in the snacks should be done and, the drying process could be using a more economical drying techniques that may help more entrepreneur to adapt the technology.

CONCLUSIONS

The development of food products from fruit seeds is a promising avenue for sustainable food production, though several key challenges persist. The primary concerns center around setting up consistent standards and meeting necessary regulatory requirements. This field of research can be significantly enriched through the incorporation of Madani's Principle and Islamic Science frameworks, which provide valuable ethical guidelines for development. A critical recommendation emerging from this review is the necessity of proper food processing protocols for each seed variety. This processing must be methodically conducted to ensure that any inherent toxicity is reduced to levels safe for human consumption. Such careful attention to processing and safety aligns with the fundamental requirements of the halaalan thayyiban concept, which emphasizes both permissibility and wholesomeness in food products.

REFERENCES

Abdul, Hafaz, Ngah., Thurasamy, Ramayah., Mohammad, Iranmanesh., Suhaiza, Zailani. (2023). Editorial: Halal production, services, consumption, and consumer behavior. Frontiers in Psychology, 13. doi: 10.3389/fpsyg.2022.1104099

Agbai, C.M., Olawuni, I.A., Ofoedu, C.E., Ibeabuchi, C.J., Okpala, C.O.R., Shorstkii, I., Korzeniowska, M. (2021). Changes in anti-nutrient, phytochemical, and micronutrient contents of different processed rubber (Hevea brasiliensis) seed meals. PeerJ, 9

. https://doi.org/10.7717/peerj.11327

Aguihe, P. C., Kehinde, A. S., Ospina-Rojas, C. I., & Murakami, A. E. (2017). Evaluation of processing methods of rubber (Hevea brasiliensis) seed meal for use as a feed ingredient for broiler chickens. Journal of Poultry Research, 14(1), 20-27.

Agus, Budiyono., Abd, Haris., Linda, Tri, Antika., Arin, Wildani. (2024). Implementing the Concept of Integration of Science and Islamic Values at Islamic University. Al-Ishlah, 16(1). doi: 10.35445/alishlah.v16i1.4639

Al Juhaimi, F. and Özcan, M. M. (2018). Comparison of cold-pressing and soxhlet extraction systems for bioactive compounds, antioxidant properties, polyphenols, fatty acids and tocopherols in eight nut oils. Journal of Food Science and Technology, 55(1), 3163-3173.

Azman, S.N. (2024). *Characterization of Rubber Seed Oil and It's Suitaibility to be Incorporated in Chocolate Spread* [Unpublished manuscript]. Food Biotechnology, Universiti Sains Islam Malaysia.

Bishayee, A., Kavalakatt, J., Sunkara, C., Johnson, O., Zinzuwadia, S.S., Collignon, T.E. Banerjee, S., Barbalho, S.M. (2024). Litchi (*Litchi chinensis* Sonn.): A comprehensive and critical review on cancer prevention and intervention. Food Chemistry. 457: 140142

Carmita, Jaramillo, Jaramillo., Jonh, Jairo, Méndez, Arteaga., Liceth, N., Cuéllar, Álvarez., Walter, Murillo, Arango. (2024). A Multifaceted Exploration of the Biological Properties of Three Amazonian Fruit Seeds. doi: 10.20944/preprints202407.0670.v1

Eka, H.D., Tajul Aris, Y., Wan Nadiah, W.A. (2010). Potential use of Malaysian rubber (Hevea brasiliensis) seed as food, feed and biofuel. International Food Research Journal 17: 527-534

Goyal, A., Tanwar, B., Sihag, M.K., Sharma, V. (2022). Sacha inchi (*Plukenetia volubilis* L.): An emerging source of nutrients, omega-3 fatty acid and phytochemicals. Food Chemistry. 372 (B): 131459

Hamdan, N.A.A. (2024). Comparative Study on Lychee (*Litchi Sinensis*) Seeds Flour as Gluten-Free Alternatives For Bread: Physicochemical And Nutritional Composition. Bachelor of Science with Honours in Food Biotechnology. Universiti Sains Islam Malaysia.

Harsh, Kumar., Neetika, Kimta., S., Guleria., Richard, Cimler., Nidhi, Sethi., Daljeet, Singh, Dhanjal., Reena, Singh., Sampy, Duggal., Rachna, Verma., Prerna, Prerna., Ashok, Kumar, Pathera., S., Alomar., Kamil, Kuča. (2024). Valorization of non-edible fruit seeds into valuable products: A sustainable approach towards circular bioeconomy. Science of The Total Environment, 171142-171142. doi: 10.1016/j.scitotenv.2024.171142

Hossain, M. E., Karim, M. H., Sanjida Alam, S. A., & Nath, S. K. (2015). Nutritive value of rubber seed (Hevea brasiliensis). Agricultural and Food Sciences.

Kim, D.S., Joo, N. (2019). Nutritional composition of Sacha inchi (*Plukenetia Volubilis* L.) as affected by different cooking methods. International Journal of Food Properties, 22 (1): 1235-1241.

Lalabe, B. C., Olusiyi, J. A., & Afolabi, K. D. (2017). Effects of soaking on the nutritive value of raw full-fat rubber (Hevea brasiliensis) seed. Nigerian Journal of Agriculture, Food and Environment, 13(2), 78-82.

Marina, Fidelis., Cristiane, de Moura., Tufy, Kabbas, Junior., Nora, Pap., Pirjo, Mattila., Sari, Mäkinen., Predrag, Putnik., Danijela, Bursać Kovačević., Ye, Tian., Baoru, Yang., Daniel, Granato. (2019). Fruit Seeds as Sources of Bioactive Compounds: Sustainable Production of High Value-Added Ingredients from By-Products within Circular Economy. Molecules, 24(21):3854-. doi: 10.3390/molecules24213854

Oluodo, A., Lukman, N.H., & Komilus, C.F. (2018). Potential Utilization of Rubber Seed Meal as Feed and Food. International Journal of Engineering & Technology, 7(4), pp. 64-71. https://doi.org/10.14419/ijet.v7i4.43.25821

Sharma, B. B., Saha, R. K., & Saha, H. (2014). Effects of feeding detoxified rubber seed meal on growth performance and haematological indices of Labeo rohita (Hamilton) fingerlings. Animal Feed Science and Technology, 193, 84-92.

Shumyla, Allaqaband., Aamir, Hussain, Dar., Ulpa, Patel., Navneet, Kumar., G., A., Nayik., Shafat, Ahmad, Khan., Mohammad, Javed, Ansari., Nadiyah, M., Alabdallah., Pradeep, Kumar., Vinay, Kumar, Pandey., Béla, Kovács., Ayaz, Shaikh. (2022). Utilization of Fruit Seed-Based Bioactive Compounds for Formulating the Nutraceuticals and Functional Food: A Review. Frontiers in Nutrition, 9. doi: 10.3389/fnut.2022.902554

Suprayundi, M.A., Inara, C., Ekasari, J., Priyoutomo, N., Haga, Y., Takeuchi, T., & Satoh, S. (2014). Preliminary nutritional evaluation of rubber seed and defatted rubber seed meals as plant protein sources for common carp Cyprinus carpio L. juvenile diet. Aquaculture Research, 46(12), 2972-2981.

Udo, M.D., Ekpo, U., & Ahamule, F.O. (2018). Effects of processing on the nutrient composition of rubber seed meal. Journal of the Saudi Society of Agricultural Sciences, 17(3), 297-301.

Wen-Chien, Lu., C, Chiu., Yung-Jia, Chan., Amanda, Tresiliana, Mulio., Po-Hsien, Li. (2023). New perspectives on different Sacha inchi seed oil extractions and its applications in the food and cosmetic industries. Critical Reviews in Food Science and Nutrition, 1-19. doi: 10.1080/10408398.2023.2276882

Wilson, Daniel, Caicedo, Chacon., Yessica, Alexandra, Rodriguez, Gaviria., Ana, Paula, Zapelini, de Melo., Silvani, Verruck., Alcilene, Rodrigues, Monteiro., Germán, Ayala, Valencia. (2023). Physicochemical properties and potential food applications of starches isolated from unconventional seeds: A review. Starch-Stärke, doi: 10.1002/star.202200228

Zulhasanain, S.N.A. (2024). Production of *Hevea Brasiliensis*-Based Tempeh: Nutritional Composition and Physicochemical Properties. Bachelor of Science with Honours in Food Biotechnology. Universiti Sains Islam Malaysia.

EXPLORING THE SURPLUS SHARING MECHANISM IN TAKAFUL TOWARDS BETTER MARKET TRANSPARENCY

Md Azmi Abu Bakar[i] & Nuradli Ridzwan Shah Mohd Dali[ii]

[i](*Corresponding author*). Ph.D. candidate, Faculty of Economy and Muamalat, Universiti Sains Islam Malaysia, USIM.mdazmi.abubakar.2011@gmail.com
[ii]Associate Professor, Faculty of Economy and Muamalat, Universiti Sains Islam Malaysia, USIM. nuradli@usim.edu.my

Abstract: The sharing of surplus has been widely practised in the takaful industry worldwide ever since takaful came into the market in the 1980s. The practice signifies one of the major differences between the takaful and conventional insurance. The sharing of surplus in takaful is deemed as a unique characteristic that benefits the consumers while at the sametime securing the protection for their lives, assets and properties. The phenomenal growth rate of the takaful industry relative to its peer conventional insurance has been acknowledged by many researchers as largely attributed to the sharing of surplus which provides a cash-back return on top of utilizing the donation contract to help others. IFSB and World Bank in their joint publication in 2017 have acknowledged that the driving force behind the growth of takaful among others is attributed to the sharing of the surplus to consumers as provided under the takaful contract which is perceived as a fairer contract and more consumer-friendly. Although surplus-sharing has been practised since more than three decades ago, its mechanism to the consumers and public at large remains vague and unclear. This study intends to apprise the need to unveil the surplus-sharing mechanism as practiced in takafulaswell as the need to heighten the level of disclosure to the consumers for better market transparency. The disclosure of the surplus-sharing mechanism to the consumers is essential not only to meet the call from the consumers group but more importantly to ensure the principles of justice, fairness and transparency are fully observed in

takaful as these principles are entrenched as the core pillars in the conduct of Islamic finance. It is hoped that this study will set a foundation for more thorough studies related to the same discipline. This further calls for more in-depth studies to be conducted regarding fairness and justice in the surplus-sharing mechanism to ensure that the principle of "*al-adl wal ehsan*" is upheld as enshrined in the Shariah.

Keywords: Takaful, Surplus, Distribution of Surplus, Surplus Sharing.

INTRODUCTION

The history of takaful can be traced back to the time of the Prophet (s.a.w) through the practice of a social system of *Al-Aqilah* (Fadzli, Zamri & Khudus, 2015). It is asystem where the members of the community jointly contribute to pay the compensation on behalf of a member who was liable to pay the *diyat* (compensation) to the heirs of the victim in the case of murder committed by a member of the community. The practice was prevalent during the pre-Islamic time where if a member of a tribe was killed unintentionally by a member of another tribe, the heir of the victim would be compensated by the close relatives of the killer. The virtue of *Al-Aqilah* was approved by the Prophet (s.a.w) which was then incorporated into the constitution of Medina (Borhan & Saari, 2003). The practice later was adopted and made mandatory during the time of the second caliph, Umar (r.a.) (Fadzlietal., 2015).

Takaful is a scheme based on brotherhood and solidarity among a group of persons called "the participants" who agree to jointly share the risks and provide mutual financial assistance to any fellow participants resulting from injuries, death, damages or losses to the properties of the participants (Fadzliet al., 2015). Each participant contributes a sum of money as *tabarru'* (a donation) to a common fund shared by all the participants. The fund will be used to pay the claims made by fellow participants who are inflicted by the unfortunate events covered under the scheme. According to Bhatty (2010), takaful is an insurance scheme based on a risk-sharing concept founded strictly on the principles of Shariah instead of a risk transfer concept as in conventional insurance. For this reason, according to Zainal (2017), takaful, in practice, is similar to mutual or cooperative insurance setups that operate within the values of "self-help, self-responsibility, democracy, equality, equity, and solidarity". Rusni (2012) describes takaful as a social and ethical insurance based on the Shariah principles of *ta'awun* (cooperation) and *tabarru'* (donation) where the risks are shared by the members of the scheme who agree to jointly indemnify each other in the event of losses occur to anyone of them.

In the course of running the business, the takaful fund can be in deficit or surplus. The fund is in deficit when its assets are insufficient to pay its liabilities. In this instance, the fund is said to be in the state of insolvent. At this stage, the regulator may require the operator to inject *qard-hassan* (benevolent loan) from its own capital to top up the deficit amount. The fund is in surplus when its assets exceed its liabilities. In simpler terms, a surplus arises when the *tabarru'* exceeds the claim costs including the provisions of the reserve. There are mixed views on whether the surplus can be shared by the operator, or whether it belongs the participants exclusively to be shared among the participants themselves, or whether it should be kept in the fund and not be distributed at all. Most countries currently hold

to the view that the surplus can be shared between the participants and takaful operator based on the contract of *Ju'alah* (performance fee) provided that this is stated in the takaful contract (COMCEC, 2019).

The description of the rights of the participant to the surplus of the takaful fund is stipulated in the takaful contract called the takaful certificate. The certificate spells out the terms and conditions governing the takaful scheme covering the rights and obligations of both parties to the contract that is the participant and takaful operator. These terms include the rights of the participant to the surplus. However, it is discovered that the disclosures made by the takaful operators generally are still broad and vague. According to a study on market practice conducted by Hamim, Izwayu, & Noraziyah, (2015), the information on the surplus disclosed by the operators, in general, is usually broad, generalized and only confined to the basic information such as the sharing ratio between the operator and participants, and when the surplus is distributed. According to Smith (2017), although the distribution of surplus may seem relatively simple in principle, it is not clear how the amount paid to each participant is determined. Thus, the mechanism of surplus distribution may raise questions as to fairness.

METHODS

This study examines the need to disclose the surplus-sharing mechanism in takaful for better transparency and hence increase its market awareness. To achieve this objective, a review was conducted on the written documentation produced by takaful operators such as the marketing materials, takaful certificates and corporate websites of the operators. The purpose of the review is to gauge the level of disclosure to the participants and the public in general, concerning the surplus-sharing mechanism as practiced by the respective takaful operator. This was followed by the interviews conducted with senior executives of each of the general takaful operators in Malaysia. The purposeful sampling

method is adopted whereby the interviews were conducted only with the general takaful operators in Malaysia. The selection of the general takaful operator was made based on the size of the general business in the global takaful market, and in Malaysia in particular. IFSB (2020) reported that the general takaful sector remains the dominant type of business globally with a share of 82% of the total takaful contribution worldwide. In the context of the Malaysian market, general takaful in 2022 generated a total of RM4.64b gross contribution which represents 32% of the total takaful contributions collected in the year (MTA, 2022). Moreover, general takaful products such as motor and homeowners takaful schemes are more familiar to the majority of the public. This study uses in-depth semi-structured interview techniques to collect data from the respondents. According to Yin (2011), purposive sampling is the most effective in this context to yield richness and relevance of information about the research questions.

RESULTS AND DISCUSSION

The clauses which stipulate the basis of the surplus sharing to the participants are defined in the takaful certificate issued by takaful operators to the participants. Based on the review conducted on the takaful certificates issued by the takaful operators, there are some common wordings or similarities observed across all the operators. One takaful operator, TO1, states that: "50% of the distributable surplus arising from the GTF as determined by Us will be distributed to eligible participants in the form of cash back. We will receive 50% of the distributable surplus as performance incentive based on *Ju'alah*. Your entitlement to the Cash Back is subject to the following terms and conditions: • no claim has been made during the current Period of Takaful; • no benefit has been received during the current Period of Takaful. The Cash Back amount will be paid directly to Your bank account. The Cash Back is only payable/claimable up to six (6) months from the declaration date. Thereafter, Your entitlement to the said Cash Back shall

immediately be forfeited and such Cash Back amount will be credited to the GTF by Us. The Cash Back is not guaranteed and will be based on the actual claims experience and fund performance". Another operator, TO2, states: "Takaful Contribution, after deducting wakalah fee will be credited to the General Takaful Fund (hereinafter referred to as "GTF") under the principle of *tabarru'*. We will invest and manage the GTF for the participants in accordance with the Shariah. Any surplus arising from the GTF will be shared and allocated between the GTF and Us in accordance with the following proportions: a) 50% of the surplus will be allocated to the GTF, which will be declared and distributed to the eligible participants in the form of Cash Back, and b) 50% of the surplus will be allocated to Us. The surplus arising from the GTF is not guaranteed and will be based on Our actual claims experience and will first be applied to settle any *Qardh* owing to Us. The entitlement, declaration and amount of Cash Back shall be determined and distributed at Our sole and absolute discretion. Cash Back (if any) will only be payable to the eligible participants provided no claims have been made and no benefits have been received during the current Period of Takaful".

Similar wordings were observed in the takaful certificates of other operators. The certificates mostly mention about the sharing ratio of the surplus between the operator and participant, that the surplus is not guaranteed and will be based on the actual claims experience of the fund, and, subject that no claim has been made by the participant during the period of takaful. It is evident from the wording used that the information provided to the participants is not descriptive enough. The clauses on surplus distribution do not provide sufficient information on how the surplus is distributed to the participant and what are other conditions required for determining the eligibility and amount of surplus to be paid. Similar results can also be seen from the interviews conducted with the senior executive of the general takaful

operators. Based on the Likert scale of five, the operators were asked about their beliefs on the customers' awareness of their rights to the surplus.

Table 1.

In your view, are your takaful participants fully aware that they are entitled to share the surplus of the takaful fund if there is a surplus?				
	TO1	TO2	TO3	TO4
Not aware at all				
Somewhat aware			x	x
Neutral	x			
Aware		x		
Fully aware				

None of the operators indicate that their customers are fully aware. Two of the operators believe that their customers' awareness is below average. Further, to the question "In your view, how can this be improved? How best to ensure that the participants are aware of their right to the distribution of the takaful surplus?", the responses given are:

TO1: Efforts are required to educate the public on the takaful business model, as compared to conventional insurance.
TO3: Through personalized communication.

TO4: Education of surplus through media - agency and other distribution channels are well briefed on the surplus features within the product and communicate them to customers.

The operators were asked about their views on the customers' awareness of the calculation of the surplus that will be paid to them, and how it is being computed.

Table 2.

In your view, are your takaful participants fully aware of the calculation of their share of the surplus, and how it is calculated?

	TO1	TO2	TO3	TO4
Not aware at all			x	
Somewhat aware				
Neutral				x
Aware	x			
Fully aware		x		

One operator has a view that the customers are not aware at all of how their share of the surplus is calculated. On the other hand, another operator believes that their customers are fully aware of the calculation. Further, to the question: "In your view, how can this be improved? How best to ensure that the participants are aware of the rules and factors that are applied by the takaful operator in the distribution of the takaful surplus?" TO4 responded that: "Every operator has its own calculation approach but the operator can imply a ratio of surplus to the contribution paid for the participant to provide an understanding of how the takaful fund is managed".

To gauge a measure to what level the operators believe that their present surplus distribution is fair to the participants, the operators were asked the following question and the responses were captured as below:

Table 3.

In your view, is the current distribution of the surplus mechanism fair to the participants?				
	TO1	TO2	TO3	TO4
Strongly disagree				
Disagree				
Neutral				x
Agree	x		x	
Strongly agree		x		

Despite the limited disclosures on the surplus distribution mechanism to the participants, it is pleased to note that most operators have a positive perception that their surplus

distribution practice is fair to the participants, except one operator that sits on the fence with a neutral view. This to a certain degree provides comfort that the practice is well in place although the level of transparency in the market practice is still low.

CONCLUSIONS

Justice, transparency and fairness are the hallmark values in Islamic commercial contracts which underpin the conduct of Islamic finance transactions (Laldin & Furqani, 2013). Failure to observe these principles can affect the validity and enforceability of the transactions. On a broader scale, this can undermine the integrity of Islamic finance, and ruin market confidence and its stability.

Based on the study, there is a need to explore further in-depth on the subject of surplus distribution mechanism by takaful operators in the market. The mechanism has to be made more transparent to the public to ensure justice and fairness. More is required from the operators to disclose the mechanism, rules and conditions of the distribution. The increase in the disclosure promotes reliability through ethical conduct of the takaful industry with transparency and fairness, which are free from elements of unfairness or unjust. The takaful industry should aim to win the trust and confidence of the public by propagating strong ethical conduct that will heighten the level of knowledge, awareness and appreciation of the business. This will further strengthen the stability and integrity of the takaful industry moving forward.

REFERENCES

Bhatty, A. (2010). *The growing importance of takaful insurance.* Asia Regional Seminar organized by OECD and BNM under the sponsorship of the Government of Japan, Kuala Lumpur, 23–24 September 2010.

Borhan, J. T., & Saari, C. Z. (2003). The Principle of al-Takaful (Collective Responsibility) In Islam and Its Practice in the Operations of Syarikat Takaful Malaysia Berhad. *Journal of Usuluddin, ejournal.um.edu.my, vol.* 17, 33-56.

COMCEC. (2019). *Improving the takaful sector in Islamic countries.* Ankara, Turkey: Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation.

Fadzli, M., Zamri, W., & Khudus, A. (2015). *Takaful: Operations and Business Competence.* Kuala Lumpur: IBFIM

Hamim Syahrum A.M., I. A. (2015). Surplus Sharing Practices of Takaful Operators in Malaysia. *ISRA International Journal of Islamic Finance. Vol. 7. Issue 1*, 99-126.

IFSB. (2020). *Islamic financial services industry stability report.* Islamic Financial Services Board.

IFSB & World Bank. (2017). *Realizing the value proposition of the takaful industry for a stable and inclusive financial system.* Kuala Lumpur & Washington DC: Islamic Financial Services Board & World Bank Group.

Laldin, M. A., & Furqani, H. (2013). The objective of the Shariah in Islamic Finance: identifying the ends and the means. *NewHorizon,* Sha'ban 1434, 26–31.

MTA (2022). *Annual Report.* Kuala Lumpur: Malaysian Takaful Association. https://annualreport2022.takaful4all.org/

Rusni, H. (2012). *Islamic Banking and Takaful 2nd Edition.* Kelana Jaya, Selangor: Pearson Malaysia.

Smith, J. A. (2017). Chapter 2: Regulatory developments and implications for the industry: Contrasting the various approaches to regulating takaful. In IFSB and World Bank (Eds.), *Realising the value proposition of the takaful industry for a stable and inclusive financial system.* Islamic Financial Services Board (IFSB) and World Bank Group

Yin, R. K. (2011). *Qualitative Research from Start to Finish.* New York: The Guildford Press.

Zainal, A.M. (2017). Chapter 4: Risk Management and Governance in Takaful. In IFSB & World Bank, *Realizing the value proposition of*

the takaful industry for a stable and inclusive financial system. Islamic Financial Services Board (IFSB) and World Bank Group.

EXPLORING GREEN CHEMISTRY VIA QUANTUM MECHANICAL SIMULATIONS OF ENZYMATIC REACTION MECHANISMS

Muhammad Qadri Effendy bin Mubarak[i]

[i] (*Corresponding author*). Senior Lecturer, Fakulti Sains dan Teknologi, Universiti Sains Islam Malaysia. qadri.mubarak@usim.edu.my

Abstract: Green chemistry aims to design chemical processes that reduce or eliminate the use and generation of hazardous substances, making sustainability a core focus in modern research. Enzymatic reactions offer a natural and environmentally friendly pathway for catalysis, yet understanding their mechanisms at a fundamental level remains a challenge. This study explores the application of quantum mechanical (QM) simulations to model enzymatic reaction mechanisms, providing insights into their catalytic efficiency and potential for green chemistry applications. Using the QM cluster models, we simulate the active sites of enzymes to elucidate the electronic factors governing their catalytic behavior. These models allow for the detailed examination of reaction pathways, transition states, and energy barriers, offering a molecular-level understanding of how enzymes achieve such high specificity and efficiency in promoting reactions. By leveraging the accuracy of QM simulations, we investigate the potential of enzyme-catalyzed processes to replace traditional chemical methods, which often rely on toxic solvents and harsh conditions. The results of this research underscore the importance of quantum mechanical modeling in identifying and optimizing enzymatic reactions for green chemistry. Through this approach, we demonstrate how QM simulations can be a powerful tool in the design of eco-friendly catalytic processes, paving the way for more sustainable industrial practices. Ultimately, this study contributes to the broader goal of integrating green chemistry principles into the development of next-generation catalytic systems.

Keywords: Green chemistry, Quantum mechanical simulations, cluster model

INTRODUCTION

Green chemistry emphasizes the design of chemical products and processes that minimize the generation of hazardous substances, has become a cornerstone in the pursuit of sustainable chemical practices. Among the approaches aligned with green chemistry principles, enzymatic catalysis stands out due to its exceptional efficiency and selectivity under mild reaction conditions. Enzymes, as natural biocatalysts, have the potential to replace traditional chemical catalysts in various industrial processes, thereby reducing the environmental impact of these reactions. However, a detailed understanding of the mechanisms by which enzymes catalyze reactions is crucial for optimizing their use.

Thus, Quantum mechanical (QM) simulations have proven to be a powerful tool for investigating the mechanistic details of enzymatic reactions. These simulations enable the exploration of electronic structures and reaction pathways at the molecular level, providing insights that are often inaccessible through experimental methods alone. The integration of QM simulations with molecular mechanics (QM/MM) has further enhanced our ability to model enzymatic processes, allowing for the detailed analysis of enzyme active sites within the context of their broader protein environments

Recent studies have demonstrated the value of QM simulations in advancing our understanding

of enzyme catalysis. Previous study had utilized large-scale electronic structure simulations to reveal the quantum mechanical effects that play a critical role in enzyme catalysis, highlighting the importance of electronic interactions in determining catalytic efficiency (de Visser et al, 2024). Similarly, Pan et al. (2023) employed QM/MM simulations to perform a free energy profile decomposition analysis, which provided insights into the individual contributions of enzyme residues to reaction energy barriers. These findings underscore the potential of QM simulations to uncover the molecular mechanisms underlying enzymatic catalysis, thereby facilitating the design of more efficient and environmentally friendly catalytic processes.

In this research, we aim to explore the application of quantum mechanical simulations to enzymatic reaction mechanisms within the framework of green chemistry. By focusing on the detailed molecular interactions that drive enzyme-catalyzed reactions, this study seeks to identify strategies for optimizing these processes to achieve greater sustainability and efficiency in chemical production.

METHODS

This study employs computational methods previously validated and proven effective in replicating experimental results by using quantum chemistry approach (Cantú Reinhard, Faponle, and de Visser, 2016). Density Functional Theory (DFT) calculations were conducted using the Gaussian-09 software (Frisch, Hratchian, and Nielsen, 2009). Two unrestricted DFT methods, the hybrid UB3LYP (Lee, Yang, and Parr, 1988; Becke, 1993) and UBP86 (Perdew, 1986; Becke, 1988) were used for all geometry optimizations, scans, and frequency calculations.

We focus on the chemical properties and methane hydroxylation activity of the μ-nitrido bound diruthenium(IV)-oxo porphyrazine (Pz) complex, $^{2,4,6}[O=Ru^{IV}(Pz_{+\bullet})NRu^{IV}(Pz)]^0$ (or $^{2,4,6}[O=Ru^{V}(Pz)NRu^{IV}(Pz)]^0$) where will be label as

1. Geometry optimizations and potential energy scans were performed with the LACVP basis set including core potential for ruthenium and 6-31G for other atoms (Ditchfield, Hehre, and Pople, 1971; Hay and Wadt, 1985). All optimized structures and transition states were validated with an analytical frequency analysis, confirming the presence of a single imaginary frequency in the transition states. Solvent effects were included using a polarized continuum model (CPCM), mimicking acetonitrile with a dielectric constant of $\varepsilon = 35.688$. To enhance accuracy, single-point energy calculations were carried out with an LACV3P+ basis set for ruthenium and 6-311+G* for other atoms for basis set BS2. These methods have been rigorously tested in previous studies and shown to accurately reproduce experimentally determined free energies of activation (Cantú Reinhard, Faponle, and de Visser, 2016; Cantú Reinhard et al., 2017).

RESULTS AND DISCUSSION

Figure 1. Optimized geometries of complexes ^{2,4,6}1 containing $^{2,4,6}[O=Ru^{IV}(Pz_{+\bullet})NRu^{IV}(Pz)]^0$ as obtained in Gaussian-09. Bond lengths are in angstroms and relative energies in kcalmol^{-1}. Data for ^{2,4,6}1 and taken from previous work (Mubarak et al., 2017).

In this study, we examine the chemical properties and reactivity of the μ-nitrido diruthenium(IV)-oxo porphyrazine (Pz) complex $^{2,4,6}[O=Ru^{IV}(Pz_{+\bullet})Ru^{IV}(Pz)]^0$ (or $^{2,4,6}[O=Ru^{V}(Pz)NRu^{IV}(Pz)]^0)$], denoted as complex

1. Using UB3LYP and UBP86 density functional theory methods, this study analyze this neutral complex across its doublet, quartet, and sextet spin states, and compare its properties to diiron(IV)-oxo complexes to gain insights into differences in the reactivity and stability (Silaghi-Dumitrescu *etal.*, 2011; Ansari *et al.*, 2015; Quesne *et al.*, 2016). The structural analysis indicated that the Ru_1–O and Ru_2-μ-N bonds in the ruthenium complexes are significantly elongated compared to those in diiron counterparts, consistent with the heavier nature of ruthenium. Notably, the Ru_1–O bond is longer than the Ru_2–μ-N bond, suggesting different bonding characteristics. Additionally, molecular orbital analysis highlighted distinct π-interactions in the xz and yz planes, differentiating the Ru–O and Ru–N interactions from those typical of mononuclear heme systems.

The analysis revealed that the free energies calculated with both B3LYP and BP86 are notably similar, particularly for the transition states, with analogous structures also observed. This suggests that the choice of density functional method has minimal impact on the structural and energetic outcomes of the reaction mechanism. In contrast to the spin-state ordering and relative energies seen in mononuclear iron and manganese-oxo complexes, where results can

vary significantly depending on the method used, especially the amount of Hartree-Fock exchange included (Sainna, Sil, *et al.*, 2015; Cantú Reinhard, Faponle and de Visser, 2016; Yang *et al.*, 2016).

Energy comparisons across different spin states of complex [2,4,6]1 as shown in Figure 2 revealed that the doublet spin state is the ground state, with the quartet and sextet spin states lying more than 10 kcal mol⁻¹ higher in energy. This suggests that the reaction is most likely will occur via a single-state reactivity pathway on the doublet state surface. However, the multi-state reactivity often observed in iron(IV)-oxo systems, which involve closely lying spin states (Hirao *et al.*, 2006; Visser, 2006). Thus the ability of the ruthenium to stabilize low-lying spin states positions could make it as a promising alternative in enzymatic systems that require stability. The predictable and controllable reaction outcomes afforded by single-state reactivity in ruthenium complexes are significant advantage over other transition metals. In the case of iron, where different spin states can complicate reaction mechanisms of the enzyme itself. This stabilization has the potential to inspire the design of innovative catalysts that emulate natural enzymes, leading to more

Figure 2. Potential energy landscape of methane hydroxylation by [2,4,6]1 as obtained with DFT using UB3LYP [UBP86] level of theory. The energy level are in kcal mol⁻¹ with solvent, thermal, entropic and ZPE corrections included. Optimized geometries give bond lengths in angstroms and the imaginary frequency in cm⁻¹. Data were taken from previous work (Mubarak et al., 2017).

efficient and sustainable chemical transformations.

Figure 2 provides the energy profile for methane hydroxylation catalyzed by the diruthenium complex. The mechanism starts via a stepwise mechanism beginning with hydrogen atom abstraction through the transition state of **TS**HA, forming a radical intermediate (**I**HA), followed by an OH rebound step via **TS**reb leading to the formation of the alcohol product complex (**P**HA). This mechanism mirrors iron(IV)-oxo complexes but with a notably lower activation barrier for hydrogen atom abstraction, indicating that the diruthenium complex is a more efficient oxidant (Quesne*et al.*, 2016). Optimized geometries of the rate-determining doublet spin transition states (^{2}**TS**HA) show late transition states with long C–H distances (1.375 Å and 1.471 Å at the B3LYP and BP86 levels of theory, respectively) and shorter O–H distances (1.157 Å and 1.117 Å), correlating with high energy barriers.

Previous studies have demonstrated that the height of hydrogen atom abstraction barriers correlates with the strength of the C–H bond being broken, with stronger C–H bonds leading to more product-like transition states (Latifiet al. 2012). The strong C–H bond strength in methane with the bond dissociation energy of 101.6 kcal mol^{-1} at the UB3LYP level of theory explains the high hydrogen atom abstraction barriers observed. The rate-determining step of hydrogen atom abstraction for complex ^{2}1 has a free energy of activation of 7.8 kcalmol^{-1}, significantly lower than the 15.7 kcalmol^{-1} found for analogous μ-nitrido bridged diiron(IV)-oxo phthalocyanine complexes (Quesne*et al.*, 2016). This reduction in the activation barrier by nearly 8 kcalmol^{-1} suggests a rate enhancement of over 10^6, further supporting the conclusion that the diruthenium(IV)-oxo species is a considerably more efficient oxidant compare their diiron(IV)-oxo counterparts .

CONCLUSIONS

The analysis of the μ-nitrido diruthenium(IV)-oxo porphyrazine complex has provided significant insights into its chemical properties and reactivity. Our study demonstrates that the diruthenium complex exhibits a pronounced preference for the doublet spin state, with the quartet and sextet spin states being considerably higher in energy. This stabilization of the low-spin state facilitates single-state reactivity, which is a key factor in the complex's enhanced catalytic efficiency.

The structural and electronic properties of the diruthenium complex reveal elongated Ru1–O and Ru2–μ-N bonds, indicative of the unique bonding characteristics of ruthenium. These structural features, combined with the distinct π-interactions within the complexes were observed in the molecular orbitals and might contribute to the complex's ability to stabilize the low-spin state and lower the activation barrier for hydrogen atom abstraction during methane hydroxylation.

Our findings suggest that the diruthenium(IV)-oxo species is a significantly efficient oxidant than its diiron(IV)-oxo counterpart, resulting in a potential rate enhancement. The ability of ruthenium complexes to maintain a stable low-spin state and exhibit single-state reactivity makes them promising candidates for catalytic applications that require high efficiency and selectivity.

Overall, the unique electronic structure and reactivity of the diruthenium complex highlight its potential as an alternative catalyst in enzymatic systems, offering advantages in terms of both efficiency and predictability. Future research could explore the development of ruthenium-based catalysts that mimic natural enzymes, potentially leading to more sustainable and environmentally friendly chemical processes.

REFERENCES

Ansari, M., Vyas, N., Ansari, A. and Rajaraman, G., 2015. "Oxidation of Methane by an N-Bridged High-Valent Diiron-Oxo Species: Electronic Structure Implications on the Reactivity." *Dalton Transactions*, 44(34), pp.15232-15243. https://doi.org/10.1039/c5dt01060h.

Becke, A. D., 1988. "Density-Functional Exchange-Energy Approximation with Correct Asymptotic Behavior." Physical Review A 38 (6): 3098–3100. https://doi.org/10.1103/PhysRevA.38.3098.

Becke, A. D., 1993. "Density-functional Thermochemistry. III. The Role of Exact Exchange." The Journal of Chemical Physics 98 (7): 5648–52. https://doi.org/10.1063/1.464913.

Cantú Reinhard, F.G., Barman, P., Mukherjee, G., Kumar, J., Kumar, D., Kumar, D., Sastri, C.V. and de Visser, S.P., 2017. "Keto-Enol Tautomerization Triggers an Electrophilic Aldehyde Deformylation Reaction by a Nonheme Manganese(III)-Peroxo Complex." *Journal of the American Chemical Society* 139 (50): 18328–38. https://doi.org/10.1021/jacs.7b10033.

Cantú Reinhard, F.G., Faponle, A.S. and de Visser, S.P., 2016. Substrate sulfoxidation by an iron (IV)-oxo complex: Benchmarking computationally calculated barrier heights to experiment. *The journal of physical chemistry A, 120*(49), pp.9805-9814.

de Visser, S. P., Wong, H., Zhang, Y., Yadav, R., & Sastri, C. (2024). Quantum Mechanical Cluster Models for Calculations on Enzymatic Reaction Mechanisms: Set-Up and Accuracy. *Chemistry–A European Journal*, e202402468.

Ditchfield, R.H.W.J., Hehre, W.J. and Pople,J.A., 1971."Self-Consistent Molecular-Orbital Methods. IX. An Extended Gaussian-Type Basis for Molecular-Orbital Studies of Organic Molecules." The Journal of Chemical Physics 54 (2): 724–28. https://doi.org/10.1063/1.1674902.

Frisch, M.J., Hratchian, H.P. and Nielsen, A.B., 2009. Gaussian 09: Programmer's Reference. gaussian.

Hay, P.J. and Wadt, W.R., 1985. "Ab Initio Effective Core Potentials for Molecular Calculations. Potentials for the Transition Metal Atoms Sc to Hg." *The Journal of Chemical Physics* 82 (1): 270–83. https://doi.org/10.1063/1.448799.

Hirao, H., Kumar, D., Que Jr, L. and Shaik, S., 2006. "Two-State Reactivity in Alkane Hydroxylation by Non-Heme Iron-Oxo Complexes." *Journal of the American Chemical Society* 128 (26): 8590–8606. https://doi.org/10.1021/ja061609o.

Latifi, R., Valentine,J.S., Nam, W. and de Visser, S.P., 2012. "Predictive Studies of H-Atom Abstraction Reactions by an Iron(IV)-Oxo Corrole Cation Radical Oxidant." Chemical Communications 48 (29): 3491–93.https://doi.org/10.1039/c2cc30365e.

Lee, C., Yang, W. and Parr, R.G., 1988. "Development of the Colle-Salvetti Correlation-Energy Formula into a Functional of the Electron Density." Physical Review B 37 (2): 785–89. https://doi.org/10.1103/PhysRevB.37.785.

Mubarak, M. Q. E., Sorokin, A. B., & de Visser, S. P. (2019). Properties and reactivity of μ-nitrido-bridged dimetal porphyrinoid complexes: how does ruthenium compare to iron?. *JBIC Journal of Biological Inorganic Chemistry*, *24*, 1127-1134.

Pan, X., Van, R., Pu,J., Nam, K., Mao, Y., & Shao, Y. (2023). Free Energy Profile Decomposition Analysis for QM/MM Simulations of Enzymatic Reactions. *Journal of Chemical Theory and Computation*, *19*(22), 8234-8244.

Perdew, J.P., 1986. "Density-Functional Approximation for the Correlation Energy

of the Inhomogeneous Electron Gas." *Physical Review B* 33 (12): 8822.

Quesne, M.G., Senthilnathan, D., Singh, D., Kumar, D., Maldivi, P., Sorokin, A.B. and de Visser, S.P., 2016. "Origin of the Enhanced Reactivity of -Nitrido-Bridged Diiron(IV)-Oxo Porphyrinoid Complexes over Cytochrome P450 Compound I." *ACS Catalysis* 6 (4): 2230–43. https://doi.org/10.1021/acscatal.5b02720.

Sainna, M.A., Sil, D., Sahoo, D., Martin, B., Rath, S.P., Comba, P. and de Visser, S.P., 2015. "Spin-State Ordering in Hydroxo-Bridged Diiron(III)Bisporphyrin Complexes." *Inorganic Chemistry* 54 (4): 1919–30. https://doi.org/10.1021/ic502803b.

Silaghi-Dumitrescu, R., Makarov, S.V., Uta, M.M., Dereven'kov, I.A. and Stuzhin, P.A., 2011. "Redox Non-Innocence of a Nitrido Bridge in a Methane-Activating Dimer of Iron Phthalocyanine." *New Journal of Chemistry* 35 (5): 1140–45.

Visser, S. P. D., 2006. "Substitution of Hydrogen by Deuterium Changes the Regioselectivity of Ethylbenzene Hydroxylation by an Oxo-Iron-Porphyrin Catalyst." Chemistry - A European Journal 12 (31): 8168–77. https://doi.org/10.1002/chem.200600376.

Yang, T., Quesne, M.G., Neu, H.M., Cantú Reinhard, F.G., Goldberg, D.P. and de Visser, S.P., 2016. "Singlet versus Triplet Reactivity in an Mn(V)-Oxo Species: Testing Theoretical Predictions Against Experimental Evidence." Journal of the American Chemical Society 138 (38): 12375–86.

https://doi.org/10.1021/jacs.6b05027.

MENU RAHMAH PURCHASE INTENTION AMONG UNIVERSITY STUDENTS: MADANI ECONOMY EMPOWERMENT

Wan Rasyidah Wan Nawang[i], Amirul Amri Zainudin[ii], Intan Fatimah Anwar[iii] & Nor Haziah Hashim[iv]

[i](*Corresponding author*). Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia. wrasyidah@usim.edu.my
[ii]Undergraduate Student, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia. amirulamri@raudah.usim.edu.my
[iii]Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia. intan.anwar@usim.edu.my
[iv]Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia. haziah.h@usim.edu.my

Abstract: Malaysia's economic slowdown following the COVID-19 pandemic has led to a struggle for basic meals. The government introduced Menu Rahmah, a price-discounted meal option, as part of the Madani economy policy. This study was conducted to examine the role of perceived price attractiveness and perceived food quality of Menu Rahmah on purchase intention among university students. By utilizing the Theory of Planned Behaviour (TPB), an online survey was conducted with 229 students who have purchased Menu Rahmah. The data was analysed using partial least square structural equation modelling (PLS-SEM) to test the relationship between the variables. The results showed that perceived price attractiveness significantly influences consumers' intention to buy Menu Rahmah, while perceived food quality does not. Apart from contributing to the comprehension of consumer behaviour and discounted products, this study also offers insights for the government and Menu Rahmah operators on the importance of consistently providing Menu Rahmah to economically disadvantaged Malaysians, particularly university students, to achieve a Madani economy that serves all Malaysians' needs while fostering long-term economic stability and growth.

INTRODUCTION

Everyone worldwide, including Malaysia, has suffered greatly as a result of the COVID-19 pandemic, making it difficult even to afford a simple meal. The Malaysian government has introduced Menu Rahmah, a meal option with a price reduction, as one of its initiatives. The Kementerian Perdagangan Dalam Negeri dan Kos Sara Hidup (KPDN), led by Prime Minister Datuk Seri Anwar Ibrahim, introduced the Madani Economy, aiming for inclusivity, sustainability, and equitable wealth distribution, with Menu Rahmah as an initiative in this Madani economy. MenuRahmah aims to achieve a Madani economy that caters to all Malaysians' needs, promoting long-term economic stability and growth through affordable food, local business support, sustainable practices, and community cohesion. The term "Rahmah" stems from an Arabic word that means compassion which signifies unity among Malaysian citizens during challenging times.

Menu Rahmah is a program that provides affordable meals to low-income individuals and

families, aiming to provide nutritious meals at a lower cost, primarily targeting the B40 income group and hard-core poor. Small eatery stalls and major restaurants, like Mydin Mohamed Holdings Berhad, have promoted and provided Menu Rahmah to support the government initiative. The late Datuk Seri Salahuddin Ayub, a former KPDN Minister, argued that the word "Rahmah" should be interpreted as a holistic approach to fostering wellness among Malaysians, regardless of their cultural or ethnic background. Thus, non-halal restaurants are also serving Menu Rahmah to appeal to non-Muslim clients in the B40 income bracket and the hardworking poor.

Eventhough the Menu Rahmah pricing initiative makes food much more affordable for the B40 demographic, KPDN has made it clear that these meals are available to people from all socioeconomic classes, including university students with limited financial resources. This study aims to investigate the purchase intentions of young Malaysians, particularly university students, who have been well-received with Menu Rahmah, a popular discounted meals, in light of its success in reducing their financial burden.

Previous research on discounted items revealed that factors such as perceived price attractiveness (Büyükdağ et al., 2020) and perceived quality (Iranmanesh et al., 2017) influence purchase intention. To the best of the researchers' knowledge, this is a first-of-its-kind study which examine purchase intention on Menu Rahmah.

This study examines purchase intention of Menu Rahmah pursuant to the Theory of Planned Behaviour (TPB) by Ajzen (1991). While Ajzen's TPB emphasizes attitudes, perceived behavioral control, and subjective norms as the primary determinants of intention, Ajzen recognized that various additional factors could also shape intentions indirectly. Thus, in this study it is predicted that perceived price attractiveness and

perceived food quality can influence purchase intention of Menu Rahmah.

Intention in the TPB is an individual's motivation, readiness, and commitment to perform a specific action. It is crucial as it converts thoughts and beliefs into concrete plans and actions (Bagozzi & Yi, 1989; Triandis, 1979), reducing the likelihood of behaviour. Intention is a pivotal element in the decision-making process, ensuring the successful execution of subsequent actions. This study explores consumer intention to purchase Menu Rahmah, focusing on the impact on perceived price attractiveness and perceived food quality.

Price is a crucial marketing parameter that represents a product's cost and is perceived as a quality indicator by consumers. Perceived price attractiveness is a subjective evaluation of a product's monetary value, influenced by consumer purchasing power (Calvo-Porral & Lévy-Mangin, 2017). Retailers offering discounted products offer consumers significant money-saving opportunities, with higher monetary savings enhancing the perceived attractiveness of the price. Rai and Bhattarai's (2023) study revealed that perceived price attractiveness positively and significantly influences purchase intention.

Perceived quality refers to a consumer's perception of a product's superiority or excellence (Zeithaml, 1988). Perceived quality of discounted products can negatively impact purchase intention, as consumers often associate discounts with lower quality or reduced value, reducing their willingness to make a purchase (Lee & Chen-Yu, 2018). A study by Yazdanparast and Kukar-Kinney (2023) found that perceived quality negatively and significantly impacts consumer purchase intentions of discounted products.

Figure 1 presents the study's conceptual framework and hypotheses, which were

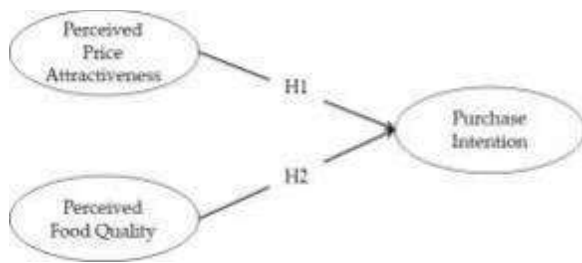developed based on the abovementioned argument.

Figure 1. Research Framework

The followings are the study's hypotheses:

H1: Perceived price attractiveness positively and significantly influence purchase intention of Menu Rahmah.

H2: Perceived food quality negatively and significantly influence purchase intention of Menu Rahmah.

METHODS

The study is a quantitative research method, utilizing an online questionnaire survey distributed via Google Forms on social media platforms like Facebook and WhatsApp. A total of 229 university students participated, a suitable sample size for correlation analyses, as recommended by Hair et al. (2018) and Cohen (1992). The survey items were taken from earlier research. A five-point Likert scale was used to measure the constructs, with 1 denoting strongly disagree and 5 denoting strongly agree. The data was analysed using PLS-SEM, which involves two stages: measurement model assessment and structural model assessment.

RESULTS AND DISCUSSION

Two hundred twenty-nine university students took part in this study. Compared to male respondents (47.6%), female respondents participated at a higher rate (52.4%). All respondents were between the ages of 18 and 25, since the study's focus was on university students. About half of those surveyed (77.7%) are pursuing a bachelor's degree, 18.8% are pursuing a diploma, and 3.5% are pursuing postgraduate studies.

The data measurement assessment was initial conducted to evaluate the validity and reliability of the constructs. The model fit was confirmed by assessing factor loadings (greater than 0.7) (Byrne, 2016), Cronbach's alpha (above 0.7) (Nunnally, 1978), composite reliability (CR) (over 0.7) (Hair et al., 2019), and average variance extracted (AVE) (exceeding 0.5) (Ramayah et al., 2018), ensuring a minimum threshold was met for the structural model assessment. Table 1 shows that the constructs'reliability and validity values surpass the recommended thresholds for each assessment, indicating a high level of confidence in the survey instrument's quality.

Table 1. Constructs' Reliability and Validity Results

Construct and Item	1 (>0.7)	2 (>0.7)	3 (>0.7)	4 (>0.5)
Perceived Price Attractiveness		0.883	0.919	0.740
PPA1	0.894			
PPA2	0.788			
PPA3	0.895			
PPA4	0.860			
Perceived Food Quality		0.790	0.860	0.607
PFQ1	0.726			
PFQ2	0.769			
PFQ3	0.860			
PFQ4	0.755			
Purchase Intention		0.897	0.928	0.764
PI1	0.825			
PI2	0.912			
PI3	0.884			
PI4	0.872			

Note: 1 =factor loadings, 2 = Cronbach's alpha, 3 = CR, 4 = AVE

Next is to assess the discriminant validity of the constructs using the heterotrait-monotrait (HTMT) ratio, with a value of 0.9 indicating favourable validity (Henseleretal., 2015). Table 2 reveals that the HTMT test has a good discriminant validity, with a value less than 0.9

in all cases, indicating it passed the measurement model assessments.

Table 2. HTMT Results

Constructs	1	2	3
1. PFQ			
2. PPA	0.787		
3. PI	0.653	0.882	

After evaluating the measurement model and confirming its fitness, the hypothesised relationships in the structural model assessments are tested using the bootstrapping procedure. The comprehensive reporting of structural model results includes significance testing, effect size (f2), and model's explanatory power (R2).

The hypothesis test results revealed that H1 was supported, while H2 was not. Regarding the f2, Cohen (1988) proposed that the effect size (f2) be classified as small, medium, or large, correspondingly, at 0.02, 0.15, and 0.35. The study model demonstrated explanatory power at both small and large levels (0.017 and 0.845). With regard to R2, according to Sarstedt and Mooi (2019), R2 values of 0.67, 0.33, and 0.19 suggest strong, moderate and weak explanatory power, respectively. The study's R2 indicates that the model has a moderate degree of explanatory power.
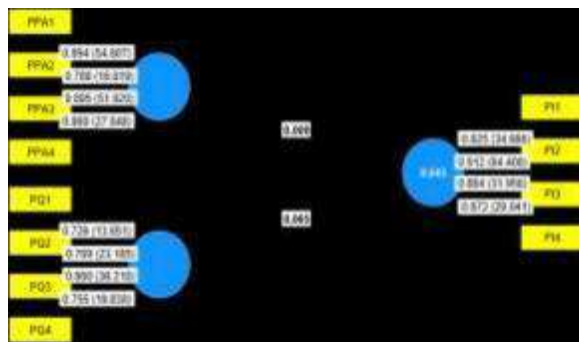
Figure 2. Structural Model

As illustrated in Figure 2, perceived price attractiveness (H1) was positively and significantly related to purchase intention (t=13.408, p=0.000), aligning with a previous

study by Rai and Bhattarai (2023). On the contrary, perceived food quality (H2) was insignificant (t=1.845, p=0.065), contradicting a previous study by Yazdanparast and Kukar-Kinney (2023).

The study reveals that university students are influenced by the perceived price attractiveness of MenuRahmah, willing to sacrifice food quality for discounted and low-priced meals. Customers often view discounted items as average quality, with their focus on the discount itself and the money saved over the quality of the items.

CONCLUSIONS

To the best of the researchers'knowledge, this is the first study to examine the Menu Rahmah program since its inception. This study examines Menu Rahmah purchase intention among university students using the TPB model and PLS-SEM statistical analysis, focusing on the need for assistance for these students who lack sufficient resources for daily living.

The findings of the study indicates that university students are more inclined to buy Menu Rahmah due to its affordable prices, even sacrificing quality for basic meals. University students often struggle with financial constraints, making Menu Rahmah an ideal alternative for them,benefiting from the program.

This study adds to the limited literature on discounted products, perceived price attractiveness, and perceived food quality on consumer behavior. It offers valuable insights for the government and food operators to continue offering Menu Rahmah to alleviate financial burdens for the unprivileged. The government should support Menu Rahmah operators, offering meals that align with government policy, support the Madani economic framework, reduce living costs, stimulate small businesses, and provide care and compassion to impoverished individuals.

The study's limitations lie in its focus on consumers, suggesting future research should consider the perspective of Menu Rahmah sellers using a qualitative method for more comprehensive understanding.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Bagozzi, R. P., & Yi, Y. (1989). The degree of intention formation as a moderator of the attitude-behavior relationship. *Social Psychology Quarterly*, *52*(4), 266-279. https://doi.org/10.2307/2786991

Byrne, B.M. (2016), *Structural equation modeling with AMOS: Basic concepts, applications, and programming* 3rd ed. Abingdon, OX: Routledge, Taylor and Francis Group.

Büyükdağ, N., Soysal, A. N., & Ki.tapci, O. (2020). The effect of specific discount pattern in terms of price promotions on perceived price attractiveness and purchase intention: An experimental research. *Journal of Retailing and Consumer Services*, *55*, 102112. https://doi.org/10.1016/j.jretconser.2020.102112

Calvo-Porral, C., & Lévy-Mangin, J. P. (2017). Store brands' purchase intention: Examining the role of perceived quality. *European Research on Management and Business Economics*, *23*(2), 90-95. https://doi.org/10.1016/j.iedeen.2016.10.001

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* 2nd ed. Hillsdale, NJ: Lawrence Earlbaum Associates.

Cohen, J. (1992). Quantitative methods in psychology: A power primer. *Psychological Bulletin, 112*, 1155-1159.

Hair,J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate data analysis* 8th ed. United Kingdom: Cengage Learning.

Hair,J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Iranmanesh, M., Jayaraman, K., Zailani, S., & Ghadiri, S. M. (2017). The effects of consumer perception of volume discount benefits on intention to purchase grocery products: deal proneness as a moderator. *Asia Pacific Journal of Marketing and Logistics, 29*(5), 1017-1035. https://doi.org/10.1108/APJML-07-2016-0135

Lee, J. E., & Chen-Yu,J. H. (2018). Effects of price discount on consumers' perceptions of savings, quality, and value for apparel products: mediating effect of price discount affect. *Fashion and Textiles, 5*, 1-21. https://doi.org/10.1186/s40691-018-0128-2

Nunnally, J. C. (1978). An overview of psychological measurement. *Clinical diagnosis of mental disorders: Ahandbook*, 97-146. https://doi.org/10.1007/978-1-4684-2490-4_4

Rai, A., & Bhattarai, M. (2023). The influence of pricing attractiveness, price sensitivity, and product variety on consumers' purchase intention: An analysis of Nepal's footwear market. *Journal of Management*, *6*(1), 1-14. https://doi.org/10.3126/jom.v6i1.58861

Ramayah, T., Cheah, J.H., Chuah, F., Ting, H. and Memon, M.A. (2018). *Partial least squares structural equation modelling (PLS-SEM) using SmartPLS 3.0: An updated practical guide to statistical analysis* 2nd ed. Kuala Lumpur: Pearson Malaysia Sdn. Bhd.

Sarstedt, M., & Mooi, E. (2019). *A concise guide to market research* 3rd ed. Berlin, Heidelberg: Springer.

Triandis, H. C. (1979). Values, attitudes, and interpersonal behavior. In *Nebraska symposium on motivation*. University of Nebraska Press.

Yazdanparast, A., & Kukar-Kinney, M. (2023). The effect of product touch information and sale proneness on consumers' responses to price discounts. *Psychology & Marketing*, *40*(1), 146-168. https://doi.org/10.1002/mar.21755

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, *52*(3), 2-22. https://doi.org/10.1177/00222429880520030 2

THE ROLE OF AI IN SHAPING PUBLIC PERCEPTION: ETHICAL AND SOCIAL IMPLICATIONS OF AI-GENERATED CONTENT

Noor Adzrah Ramle[i] & Safiyyah Ahmad Sabri[ii]

[i](*Corresponding author*) Universiti Sains Islam Malaysia.nooradzrah@usim.edu.my
[ii]Universiti Sains Islam Malaysia.safiyyah@usim.edu.my

Abstract: This study examines the role of artificial intelligence (AI) in shaping public perception through AI-generated content, focusing on the ethical dilemmas and social implications that arise from its use. As AI technology, particularly in the form of generative AI like deepfakes, continues to advance, it presents both opportunities and challenges for public communication and media integrity. This study explores how AI-generated content has been utilized to influence public opinion and the ethical considerations present for journalists and media organizations. Additionally, it discusses the broader societal impacts, including the erosion of public trust, the potential for misinformation, and the implications for democracy and social stability. The discussion is further contextualized by recent developments in Malaysia, particularly Astro Awani's introduction of media guidelines for AI-generated content, reflecting on how these guidelines align with global newsroom practices.

*Keywords***:** Artificial Intelligence (AI), public perception, public trust, ethical implications, misinformation.

INTRODUCTION

AI technology, particularly generative AI, has transformed the landscape of digital media by enabling the creation of hyper-realistic images, videos, and narratives that can mimic real individuals and events with high accuracy. These advancements have profound implications for how information is disseminated and perceived by the public. The central objective of this paper is to analyze the influence of AI-generated content on public perception and to explore the ethical and social challenges that arise from its use in media and communications. The study draws from recent guidelines adopted by leading news organizations, such as The New York Times, and insights from international research on AI's impact on journalism (Dolnick & Seward, 2024; Doddset al., 2024).

METHODS

This research employs a qualitative approach, utilizing a combination of case studies, literature review, and analysis of newsroom guidelines to understand the ethical and social implications of AI-generated content. Case studies focus on notable incidents globally and within specific countries, including Malaysia, where AI-generated content has significantly influenced public perception. The literature review synthesizes recent academic research on AI's ethical use in media, while an analysis of newsroom guidelines provides insights into how media organizations are adapting to the challenges posed by AI technologies. This includes an examination of the principles adopted by The New York Times, which emphasizes transparency, human oversight, and ethical standards in the use of AI (Dolnick & Seward, 2024).

RESULTS AND DISCUSSION

The findings reveal that AI-generated content significantly impacts public perception by blurring the line between reality and fabrication. Globally, deepfakes have been used to create convincing yet false narratives that mislead audiences and manipulate public opinion. In political contexts, such content can undermine democratic processes by influencing voter behavior based on fabricated events or statements (Chesney & Citron, 2019). During the 2020 U.S. Presidential election, concerns about deepfake technology's potential misuse to spread misinformation were prevalent, though proactive measures by social media platforms and news organizations helped mitigate significant damage (Chesney & Citron, 2019).

Ethical dilemmas associated with AI-generated content are primarily centered around issues of consent, authenticity, and the potential for misuse. The creation of deepfake videos without the depicted individuals' consent raises serious ethical concerns, particularly regarding privacy and potential reputational harm (Mittelstadt, 2019). Additionally, the ability of AI to produce highly realistic yet entirely fabricated content threatens the credibility of legitimate news sources and can exacerbate social divisions by reinforcing stereotypes or amplifying inflammatory rhetoric (Marwick & Lewis, 2017).

Astro Awani's recent introduction of AI guidelines marks a significant development in addressing these challenges within the Malaysian context. These guidelines, mirroring those of global organizations like The New York Times, emphasize the importance of transparency, human oversight, and ethical standards in using AI-generated content. The guidelines aim to ensure that any AI-generated content is factually accurate, meets editorial standards, and is transparently presented to the audience, thereby maintaining public trust and upholding journalistic integrity.

Astro Awani's approach aligns with broader global trends where newsrooms increasingly recognize the need for ethical frameworks to govern AI use in journalism. The New York Times, for example, mandates human oversight for all AI-generated content and requires transparency about AI's role in news production (Dolnick & Seward, 2024). These principles are vital in preventing misinformation and ensuring that AI tools enhance, rather than undermine, journalistic practices.

However, the rapid adoption of AI in newsrooms also presents several challenges. A significant issue is the potential for rigid, top-down guidelines that do not fully account for the complexities of journalistic practice. As noted by Dodds and colleagues (2024), many AI guidelines in newsrooms have been developed without sufficient input from journalists, creating a disconnect between intended ethical standards and practical realities. This can result in guidelines that are either too restrictive or not adequately enforced, limiting their effectiveness.

In Malaysia, Astro Awani's JIWA guidelines which was introduced recently, provide a valuable case study of how news organizations can navigate these challenges in diverse contexts. By incorporating feedback from journalists and other stakeholders, Astro Awani has developed guidelines that are not only ethically robust but also practically applicable in a fast-paced news production environment. This approach ensures responsible AI tool usage while empowering journalists to make informed decisions about content production.

Comparatively, newsroom guidelines worldwide show a high degree of similarity, emphasizing ethical standards, human oversight, and transparency. For instance, European newsrooms have highlighted the need to protect user privacy, reflecting broader regulatory trends within the EU (Dodds et al., 2024). Despite these commonalities, concerns remain that these guidelines may not adequately address the

unique challenges faced by different newsrooms, particularly those with fewer resources. Tomás Dodds suggests that a diversity of approaches is necessary to reflect the different contexts in which newsrooms operate (Doddset al., 2024).

The broader societal implications of AI-generated content are also significant. As AI continues to evolve, there is a growing concern that deepfakes and other forms of synthetic media could exacerbate social divisions, particularly in countries with existing ethnic or religious tensions. In Malaysia, where social cohesion is a critical issue, the potential for AI-generated content to amplify divisive narratives is a serious concern. By adopting proactive guidelines and fostering public awareness, news organizations like Astro Awani and perhaps, other media organizations can play a crucial role in mitigating these risks and promoting a more informed and cohesive society.

CONCLUSIONS

The study concludes that while AI-generated content offers new possibilities for innovation in media, its potential for misuse necessitates robust ethical frameworks and regulatory measures. News organizations must prioritize transparency and human oversight in the deployment of AI technologies, as exemplified by the guidelines introduced by Astro Awani and The New York Times (Dolnick & Seward, 2024). These frameworks are essential for maintaining public trust and ensuring that AI tools are used to enhance journalistic integrity rather than undermine it.

Policymakers should also consider implementing regulations that specifically address the creation and dissemination of AI-generated content, including penalties for those who use AI for malicious purposes (Cathetal., 2018). In addition to regulatory measures, there is a need for ongoing public education and media literacy campaigns to enhance the public's ability to critically assess AI-generated content. By

fostering an informed and vigilant public, society can better navigate the challenges posed by AI-generated content and mitigate its potential harms.

In conclusion, addressing the ethical and social implications of AI-generated content requires a multi-faceted approach that includes technological innovation, robust ethical standards, and effective regulatory frameworks. By fostering collaboration among technologists, ethicists, journalists, and policymakers, it is possible to harness the benefits of AI while minimizing its potential harms.

REFERENCES

Bradshaw, S., & Howard, P. N. (2018). "The Global Organization of Social Media Disinformation Campaigns." *Journal of International Affairs*, *71*(1.5), 23–32. https://www.jstor.org/stable/26508115

Cath, C., et al. (2018). Artificial Intelligence and the 'Good Society': The US, EU, and UK Approach. *Science and Engineering Ethics*, 24(2), 505-528. https://doi.org/10.1007/s11948-017-9901-7

Chesney, R., & Citron, D. K. (2019). Deepfakes and the New Disinformation War: The Coming Age of Post-Truth Geopolitics. *Foreign Affairs*, 98(1), 147-155. https://www.foreignaffairs.com/articles/world/2018-12-11/deepfakes-and-new-disinformation-war

Dolnick, S., & Seward, Z. (2024). AI Guidelines for The New York Times. The New York Times.

Dodds, T., de Lima Santos, M. F., & Yeung, J. (2024). AIin Newsrooms: A Comparative Study of Guidelines in 17 Countries. Oxford Internet Institute.

Marwick, A., & Lewis, R. (2017). Media Manipulation and Disinformation Online. Data & Society Research Institute. https://datasociety.net/pubs/ia/DataAnd

COMPARATIVE ANALYSIS OF S&P 500 SHARIAH AND BURSA MALAYSIA HIJRAH SHARIAH INDEX

Hamdi Hakeim Mudasir[i] & Nuradli Ridzwan Shah Mohd Dali[ii]

[i] (*Corresponding author*). Lecturer, Universiti Sains Islam Malaysia.hamdi@usim.edu.my
[ii] Associate Professor, Universiti Sains Islam Malaysia.nuradli@usim.edu.my

Abstract: Shariah-compliant indices serve as vital instruments for Islamic investors seeking ethical and Shariah-compliant investment opportunities. This abstract examines the comparative analysis of two prominent Shariah indices: the Bursa Malaysia Shariah Index and the S&P 500 Shariah. The Bursa Malaysia Shariah Index reflects the performance of Shariah-compliant securities listed on Bursa Malaysia. Comprising a diverse range of sectors, this index adheres to Islamic principles, excluding companies involved in interest-based financing and those associated with alcohol or gambling. On the other hand, the S&P 500 Shariah extends its coverage primarily in the USA, encompassing companies from various industries that meet Shariah compliance criteria. This analysis explores the historical performance for the last 3 years. It considers key performance indicators such as return on investment, and volatility Additionally, the abstract investigates the impact of economic conditions, regulatory environments, and market trends on the performance differentials between the two indices.

*Keywords***:** Shariah index, Shariah-compliant securities, Passive Portfolio, Hijrah Shariah Index, S&P Shariah Index

INTRODUCTION

The rise of Islamic finance especially Shariah investment has led to the development of Shariah-compliant indices, offering Muslim investors means to participate in the global financial markets while adhering to Islamic principles. The Shariah indexes even claimed to be performing better than non-Shariah indexes and less affected during crisis (Al Rahahlehetal., 2021). Among these indices, the Bursa Malaysia Shariah Index and the S&P 500 Shariah Index stand out due to their prominence in representing both emerging and developed markets. This paper seeks to conduct a comparative analysis of these two indices, with a particular focus on the implications of active versus passive investment strategies.

1. Brief Introduction to the Two Indexes

Investors that prioritize Shariah-compliant investments commonly utilize the FBM Hijrah Shariah Index and the S&P 500 Shariah Index as significant benchmarks. The FBM Hijrah Shariah Index is a Malaysian stock market index that monitors the financial performance of firms listed on Bursa Malaysia. The index comprises 30 constituents. These companies are chosen based on their adherence to Shariah principles, as established by the Shariah Advisory Council of the Securities Commission Malaysia. This index offers investors the opportunity to participate in a varied portfolio of Malaysian shares that comply with Shariah principles. As a result, it is highly favored by local investors.

On the other side, the S&P 500® Shariah comprises all Shariah-compliant constituents of the S&P 500. This index is designed to cater to investors seeking global diversity while adhering to Islamic investment rules. It gives broader exposure across several sectors in the US, enabling investors to participate in the

performance of Shariah-compliant companies in the American market.

2. Active vs. Passive Strategies in Portfolio Investment

In the context of Shariah-compliant investing, the debate between active and passive investment strategies is particularly relevant. Active management involves the selection of individual stocks or other securities by a portfolio manager, who aims to outperform the market or a specific index, such as the FBM Hijrah Shariah Index. Proponents of active strategies argue that, especially in a concentrated market like Malaysia, skilled managers can identify mispriced securities or exploit market inefficiencies to generate excess returns and with the applications of technical analysis, the performance of the Shariah index can be improved (Omar Farooq & Hasib Reza, 2014). Traditionally, active fund managers use fundamental analysis to identify performing stocks (Abdallah AhmedAlswalmeh & Mohd Dali, 2020; Ahmed Alswalmeh & Mohd Dali, 2019; Mohd Dalietal., 2008) and others use both technical and fundamental and the latest technology such as neural network (Dhafer et al., 2021, 2022)

Conversely, passive investment strategies involve replicating the performance of a market index, such as the S&P Shariah Index, by holding a portfolio that mirrors the index's composition. Passive investors believe that markets are generally efficient, making it difficult for active managers to consistently outperform benchmarks after accounting for fees and expenses. For Shariah-compliant portfolios, passive strategies offer an efficient way to gain diversified exposure to compliant assets without the need for ongoing active management.

Studies have shown mixed results when comparing the performance of active versus passive strategies in Shariah-compliant investing. While some research indicates that active management may add value in less

efficient markets, others suggest that the cost-effectiveness and broad diversification of passive strategies make them more suitable for long-term investors, particularly in more developed and liquid markets.

3. Risk and Return: Comparing Investing Locally (FBM Hijrah Shariah) to Internationally (S&P Shariah Index)

The comparison between investing locally via the FBM Hijrah Shariah Index and internationally through the S&P Shariah Index involves analyzing both risk and return profiles. Local investments, such as those in the FBM Hijrah Shariah Index, are often influenced by the specific economic and political environment of Malaysia. While these investments may offer opportunities for higher returns due to local market knowledge and reduced currency risk, they also come with a higher concentration risk, given the limited number of sectors and companies available in the Malaysian market.

On the other hand, international investments in the S&P Shariah Index provide exposure to a more diversified set of economies and industries, potentially reducing overall portfolio risk through diversification. By investing in a global index, investors can benefit from growth in different regions and sectors that may not be available in the local market. However, this global exposure introduces additional risks, such as currency fluctuations and geopolitical uncertainties, which can impact the overall returns.

Empirical studies suggest that while local indices like the FBM Hijrah Shariah may outperform during periods of strong domestic economic growth, international indices like the S&P Shariah tend to offer better risk-adjusted returns over the long term due to their diversification benefits. The choice between the two ultimately depends on an investor's risk

tolerance, investment horizon, and the importance of diversification in their portfolio strategy.

METHODS

The research employs monthly data from Bursa Malaysia Hijrah Shariah Index and S&P 500 Shariah. The data is obtained from the financial times.

RESULTS AND DISCUSSION

The results and discussion of the work should be explicitly described and illustrated. Supporting figures, tables and images of the results **(no more than two figures and two tables)** may be included in the extended abstract.

The period of the study begins in August 2019 (pre covid) and goes on until July 2024.As clearly seen in figure 1, S&P 500 Shariah's performance far outweighs the Bursa Malaysia Shariah Index.

Figure 1 below shows the real return of S&P 500 Shariah (shaded area) vis a vis Bursa Malaysia Hijrah Index (orange line). The former records almost 100 percent return post covid period whilst the latter records almost zero percent return.

(Source: Financial Times)

Figure 1. 5 Year Return of Bursa Malaysia Hijrah Shariah Index vs S&P 500 Shariah

Figure 2 below shows the period over 3 years. The year 2022 explains that Bursa Malaysia Hijrah Shariah Index and S&P 500 shariah indicate the consistency of global market

uncertainty especially Russia and Ukraine war and the Federal Reserve (Fed) keep on rising the interest rates.

(Source: Financial Times)

Figure 2. 3 Year Return of Bursa Malaysia Hijrah Shariah Index vs S&P 500 Shariah

Figure 3 below shows the last 1-year performance,and it clearly shows that S&P 500 Shariah outperforms by 30% than Bursa Malaysia Hijrah. Nevertheless, Bursa Malaysia Hijrah index records positive return (more than 10%).
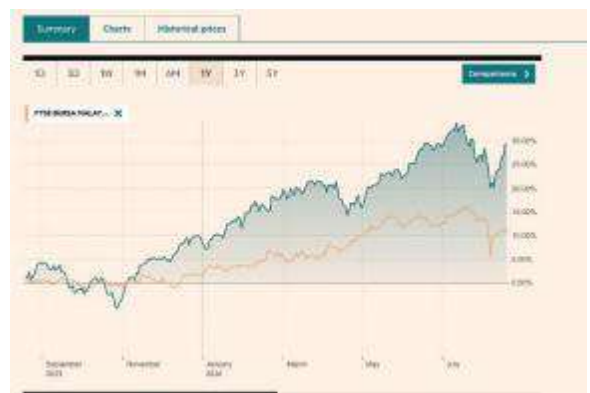
(Source: Financial Times)

Figure 3. 1 Year Return of Bursa Malaysia Hijrah Shariah Index vs S&P 500 Shariah

Figure 4 shows that the S&P Shariah 500 underperform the Hijrah index from March 2024 until the beginning of July 2024. The Hijrah index increased by 6% as compared to S&P Shariah index which has increased by 8%**.**
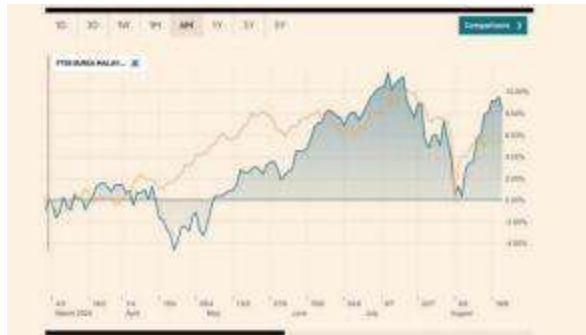
(Source: Financial Times)

Figure 4. 6 Month Return of Bursa Malaysia Hijrah Shariah Index vs S&P 500 Shariah

CONCLUSIONS

This can be concluded that S&P 500 Shariah is far outperforming the local's Bursa Malaysia Hijrah Shariah. It shows that the latter still struggling post Covid-19 whilst the former shows an outstanding performance as the US corporate report impressive quarterly and annual earnings. Nevertheless, the Hijrah index is seen to be recovering in the 2nd quarter of 2024. Therefore, as an investor, the selection of becoming a passive or active investor will depend on the historical performance of the indexes. As for the comparison of both Shariah indexes, the performance of S&P 500 Shariah index is greater than the Hijrah index.

REFERENCES

Abdallah Ahmed Alswalmeh, A., & Mohd Dali, N. R. S. (2020). The Effects of Accounting and Market Indicators Towards Company's Performance: A Conceptual Framework. *Asian Journal of Accounting and Finance*, *2*(2), 85–89. http://myjms.moe.gov.my/index.php/ajafin

AhmedAlswalmeh, A. A., & Mohd Dali, N. R. S. (2019). Dimensions Affecting Company's Performance: A Systematic Review Of 4 Databases. *International Journal of Business and Technology Management*, *1*(1), 46–56.

Al Rahahleh, N., Akguc, S., & Abalala, T. (2021). Dow Jones Islamic Index firms: how profitable are they? *International Journal of Islamic and Middle Eastern Finance and Management*, *14*(3), 463–481. https://doi.org/10.1108/IMEFM-09-2019-0379

Dhafer, A. H., Mat Nor, F., Alkawsi, G., Al-Othmani, A. Z., Mohd Dali, N. R. S., Alshanbari, H. M., Bin Khairi, K. F., & Baashar, Y. (2022). Empirical Analysis for Stock Price Prediction Using NARX Model with Exogenous Technical Indicators. *Computational Intelligence and Neuroscience*, *2022*. https://doi.org/10.1155/2022/9208640

Dhafer, A. H., Nor, F. M., Hashim, W., Shah, N. R., Bin Khairi, K. F., & Alkawsi, G. (2021). A NARX Neural Network Model to Predict One-Day Ahead Movement of the Stock Market Index of Malaysia. *2021 2nd International Conference on Artificial Intelligence and Data Sciences, AiDAS 2021*. https://doi.org/10.1109/AiDAS53897.2021.9574394

Financial Times, retrieved from https://markets.ft.com/data/indices/tearsheet/summary?s=SHX:IOM

Mohd Dali, N. R. S., Mudasir, H. H., & Abdul Hamid, S. (2008). Performance of Shariah compliance companies in the plantation industry. *International Journal of Islamic and Middle Eastern Finance and Management*, *1*(2), 166–178. https://doi.org/10.1108/17538390810881008

Omar Farooq, M., & Hasib Reza, Md. (2014). Dow Jones Islamic Market US Index: Applying technical analysis from a comparative perspective. *International Journal of Islamic and Middle Eastern Finance and Management*, *7*(4), 395–420. https://doi.org/10.1108/IMEFM-12-2013-0134.

THE PERFORMANCE OF S&P 500 SHARIAH AND BURSA MALAYSIA EMAS SHARIAH INDEX POST COVID-19 PANDEMIC

Hamdi Hakeim Mudasir[i] & Nuradli Ridzwan Shah Mohd Dali[ii]

[i](*Corresponding author*). Lecturer, Universiti Sains Islam Malaysia. hamdi@usim.edu.my
[ii]Associate Professor, Universiti Sains Islam Malaysia. nuradli@usim.edu.my

.

Abstract: Shariah-compliant indices serve as vital instruments for Islamic investors seeking ethical and Shariah-compliant investment opportunities. This abstract examines the comparative analysis of two prominent Shariah indices: the Bursa Malaysia Shariah Index and the S&P 500 Shariah. The Bursa Malaysia Shariah Index reflects the performance of Shariah-compliant securities listed on Bursa Malaysia. Comprising a diverse range of sectors, this index adheres to Islamic principles, excluding companies involved in interest-based financing and those associated with alcohol or gambling. On the other hand, the S&P 500 Shariah extends its coverage primarily in the USA, encompassing companies from various industries that meet Shariah compliance criteria. This analysis explores the historical performance for the last 3 years. It considers key performance indicators such as return on investment, and volatility Additionally, the abstract investigates the impact of economic conditions, regulatory environments, and market trends on the performance differentials between the two indices.

*Keywords***:** Shariah index, Bursa Malaysia EMAS Shariah Index, S&P Shariah Index

INTRODUCTION

Shariah-compliant indices are designed to reflect the performance of companies adhering to Islamic finance principles exclude businesses engaged in activities prohibited by Shariah law, such as alcohol, gambling, and usury. This literature review examines the comparative aspects of two significant Shariah-compliant indices: the S&P 500 Shariah Index and the Bursa Malaysia EMAS Shariah Index. These indices cater to distinct markets—U.S. and Malaysian—and their comparative analysis provides insights into their performance, sectoral composition, and adherence to Shariah principles.

Shariah-compliant indices are a subset of conventional indices, tailored to meet the requirements of Islamic finance. According to Azad and Hossain (2022), these indices exclude sectors and companies that do not comply with Shariah principles, thus offering investors ethical investment opportunities aligned with religious values. The key aim is to provide a financial product that maintains integrity with Shariah law while delivering competitive returns.

1. Brief Introduction to the Two Indexes

The S&P 500 Shariah Index is derived from the S&P 500 Index but adjusts for Shariah compliance. Research by Adnan et al. (2023) highlights that while the S&P 500 Shariah Index retains a similar overall market exposure to its parent index, it excludes sectors such as finance and utilities, which, which impacts its sectoral distribution. Furthermore, studies by Liu and Zhang (2022) indicate that the S&P 500 Shariah Index exhibits different risk-return characteristics compared to the conventional S&P 500, due to these exclusions

The Bursa Malaysia EMAS Shariah Index is a benchmark for Shariah-compliant stocks listed on the Malaysian stock exchange. Research by

Tan and Lee (2023) emphasized that this index reflects the performance of Malaysian companies in compliance with Shariah law, often showing sectoral biases towards consumer products and industrial sectors. According to Nasir and Ismail (2023), the index tends to exhibit lower volatility and different performance metrics compared to conventional indices, reflecting local economic conditions and sectoral focus.

Comparative studies between Shariah-compliant indices from different regions highlight significant differences influenced by local market conditions and Shariah compliance criteria. For instance, Ahmed et al. (2024) conducted a comparative analysis of the S&P 500 Shariah Index and Bursa Malaysia EMAS Shariah Index, revealing that while the former benefits from a broad international market exposure, the latter is more reflective of regional economic factors and sectoral preferences. Similarly, the research by Ibrahim and Nur (2024) shows that the S&P 500 Shariah Index often exhibits higher volatility and returns compared to the Bursa Malaysia EMAS Shariah Index, which maintains more stable performance due to its sectoral concentration and regional focus.

METHODS

The research employs monthly data from Bursa Malaysia EMAS Shariah Index and S&P 500 Shariah. The data is obtained from the financial times.

RESULTS AND DISCUSSION

The study period begins in August 2019 (pre-covid) and goes on until July 2024. As clearly seen in figure 1, S&P 500 Shariah's performance far outweighs the Bursa Malaysia Shariah Index.

Figure 1 below shows the real return of S&P 500 Shariah vis a vis Bursa Malaysia EMAS Index. The former records almost 100 percent return post covid period whilst the latter records almost zero percent return.
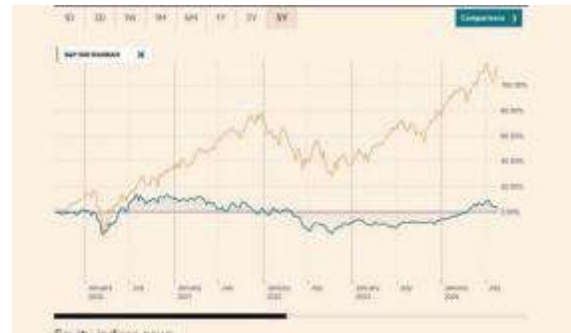
(Source: Financial Times)

Figure 1.
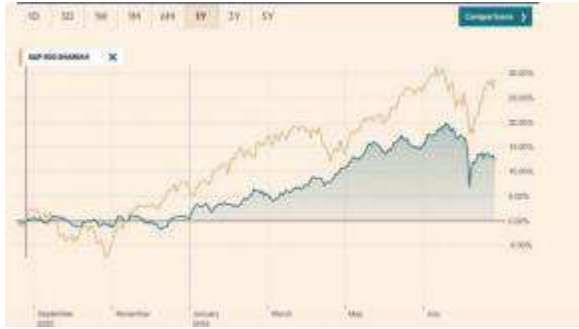**5 Year Return of Bursa Malaysia EMAS Shariah Index vs S&P 500 Shariah**

Figure 2 below shows the period over 3 years. The year 2022 explains that Bursa Malaysia EMAS Shariah Index and S&P 500 shariah indicate the consistency of global market uncertainty especially Russia and Ukraine war and the Federal Reserve (Fed) keep on rising the interest rates.
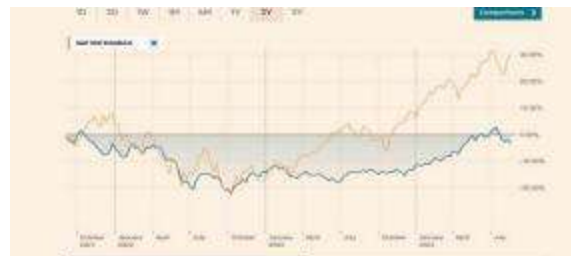
(Source: Financial Times)

Figure 2.
3 Year Return of Bursa Malaysia EMAS Shariah Index vs S&P 500 Shariah

Figure 3 below shows the last 1-year performance, and it clearly shows that S&P 500 Shariah is outperforming much better than Bursa Malaysia EMAS even the latter records positive return.
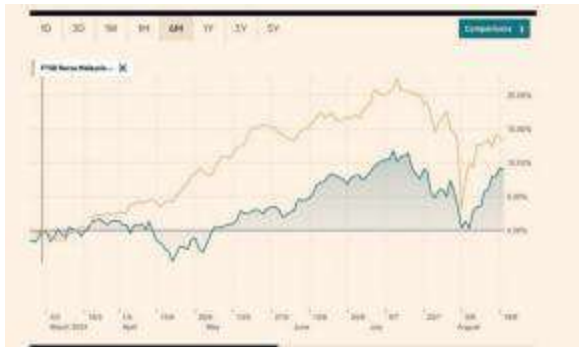
(Source: Financial Times)

Figure 3.
1Year Return of Bursa Malaysia EMAS Shariah Index vs S&P 500 Shariah

Figure 4 below shows the Emas Index increased by 10% but the S&P 500 Shariah Index still outperformed the Emas Index (Increase almost 15%).

(Source: Financial Times)

Figure 4.
6-MonthReturn of Bursa Malaysia EMAS Shariah Index vs S&P 500 Shariah

CONCLUSIONS

This can be concluded that S&P 500 Shariah is far outperforming the local's Bursa Malaysia EMAS Shariah. It shows that the Emas Index is still recovering with post covid whilst the S&P 500 Shariah Index shows an outstanding performance as the US corporate reports impressive positive quarterly and annual earnings.

REFERENCES

Adnan, M., Hasan, M., & Rauf, A. (2023). "Shariah-Compliant Indices and Market Dynamics: The Case of S&P 500 Shariah Index." *Journal of Islamic Financial Studies*, 14(1), 78-95.

Ahmed, R., Khan, T., & Arif, S. (2024). "Global vs. Regional Shariah-Compliant Indices: A Comparative Study of S&P 500 and Bursa Malaysia EMAS." *Journal of Global Financial Markets*, 20(1), 34-49.

Azad, M. A., & Hossain, M. (2022). "Principles and Performance of Shariah-Compliant Indices." *International Journal of Islamic Finance*, 15(2), 89-106.

Ibrahim, H., & Nur, A. (2024). "Volatility and Return Characteristics of Shariah-Compliant Indices: A Comparative Study." *Emerging Markets Review*, 31(4), 112-129.

Financial Times, retrieved from https://markets.ft.com/data/indices/tearsheet/summary?s=SHX:IOM

Liu, X., & Zhang, L. (2022). "Risk-Return Analysis of Shariah-Compliant Indices: A Comparative Study of S&P 500 and its Shariah Version." *Financial Review*, 57(3), 323-341.

Nasir, M., & Ismail, S. (2023). "Performance Analysis of Shariah-Compliant Indices: Evidence from Bursa Malaysia EMAS Shariah." *International Journal of Islamic Finance*, 16(1), 54-72.

Tan, S., & Lee, J. (2023). "Sectoral Performance and Risk Characteristics of Bursa Malaysia EMAS Shariah Index." *Asian Economic and Financial Review*, 15(2), 146-161.

CO-TAKAFUL AND ISLAMIC SYNDICATED FINANCING: A BLEND BETWEEN ISLAMIC AND CONVENTIONAL FINANCE

Nur I'ffah Muhammad Nasir[i] & Azmuddin Razali[ii]

[i](*Corresponding author*). Senior lecturer, Faculty of Economics and Muamalat, USIM. nuriffahnasir@usim.edu.my
[ii]Head of Shariah, MUFG (Malaysia) Berhad. azmuddinrazali@gmail.com

Abstract: This paper aims to critically examine the practices in Islamic banking and finance that combine the involvement of both Islamic and conventional financial institutions within a single transaction or product from the lens of Shariah. Islamic financial institutions are known to be distinctively different from conventional financial institutions operationally, more specifically in terms of Shariah compliance. Therefore, when both types of institutions participate in a single transaction or product, some Shariah concerns might arise. This paper adopts a qualitative research method, specifically desk research methodolgy which involves the review of relevant materials such as journal articles, reports, working papers, guidelines as well as standards issued by Bank Negara Malaysia (BNM) and Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI). Findings reveal that the involvement of both Islamic and conventional financial institutions within a single transaction or product does trigger some Shariah considerations, however, it can still be practiced following certain parameters to ensure Shariah compliance.

Keywords: Cotakaful, Islamic syndicated financing, Islamic finance

INTRODUCTION

Co-takaful or co-insurance refers to a risk sharing agreement between two or more takaful operators/insurance companies. In this risk sharing agreement, the takaful operators/insurance companies agree to share the underwritten risk whereby each of them insures its part of the risk related to the client(Bank Negara Malaysia, 2010). Meanwhile, Islamic syndicated finance refers to two or more financial institutions (typically banks) that join together to finance a deal whereby each financial institution contributes their part of financing to the client (Islamic Finance News, 2022). In 2014, a micro-takaful scheme named Group Takaful Rakyat 1Malaysia (i-BR1M) was underwritten collectively by 10 takaful operators under the administration of the lead co-takaful operator - Takaful Ikhlas Sdn. Bhd. The 10 takaful operators[1] include (1) Takaful AmFamily Takaful Berhad, (2) Prudential BSN Takaful, (3) Etiqa Takaful, (4) Sun Life Malaysia Takaful, (5) Great Eastern Takaful Berhad, (6) Syarikat Takaful Malaysia Berhad, (7) Takaful Ikhlas Sdn. Bhd. (8) Hong Leong MSIG Takaful Berhad (9) HSBC Amanah Takaful Berhad and (10) MAA Takaful Berhad (Abdullah, 2021). This is a case example of co-takaful arrangement between takaful operators in Malaysia. Meanwhile, in 2023, a power producer company YTL DC South Sdn. Bhd. (a wholly owned subsidairy of YTL Power International Berhad -YTL Power) was granted a RM1.1 billion Islamic term financing facility by

---

[1] Some of the takaful operators in the provided list might cease to exist or have changed names due to the separation of family business and general business licences following the Islamic Financial Services Act (IFSA) 2013 requirements. While some might have been acquired by other company through merger and acquisition.

joint mandated lead arrangers Malayan Banking (Maybank) and OCBC Bank (Malaysia). The environmental, social, and governance (ESG) financing acquired was set to fund the development of a data centre in Kulai, Johor which is part of theYTL Power's plan to develop a green data centre park in achieving the graeter objective of carbon neutrality[2]. This is one of the many cases of Islamic syndicated financing in Malaysia, although sometimes news or article headlines would not mention the term "syndicated financing"; instead "term financing" is mentioned[3]. From the definition and examples provided above, it is clear that the co-takaful arrangement and Islamic syndicated financing mainly include involvement of companies and corporates.

It is also important to highlight that the scope of co-takaful arrangement in this study is confined to the arrangement between several takaful operators or between takaful operators and insurance companies. This is because the term "co-takaful" or "co-insurance" is also used to describe as one of the co-payment mechanism between takaful operator or conventional insurance with their individual client specifically for the medical card product. There are some key differences to distinguish between the usage of this term for both situation. Firstly, parties involves co-takaful arrangement are companies and corporates such as takaful operators and insurance companies. Meanwhile, co-takaful for co-payment involves the takaful operator and the individual client or takaful participant. Second, in terms of type of takaful, co-takaful arrangement are more practiced in general takaful while co-takaful for co-payment is mainly used in family takaful, particularly medical card products. Third is the customer segmentation, for co-takaful arrangement, the takaful operators <u>and insurance companies enter</u> into risk sharing

agreement usually for clients from the corporate segment. while co-takaful for co-payment is usually a product offered for the public at large which implies that it is for the retail customer segment. The summary of the differences between the usage of co-takaful in provided in the table below.

Table 1. Summary of differences between usage of co-takaful terminology

Definition	
Co-takaful arrangement	a risk sharing agreement between two or more takaful operators/insurance companies
Co-takaful as co-payment	a type of co-payment where a takaful participant bears a specified percentage of total eligible medical expenses covered, with the remainder being covered by the licensed takaful operator[4]
Parties involved	
Co-takaful arrangement	Takaful operators and insurance companies
Co-takaful as co-payment	takaful operator and takaful participant
Type of takaful	
Co-takaful arrangement	General takaful
Co-takaful as co-payment	Family takaful, particularly medical card products
Customer segmentation	
Co-takaful arrangement	Corporate client segment
Co-takaful as co-payment	Retail client segment

Reference: Author's own (2024)

In general, if the co-takaful arrangement is between several takaful operators, there is no Shariah concern because all of the parties

[2] Retrieved on 30th August 2024, https://www.maybank.com/en/news/2023/01/19.page

[3] Retrieved on 30th August 2024, https://www.ocbc.com.my/group/media/release/2023/ytl-power-esg-project-financing.page?

[4] Retrieved on 30th August 2024, https://www.bnm.gov.my/documents/20124/938039/pd_mhit_feb2024.pdf

involved are conducting Shariah compliant business and activities. The same applies to Islamic syndicated financing, if it is between Islamic banks, there is no Shariah concern. However, if the co-takaful arrangement is between one or more takaful operators and one or more insurance companies, or if the syndicated financing involves the combination of Islamic banks and conventional banks, this might give rise to some Shariah concerns due to the fact that the operations of insurance companies and conventional banks are not Shariah compliant.

From a Shariah standpoint, it is permissible for a Shariah compliant takaful operator to jointly share the risk with a non-Shariah complaint insurance company? Will it tantamount to "helping" the conventional business which is clearly prohibited in Quran in surah al-Maidah (5:2) which stated "Cooperate with one another in goodness and righteousness, and do not cooperate in sin and transgression"?[5] If it does not falls under the interpretation of the stated verse, what is the Shariah justification to support the implementation of co-takaful between takaful operators and insurance companies? These are some of the questions that the study aims to resolve.

METHODS

The methodology adopted in this study is a desk research methodology which makes it classified as qualitative study. It involves the review of relevant secondary data in the form of journal articles, reports, websites, working papers and other publications such standards and guidelines issued by the regulator such as the Bank Negera Malaysia (BNM) and international bodies such as the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI).

RESULTS AND DISCUSSION

For co-takaful arrangement, BNM in its Shariah resolution mentioned that it is permissible to implement the co-takaful arrangement between a takaful operator and an insurance company with the condition that there is a separate execution of the agreement between the customer and the takaful operator as well as between the customer and the insurance company (Bank Negara Malaysia, 2010).

The permissibility is based on the principle of distinguishing the forbidden and permissible matters within a transaction to avoid mixture of both. Therefore, the separate execution condition fulfills this distinguishing principle, making it allowable. This directly answers the question of whether co-takaful will tantamount to "helping" the conventional business, and the short answer in no because of the separate execution in place.

For Islamic syndicated financing, the AAOIFI in its Shariah standard no. 24 stated that there is no Shariah restriction against Islamic banks and conventional banks participating in syndicated financing provided that the utilization of funds are managed according to Shariah practices[6]. The Shariah standard for AAOIFI also outlines the ruling for the lead arranger whether it is led by an Islamic bank or conventional bank. In essence, in order for the Islamic syndicated financing to be Shariah compliant, the accounts of the fund between the Islamic bank and conventional bank needs to be kept separately.

The Shariah justification for the AAOIFI standard is based on permissibility of partnership between a Muslim and non-Muslim unless in the case of Shariah non-complaint activities. The main focus should be on the dealings instead of the parties involved. Therefore, it can be highlighted that Islamic syndicated financing must only be allowed for Shariah compliant activities.

From the discussion above relating to both co-takaful arrangement and Islamic syndicated financing, it can be concluded that a clear

---

[5] Retrieved on 30th August 2024,
https://quran.com/en/al-maidah/2

guideline and condition that must be fulfilled when participating with insurance companies and conventional banks in an agreement is the separation of funds.

CONCLUSIONS

As the Islamic finance industry keeps evolving, we should always be open to new ideas and grab any opportunity that can help increase the participation of takaful operators and Islamic banks in the market, and this include the practice of co-takaful arrangement and Islamic syndicated financing. At the same time, we should also be wary of any Shariah concern that might arise especially when dealing with the conventional counterparts. This study provides a general overview of co-takaful arrangement and Islamic syndicated financing from the Shariah point of view. After seeking the Shariah ruling from the BNM and AAOIFI, it is clear that both co-takaful arrangement and Islamic syndicated financing are permissible with the condition that they observe the separation of funds and separation in execution.

Results have shown that the Shariah ruling on co-takaful provided by BNM is rather brief, hence it is recommened for future research to investigate further into the practices of co-takaful arrangement and Islamic syndicated financing, whether they are similar to the theoretical concepts explained and what are Shariah issues that arise during the operational phase of co-takaful arrangement and Islamic syndicated financing.

REFERENCES

Abdullah, N. I. (2021). Impactful and Collective Microtakaful in Addressing the Impact of the COVID-19 Pandemic. *Journal of Islamic Finance*, *10 (1)*(Special Issue), 117-126.

Bank Negara Malaysia. (2010). *Shariah Resolutions in Islamic Finance* (2nded.). https://www.bnm.gov.my/documents/20124/9198675/shariah_resolutions_2nd_edition_EN.pdf

Islamic Finance News. (2022). *IFNAnnual Guide*.

SINGLE MODE FIBER BASED SPR SENSOR FOR THE DETECTION OF AIR CONTAMINANTS

M. Nashahar[i], M. Othman[ii], M.F. Mohd Fadhir[iii], N. M. Razali[iv], A. Thayalan[v], K.N.Z. Ariffin[vi] & F.M. Mohd Shuib[vii].

[i],Student, Universiti Sains Islam Malaysia. mnashahar@gmail.com
[ii](*Corresponding author*). Senior Lecturer, Universiti Sains Islam Malaysia. marinah@usim.edu.my
[iii]Student, Universiti Sains Islam Malaysia. Firdauz1308@gmail.com
[iv]Application Engineer, CAD-IT. nazirahmohdrazali@gmail.com
[v]Senior Lecturer, Taylor's University. aruna.thayalan@taylors.edu.my
[vi]Senior Lecturer, Universiti Sains Islam Malaysia. nabilahzainul@usim.edu.my
[vii]Lecturer, Universiti Sains Islam Malaysia. farrah@usim.edu.my

Abstract: This paper investigates the performance of a single mode fiber (SMF) based sensor utilizing surface plasmon resonance (SPR) for the detection of air contaminants. A numerical model of the SMF-based sensor is developed using the Finite Element Method (FEM) in COMSOL to investigate its sensing performance. The performance is evaluated by varying coating materials, specifically silver and gold, with coating thicknesses ranging from 30 nm to 50 nm. The findings show that the sensor achieves a maximum confinement loss of 10,252.88 dB/m and an amplitude sensitivity of 219 RIU_{-1} with a 50 nm gold coating

Keywords: single mode fiber, sensor, COMSOL, surface plasmon resonance, modelling.

INTRODUCTION

Air pollution causes 7 million global deaths annually, equivalent to 11.65% of all deaths (Air Pollution: The Invisible Health Threat, 2023). This alarming statistic highlights the urgent need for action to address this issue. Air pollution stems primarily from emissions from vehicles, industries, and burning fossil fuels. These emissions release harmful gases like ozone, nitrogen dioxide, and particulate matter. Air pollution has a profound impact on human health, leading to a range of detrimental effects.

It is associated with various health issues, including respiratory problems such as asthma, bronchitis, and lung cancer (Air Pollution: The Invisible Health Threat, 2023; Air Quality and Health, 2024).

Fiber optic sensors offer significant potential in addressing pollution. They demonstrate high sensitivity, enabling the detection of minute changes in air pollutant concentrations, making them ideal for early warning systems and environmental monitoring (Butt et al., 2022). These sensors can be utilized for remote sensing over long distances, eliminating the need for direct contact with pollutants, which is particularly beneficial for monitoring hazardous or inaccessible areas, and in addition to this, some sensors can measure multiple air pollutants simultaneously, providing comprehensive air quality data. They also offer the advantage of being resistant to corrosion, electromagnetic interference, and harsh environmental conditions, and their lightweight, thin design allows for easy integration into existing infrastructure or deployment in space-constrained locations (Buttetal., 2022).

Surface plasmon resonance in fiber optics is a powerful sensing technique that enhances the sensitivity of optical fibers for detecting changes in the refractive indexof surrounding media. By

integrating SPR with fiber optics, it enables precise and real-time detection of biological, chemical, and environmental parameters with high sensitivity and specificity, making them applicable in various fields such as medical diagnosis (Moussilli et al., 2018), bioengineering (Homola, 2003; Silin & Plant, 1997) and environmental monitoring (Shao et al., 2018; Zhao et al., 2018).

The sensing performance of optical fiber sensors depends on their geometry, structural parameters, and metal coating. Traditional sensors enhance SPR by removing cladding to increase evanescent wave exposure (Zhang et al., 2019). Single mode fiber sensors gain sensitivity as the core directly contacts the environment. Gold and silver coatings are used to excite SPR, with their performance linked to thickness (Zhang et al., 2019).

In this work, an unclad single mode fiber with SPR is coated with thin films of gold and silver. The study investigateshow the thickness of these gold and silver films influences confinement loss and amplitude sensitivity in detecting acetone which is one of the hazardous air contaminants.

METHODS

To study the sensor's sensitivity, a numerical model of a fiber-based sensor was developed. An unclad single mode fiber structure with SPR was chosen as it offers enhanced sensitivity for sensing applications due to the increased interaction between the light propagating through the core and the external environment, allowing for more effective detection of changes in refractive index. The unclad single mode fiber consists of core, coating, and analyte, as shown in Figure 1.
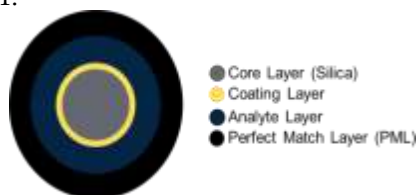
Figure 1. Geometry of unclad single mode fiber

Table 1. List of sensor parameter (Fakhrietal., 2023)

Sensor Parameter	Value (μm)
Core diameter	8.2
Coating diameter	8.25
Analyte diameter	11.25
Perfectly Matched Layer (PML)	18.25
Wavelength	0.65

This work utilized FEM-based COMSOL Multiphysics for the numerical analysis of sensor performance. The material used within the structure is shown in Table 2.

Table 2. List of material for each geometry

Geometry	Material
Core	Fused Silica
Coating	Gold and Silver
Analyte	Acetone
PML	Acetone

The Sellmeier equation shown below was used to calculate the refractive index of the fused silica (Haque et al., 2019; Hasanet al., 2017)

$$n_{si}^2 (\lambda) = 1 + \frac{B_1\lambda^2}{\lambda^2-C_1} + \frac{B_2\lambda^2}{\lambda^2-C_2} + \frac{B_3\lambda^2}{\lambda^2-C_3} \qquad [1]$$

where n_{si}^2 is the λ-dependant RI of fused silica, and λ denotes wavelength in μm. B_1, B_2, B_3, C_1, C_2 and C_3 are the Sellmeier coefficients, while the operating frequency was calculated using equation [2].

$$f = \frac{c_{const}}{\lambda} \qquad [2]$$

where c_{const} is the speed of light. The output, which is the electrical field distribution obtained, is shown in Figure 2.

Figure 2. Electrical field distribution

The geometrical parameters of the fiber sensor, such as the coating material and thickness, affects the level of interaction between the coating surface and the evanescent field, which in turn determines the performance of the sensor. While optimizing these parameters, the confinement loss (CL) was measured. The confinement loss of the sensor was determined for the coating material by employing the effect of wavelength and the imaginary part Im(n$_{eff}$) of the effective index n$_{eff}$ of the core mode as shown in Equation (3)(Rahman et al., 2020).

$$\alpha = 8.686 \times \frac{2\pi}{\lambda} \times Im(n_{eef}) \times 10^9 \qquad [3]$$

where $2\pi/\lambda$ indicates wave number in the free space and the operating wavelength, and λ is in μm (Islam et al., 2020; Mahfuz et al., 2019; Rahman et al., 2020). From the simulation, the value of Im(n$_{eff}$), which signifies the imaginary part of the effective index, was deduced (Shafkat, 2020). The amplitude sensitivity was obtained by using the following equation (Islam et al., 2020; Rakibul Islam etal., 2020).

$$S_A(\lambda) = -\frac{1}{\alpha(\lambda, n_a)} \frac{\Delta\alpha(\lambda, n_a)}{\Delta n_a} \qquad [4]$$

Here $\alpha(\lambda, n_a)$ is the overall loss where analyte refractive index is equal to n$_a$ and o$\alpha(\lambda, n_a)$ is the difference between two adjacent loss spectra due to a small change in the refractive index of the analyte, and Δn_a is the change of the refractive index of the analyte (Islam et al., 2020; Rakibul Islam et al., 2020). Amplitude sensitivity rises with an increment of analyte RI and peak point shifts towards higher wavelength.

RESULTS AND DISCUSSION

The selection of coating materials for fiber optic sensors, specifically silver and gold, significantly influences the sensitivity of these sensors, especially for detecting air contaminants. Both materials were chosen due to their exceptional plasmonic properties.
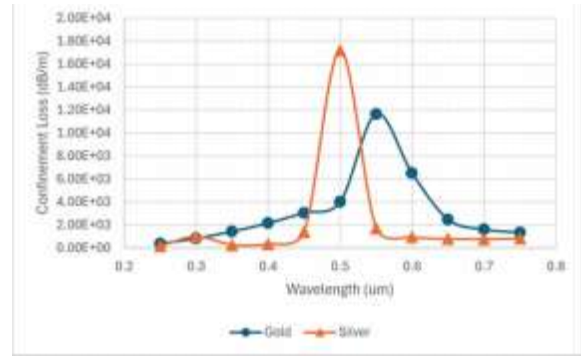

Figure 3. Confinement loss (dB/m) of Acetone at different wavelengths (μm) with different coating material (silver and gold).

Table 3. Amplitude sensitivity for different material (silver and gold)

Coating Material	Amplitude Sensitivity (RIU$_{-1}$)
Silver	3.30E+03 (3,300)
Gold	1.12E+02 (112)

Based on Figure 3 and Table 3, gold was chosen as the coating material for the fiber optic sensor over silver, despite silver's higher confinement loss of 17,200 dB/m and amplitude sensitivity of 3,300 RIU$_{-1}$. Gold, with a confinement loss of 11,600 dB/m and amplitude sensitivity of 112 RIU$_{-1}$, offers superior chemical stability and resistance to oxidation which ensures the long-term reliability and robustness of the sensor, making it more suitable for environmental monitoring applications where durability and consistent performance are critical. In addition to this, gold's ability to maintain its plasmonic properties over extended periods further enhancing the sensor's effectiveness in detecting air contaminants without the need for frequent maintenance (Badshah et al., 2020; Jiang et al., 2023).

The sensor's performance is dependent on its structural parameters. Key parameters include the thickness of the silver and gold layers, which in this work has been varied from 30 nm to 50nm in 10 nm increments. It is observed that thinner gold layers resulted in higher loss of depth and

sensitivity, whereas thicker gold layers reduced these aspects. Due to gold's damping effect, increasing the coating thickness decreased the peak loss.

As is evident in Figure 4, the peak confinement losses are 15,897.28 dB/m, 11,600 dB/m, and 10,252.88 dB/m respectively, for coating thickness ranging from 30 nm to 50 nm. Table 4 shows that amplitude sensitivity decreased from 291.127 to 112 RIU$_{-1}$ as coating thickness increased from 30 nm to 50 nm. The lowest confinement loss was observed at a coating thickness of 50 nm, while the highest was at 30 nm. However, the highest amplitude sensitivity was achievedata thickness of 50 nm. Therefore,a coating thickness of 50 nm was chosen as the optimal gold layer thickness for the proposed biosensor.
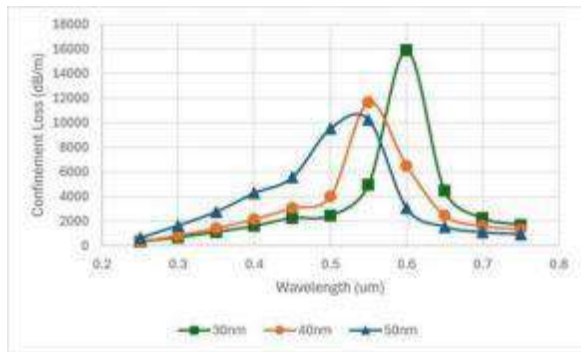
Figure 4. Confinement loss (dB/m) of acetone at different wavelengths (µm) for three different thickness of gold coating

Table 4. Amplitude sensitivity for different coating thickness

Coating Thickness	Amplitude Sensitivity (RIU$_{-1}$)
30 nm	-
40 nm	112
50 nm	291.27

CONCLUSION

In conclusion, the single mode fiber-based sensor with a 50 nm gold coating demonstrates excellent sensitivity for detecting air contaminants such as acetone, with a confinement loss of 10,252.88 dB/m, an amplitude sensitivity of 219 RIU$_{-1}$.

REFERENCES

Air pollution: The invisible health threat. (2023, July 12). World Health Organization (WHO).

Air quality and health. (2024). Minessota Pollution Control Agency.

Badshah, M. A., Michel, D., Alam, N. E., Madni, I., Abbas, N., Alameh, K., & Kim, S. (2020). Enhancing the Sensitivity of a Surface Plasmon Resonance Sensor with Glancing Angle Deposited Nanostructures. *Plasmonics*, *15*(6), 2161–2168. https://doi.org/10.1007/s11468-020-01245-0

Butt, M. A., Voronkov, G. S., Grakhova, E. P., Kutluyarov, R. V., Kazanskiy, N. L., & Khonina, S. N. (2022). Environmental Monitoring: A Comprehensive Review on Optical Waveguide and Fiber-Based Sensors. *Biosensors*, *12*(11), 1038. https://doi.org/10.3390/bios12111038

Fakhri, M. A., Salim, E. T., Tariq, S. M., Ibrahim, R. K., Alsultany, F. H., Alwahib, A. A., Alhasan, S. F. H., Gopinath, S. C. B., Salim, Z. T., & Hashim, U. (2023). A gold nanoparticles coated unclad single mode fiber-optic sensor based on localized surface plasmon resonance. *Scientific Reports*, *13*(1). https://doi.org/10.1038/s41598-023-32852-6

Haque, E., Mahmuda, S., Hossain, Md. A., Hai, N. H., Namihira, Y., & Ahmed, F. (2019). Highly Sensitive Dual-Core PCF Based Plasmonic Refractive Index Sensor for Low Refractive Index Detection. *IEEE Photonics Journal*, *11*(5), 1–9. https://doi.org/10.1109/JPHOT.2019.2931713

Hasan, Md., Akter, S., Rifat, A., Rana, S., & Ali, S. (2017). A Highly Sensitive Gold-Coated Photonic Crystal Fiber Biosensor Based on Surface Plasmon Resonance. *Photonics*, *4*(1), 18. https://doi.org/10.3390/photonics4010018

Homola, J. (2003). Present and future of surface plasmon resonance biosensors. *Analytical*

and Bioanalytical Chemistry, *377*(3), 528-539. https://doi.org/10.1007/s00216-003-2101-0

Islam, M. R., Jamil, Md. A., Zaman, Md. S.-U., Ahsan, S. A. H., Pulak, M. K., Mehjabin, F., Khan, M. M. I., Chowdhury, J. A., & Islam, M. (2020). Design and analysis of birefringent SPR based PCF biosensor with ultra-high sensitivity and low loss. *Optik*, *221*, 165311. https://doi.org/10.1016/j.ijleo.2020.165311

Jiang, H., Shen, T., Feng, Y., Liu, C., & Liu, X. (2023). SPR-based sensor for ultra-high sensitivity high refractive index measurements in the near-infrared. *Optical and Quantum Electronics*, *55*(13), 1199. https://doi.org/10.1007/s11082-023-05484-3

Mahfuz, M. Al, Mollah, Md. A., Momota, M. R., Paul, A. K., Masud, A., Akter, S., & Hasan, Md. R. (2019). Highly sensitive photonic crystal fiber plasmonic biosensor: Design and analysis. *Optical Materials*, *90*, 315-321. https://doi.org/10.1016/j.optmat.2019.02.012

Moussilli, M. M., ElFalou, A. R., & Shubair, R. M. (2018). On the Design of Graphene Surface Plasmon Resonance Sensors for Medical Applications. *2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting*, 1399-1400.

https://doi.org/10.1109/APUSNCURSINRSM.2018.8609208

Rahman, Md. M., Rana, Md. M., Anower, M. S., Rahman, M. S., & Paul, A. K. (2020). Design and analysis of photonic crystal fiber-based plasmonic microbiosensor: an external sensing scheme. *SN Applied Sciences*, *2*(7), 1194. https://doi.org/10.1007/s42452-020-2998-3

Rakibul Islam, M., Iftekher, A. N. M., Rakibul Hasan, K., Nayen, Md. J., & Bin Islam, S. (2020). Dual-polarized highly sensitive surface-plasmon-resonance-based chemical and biomolecular sensor. *Applied Optics*, *59*(11), 3296. https://doi.org/10.1364/AO.383352

Shafkat, A. (2020). Analysis of a gold coated plasmonic sensor based on a duplex core

photonic crystal fiber. *Sensing and Bio-Sensing Research*, *28*, 100324. https://doi.org/10.1016/j.sbsr.2020.100324

Shao, Y., Wang, Y., Cao, S., Huang, Y., Zhang, L., Zhang, F., Liao, C., & Wang, Y. (2018). Mechanism and Characteristics of Humidity Sensing with Polyvinyl Alcohol-Coated Fiber Surface Plasmon Resonance Sensor. *Sensors*, *18*(7), 2029. https://doi.org/10.3390/s18072029

Silin, V., & Plant, A. (1997). Biotechnological applications of surface plasmon resonance. *Trends in Biotechnology*, *15*(9), 353-359. https://doi.org/10.1016/S0167-7799(97)01085-8

Zhang, R., Pu, S., & Li, X. (2019). Gold-film-thickness dependent SPR refractive index and temperature sensing with hetero-core optical fiber structure. *Sensors (Switzerland)*, *19*(19). https://doi.org/10.3390/s19194345

Zhao, Y., Lei, M., Liu, S.-X., & Zhao, Q. (2018). Smart hydrogel-based optical fiber SPR sensor for pH measurements. *Sensors and Actuators B: Chemical*, *261*, 226-232. https://doi.org/10.1016/j.snb.2018.01.120

MEDIA FREEDOM IN REPORTING ON RACE, CULTURE, AND RELIGION IN MALAYSIA

Safiyyah Ahmad Sabri[i], Noor Adzrah Ramle[ii], Muhammad Raqib Mohd Sofian[iii] & Muhamad Zaki Mustafa[iv]

[i](*Corresponding author*). Senior Lecturer, Universiti Sains Islam Malaysia.safiyyah@usim.edu.my
[ii]Senior Lecturer, Universiti Sains Islam Malaysia.neezam@usim.edu.my
[iii]Senior Lecturer, Universiti Sains Islam Malaysia.m.raqib@usim.edu.my
[iv]Senior Lecturer, Universiti Sains Islam Malaysia.zaki@usim.edu.my

Abstract: Media freedom has always been claimed as one of the human rights. However, with the multi background of race, culture, and religion of her people, Malaysia has long fight with challenges to press freedom. This study explores the perspectives of journalists of Utusan Malaysia and The Star newspapers on media freedom in Malaysia. Using in-depth interviews, the research reveals the factors contributing towards control in their reporting including restrictive laws, political interference, ownership, and self-censorship within the media industry. The findings offer crucial insights into the barriers but at the same time, tolerating social harmony will always be a priority in the country.

Keywords: media freedom, plural society, self-awareness, social harmony

INTRODUCTION

Media freedom is claimed to be one of the most important functions to support democracy, accountability, and openness in society (Lee, 2019). It is also considered as a fundamental human right. An independent and free media is an essential watchdog that helps people hold their leaders responsible, make educated decisions, and take an active part in the political process (Ooi, 2019). Media freedom contributes to the fight against corruption the exposure of power abuses, and the promotion of transparency and public dialogue by allowing the free exchange of ideas and information.

The importance of media freedom in Malaysia, is particularly salient with the existence of significant challenges to press freedoms (Tan, 2018). Not just the freedom of media, the political landscape too has marked by periodic tensions between the government and opposition forces. Because of this context, the implementation of restrictive laws and policies complying the media have become the constraint for them to report freely and that they always have fear144 of repercussion.

Over the decades, Malaysia has faced many issues related to media censorship, political interference, and the concentration of media ownership which have always been under the power of individuals or parties that have close ties to the ruling party (Kaur, 2021). This has become a dilemma for the journalists to avoid contents that might have potential consequences of reporting on certain sensitive topics or opinions that might have clash with the ownership interests.

Because of this environment, it has always be a struggle for the media to uphold media freedom in Malaysia that some claimed to affect the country's development and the freedom of the people to hold their leaders accountable (Yusof, 2017). Understanding the unique challenges and dynamics surrounding press freedoms in

Malaysia is crucial to addressing this critical issue and ensuring that the media can fulfill its essential role in promoting transparency, good governance, and the fundamental rights of the people.

The media organizations in Malaysia face several significant challenges that hold their ability to report freely and independently (Yusof, 2017). For example, the Printing Presses and Publications Act and the Communications and Multimedia Act impose stringent regulations on media outlets. The PPPA requires publishers to obtain licenses, which can be revoked at the government's discretion while latter enables authorities to monitor and control online content, that leads to censorship and limiting the scope of reporting.

Political influence over media organizations remains a pervasive issue in Malaysia. Many media organizations are either directly controlled by political parties or face pressure from the government, which frequently leads to biased reporting, especially when it comes to delicate subjects like political dissent, electoral integrity, and government acts (Abdul Rahman, 2020). Reporters too often practice self-censorship because they are afraid of the consequences. Critical reporting on contentious topics such as human rights violations, corruption, and other issues is discouraged by this culture of prudence (UNESCO, 2020). In an effort to safeguard their careers and media outlets, journalists may choose to completely avoid covering particular topics or present them in a way that supports official narratives (Lim, 2021).

In summary, the issues of legal restrictions, political pressure, self-censorship, and limited access to information creates a challenging environment for media organizations in Malaysia (Abdul Rahman, 2020). These factors significantly hinder robust reporting on critical issues, undermining the role of the media as a pillar of democracy and accountability.

METHODS

This study explores the perspectives of journalists of Utusan Malaysia and The Star newspapers on media freedom in Malaysia. Through a qualitative method, this study conducted in-depth interviews with five media practitioners from Utusan Malaysia (four journalists and one editor), and another five from The Star (four journalists and one editor). The set of main questions were derived from the problem statements of this study and the respondents were marked as UM1, UM2, UM3, UM4, UM5, TS1, TS2, TS3, TS4, and TS5 to keep them anonymous. As the interview is a semi-structured, more questions were used to gain more explanation if needed. The data were first transcribed before analyzed using NVivo of the latest version.

FINDINGS AND DISCUSSION

Findings show that the themes derived from the interviews are divided into four main themes; (1) legal restrictions, (2) political influence, (3) self-censorship, and (4) digital challenges.

For (1) legal restrictions, most of the media practitioners agreed that some laws such as the PPPA should be omitted. UM1 stated that the regulations have close many other opportunities for new media organizations to operate legally, that due to that, they chose to go using other alternatives. On the other hand, TS3 said that some methods like using the social media will open up more chances of fake news being spread, and that credibility will always be questioned. UM5 too added that maybe they should not be too strict but the law existence is sometimes necessary due to some irresponsible parties that might misuse the total freedom.

Meanwhile, for (2) political influence, all respondents agreed that there should not be any interference from the political parties at all. TS1 said that "to become free, the first thing we have to do is to get rid of the political influence especially in the ownership". TS4 on the other hand felt that all the troubles especially on the

censorship come from political issues. UM2 and TS5 said that he did not understand the relevance of having political interests in the media organizations except that they wanted to control the contents. UM5 said that sometimes these political interference used the elements of race and religion in their agenda and that becomes a challenge for them. But finally, those contents will usually be eliminated from their reporting.

For theme (3) self-censorship, almost all respondents agreed that they need to practice self-censorship due to the restrictions of laws and regulations. UM4 said that on top of that, they have to be careful when reporting on cases like corruption while TS3 stated human rights abuses as example. However, UM1, UM3, TS2 and TS5 agreed that for certain issues like race and religion is different. They agreed that they have to put extra caution when reporting on such issues due to the sensitivity of the plural society Malaysia has.

Finally, theme (4) digital challenges show that all respondents agreed that it is better and easier for them to do online reporting. All of them too agreed on the advantages of having social media as a new platform to spread news. However, UM1 and TS3 highlighted the struggle they faced when fighting against fake news. TS2 stated that it is shocking that many people sometimes could simply believe in stories without making any fact-checking. This has led to many other irresponsible parties taking advantage of spreading more fake or falsenews to create chaos or tension in the society. UM2, UM5, and TS4 agreed that among all fear they have in fighting fake news are the ones that touched the sensitivity of race and religion. For example, some netizens could just commented on a post by touching the sensitivity of race or religion sentiments.

CONCLUSION AND RECOMMENDATIONS

In conclusion, it can be said that most of the respondents do agree on media having total freedom in reporting but not on race and religion issues. Factors of having legal restrictions at large maybe could be revised on the restrictions making it more open and not too strict especially for new media organizations to operate in spreading news. On the other hand, none of the respondents agreed to have any political influence in the media organizations as they agreed that there is no necessity of having it in the organization. In fact, this factor has become one of the biggest barriers in shaping their contents as most of the time, they have to report contents that only fulfill the political party's interest. At some point, this political factor could some time misused race and religion sentiments in spreading their agenda that have made the journalists in dilemma either to report or do not report at all. For self-censorship, it has long been a practice in media organizations to avoid unnecessary sequences especially when reporting on race and religion issues like the translation of God to Allah issue. Finally, it is an advantage to have the digital platform for the media organizations as it has become easier for them to reach a larger audience. However, there are challenges when it comes to open comments made by some netizens that might touch on race and religion on purpose. This could lead to misunderstanding and a threat to the national harmony of Malaysians. Another example is competition between the news organizations and the online entertainment-based organizations is high that makes the credibility of the news questionable. Having these platforms could easily open opportunities for netizens to trust and comment freely if there are no proper monitoring on the contents of the comments. Overall, media should be given the freedom in reporting, but the Malaysian media practitioners however know and agreed to have restrictions when it comes to reporting on race and religion issues.

REFERENCES

Abdul Rahman, R. (2020). Media ownership and political influence in Malaysia: Acase study of Utusan Malaysia. *Asian Journal of Communication, 30*(3), 245-261.

Faridah, A. (2022). Social media and press freedom in Malaysia. Challenges and opportunities. *Asian Journal ofMedia Studies, 8*(1), 34-50.

Kaur, K. (2021). Censorship and control in Malaysia's media landscape. *Media and Communication, 9*(2), 71-82.

Lee, S. H. (2019). Press freedom and censorship in Malaysia: Legal and political challenges. *Journal of Media Law, 11*(1), 27-45.

Lim, M. (2021). Digital media in Malaysia: Opportunities and challenges for independent journalism. *International Journal of Communication, 15*, 256-273.

Ooi, C. S. (2019). Navigating self-censorship: Malaysian journalists in a restricted environment. *Journalism Studies, 20*(4), 500-515.

Tan, J. (2018). The impact of self-censorship on Malaysian journalism. *Media, Culture & Society, 40*(6), 779-795.

UNESCO (2020). *World trends in freedom of expression and media development: Global report 2020*. Paris: UNESCO Publishing.

Yusof, N. (2017). The role of government in media regulation: A Malaysian perspective. *Journal of Asian Pacific Communication, 27*(1), 102-115.

ADDRESSING DIGITAL ADDICTION: TECHNOLOGY-BASED SOLUTIONS FOR RISK MITIGATION

Hanifah Abdul Hamid[i] & Nuradli Ridzwan Shah Mohd Dali[ii]

[i] (*Corresponding author*). Senior Lecturer, Universiti Sains Islam Malaysia.hanifah@usim.edu.my

[ii]Associate Professor, Universiti Sains Islam Malaysia.nuradli@usim.edu.my

Abstract: Excessive and obsessive use of digital gadgets, known as digital addiction, presents substantial dangers to social connections, productivity, and general well-being. People are becoming more susceptible to these behaviours with the growing use of persuasive methods on digital platforms. This extended abstract examines technological interventions, including behaviour monitoring, well-being applications, AI-driven suggestions, gamification, and parental controls, as methods to encourage healthy digital habits. Although these solutions have potential, they must address ethical considerations like privacy and data security. It is crucial to tackle digital addiction utilising technological interventions to cultivate a harmonious and wholesome connection between people and technology.

Keywords: Digital, Addiction, Responsible, Technology, Intervention.

INTRODUCTION

In the contemporary era characterised by extensive interconnectivity, the widespread utilisation of digital technology has yielded substantial advantages, while concurrently engendering a disquieting occurrence known as digital addiction. The proliferation of smartphones, social media platforms, online gaming, and other digital tools has led to a notable increase in the potential for individuals to acquire harmful and compulsive digital behaviours (Kuss et al., 2021). This extended abstract delves into the concept of digital addiction, examining the accompanying risks and considering the role of technology intervention in mitigating these risks. Digital addiction, commonly known as problematic internet usage or internet addiction disorder, (Tong et al., 2019; Davis, 2001, Young, 1999) is distinguished by the excessive and compulsive utilisation of digital devices or online services, resulting in unfavourable outcomes across multiple areas of life. The potential outcomes encompassed by these repercussions may involve the impairment of social connections, a reduction in productivity, degraded mental and physical well-being, and an overall decline in the quality of life. The prevalence of digital devices and the strategic implementation of persuasive strategies inside digital platforms contribute to individuals' susceptibility to digital addiction. The issue of digital addiction has prompted significant attention, leading to the emergence of technology intervention as a critical field of study and innovation (Gorowska et al., 2022; Ding and Li, 2023). This intervention entails the use of digital technologies and tactics to foster healthier digital behaviours and alleviate the potential hazards linked to excessive screen time and online involvement (Cemiloglu et. Al, 2022). Hence, there are several salient dimensions of technological involvement that can be discerned.

METHODS

This literature study analyses 2015-2024 research in Scopus, Ebscohost, Emerald, and IEEE on technology-based digital addiction treatments. These databases were chosen for their substantial collections of peer-reviewed, high-impact publications related to the issue. Search terms including "digital addiction," "technology intervention," and "AI in digital behaviour" were

carefully chosen. After screening titles and abstracts, a full-text review was performed to include only relevant and open-access articles. Articles were chosen based on publication date, peer-review status, and concentration on technology interventions. Studies beyond the scope or not in English were omitted.

Key material was retrieved and synthesised from chosen papers after thematic and comparative analysis. Thematic research revealed digital addiction intervention tendencies, including behaviour monitoring, AI-driven solutions, and gamification. A comparative study examined user involvement and ethical implications to assess these strategies' efficacy. Despite its meticulous methodology, the study admits limitations, including the probable exclusion of significant research outside the specified databases and non-English publications. This technique summarises technology-based digital addiction therapy research, providing significant insights for future study and policy development.

RESULTS AND DISCUSSION

The analysis yielded numerous notable suggestions for reducing the hazards associated with digital addictions.

Behaviour Monitoring Apps

The utilisation of technology enables the tracking and monitoring of an individual's digital behaviour. Applications and software solutions have the capability to gather data pertaining to the duration of time spent on screens, the usage of certain applications (Noë et al., 2019; Budney et al., 2019), and online activities (Dieris-Hirche et al., 2021). The aforementioned data can afterwards undergo analysis in order to discern patterns of excessive utilisation, hence furnishing individuals with valuable insights pertaining to their digital behaviours (Lazarinis et al., 2020). A plethora of digital well-being applications have been created with the intention of assisting individuals in regulating their usage of electronic devices and establishing a hierarchy of

importance for their digital engagements. These applications frequently provide functionalities such as restrictions on screentime, monitoring of app usage, and reminders to prompt users to take periodic breaks (Cham etal., 2019).

Artificial Intelligence Driven Solutions

Using artificial intelligence (AI) algorithms enables the analysis of users' digital behaviour, facilitating the provision of personalised recommendations to foster healthy digital habits (Hein et al., 2024). For instance, AI applications have been introduced to recognize people who have addiction issues with smartphones (Noeet. al. 2019).

As an illustration, artificial intelligence can propose personalised screen time restrictions or provide tactics for mitigating digital interruptions (Bandawar et. al, 2018) The implementation of gamification techniques is utilised in certain therapies to incentivize users to decrease their usage of digital devices, commonly referred to as a "digital detox."

Gamifications

Gamified applications facilitate the transformation of digital detoxification into an enjoyable and incentivized endeavour, thereby motivating individuals to disengage from their electronic devices (Chau et al., 2023; Pakpour et al., 2022). Parental control tools encompass technological interventions that are available to parents and guardians aiming to regulate and oversee the amount of time their children spend on screens. Parental control solutions enable parents to establish device utilisation constraints and limit access to certain materials.

CONCLUSION

The potential of technology intervention in addressing the challenges of digital addiction is noteworthy; yet it is imperative to carefully examine the ethical considerations associated with it, such as concerns on privacy and data security. The task of maintaining a harmonious equilibrium between the promotion of digital well-being and the preservation of individual

autonomy is a complex endeavour that necessitates continuous vigilance.

ACKNOWLEDGEMENT

REFERENCES

Bandawar, M., Narasimha, V. L., & Chand, P. (2018). Use of digital technology in addiction disorders. *Indian journal of psychiatry*, *60*(Suppl 4), S534. 10.4103/psychiatry.IndianJPsychiatry_21_18

Budney, A. J., Borodovsky, J. T., Marsch, L. A., & Lord, S. E. (2019). Technological innovations in addiction treatment. In *The Assessment and treatment of addiction* (pp. 75-90). Elsevier.https://doi.org/10.1016/B978-0-323-54856-4.00005-5

Cemiloglu, D., Almourad, M. B., McAlaney, J., & Ali, R. (2022). Combatting digital addiction: Current approaches and future directions. *Technology in Society*, *68*, 101832.https://doi.org/10.1016/j.techsoc.2021.101832

Cham, S., Algashami, A., Aldhayan, M., McAlaney, J., Phalp, K., Almourad, M. B., & Ali, R. (2019). Digital Addiction: Negative Life Experiences and Potential for Technology-Assisted Solutions. In: Rocha, Á., Adeli, H., Reis, L., Costanzo, S. (eds) New Knowledge in Information Systems and Technologies. WorldCIST'19 2019. Advances in Intelligent Systems and Computing, vol 931. Springer, Cham. https://doi.org/10.1007/978-3-030-16184-2_87

Chau, C. L., Tsui, Y. Y. Y., & Cheng, C. (2019). Gamification for internet gaming disorder prevention: Evaluation of a Wise IT-Use (WIT) Program for Hong Kong primary students. *Frontiers in psychology*, *10*, 2468.

Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in human behavior*, *17*(2), 187-195.

Dieris-Hirche,J., Bottel, L., Pape, M., Te Wildt, B. T., Wölfling, K., Henningsen, P., & Herpertz, S. (2021). Effects of an online-based motivational intervention to reduce problematic internet use and promote treatment motivation in internet gaming disorder and internet use disorder (OMPRIS): study protocol for a randomised controlled trial. *BMJ open*, *11*(8), e045840.

Ding, K., & Li, H. (2023). Digital addiction intervention for children and adolescents: a scoping review. *International journal of environmental research and public health*, *20*(6), 4777.

Gorowska, M., Tokarska, K., Zhou, X., Gola, M. K., & Li, Y. (2022). Novel approaches for treating Internet Gaming Disorder: A review of technology-based interventions. *Comprehensive Psychiatry*, *115*, 152312.

Hein, K., Conkey-Morrison, C., Burleigh, T. L., Poulus, D., & Stavropoulos, V. (2024). Examining how gamers connect with their avatars to assess their anxiety: A novel artificial intelligence approach. *Acta Psychologica*, *246*, 104298.

Kuss, D. J., Kristensen, A. M., & Lopez-Fernandez, O. (2021). Internet addictions outside of Europe: A systematic literature review. *Computers in Human Behavior*, *115*, 106621. https://doi.org/10.1016/j.chb.2020.106621

Noë, B., Turner, L. D., Linden, D. E., Allen, S. M., Winkens, B., & Whitaker, R. M. (2019). Identifying indicators of smartphone addiction through user-app interaction. *Computers in human behavior*, *99*, 56-65.

Lazarinis, F., Alexandri, K., Panagiotakopoulos, C., & Verykios, V. S. (2020). Sensitizing young children on internet addiction and online safety risks through storytelling in a mobile application. *Education and Information Technologies*, *25*, 163-174.

Pakpour, A. H., Fazeli, S., Zeidi, I. M., Alimoradi,

Z., Georgsson, M., Brostrom,A., & Potenza, M. N. (2022). Effectiveness of a mobile app-based educational intervention to treat internet gaming disorder among Iranian adolescents: study protocol for a randomized controlled trial. *Trials, 23*(1), 229.

Tong, W. T., Islam, M. A., Low, W. Y., Choo, W. Y., & Abdullah, A. (2019). Prevalence and Determinants of Pathological Internet Use among Undergraduate Students in a Public University in Malaysia. *The Journal of Behavioral Science, 14*(1), 63-83.

DOI:https://doi.org/10.31436/imjm.v17i2.270

Young, K. S. (1999). Internet addiction: Evaluation and treatment. *Bmj, 319*(Suppl S4).

UNDERSTANDING DIGITAL ADDICTION IN FINANCIAL TRADING

Nuradli Ridzwan Shah[i] & Hanifah Abdul Hamid[ii],

[i](*Corresponding author*). Associate Professor. Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia;

nuradli@usim.edu.my

[ii] Lecturer. Cybersecurity and Systems Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia;hanifah@usim.edu.my

Abstract: Digital technology has significantly transformed financial trading, making it more accessible and convenient, but it has also introduced new challenges, including the risk of digital addiction among traders. This paper explores the phenomenon of digital addiction in financial trading by examining its causes, symptoms, consequences, and potential strategies for intervention. Factors contributing to digital addiction include 24/7 market access, instant gratification from digital platforms, and the Fear of Missing Out (FOMO) driven by social media. Key symptoms include compulsive trading, neglect of responsibilities, obsessive market monitoring, and emotional distress. The impacts of this addiction range from financial losses and strained relationships to negative mental health outcomes and professional consequences. To mitigate these risks, a multifaceted approach is required, incorporating education, digital detox practices, structured trading plans, professional support, and community-based accountability. This study emphasizes the need for traders and the financial industry to balance the benefits of digital trading with mindful and responsible practices to manage the risks associated with digital addiction.

Keywords Digital, Addiction, Financial, Trading, Hazards, Islamic finance.

INTRODUCTION

Gambling and investment are fundamentally different in various aspects and should be regarded as conceptually separate (Arthur et al., 2016). Nevertheless, the emergence of digital technology has revolutionised the practise of financial trading, rendering it increasingly accessible and convenient. Nevertheless, the advent of digital transformation has concurrently engendered a novel apprehension: the emergence of digital addiction inside the realm of financial trading which is almost similar to the symptom of gambling. This extended abstract examines the phenomenon of digital addiction within the domain of financial trading, focusing on its origins, contributing factors, observable manifestations, effects on traders, and potential approaches for intervention and therapy.

Causal Factors

The phenomenon of digital addiction in financial trading can be ascribed to various underlying causative reasons.

The advent of the digital era has effectively eliminated the constraints of conventional trading hours, thereby enabling traders to actively participate in the market at any given time.

Figure 1: Global Trading Hours in Malaysian Time (MYT)

Traders in Malaysia have opportunities to trade almost continuously by shifting focus across these exchanges. The perpetual accessibility of stock market information may result in an excessive preoccupation with monitoring stock prices and engaging in trading activities around the clock. Moreover, trading in cryptocurrencies offer 24/7 trading capabilities.

Digital platforms provide users with immediate access to market data and facilitate swift execution of trades. The phenomenon of rapid satisfaction can give rise to a loop fueled by dopamine, especially for highly volatile financial instruments such as cryptocurrencies (Kim, 2022), when traders actively pursue ongoing thrill and financial advantages (Sonkurt, 2023).

Social media and online trading forums frequently intensify the phenomenon known as Fear of Missing Out (FOMO) (Johnson et al., 2023). These platforms promote hasty decision-making among traders and foster a constant need to be engaged with the market.

Symptoms

The process of identifying digital addiction in stock trading necessitates the recognition of crucial symptoms.

Compulsive trading refers to the phenomenon when traders demonstrate an inclination to engage in repeated trade executions (Mosenhauer et al., 2022), even in the absence of logical justifications (Kamolsareeratana & Kouwenberg, 2023).

Neglect of Additional Obligations: The phenomenon of digital addiction can result in the neglect of personal, professional, and financial responsibilities, as individuals prioritise trading activities.

Obsessive monitoring refers to the continuous surveillance of stock prices, news updates, and market happenings, which frequently results in heightened levels of worry (Sonkurt, 2023). Traders may encounter emotional distress characterised by fluctuations in mood, heightened

levels of anxiety, or symptoms of depression that are directly linked to their engagement in trading endeavours (Håkanssonet al., 2021).

Impacts

The ramifications of digital addiction on financial trading can be substantial.

Impulsive and frequent trading practises have the potential to lead to significant financial losses.

Strained Relationships: The neglect of personal and professional responsibilities has the potential to exert pressure on relationships with family, friends, and coworkers.

The act of engaging in excessive trading has the potential to contribute to several negative mental health outcomes, such as anxiety, stress, and emotional discomfort.

Professional Consequences: The failure to fulfil work obligations might result in adverse professional outcomes and a heightened sense of employment instability.

Treatment

Addressing the risks associated with digital addiction in stock trading necessitates the implementation of a comprehensive and diverse strategy. Education and Awareness: It is imperative to provide traders with comprehensive knowledge regarding the indicators of addiction and the need of establishing clear boundaries in trading activities. Engaging in a practise known as a "digital detox," wherein individuals intentionally schedule breaks from trading platforms and social media, has been found to be effective in disrupting the cycle of addiction. The establishment and adherence to a clearly defined trading plan has the potential to mitigate impulsive behaviour. Seeking expert support, like as therapy or counselling, might be beneficial for traders who are grappling with severe addiction. Support systems play a crucial role in fostering responsible trading by offering individuals the opportunity to engage with support groups and communities. These groups

provide a supportive environment that encourages responsible trading practises and fosters a sense of accountability among participants.

CONCLUSION

The escalating prevalence of digital addiction in stock trading is becoming an increasingly prominent issue, driven by the ongoing transformation of the financial markets through technological advancements. It is imperative for traders and the industry at large to possess a comprehensive understanding of the underlying elements, symptoms, impact, and possible treatment techniques. Achieving a harmonious equilibrium between the advantages of digital trading and the adoption of ethical and conscientious conduct is crucial in addressing the potential hazards linked to digital addiction within the realm of stock trading.

ACKNOWLEDGMENT

REFERENCES

Arthur, J. N., Williams, R. J., & Delfabbro, P. H. (2016). The conceptual and empirical relationship between gambling, investing, and speculation. *Journal of Behavioral Addictions*, *5*(4), 580–591. https://doi.org/10.1556/2006.5.2016.084

Håkansson, A., Fernández-Aranda, F., & Jiménez-Murcia, S. (2021). Gambling-Like Day Trading During the COVID-19 Pandemic – Need for Research on a Pandemic-Related Risk of Indebtedness and Mental Health Impact. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.715946

Johnson, B., Sun, T., Stjepanović, D., Vu, G., & Chan, G. C. K. (2023). "Buy High, Sell Low": A Qualitative Study of Cryptocurrency Traders Who Experience Harm. *International Journal of Environmental Research and Public Health*, *20*(10). https://doi.org/10.3390/ijerph20105833

Kamolsareeratana, A., & Kouwenberg, R. (2023). Compulsive Gambling in the Stock Market: Evidence from an Emerging Market. *Economies*, *11*(1). https://doi.org/10.3390/economies11010028

Kim, H. (2022). An empirical analysis of navigation behaviors across stock and cryptocurrency trading platforms: implications for targeting and segmentation strategies. *Electronic Commerce Research*. https://doi.org/10.1007/s10660-022-09612-1

Mosenhauer, M., Newall, P. W. S., & Walasek, L. (2022). The stock market as a casino: Associations between stock market trading frequency and problem gambling. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2021.00058

Sonkurt, H. O. (2023). Cryptocurrency trading as a behavioral addiction: A case report. *Psychiatria Danubina*, *35*, 128–131. https://doi.org/10.24869/psyd.2023.128.

STRATEGIC DIVERSIFICATION OF FACILITY MANAGEMENT SERVICES IN MALAYSIA'S CONSTRUCTION INDUSTRY: A CASE STUDY

Rosnia Masruki[i], Marini Kasim[ii], Nazahah Abd. Rahim[iii] & Faizahani Ab. Rahman[iv]

[i](*Corresponding author*). Associate Professor, Universiti Sains Islam Malaysia. rosnia@usim.edu.my
[ii]Senior Lecturer, Universiti Utara Malaysia.marini@uum.edu.my
[ii]Senior Lecturer, Universiti Utara Malaysia.nazahah@uum.edu.my
[ii]Senior Lecturer, Universiti Utara Malaysia. faizahani@uum.edu.my

Abstract: In alignment with the Malaysia Madani government's emphasis on sustainability, particularly through effective asset maintenance, this study investigates strategies for sustaining order books and executing efficient facility management by emphasizing the strategic diversification of services. This case study examines a company's strategic transition from a construction-centric operation to a comprehensive facility management approach, highlighting the complexities of such strategic integration within the local construction industry. Through a semi-structured interview with the CEO of a leading construction company, the study reveals that the transition was largely driven by employee readiness and loyalty, aiming to expanding services while retaining a strong focus on construction. Challenges in adhering to statutory requirements prompted proactive CEO involvement including compliance training to ensure the successful launch of facility management services. Despite these challenges, the integration was managed as a value-added extension to the company's core business operations. However, caution is advised when interpreting these findings, as the study is limited to a single company, limiting the generalisability of the results to the broader industry. Future research should consider including a diverse range of companies to validate these findings and further explore competitive strategies in the evolving construction industry. This study underscores the critical role of strategic decision-making in service diversification, advocating for alignment with core competencies and diversification strategies that not only enhance current operations but also ensure long-term sustainability. The study's insights provide a foundational understanding of leveraging core competencies for successful service diversification, offering a valuable framework for business expansion strategies in Malaysia's construction industry.

Keywords: Strategic diversification, facility management, construction industry, sustainability, case study.

INTRODUCTION

The construction industry in Malaysia is a critical driver of the national economy, contributing approximately 3.6% to country's Gross Domestic Product (GDP) and accounting for about 10% of total employment (Statista, 2023). Over recent decades, the industry has experienced significant growth, driven by government initiatives, urbanization, and foreign investment. However, this growth has brought challenges, such as maintaining the quality and sustainability of construction projects. To address these challenges, Facility Management (FM) services have emerged as a vital aspect, ensuring that buildings and infrastructure are managed efficiently, meeting the highest standards of safety, functionality and sustainability.

According to Aziz et al. (2016), the International Facility Management Association (IFMA), FM is a multidisciplinary field that integrates various activities to enhance the functionality, comfort, safety and efficiency of the built environment.

FM achieves this by coordinating people, place, process and technology. This wide-ranging scope includes services such as maintenance, cleaning, security and energy management, which are essential for optimising the performance of buildings throughout their lifecycle. Integrating FM services into the construction industry can provide significant benefits, including extending building lifespan, reducing cost and improving user satisfaction.

The Malaysian government has prioritised sustainability and asset maintenance as part of its Malaysia Madani agenda, aiming to foster a more sustainable and resilient construction sector. In line with this agenda, As reported in the Federation Budget of Malaysia, substantial investments have been directed towards construction and infrastructure development, as evidenced by the RM69.8 billion allocated for public projects in the 2023 federal budget (Ministry of Finance Malaysia, 2023). FM plays a pivotal role in the post-construction phase by ensuring that buildings and infrastructure maintain their intended quality and operational standards.

Key functions of FM. FM in the construction context can be categorised into five core management areas, these are:

i) Maintenance Management: Conducting regular inspection and preventive maintenance to ensure the longevity and reliability of building systems.

ii) Energy Management: Optimising energy consumption to reduce operational costs and environmental impact.

iii) Space Management: Managing space utilisation effectively to meet organisational needs and accommodate changes.

iv) Health, Safety, Security and Environmental (HSSE) Management: Implementing robust systems and protocols to protect occupants and assets.

v) Sustainability Initiatives: Adopting practices that minimise environmental impact, such as

waste reduction and obtaining green building certifications.

However, as noted by Renard Yung Jhien Siew (2017), environmental and social reporting is often less comprehensive compared to corporate governance reporting within the Malaysian property and construction sectors. Moreover, there is a notable absence of detailed information regarding health and safety performance and the specific initiatives to improve these areas.

Despite the acknowledged importance of FM services, there is an urgent need for diversification within the Malaysian construction industry. Many construction companies have traditionally focused narrowly on their core activities, potentially overlooking the advantages of expanding their FM capabilities. This lack of diversification may result in missed opportunities to enhance operational efficiency and achieve long-term sustainability. Additionally, specific challenges within the Malaysian context, including regulatory requirements, market competition and workforce readiness (Akunyumu et al. 2021), necessitate a strategic approach to FM service diversification. Such as approach will help construction companies can maintain a competitive edge while addressing the evolving demands of the industry.

This study aims to explore strategies that can sustain order books and enhance the efficiency of facility management by focusing on the strategic diversification of services. The primary objective is to identify and analyse strategies that construction companies can implement to maintain their market position and improve their FM services.

METHOD

This study adopts a case study approach to investigate strategic diversification in FM services within Malaysian construction industry. The combination of primary and secondary data collection methods provides a comprehensive

understanding of complex organisational decisions and their outcomes. Primary data were gathered through a semi-structured interview with the CEO of a prominent construction company, conducted on 7 January 2024, at the company's office. For confidentiality, the company is referred to as CCorp. Secondary data were sourced from industry reports and academic literature to provide context and support the findings from the interview. The CEO was selected for the interview because of her pivotal role in strategic decision-making, offering valuable insights into the company's diversification strategies. The interview focused on understanding the drivers behind the diversification into FM, the challenges encountered and the outcomes achieved. The qualitative data collected were analysed using coding and thematic analysis to identify relevant themes and insights that could inform broader industry practices.

RESULTS AND DISCUSSION

The results of this interview is organised into four subheadings, these are: i. an overview of CCorp., ii. revenue distribution, iii. operational challenges and strategic responses and finally, iv. summary of key strategies of strategic diversification.

i. Overview of C Corp.

C Corp., a subsidiary of AC Synergy Bhd. led by CEO Madam Sis, has strategically diversified its operations beyond itscore focus on construction. The company, which has historically been rooted in construction, has expanded into property development and hospitality services, reflecting a calculated approach to business diversification aimed at stabilizing and expanding its revenue base.

While construction remains C Corp.'s primary revenue stream, contributing 80-85% of total income, the diversification into property development (10-20% of revenue) and hospitality services (a smaller portion) demonstrates the company's efforts to establish a more balanced

and resilient business model. This revenue distribution implies C Corp.'s strong foundation in construction, while highlighting its proactive steps towards growth in related industries.

The case study centres on C Corp., a subsidiary of AC Synergy Bhd., led by the CEO, Madam Sis. C Corp., the parent company, has diversified its operations through various subsidiaries. C Corp., one of these subsidiaries, focuses entirely on construction. Additionally, the group has expanded into property development and hospitality services, illustrating a strategic diversification approach.

ii. Revenue Distribution and Strategic Focus

Figure 1: Strategic Considerations of Diversification

Figure 1 illustrates the core strategic considerations for C Corp.'s diversification into Facility Management (FM) services, which include integrating FM services synergistically with their core construction business, investing in employee training, targeting reliable clients, ensuring regulatory compliance, and addressing operational challenges directly (Wimalasena & Gunatilake, 2018).

The integration of FM services with C Corp.'s core construction business represents a natural extension rather than a replacement of existing services. This approach allows C Corp. to capitalize on new market opportunities while sustaining long-term success in Malaysia's competitive construction and FM sectors.

iii. Operational Challenges and Strategic Responses

Transitioning to Facility Management (FM) services presents several operational challenges for C Corp., necessitating strategic responses to ensure seamless integration and continued success. There are five key areas of focus, these include:

Optimizing Resource Allocation and Enhancing Operational Workflows. C Corp. faces the challenge of efficiently allocating resources across its diversified operations. To address this, the company has implemented strategies to optimize resource allocation, leveraging digital platforms for project management and streamlining workflows to enhance operational efficiency. This approach ensures that resources are effectively utilized, minimizing waste and maximizing productivity (Hashim etal., 2021).

Implementing Robust Quality Assurance Protocols. Maintaining high service standards is crucial as C Corp. diversifies into FM services. The company has introduced rigorous quality assurance protocols to ensure consistency and reliability across all projects. These protocols include regular performance evaluations, adherence to industry best practices, and continuous monitoring to identify and rectify any potential issues promptly.

Investing in Employee Training and Development. A critical challenge in diversifying into FM services is ensuring that the workforce is equipped with the necessary skills to meet the evolving demands of this industry. To address this, C Corp. has made significant investments in employee training and development. By fostering a culture of continuous learning and adaptability, the company ensures that its employees are well-prepared to handle the unique operational challenges of FM service delivery. This strategic focus on skill enhancement not only improves service quality but also strengthens employee loyalty and retention, which are crucial for maintaining operational continuity during this transition (Akinbola et al., 2022).

Targeting Financially Stable Clients to Mitigate Risks. In the face of market volatility, targeting specific clients, particularly government-linked companies (GLCs) such as Multicom and Petronas, is a key strategy. This selective approach enables C Corp. to focus on financially stable clients, thereby reducing risks associated with payment delays or defaults and ensuring steady revenue streams.

Ensuring Stringent Regulatory Compliance and Certification. Regulatory compliance and certification are integral to C Corp.'s diversification strategy. The CEO highlighted the importance of meeting statutory requirements and obtaining the necessary certifications for FM service provision. Proactive measures, including direct CEO involvement in compliance training initiatives, underscore C Corp.'s commitment to regulatory adherence, operational readiness, and technological adaptation (Akinbola et al., 2022; Hashim et al., 2021).

By staying ahead of regulatory changes and requirements, C Corp. mitigates potential compliance risks, ensuring operational efficiency and readiness for future challenges. This commitment to regulatory adherence is further supported by industry literature, such as the works of Hashim etal. (2021) and Akinbola et al. (2022), which emphasize the importance of HSSE standards in enhancing compliance in the real estate sector.

These focus areas are essential in overcoming the complexities associated with FM service delivery, ensuring that C Corp. maintains its high standards across its diversified operations.

iv. Key Strategies of Strategic Diversification

Table 1 outlines the key strategies and initiatives employed by C Corp. in its strategic diversification into FM services. These include leveraging the existing workforce and expertise, integrating technology, fostering proactive leadership and compliance, strategically targeting clients and mitigating risks, acting as a rescue contractor, and building cultural resilience (Wimalasena & Gunatilake, 2018).

Table 1 : Key strategies in C Corp's Strategic Diversification into FM Services

No.	Key Strategies	Initiatives
1.	Leveraging Existing Workforce and Expertise	- Initiated FM services in specialized areas like waste management.
2.	Technological Integration	- Cautious and deliberate adoption of modern solutions - Incremental implementation to address generational gaps and ensure employee buy-in
3.	Proactive Leadership and Compliance	- Hands-on involvement of senior management, especially CEO - Personal oversight of compliance training and regulatory obligations
4.	Strategic Client Targeting and Risk Mitigation	- Focused on financially stable clients such as GLCs like Multicom and Petronas - Mitigated risks associated with volatile private sector payments
5.	Role as a Rescue can tract ar	- Demonstrated capability in managing complex, time-sensitive projects - Successful interventions in critical projects like LRT and MRT station rescues
6.	cultural Resilience	-supported by active senior management involvement - Frequent site visits and direct engagement to ensure high operational standards and foster a resilient organisational culture

This table summarizes the strategies that have enabled C Corp. to expand into FM services while maintaining operational excellence and client satisfaction in Malaysia's competitive construction industry.

The findings in this case study suggest that construction firms considering diversification into FM services should invest in employee training and leadership development to navigate the complexities of FM service delivery successfully. This study contributes to the broader understanding of strategic diversification in Malaysia's construction sector, demonstrating how aligning FM services with core competencies can enhance operational efficiency and long-term sustainability (Wimalasena & Gunatilake, 2018; Hashim et al., 2021). By adopting strategic diversification measures, construction firms cannot only sustain their order books but also contribute to the broader goal of national economic stability and growth through enhanced facility management capabilities.

CONCLUSIONS

This study examines C Corp.'s strategic diversification to sustain its order books and enhance facility management efficiency within Malaysia's construction industry. Two major findings are highlighted: the strategic considerations of diversification and the specific strategies and initiatives employed by C Corp. in its diversification strategy into FM services. The research reveals that employee readiness and loyalty are crucial drivers of successful diversification. Key strategies include proactive leadership involvement, compliance training, and the phased integration of FM services, which collectively support the company's diversification efforts while maintaining a strong foundation in construction. While this study is limited to a single company, the findings indicate the importance of aligning diversification efforts with core competencies to enhance operations and sustain long-term value. Future research could explore comparative studies across multiple companies to identify best practices and address challenges specific to different market segments within Malaysia's construction and FM sectors.

REFERENCES

Akinbola, K. B., Oladeni, I. A., & Odewande, A. G. (2022). Observance of Health, Safety, Security, and Environmental Policies by Facilities Management Firms on Commercial Real Estate in Lagos. *Ilaro Journal of Environmental Research & Development*, *6*, 53–68.

Akunyumu, S., Fugar, F. D. K., Adinyira, E., & Danku, J. C. (2021). A review of models for assessing readiness of construction organisations to innovate. In *Construction Innovation* (Vol. 21, Issue 2, pp. 279–299). Emerald Group Holdings Ltd. https://doi.org/10.1108/CI-01-2020-0014

Aziz, N. D., Nawawi, A. H., & Ariff, N. R. M. (2016). Building Information Modelling (BIM) in Facilities Management: Opportunities to be Considered by Facility Managers. *Procedia - Social and Behavioral Sciences*, *234*, 353–362. https://doi.org/10.1016/j.sbspro.2016.10.252

Hashim, N., Samsuri, A. S., & Idris, N. H. (2021). Assessing organisations' readiness for technological changes in construction industry. *International Journal of Sustainable Construction Engineering and Technology*, *12*(1), 130–139. https://doi.org/10.30880/ijscet.2021.12.01.013

Ministry of Finance Malaysia, 2023, Federal Government Budget. Construction industry.

Renard Yung Jhien Siew. (2017). Critical Evaluation of Environmental, Social and Governance Disclosures of Malaysian Property and Construction Companies. *Construction Economics and Building* , *17*(2), 81–91.

Statista (2023). Share of construction industry to the gross domestic products (GDP) in Malaysia from 2015 to 2023. https://www.statista.com/statistics/1338744/malaysia-share-of-construction-to-the-gdp/

Wimalasena, N. N., & Gunatilake, S. (2018). The readiness of construction contractors and consultants to adopt e-tendering: The case of Sri Lanka. *Construction Innovation*, *18*(3), 350–370. https://doi.org/10.1108/CI-03-2017-0025

THE LEVEL OF FINANCIAL LITERACY AMONG ISLAMIC STUDY UNDERGRADUATE STUDENTS

Norlida Mahussin[i] & Ahmad Amiruddin Rosman[ii]

[i] (*Corresponding author*).Lecturer, Universiti Sains Islam Malaysia Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia. norlida@usim.edu.my
[ii] Student, Universiti Sains Islam Malaysia Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia. ahmadamiruddin1421@raudah.usim.edu.my

Abstract: This study examines the level of financial literacy among undergraduate students at the Faculty of Quran and Sunnah, Universiti Sains Islam Malaysia (USIM). This study evaluates students' financial knowledge using a survey questionnaire. The questions asked include fundamental financial knowledge and Islamic financial concepts. 238 students participated in the online survey. The result indicates a moderate level of basic financial literacy. However, for Islamic financial literacy, the average score is substantially higher. The findings indicate that the students have a more comprehensive understanding of Islamic financial principles. This study contributes to the ongoing efforts to enhance financial education and awareness among Malaysia's younger population by offering preliminary insights into the financial literacy levels of young adults.

Keywords: Financial Literacy, Financial Knowledge, University Students

INTRODUCTION

Financial literacy is important since it directly impacts financial well-being (Lone & Bhat, 2022; Lusardi & Messy, 2023). In the era of complex financial systems and many consumer options, individuals need to make prudent financial decisions. Making such decisions requires skills that include understanding financial concepts, products and risks. Studies have shown that financial literacy is associated with investment choice (Chu et al., 2016; Li et al., 2020), debt management (Antarvanis & Karra, 2021; Hamid & Loke, 2021), and financial and retirement planning (Noviariniet al., 2021; Qian et al., 2024). Highly financially literate people tend to make better financial decisions that reduce financial distress and build up self-confidence in making financial choices. Individuals with more financial knowledge are more likely to act properly when dealing with financial difficulties. Lusardi et al. (2021) show a significant correlation between financial literacy and financial resilience during financial hardships.

Financial literacy is acquiring financial knowledge that enables individuals to make informed financial decisions and personal finance management (Noctoret al. 1992; Lusardi & Mitchell, 2014). According to the OECD (2023), financial literacy encompasses the awareness, knowledge, skills, attitudes, and behaviours required to make effective financial decisions and achieve overall financial well-being. However, surveys show that financial literacy worldwide is relatively low for example Lusardi (2019) and Klapper & Lusardi (2019). Klapper and Lusardi (2019) report that 33 percent of adults worldwide are financially literate, while some of the respondents could not answer basic financial questions. These basic questions include interest rates, inflation and risk diversification. The evidence suggests low levels of financial literacy in both developed and developing countries. As the cost of living increases, the need for proper money management is important to ensure individuals are not trapped in indebtedness.

Financial knowledge is an important indicator of youth economic prosperity (Riitsalu & Murakas,

2019). Poor financial decisions made during their adolescence can cause them to suffer in old age. Although efficient financial organisation is vital at all stages of life, effective decision-making regarding finances may become more difficult as individuals age (Mitchell et al., 2017). As a result, young adults must take the required precautions to protect their monetary security as soon as feasible. The government has implemented the National Strategy for Financial Literacy 2019 - 2023 to improve financial literacy among Malaysians. The 2021 Malaysian financial literacy survey exhibits that the MYFLIC Index stands at 59%, improved by 1.9% from 2018. This index is derived from three aspects of financial literacy which are knowledge, behavioural and attitudinal.

Despite the effort to improve financial literacy, many young Malaysians struggle to manage their money as the cost of living rises, making them vulnerable to financial shock. According to the Insolvency Department, people below 34 years old accounted for 26 percent of bankruptcy cases. In early 2024, The Credit Counselling and Debt Management Agency (AKPK) reported 53,000 youth aged 30 and below under debt worth nearly RM1.9 billion seeking assistance for debt restructuring (Tan, 2024). The primary cause of most bankruptcy cases is the inability to manage debt, which includes credit card debt, personal loans, and instalment purchases (Mohamad, 2020). AKPK highlighted that financial literacy is the key to combating bankruptcy among youth (Chin & Adlan, 2022).

This study aims to investigate the level of financial literacy, specifically focusing on financial knowledge, among undergraduate students studying the Quran and Sunnah. This study uses primary data collected through a survey questionnaire. The sample consists of undergraduate students at USIM's Faculty of Quran and Sunnah (FPQS). The programs offered in FPQS may not include finance-related subjects. Therefore, it is important to assess their level of financial knowledge. The findings can help identify areas where additional education or resources may be required. By examining their current level of financial literacy, the study intends to provide practical insights and suitable recommendations that can enhance their level of financial literacy.

METHODS

This study utilises primary data, using a survey questionnaire. The questionnaire contains three sections. The first section is the socio and demographic profile of the respondents which consists of age, gender, year of study, residence, income and educational level. The second section focused on basic financial literacy questions on compound interest, inflation, and diversification. The first three questions were derived from the Health and Retirement Study (HRS) (2004), a national survey conducted in the United States, developed by Lusardi and Mitchell (2008). The additional three questions are adopted from Lusardi and Mitchell (2007). Some modifications were made to align the question with the study's context, such as using the Malaysian currency, Ringgit Malaysia (RM), as the basis. The third section focused on basic Islamic financial knowledge adopted from Antara et al. (2016). All questions related to socio-demographic, financial literacy and Islamic financial literacy are assessed using multiple choice. The level of financial literacy is determined by calculating an indicator based on the overall number of right answers to the 11 given questions. Each right answer received one point. The grade varied from zero (all incorrect answers) to 11 (indicating all question correct answers), with higher scores reflecting a higher level of financial literacy. The respondents are undergraduate students at the Faculty of Quran and Sunnah USIM, and the study uses convenience sampling.

RESULTS AND DISCUSSION

A total of 238 students participated in the online survey, 52.5% are male and the rest are female. Most of the respondents are third and fourth-

year students (62.6%), and 141 students aged 22 and above. 63.9% of the respondents never attended any finance-related courses, 25.65% attended once, and 10.5% attended more than once. The statistics show that most of the respondents do not have enough exposure related to finance.

Table 1 presents the descriptive statistics regarding financial literacy scores. The scores range from 6.88 to 11, with a maximum of 11, indicating a moderate level of financial knowledge. It implies that there is still room for improvement in financial literacy among undergraduate students at FPQS. The meanscore of financial literacy among respondents was 2.74 out of six, which is equivalent to approximately 46%. In contrast, Islamic financial literacy received an average score of 4.14 out of five, or 83%, which is significantly higher than basic financial literacy. The results indicate that the respondents are more conversant with Islamic financial literacy facts.

Table 1. Financial Literacy Score

Score	Min	Max	Mean
Basic Financial Literacy	0	6	2.74
Islamic Financial Literacy	0	5	4.14
Total	0	11	6.88

Table 2 illustrates the distribution of responses for each of the 11 questions. The initial six queries evaluate the financial literacy of respondents. The results indicate that respondents' understanding that the growth of money is compounded over time remains moderate at 50.4%. Furthermore, 47% of respondents understood the inflation concept. The lack of familiarity with this aspect of financial products is evident in the fact that only 33% of respondents accurately identify the advantages of diversification between individual stocks and mutual fund stocks. Subsequently, respondents demonstrate a moderate comprehension of risk factors, including asset risk (47%) and risk

diversification, suggesting that their awareness of risk in financial products remains average. Only 42% of respondents provide accurate responses regarding the function of the stock market, indicating a lack of understanding of its operations.

In the Islamic financial literacy questions, the respondents demonstrate a high understanding of Riba' with a majority of 99.6% and 86.6% correctly answering questions 7 and 8. The subsequent queries regarding Ghararand Maysir also receive the highest percentage of correct responses, with 94.5% and 86.6%, respectively. The results indicate that the respondents understood the basic concept of Islamic finance. Nevertheless, only 45% of respondents provide accurate responses regarding commodities, indicating a lack of familiarity with the fundamental principles of Islamic sales.

Table 2. Financial Literacy Score

Financial Literacy Question	Correct Percentage
Q1. Interest compounding	50.4%
Q2. Inflation	47.1%
Q3. Diversification	32.8%
Q4. Asset risk	46.6%
Q5. Risk diversification	55.0%
Q6. Stock market function	42.0%

Islamic Financial Literacy Question	
Q7. Riba	99.6%
Q8. Riba	86.6%
Q9. Gharar	94.5%
Q10. Maysir	86.6%
Q11. Commodity	45.0%

CONCLUSIONS

This study provides an overview of the level of financial literacy among undergraduate students of the Faculty Quran and Sunnah in USIM. The findings show a moderate level of basic financial knowledge among the respondents. There is a

large gap between financial literacy and Islamic financial literacy, pointing to a lack of awareness of essential financial concepts among these students. This gap suggests that current educational efforts should address the unique financial literacy needs of this demographic related to personal financial management. To enhance financial literacy among undergraduate students, it is recommended that universities leverage digital tools such as mobile applications to provide accessible and engaging financial education and organise periodic workshops and seminars that cover fundamental and advanced financial topics. Collaboration with industry experts and government bodies can further enrich these programs by providing real-world insights and practical knowledge.

REFERENCES

Antara, P. M., Musa, R., & Hassan, F. (2016). Bridging Islamic Financial Literacy and Halal Literacy: The Way Forward in Halal Ecosystem. *Procedia Economics and Finance*, 37, 196–202. https://doi.org/10.1016/s2212-5671(16)30113-7

Artavanis, N., & Karra, S. (2021). Financial literacy and student debt. In *Financial Literacy and Responsible Finance in the FinTech Era* (pp. 86-105). Routledge.

Chin, C., & Adlan, N. I. (2022, November 27). Why are Some Malaysian youths going bankrupt? Insolvency Dept: Over 20% of Bankrupts Are Youths. The Star. https://www.thestar.com.my/news/education/2022/11/27/young-and-broke

Chu, Z., Wang, Z., Xiao, J. J., & Zhang, W. (2017). Financial literacy, portfolio choice and financial well-being. *Social indicators research*, *132*, 799-820.

Hamid, F. S., & Loke, Y. J. (2021). Financial literacy, money management skill and credit card repayments. *International Journal of Consumer Studies*, *45*(2), 235-247.

Klapper, L., & Lusardi, A. (2019). Financial literacy and financial resilience: Evidence from around the world. *Financial*

Management, 49(3), 589–614. https://doi.org/10.1111/fima.12283

Li, J., Li, Q., & Wei, X. (2020). Financial literacy, household portfolio choice and investment return. *Pacific-Basin Finance Journal*, *62*, 101370.

Lone, U. M., & Bhat, S. A. (2022). Impact of financial literacy on financial well-being: a mediational role of financial self-efficacy. *Journal of Financial Services Marketing*, 1-16. 22–137 https://doi.org/10.1057/s41264-022-00183-8

Lusardi, A. (2019). Financial literacy and the need for financial education: evidence and implications. *Swiss Journal of Economics and Statistics*, 155(1). https://doi.org/10.1186/s41937-019-0027-5

Lusardi, A., & Messy, F. A. (2023). The importance of financial literacy and its impact on financial wellbeing. *Journal of Financial Literacy and Wellbeing*, *1*(1), 1-11.

Lusardi, A., & Mitchell, O. S. (2007). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of monetary Economics*, *54*(1), 205-224.

Lusardi, A., & Mitchell,O. S. (2008). Planning and financial literacy: how do women fare? *American Economic Review, 98*, 413–417.

Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Mitchell, O. S., P Brett Hammond, & Utkus, S. P. (2017). *Financial decision making and retirement security in an aging world*. Oxford University Press.

Noctor, M., Stoney, S., & Stradling, R. (1992). Financial literacy: a discussion of concepts and competences of financial literacy and opportunities for its introduction into young people's learning. *National Foundation for Educational Research*.

Noviarini, J., Coleman, A., Roberts, H., & Whiting, R. H. (2021). Financial literacy,

debt, risk tolerance and retirement preparedness: Evidence from New Zealand. *Pacific-Basin Finance Journal*, *68*, 101598. https://doi.org/10.1016/j.pacfin.2021.101598

Riitsalu, L., & Murakas, R. (2019). Subjective financial knowledge, prudent behaviour and income. *International Journal of Bank Marketing*, 37(4), 934–950. https://doi.org/10.1108/ijbm-03-2018-0071

OECD (2023), "OECD/INFE 2023 International Survey of Adult Financial Literacy", *OECD Business and Finance Policy Papers*, No. 39, OECD Publishing, Paris,https://doi.org/10.1787/56003a32-en.

Tan, B. (2024, April 23). AKPK: Over 50,000 youths in debt due to credit cards, loans worth close to RM2b in total. MalayMail. https://www.malaymail.com/news/malaysia/2024/04/23/akpk-over-50000-youth.

Qian, Y., Tan, W., & Wu, J. (2024). Household financial literacy and retirement planning in rural China. *International Review of Financial Analysis*, *93*, 103130.

EMPOWERING MUSLIM WOMEN IN MODERN SOCIETY THROUGH THE INTEGRATION OF SPIRITUAL INTELLIGENCE AND ARTIFICIAL INTELLIGENCE

Nur Saadah Hamisan @ Khair

Senior Lecturer, Faculty of Quranic and Sunnah Studies, Universiti Sains Islam Malaysia.
saadahkhair@usim.edu.my

Abstract: In the 21st century, Artificial Intelligence (AI) has emerged as a transformative force, influencing various aspects of life, including decision-making, communication, and personal development. However, the integration of AI into daily life often overlooks the importance of Spiritual Intelligence (SI) particularly in the context of Muslim women. This study aims to explore how the integration of SI and AI can create a holistic framework that empowers Muslim women to navigate modern challenges while maintaining their cultural and religious identity. Utilizing a qualitative research approach, this study examines the Islamic perspective on how spiritual intelligence is vital in empowering the personal and professional lives of Muslim women. Due to needs and challenges faced by Muslim women in modern society, spiritual well-being is very important but at the same time, artificial intelligence can provide more opportunities in performing the multifaceted roles of Muslim women in present and future. The fusion of these two forms of intelligence offers unique strategies to empower Muslim women in a digital era.

***Keywords*:** Artificial Intelligence (AI), Spiritual Intelligence (SI), Muslim women, modern society.

INTRODUCTION

This study aims to highlight that besides Artificial Intelligence (AI) has become a central issue in this era, other intelligence such as Emotional Intelligence (EI) and Spiritual Intelligence (SI) should not be taken for granted. Particularly for Muslim women, they are facing various challenges, including hijabophobia, islamophobia, and the pervasive influence of Western ideologies that may conflict with their cultural and religious values. These pressures not only impact their daily lives but also challenge their ability to maintain their identity and faith.

The empowerment of Muslim women in modern society is a critical issue due to the challenges they face, such as gender inequality, social stereotypes, and technological disruptions. This research examines how integrating spiritual intelligence (SI) and artificial intelligence (AI) can contribute to their empowerment. Spiritual intelligence draws on Islamic teachings, fostering resilience, purpose, and self-awareness, while AI can provide unprecedented opportunities in education, entrepreneurship, and advocacy. The fusion of these two forms of intelligence offers unique strategies to empower Muslim women in a digital era.

Research combining SI and AI is relatively new, but each element actually has developed and analyzed in previous studies. As been first initiated by Zohar & Marshall (2000; 2004) Marshall, they believe that Spiritual Intelligence is the ultimate intelligence. SI is a type of unique human intelligence, distinct from other forms such as emotional intelligence (EQ) and intellectual intelligence (IQ), that enables individuals to reflect on deeper existential questions, connect with a sense of purpose, and

engage with values and beliefs that transcend the material world.

However, spiritual intelligence (SI) is not a newly developed concept, as it has been a central focus since the beginning of Islamic teachings. Its primary objective has always been to cultivate a deeper connection to the Divine, guiding individuals towards moral integrity, self-awareness, and purposeful living in accordance with religious principles. According to Najati (1992), the primary element emphasized by the Prophet in his efforts to guide the spiritual transformation of the Arab people was spiritual intelligence. He explains that SI is generally a form of spiritual and social maturity. It aligns an individual with their surrounding environment, enabling them to take on life's responsibilities, face challenges, and accept the realities of life with calmness and contentment.

Due to the existence of SI in the Islamic discourse, this study believes that SI has strong connection to religious values and ethics, guiding individuals in navigating life's challenges. It must not be separated with two main components, namely the relationship with God and the relationship with oneself, as discussed by Najati that SI was directly connected to Allah as its foundation (Sudi, Yama & Md Sham, 2023). SI in Islamic perspective encompasses key elements such as *Tawhid* (recognition of the oneness of Allah) by fostering a relationship with Him through worship, prayer, and devotion; *Tazkiyatun-Nafs* (purification from vices and egoism); *Ihsan* (worshiping Allah with full awareness); and *Tafakkur* (reflecting on the signs of Allah's greatness). The goal of spiritual intelligence in Islam is to create a balance between the material and spiritual aspects of life. By cultivating this intelligence, individuals can lead a meaningful and fulfilling life, experiencing happiness and receiving blessings in all areas (Sri Haryanto, 2024; Liliza & Wan Nurul Izza, 2024) .

Meanwhile, artificial intelligence (AI) is humanly developed and considered as a transformative force in modern society. It can likely be traced back to the 1940s, with the term "Artificial Intelligence" officially coined in 1956. AI is defined as "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Haenlein & Kaplan, 2009). Until today, AI has grown from simple ideas to advanced systems. It is regarded as an important tool nowadays because it automates complex processes, reducing human effort and error, and enables faster, more efficient decision-making. Its advanced technology helps improve productivity, streamline workflows, and solve problems more effectively.

In the context for Muslim women, AI can be an enabler of change, helping them overcome societal barriers by providing tools for learning, economic empowerment, and advocacy. Nevertheless, AI could be a negative tool if used without proper understanding or knowledge. Therefore, it highlights the need for spiritual intelligence among Muslim women to ensure that AI is applied ethically and responsibly, aligning its use with moral values and enhancing its positive impact on society while avoiding potential harms. So, for Muslim women, SI grounded in Islamic teachings provides a sense of resilience and purpose, helping them develop a strong moral foundation and self-empowerment.

As a main focus of this study, the concept of empowerment should be enlightened from the Islamic perspective. According to Sultana and Hasan (2010), women's empowerment can be defined as the enhancement of women's control over their own lives and choices in terms of finances, knowledge, information, skills, political power, and economic resources. Debnath et al. (2019) also note that women's empowerment focuses on improving women's educational, economic, cultural, and political status within societies that have traditionally marginalized and neglected them.

Empowerment is a multifaceted concept involving social, economic, educational, and psychological dimensions. In the context of Muslim women, empowerment entails overcoming bias and discrimination, strengthening self-determination, and enhancing participation in society. Therefore, this study proposes that the integration of SI and AI will create a holistic approach to achieving women empowerment.

METHOD

As a preliminary study, this study applies qualitative methods in collecting and analyzing data. The data primarily consists of literature reviews drawn from theses and scholarly journal articles. Notably, much of the literature reviewed has been recently published, reflecting the relatively novel nature of the topic within academic discourse.

Additionally, the analysis will involve a combination of textual and document analysis, allowing for an in-depth examination of the literature. A portion of the data will be further analyzed through content analysis, particularly when engaging with Islamic sources. This approach ensures a nuanced understanding of the subject matter, drawing on the foundational texts and principles of Islamic scholarship to provide context and depth to the findings.

RESULTS AND DISCUSSION

This study found that women empowerment, in a meaningful sense, exists within Islam through its prohibition of all forms of injustice and oppression against women. The Quran is considered a divine source of women's empowerment in Islam due to its teachings that promote justice, equality, and respect for women. It provides guidelines and principles that uplift women's status and rights, addressing issues such as gender equality, inheritance, and personal dignity (Ali, 2004). By emphasizing fairness and the value of women in various aspects of life, the Quran serves as a foundational

text that empowers women and supports their full participation in society.

The Quran also serves as the foundation for spiritual intelligence, which deepens the connection between individuals and God, as well as between individuals themselves, regardless of gender. Through its teachings, the Quran fosters a profound understanding of spiritual values and ethical conduct, thereby strengthening both personal and social relationships. But in today's world, AI should not be neglected as it offers significant benefits. Its positive impacts include automating routine tasks, providing valuable data insights, and enabling advancements in fields like healthcare, education, and industry (Sharma et al, 2022). Both SI and AI are important for Muslim women as long as they able to integrate both without neglecting their roles and responsibilities.

AI as a Tool for Empowerment

First, AI provides new opportunities for Muslim women to access education and gain knowledge. Online platforms powered by AI can provide women with tailored educational content, even in remote areas, thus promoting learning. In Islam, seeking knowledge is obligatory for both men and women. Therefore, staying informed about technological advancements is a valuable way to fulfill this obligation and ensure that one remains knowledgeable in contemporary fields.

Second, AI technologies provide flexible job opportunities, allowing women to work remotely or from home, balancing family and professional life. AI-based tools help women develop skills, access global markets, and engage in entrepreneurship. As mentioned in the Quran, Allah acknowledges individual differences in skills and capabilities and advises: "For men is a share of what they have earned, and for women is a share of what they have earned" (4: 32).

Third, AI can be used to combat discrimination and promote social justice by ensuring equal

access to opportunities, services, and resources for women. In the Quran, Islam promotes justice and equality: "O mankind, indeed We have created you from male and female and made you peoples and tribes that you may know one another. Indeed, the most noble of you in the sight of Allah is the most righteous of you" (49: 13)

Fourth, AI can be used to create safe online environments for women, protecting their privacy and dignity, which aligns with Islamic values of modesty (*haya*) and personal integrity. In Surah An-Nur (24: 30-31), Allah instructs both men and women to lower their gaze and guard their modesty. AI can help by moderating online spaces, preventing harassment, and ensuring safe digital interaction.

Fifth, AI-powered platforms offer opportunities for digital advocacy, amplifying the voices of Muslim women in social and political spheres. These platforms enable broader participation in campaigns for gender equity and social justice.

Spiritual Intelligence as a Foundation for Empowerment

First, SI fosters resilience by connecting Muslim women with their religious beliefs, providing strength and purpose in the face of adversity. SI helps women understand their purpose in life, which is essential for empowerment. In Islam, the primary purpose of life is to worship Allah (The Quran, 51: 56) and contribute positively to society.

Second, SI involves developing inner strength through patience (*sabr*) and reliance on Allah (*tawakkul*). This inner resilience empowers Muslim women to face life's challenges and difficulties with confidence and trust in Allah's plan. In Surah Al-Baqarah (2:286), Allah reminds believers that He does not burden a soul beyond its capacity.

Third, SI can ensure the ethical application of AI technologies. Muslim women can draw upon SI to guide the responsible use of AI in accordance with Islamic values, promoting justice and fairness, as guided by the teachings of the Quran and Sunnah. Allah says: "You are the best nation produced [as an example] for mankind. You enjoin what is right and forbid what is wrong and believe in Allah" (3:110).

Fourth, SI encourages self-reflection (*muhasabah*) and accountability, which are essential for personal growth and empowerment. By constantly assessing one's actions and intentions, Muslim women can strive for continuous improvement and become better versions of themselves. Allah mentioned: "O you who have believed, fear Allah. And let every soul look to what it has put forth for tomorrow, and fear Allah. Indeed, Allah is Acquainted with what you do" (59: 18).

Fifth, Spiritual intelligence fosters a deep sense of justice (*'adl*) and compassion (*rahmah*), which are core values in Islam. These qualities enable individuals to contribute positively to society, advocating for fairness and showing empathy towards others. The Quran emphasizes, "Indeed, Allah commands justice and good conduct and giving to relatives and forbids immorality and bad conduct and oppression" (16: 90).

Challenges and Opportunities

Despite the potential of AI, Muslim women face challenges such as digital literacy gaps, cultural resistance, and biases in AI systems. These challenges must be addressed through targeted education and policy initiatives. The fusion of SI and AI presents unique opportunities for Muslim women to excel in education, entrepreneurship, and advocacy. By leveraging AI technologies in alignment with spiritual values, Muslim women can lead transformative changes in their societies. In addition, there are many ethical and societal implications of AI which call for stronger governance and vigilance and demands for the

responsible and ethical use of AI (Talha Khalil & Shinwari, 2024). Due to that, the integration of SI and AI can create a holistic framework that empowers Muslim women to navigate modern challenges while maintaining their cultural and religious identity.

CONCLUSIONS

The integration of spiritual intelligence and artificial intelligence offers a comprehensive approach to empowering Muslim women in modern society. By combining the ethical grounding of SI with the practical capabilities of AI, Muslim women can overcome barriers and actively participate in shaping their futures. Further research and policy development are needed to ensure that these two forms of intelligence continue to serve as pillars of empowerment. The main purpose of empowering Muslim women is no other than shaping *ummatan wasata* as emphasized in the Quran, so that they can contribute to the ummah and be the pillars of civilized society.

REFERENCES

Ali, S. M. (2004). *The Position of Women in Islam: A Progressive View*. Albany, New York: State University of New York.

Debnath, D., Rahman, M. S., Acharjee, D. C., Latif, W. U., & Wang, L. (2019). Empowering Women through Microcredit in Bangladesh: An Empirical Study. *International Journal of Financial Studies*, 7(37), 2-11.

Haenlein, M. & Kaplan, A. (2009). ABrief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence, *California Management Review*, 61(4), 1-10. DOI: 10.1177/0008125619864925

Liliza Agustin & Wan Nurul Izza Binti Wan Husin. (2024). Islamic Spiritual Intelligence and Work Performance: A Literature Review Study. *Psikoislamedia Jurnal Psikologi*, 9(1), 37-49.

Najati, Muhammad 'Uthman. (1987). *al-Qur'an wa 'Ilmal-Nafs*. Beirut: Daral-Shuruq.

Najati, Muhammad 'Uthman. (1992). *al-Hadith al-Nabawi wa 'Ilm al-Nafs*. Lubnan: Dar al-Shuruq.

Sharma, N., Shaw, R., Bhar, A., Chatterje, S. (2022). Emerging Impact of Artificial Intelligence in Human Life. *International Journal of Computer Science and Mobile Applications*, 10(9), 26-32.

Sri Haryanto. (2024). Islamic Review of Spiritual Intelligence. *Journal International Dakwah and Communication*, 4(1), 53-58.

Sudi, S., Yama, P., & Md Sham, F. (2023). Kecerdasan Spiritual Nabawi Perspektif 'Uthman Najati. *Journal Of Hadith Studies*, 8(1), 55-64. https://doi.org/10.33102/johs.v8i1.226

Sultana, S. & Hasan, Shaikh Shamim. (2010). Impact of Micro-Credit on Economic Empowerment of Rural Women. The *Agriculturists*, 8(2), 43–49.

Talha Khalil, A. & Shinwari ZK. (2024). The dual nature of ai; a double-edged sword amid digital transformation; an ethical analysis. *International Journal of Ethics & Society*, 6(2), 1-8. doi: 10.22034/ijethics.6.2.1

Zohar, D & Marshall, I (2000). *SQ - Spiritual Intelligence, The Ultimate Intelligence*. AJM January 2001. Capaian: http://www.alisonmorgan.co.uk/Zohar.htm.

Zohar, D. & Marshall, I. (2000). *SQ: Connecting with our spiritual intelligence*. Bloomsbury Publishing USA

Zohar, D. & Marshall, I. (2004). *Spiritual Capital; The Wealth We Can Live By*. San Francisco: Berrett-Koehler Pub. Inc

SULAM NATURE APPRECIATION MODULE: SCIENCE AND THE QURAN IN HARMONY

Mohd Hafiz Abu Hassan[i], Hatika Kaco[ii] & Faszly Rahim[iii]

[i](Corresponding author). Senior Lecturer, USIM. mhafiz.a.h@usim.edu.my
[ii]Senior Lecturer, USIM.hatikakaco@usim.edu.my
[iii]Senior Lecturer, USIM. faszly@usim.edu.my

Abstract: The "Nature Appreciation: Science and the Quran in Harmony" project was conducted as part of the STREAM Mentoring Course (CIB1052) under the Service-Learning Malaysia - University for Society (SULAM) initiative. The program aimed to demonstrate the interconnection between science and the Quran, promoting the concept of Tauhidic Science among secondary school students at SMK Nilai Impian, Negeri Sembilan. Through hands-on activities, such as creating launching rockets, and producing slime, students gained a deeper understanding of scientific concepts and their relevance to Quranic teachings. Feedback showed over 85% of participants improved their grasp of STREAM (Science, Technology, Religiosity, Engineering, Artistry, Mathematics) subjects, with heightened interest in science. In "Rocket Launch," students used butane gas to build and launch rockets, with 89.06% excited about the activity, despite some challenges with mechanics. In "Slime Creation," students made slime using PVA and borax, with 92.51% learning something new and 83.42% finding science more accessible through this hands-on approach. The project also encouraged teamwork, communication, and leadership skills among students. Future iterations of the program should expand participation and incorporate more advanced scientific topics to enhance the learning experience. Longitudinal studies could assess the long-term impact of such programs on students' academic and career choices in STEM fields.

*Keywords***:** SULAM, STREAM, Tauhidic Science, STEM education & community engagement.

INTRODUCTION

Malaysia aims to elevate its STEM education to global standards, as highlighted in the Malaysian Education Blueprint 2013-2025, which sets a target of a 60:40 science/technical to arts education ratio (Abdullah, 2024). However, declining interest in STEM among students is a growing concern. Only 22.8% of Form Four students opted for science streams, leading to a drop in STEM-related university applications and a subsequent shortage of graduates in high-tech industries (BH Online, 2024). In addition to STEM education challenges, Malaysia also faces critical environmental issues, particularly waste management, where landfills are nearing capacity (SWM Environment, 2024). This study combines efforts to address both STEM education and environmental challenges through the development of a recycled materials innovation module.

This program aims to inspire school students' interest in STEM while promoting environmental sustainability. Specifically, it seeks to demonstrate the use of recycled materials in innovative product development as part of Service Learning Malaysia - University for Society (SULAM) projects (Department of Higher Education, 2019). The program also strives to improve students' understanding of scientific concepts and cultivate eco-friendly practices through hands-on STEM activities.

Additionally, the implementation of the "Nature Appreciation: Science and the Quran in

Harmony" project, an innovative SULAM initiative integrated with Integration of Naqli and Aqli (iNAQ) knowledges have introduced the concept of STREAM (Science, Technology, Religiosity, Engineering, Artistry, Mathematics). Thus, SULAM programme was conducted at SMK Nilai Impian, Negeri Sembilan on January 25, 2023 which was part of the STREAM Mentoring Course (CIB1052), aimed at introducing the interconnection between science and the Quran, promoting the concept of Tauhidic Science. Key objectives included explaining the relationship between science and the Quran in daily life (Hafiz, 2022), increasing awareness that scientific discoveries should align with the Quran, and fostering students' interest in STREAM.

METHODS

The program involved 32 students from Universiti Sains Islam Malaysia (USIM) mentoring approximately 250 students from Sekolah Menengah Kebangsaan Nilai Impian, Negeri Sembilan. The facilitators guided the students in creating innovative products using recycled materials through two distinct modules:

Module 1 - Rocket Launch (Momentum to the Sky):
Module 1 which involves rocket creation, is a module that explains concepts from the Physics syllabus in secondary schools. Theoretically, the rocket creation involves three principles: the Leidenfrost effect, the principle of air pressure, and Newton's Third Law of Motion. The Leidenfrost effect is a phenomenon where a vapor layer insulates a liquid from a surface, preventing rapid boiling. The insulating vapor allows the liquid droplets to hover above a very hot surface. Similarly, an insulating vapor layer forms between very cold liquid and a hot solid (Pacheco-Vázquez et al., 2021). In brief, Module 2 explains the Leidenfrost effect when butane is introduced into a bottle of water. A thin layer of butane forms on the water's surface without mixing with it. The Leidenfrost effect becomes more apparent when the butane appears to bubble, almost boiling, as the water is hotter than butane's boiling point.

The second principle is air pressure. Air pressure occurs when air particles collide between butane and water, generating reactive energy. Naturally, butane liquid will convert to butane gas, but it takes time. However, when the bottle is quickly inverted, collisions between particles immediately produce butane gas, forcing the gas particles to expand and be expelled through the bottle's neck due to high air pressure, pushing the rocket bottle upward.

This reaction is supported by Newton's Third Law of Motion, which states that for every action, there is an equal and opposite reaction. For instance, the bottle pushes the water downward, and the reaction pushes the bottle upward into the air. The function of air pressure is explained in the Quran within the atmospheric layers, as referenced in QS: Al-An'am (6), verse 125 (Nuraini Fatmi, 2020). Materials needed for this activity include colored paper, bottles, water, and butane to create and launch the rocket. The learning outcome of Module 2 is that students can explain the science based on kinetic theory and integrate both religious (Naqli) and scientific (Aqli) knowledge, as well as describe the existence of air pressure, referring to the theory of pressure and how it leads to an explosion. This module was evaluated through surveys provided in Google Form before and after the implementation of Module 1 activity.

Module 2 - Slime Creation (Squishy Depot):
Module 2 was developed as an activity related to the chemistry curriculum for secondary school students, focusing on the states of matter. Scientifically, matter is composed of particles that are too small to be seen with the naked eye and exists in three states: solid, liquid, and gas. Matter can interact, combine, and change from one state to another. Slime is an example of a basic chemical reaction where two compounds combine to form rearranged molecules during

the formation process. Additionally, slime is closely related to polymers, which are produced from long chains of molecules. The rubbery glue used in slime production is made from long chains of polyvinyl acetate (PVA) molecules. These chains move past one another easily, allowing slime to flow. Chemical bonds form when the PVA glue is mixed with the slime activator, which contains borax, salt solution, or starch, altering the molecular positions in PVA through a cross-linking process. A chemical reaction occurs between the rubber and borate ions, resulting in the formation of a new substance, slime (Robinovit, 2020 & Dziengel, 2020).

Therefore, based on scientific theory, Activity Module 2 helps students gain experience and skills to creatively make their own slime through two tasks: producing the best slime with the most appropriate material ratio and making slime without an activator. Materials provided to the students include cups, PVA solution, borax, and spatulas. This practical method aids students' understanding of the topic of states of matter and polymers. Module 2 explains the learning outcomes achieved by students participating in this program, which are: 1. understanding the relationship between the states of matter and polymers, 2. comprehending the impact of combining two types of matter, and 3. applying the theory of states of matter and polymers in slime formation. This module was also evaluated through surveys provided in Google Form before and after the implementation of Module 2 activity.

RESULTS AND DISCUSSION

After analyzing feedback forms, students expressed high satisfaction with the conducted activities and hoped for similar programs in the future. The program provided valuable knowledge and skills, particularly in collaborating with school and department representatives at USIM.
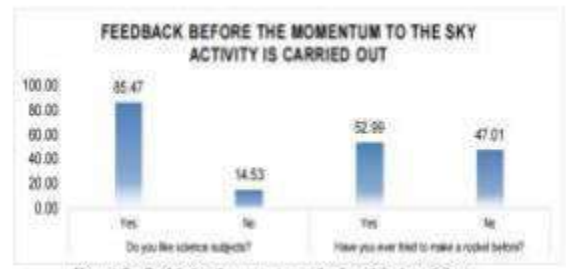
Figure 1: Feedback before the momentum to the sky activity is carried out

Figure 1 shows the feedback before Module 1 activity, "Rocket Launch (Momentum to The Sky)," from 234 school students. It reveals that only 85.47% of students were interested in Science, and just 52.99% had previous experience with rocket making before this activity.
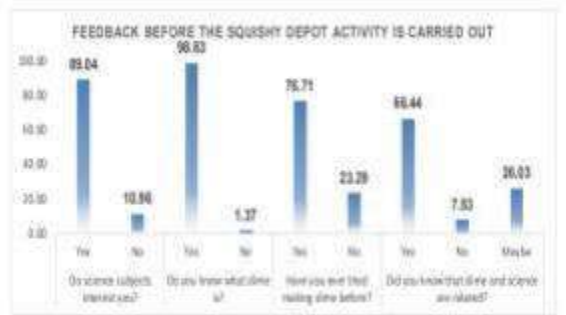

Figure 2: Feedback after the momentum to the sky activity was carried out

Figure 2 displays the feedback after the rocket activity from 128 students, with 51.56% in Form 1 and 48.44% in Form 2. Interest in Science increased by approximately 6%, reaching 91.41% after the activity, compared to 85.47% before. Additionally, 89.06% of students enjoyed the activity, although only 80.47% successfully understood the rocket-making and launching concepts. Furthermore, 90.63% agreed that the facilitators' explanations were easy to understand, leading 91.41% to support future implementations of Module 1 activity.

Figure 3: Feedback before the squishy depot activity is carried out

Figure 3 shows feedback before the Slime (Squishy Depot) Module 2 activity, with responses from 146 students: 54.1% from Form 1 and 45.9% from Form 2. It was found that 89.04% of students were interested in science, while 10.96% were not. Most students, 98.63%, were aware of slime, but only 76.71% had tried making it. Additionally, 33.56% of students were unsure or unaware that slime is related to science.

Figure 4: Feedback after the squishy depot activity was carried out

Figure 4 presents feedback after the Slime Squishy Depot activity, with responses from 187 students: 54.55% from Form 1 and 45.45% from Form 2. Following the activity, 92.51% of students learned something new, compared to 66.44% who previously knew about the connection between slime and science. Only 0.53% reported not learning anything new, and 6.95% were neutral. Additionally, 83.42% of students found that the science concepts were easier to understand through this activity, benefiting 23.29% who had never made slime before. Furthermore, 86.63% agreed that such activities provide a good alternative learning method, while 12.83% were neutral, and only 0.53% disagreed. Lastly, 0.53% of students disagreed that the facilitator's instructions were clear and easy to understand. Overall, the second module activity was conducted successfully.

CONCLUSIONS

The SULAM program enhanced student engagement in STEM and promoted sustainability by integrating recycled materials into product design. This initiative addressed waning interest in STEM and fostered environmental responsibility. It effectively combines educational objectives with societal challenges. For example, in the "Rocket Launch" activity, students built and launched rockets using butane gas, with 89.06% expressing enthusiasm despite some mechanical difficulties. In "Slime Creation," students made slime with PVA and borax, with 92.51% learning something new and 83.42% finding science more approachable through the hands-on experience.

REFERENCES

Abdullah, I. (2024*). KPT bimbang graduan sektor berteknologi tinggi tak mencukupi*. Harian Metro. Retrieved 17th July 2024, from https://www.hmetro.com.my/mutakhir/2024/05/1086617/kpt-bimbang-graduan-sektor-berteknologi-tinggi-tak-mencukupi

BH Online. (2024). *Kemerosotan minat pelajar terhadap STEM amat membimbangkan – PM*. *Berita Harian*. Retrieved from https://www.bharian.com.my/berita/nasional/2024/03/1228102/kemerosotan-minat-pelajar-terhadap-stem-amat-membimbangkan-pm

Department of Higher Education. (2019). SULAM: Service-Learning Malaysia, University for Society, SULAM Playbook. Ministry of Higher Education.

Hafiz, A. H. M. (2022). *Norma baharu: Usahasains memahami keperluan masyarakat*. *Penerbit USIM*.

Pacheco-Vázquez, F.; Ledesma-Alonso, R.; Palacio-Rangel, J. L.; Moreau, F. (2021). *Triple Leidenfrost Effect: Preventing Coalescence of Drops on a Hot Plate. Physical*

Review Letters. 127 (20): 204501. doi:10.1103/PhysRevLett.127.204501

Robinovitz, K. (2020). Science of slime. Sloomoo Institute. Retrieved January 15, 2023, from https://sloomooinstitute.com/blogs/sloomoo-stories/science-of-slime

SWM Environment. (2024). *Tapak pelupusan hampir mencapai had kapasiti: Keperluan mendesak untuk melaksanakan pengasingan sisa*. Retrieved 23rd August 2024, from https://swm-environment.com/public/media-swm-in-the-news-details?id=790

FOSTERING FINANCIAL LITERACY AMONG STUDENTS: AN INAQ GAMIFIED APPROACH

Muhammad Nuruddin bin Sudin[i], Nur Amlya binti Abd Majid[ii]
& Hashim Bin Ahmad Shuyuti[iii]

[i](*Corresponding author*). Lecturer, Tamhidi Centre, Universiti Sains Islam Malaysia.
nuruddin@usim.edu.my
[ii]Lecturer, Tamhidi Centre, Universiti Sains Islam Malaysia.. amlya@usim.edu.my
[iii]Lecturer, Tamhidi Centre, Universiti Sains Islam Malaysia,hashim@usim.edu.my

Abstract: This study explores the financial literacy awareness of university students, with a focus on spending management, saving practices, and investment knowledge. A mixed-methods approach, incorporating both descriptive and explanatory research designs. The intervention utilised gamification techniques to enhance students' understanding of key financial concepts, with an emphasis on making the learning process interactive and engaging. The results demonstrated significant improvements in financial literacy, particularly in investment knowledge, where students gained insights into various investment opportunities and the risks associated with them. The inclusion of the INAQ in the intervention further reinforced students' understanding of the moral and social implications of financial decisions. Overall, the study highlights the effectiveness of gamification in promoting financial literacy.

Keywords: Financial Awareness, Financial Literacy, Edutainment, Learning Gamification, Students problem.

INTRODUCTION

Financial literacy is increasingly recognized as a vital aspect of education, particularly for university students in Malaysia. As these students transition into adulthood, the ability to manage finances effectively becomes crucial for ensuring long-term stability and success. Molina-García et al. stated it is an essential driver of undergraduates' risk-taking propensity (Molina-García et al., 2023). This report examines the current level of financial literacy among university students, focusing on three critical areas: money spending management (*SM*), saving skills or practices (*SP*), and prior knowledge of investment (*IK*).

All these critical areas finding are originated by examining financial literacy, personal financial management and investment decision nexus (Opponget al., 2023). These research highlights a growing concern regarding the financial literacy. Studies have shown that many peoples struggle with managing their finances, often leading to issues such as overspending and accumulating debt. In Malaysia, research indicates that while students are aware of the importance of financial management, there is often a gap between their knowledge and actual financial behavior. For instance, a study by Low revealed that a significant percentage of Malaysian students lack adequate knowledge in investment, which can hinder their ability to make informed decisions about their financial futures (Lowetal., 2023).

Understanding the factors that influence students' financial behavior is essential for developing effective educational programs. By exploring current trends in money management, saving habits, and investment awareness, this report aims to provide insights that can guide the development of targeted financial literacy initiatives. These initiatives are crucial for equipping students with the tools they need to navigate the financial challenges of adulthood, fostering a generation of financially responsible individuals who can contribute to the economic stability of the region.

In recent years, gamification has emerged as a promising approach to improving financial literacy among students. By integrating game-like elements into educational activities, gamification can transform traditional learning methods into more engaging and interactive experiences. This approach has been shown to increase motivation and participation, making complex financial concepts more accessible and easier to understand (Buchory et al., 2021: Handarini et al., 2022). For instance, the use of games such as Monopoly and Muamalat Interactive Game (MIG), as highlighted in recent studies, has proven effective in enhancing students' understanding of basic accounting principles by providing a practical, hands-on learning experience (Shahwanet al. 2015).

Beyond merely increasing engagement, gamification can also foster a deeper retention of knowledge, as students are more likely to remember and apply what they have learned in a fun and competitive environment (Lutfi et al., 2023). As educational institutions seek innovative ways to address the gaps in financial literacy, particularly in regions like Malaysia, integrating gamified learning strategies offers a viable solution to making financial education more appealing and effective for university students (Eltahir et al. 2023).

METHODS

This study employs a mix method case study approach to examine how students comprehend, perceive financial literacy and provide recommendations regarding the incorporation of gamification into their instructional methods. Mix method case study allows in-depth investigation of the underlying issues and reasons for the occurrence of certain decisions resulting in a comprehensive understanding of the more in-depth experience of individuals (Hancock et al., 2021).

The study recruited participants utilizing purposeful sampling. This sampling strategy involves selecting individuals who can fulfil a specific purpose in relation to the research question and offer valuable insights into a phenomenon (Weyant, 2022). In total of 310 TAMHIDI students aged between 18 and 19 are participate voluntary from various course, consisting of male and female students. The participants were asked to fill a survey question before (pre-survey) and after (post-survey) the gamification intervention on financial literacy.

A pre-survey, conducted prior to the initiation of an intervention, is crucial in establishing a baseline for participants' prior knowledge, skills, and financial literacy understanding. Subsequently, a post-survey administered with more open-ended reflection question at the conclusion of the intervention is used to assess changes in participants' responses. This fundamental tool serves as a reference point for measuring future progress, while the follow-up survey evaluates the program's effectiveness and identifies areas for improvement.

For financial literacy gamification, the content was focusing on three critical area (SM, SP and IK). Figure 1 shows the correlation between all these three aspects based on model complex relationship in Opponget al. findings.
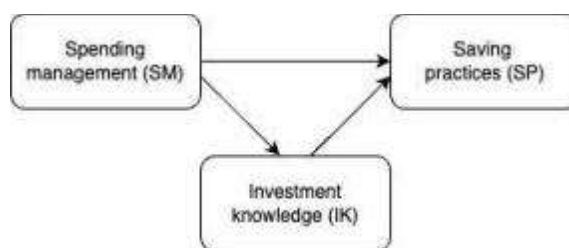

Figure 1. Complex relationship model on financial literacy

This research finding stated that there is a significant relationship between spending management, ability to understand and effectively use various financial resources with personal saving practices and investment knowledge in understanding it's risk and

benefits. It also stated Investment knowledge and decision mediates the relationship between spending management and saving practices. Since the proper investment decision can improve saving and spending ability (Opponget al., 2023).

During intervention, the winning situation (best scenario) for this gamification comes to a participant who has most final points from their total asset and positive cash flow at the end of one hour or 30 minutes session. The final points calculation is based on 40% total assets and 60% of total '*sedakah*' (charity). The 2:3 weightage ratio are based on Muslims practices stated in Surah Al-Qasas verse 77 meaning, "*But seek, through that which Allah has given you, the home of the Hereafter; and [yet], do not forget your share of the world. And do good as Allah has done good to you*". These versed emphasis on balancing motivation in seeking wealth for Hereafter first, then the rest of the world and encourage on doing good deeds to other as well as we been blessed by our creator. Hence the weightage is slightly skewed towards on charity points.

The intervention session then been closed with a discussion between participants and moderator by interpreting the gameplay session with a real-world financial situation or cases.

RESULTS AND DISCUSSION

Table 1 presents the demographic profile of the respondents, categorized into two groups: gender and academic courses. A total of 310 students (N = 310) from various backgrounds participated in this research.

Table 1. Respondent demographic

	N = 310	%
Men	125	40.323
Women	185	59.677
Medical Science	82	26.452
Physical Science	124	40.000
Accounting	43	13.871
Syariahand Law	61	19.677

Meanwhile Figure 1 presents the average values for each item in the survey, comparing the pre-intervention (yellow) and post-intervention (blue) financial literacy simulation sessions. Based on these findings, all participants demonstrated improvement in every critical aspect of financial literacy. The most significant positive impact was observed in investment knowledge (IK), while the least improvement occurred in spending management (SM).

Figure 1. Average score for each item

This indicates that students gained substantial knowledge about investment opportunities, including self-development skills, Amanah Saham Bumiputera (ASB) dividends, e-wallet rewards, and robo-advisor investments. They also learned that every investment requires commitment and an understanding of the associated risks.

In terms of spending management, students showed a moderate understanding of their own spending habits. However, many of them exhibited tendencies towards careless spending.

By introducing unexpected expenditures and related upkeep in the gaming simulation, students became more conscious of their financial behavior. This, in turn, encouraged them to manage and take full control of their spending to ensure in-game survival.

Gaining control over their spending also motivated students to appreciate the importance of saving. To secure them in-game survival, they became more vigilant about the value of their emergency reserves. Additionally, they realized that by maintaining discretionary funds, they could remain calm when facing future challenges and more effectively calculate investment risks.

One of the key considerations in survey research is ensuring the reliability of the instrument employed. To assess this, Cronbach's Alpha was utilised to measure the coefficient of reliability or internal consistency of the survey. Specifically, it evaluates the extent to which a set of items effectively measures a single unidimensional latent construct, which is a critical factor in research. Table 2 presents the Cronbach's Alpha values for each critical aspect examined in this study.

Table 2. Cronbach's Alpha, α

Critical aspect	Pre	Post	level
Money spending management	0.802	0.834	Good
Savingskill/ practice	0.845	0.866	Good
Knowledge of investment	0.867	0.811	Good

Based on Table 2, all items in critical aspect were above 0.7. ACronbach's Alpha value greater than 0.7 is generally considered acceptable in most social sciences because it signifies a moderate level of internal consistency within the surveyor test items. This finding suggests that the items are sufficiently correlated, indicating a reliable measurement of the intended concept. While a higher value closer to 1 would indicate stronger consistency, values above 0.9 might suggest

redundancy among the items, whereas values below 0.7 could indicate that the items are not well-aligned or too variable. In social sciences, where constructs such as attitudes or behaviors are often abstract and complex, a threshold of 0.7 strikes a balance between capturing adequate consistency. This makes it a widely accepted standard for ensuring the reliability of research instruments.

CONCLUSIONS

The primary objective of this study was to gain a deeper understanding of university students' awareness of financial literacy. To achieve this, the study employed a mixed-methods approach, utilising both descriptive and explanatory research designs. The participants consisted of 310 TAMHIDI students, aged between 18 and 19, from diverse backgrounds and courses. The findings demonstrate that the gamification approach significantly enhanced students' awareness of financial literacy. Students found the intervention enjoyable, were able to maintain focus, and developed a better understanding of investment risks through simulated scenarios. Furthermore, the inclusion of the INAQ element in the intervention reinforced students' appreciation of the importance of '*sedakah*' and its potential impact on their lives.

REFERENCES

Buchory, H. A., Homan, H. S., & Willy, S. (2021). The development of monopoly accounting game to increase learning motivation. Journal of Education and Social Sciences, 18(2), 75-81.

Eltahir, M. E., Annamalai, N., Uthayakumaran, A., Zyoud, S. H., Zakarneh, B., & Al Salhi, N. (2023). A Qualitative Study on Malaysian Academics' Perceptions and Suggestions on Gamified Learning. The Qualitative Report, 28(7), 2011-2028.

Hancock,D. R., Algozzine,B., & Lim, J. H. (2021). Doing case study research: A practical guide for beginning researchers.

Handarini, D., Mulyani, H., & Susilowati, N. (2022). Application of Monopoly Game

Learning Media in Increasing Student Motivation in Learning Basic of Accounting in Vocational School. Educational Administration: Theory and Practice, 28(01), 104-120.

Low, K. C., Chong, S. L., Mohamad, S. S., & Arshad, R. (2023). Digital Financial Literacy Among Young Adults In Malaysia. *European Proceedings of Social and Behavioural Sciences*.

Lutfi, A., Aftinia, F., & Permani, B. E. (2023). Gamification: Game as a Medium for Learning Chemistry to Motivate and Increase Retention of Students' Learning Outcomes. *Journal of Technology and Science Education*, *13*(1), 193-207.

Molina-García, A., Cisneros-Ruiz, A. J., López-Subires, M. D., & Diéguez-Soto, J. (2023). How does financial literacy influence undergraduates' risk-taking propensity?. The International Journal of Management Education, 21(3), 100840.

Oppong, C., Salifu Atchulo, A., Akwaa-Sekyi, E. K., Grant, D. D., & Kpegba, S. A. (2023). Financial literacy, investment and personal financial management nexus: Empirical evidence on private sector employees. Cogent Business & Management, 10(2), 2229106.

Shahwan, S., Shafii, Z., Salleh, S., Ibrahim, N., Arif, H. M., Alwi, K., & Sapian, S. M. (2015). An experiment on Shariah based Personal Financial Transactions Using a Business game. International Journal of Business, Economics and Law, 8(1), 61-66.

Weyant, E. (2022). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches: by John W. Creswell and J. David Creswell, Los Angeles, CA: SAGE, 2018, $38.34, 304pp., ISBN: 978-1506386706.

QURANIC EDUCATION FOR AUTISTIC CHILDREN IN MALAYSIA

Yuslina Mohamed[i] & Raudhah Nurdin Muhammad[ii]

[i]Associate Professor, Universiti Sains Islam Malaysia (USIM). yuslina@usim.edu.my
[ii] (*Corresponding author*). Master Student, Universiti Sains Islam Malaysia (USIM). raudhahnurdin@yahoo.com

Abstract: The prevalence of autism has been steadily rising globally over the past decade. Despite this, their access to Quranic education remains an often-overlooked aspect. While many efforts are directed towards educating neurotypical individuals, children with autism frequently face barriers to receive adequate religious education. This study aims to analyze strategies used in teaching Quranic education to autistic children in Malaysia. By using a qualitative literature analysis, findings reveal that not all available method are suitable to be implemented to autistic children. Further research and adaptation of Quranic education for autistic children are essential to ensure their spiritual development and inclusion in religious practices.

Keywords: Quranic Education, Autism, Malaysia.

INTRODUCTION

Autism prevalence has steadily increased worldwide over the past decade. However, an often-overlooked aspect of this community is their opportunity to receive Quranic education, especially considering that more than half of children with autism come from Muslim families. Many efforts are primarily directed toward educating neurotypical individuals, leaving those with autism often overlooked in this important area of learning. Even though their physical appearances might be slightly different compared to the typical society, but as a human being and servant of Allah, they should have given the right to access to the Quranic education.

Majority Islamic Scholars state that individuals with intellectual disabilities, such as autism, are exempt from legal responsibilities in matters of worship, marriage, and criminal law. This is due to their mental incapacity, which is caused by neurological impairment. However, they should still be taught and trained in acts of worship, such as prayer, fasting, and self-discipline, as these practices can serve as spiritual therapy for them (Kistoroetal., 2020; Sulaiman et al., 2024; Zulkafli et al., 2018). Moreover, they have the right to learn and worship Allah SWT, even if they may not fully understand or remember the teachings (Azimetal., 2022).

Focusing to Quranic education, current research reported that there is a gap in Quranic education for children with ASD, with most existing approaches provided are focusing to normal and typical children. Some of the causes are reported due to lack of awareness, facilities, and training for educators. In addition, some are still believed that there is not necessary for special ability children like ASD to perform ibadah and as a result, we often observed that most religious activities are usually focused to typical people with less focus to special ability children like ASD (Mohd Zin, 2006).

With those concerns, this study was conducted with objective to analyze strategies used in teaching Quranic Education to autistic children in Malaysia.

METHODS

This study uses a literature review method where previous studies related to the Quranic teaching

method were examined and reviewed. Previously, research has been conducted to explore the traditional and contemporary method used in teaching Quran (Bidin et al., 2018), and Quranic education for disabilities (Hj. NorakyaireeHj. Mohd Raus, 2017)

RESULTS AND DISCUSSION

Based on the selected articles, several methods are found used in Quranic teaching. Details are presented in Table 1 below:

Table 1. Strategy Used in Teaching Quranic Education

Strategy Used	References
- Traditional Method (*Talaqqi* and *Mushafahah)* - Al Baghdadi Method - Iqra'	(Bidinet al., 2018)
- QurANIS	(Hj. Norakyairee Hj. Mohd Raus, 2017)

Data analyzed from selected articles found that, not all Quranic teaching methods used are suitable for children with autism. Traditional teaching methods such as *talaqqimusyafahah*, and Iqra are general in nature and might need to be adjusted to meet their specific needs.

Another Quranic teaching method used is the Al-Baghdadi method, which focuses on using tapping tools and repetition to improve tajwid understanding and pronunciation. While the use of teaching aids can enhance the effectiveness of this method, it may still require adjustments to accommodate the sensory, communication, and attention challenges that children with ASD often face.

However, a flexible and structured approach like QurANIS method is found suitable and has been designed specially for ASD. This method encompasses of four basic components: Memorization (Hafazan), Quranic Recitation (Tilawah al-Quran), Worship Refinement Therapy (Terapi Tahsin Ibadah), and Natural

Therapy (Terapi Alami). This method is believed to be effective and can help engage autistic learners, who often respond well to visual stimuli and structured approaches.

CONCLUSIONS

Quranic education requires appropriate steps and techniques based on their intellectual level, so does for children with ASD. However, there is not much research or documentation found in this area. As for Muslim, this lack of focus needs serious attention, as the ability to read Quran is very important to all believers. To enhance their learning experience, greater involvement from all parties is encouraged, as better education opportunities will help brighten their future.

ACKNOWLEDGEMENT

REFERENCES

Azim, M., Ibrahim, H., Al-Quran, J., Al-Hadith, D., Islam, A. P., Malaya, U., Lumpur, K., Ahmad, K., & Abdullah, M. (2022). Autistik dari Perspektif Undang-Undang dan Hukum Islam (Autistics from the Perspective of Law and Islamic Jurisprudence). *Journal of Quran Sunnah Education and Special Needs*, *6*(May), 47–64.

Bidin, S. N. B. S., Hamzah, M. S., Rahman, T. A., Kamaruddin, K., & Azman, N. A. N. (2018). Kaedah Pengajaran Dan Pembelajaran Al-Quran: Kajiandi Masjid UniSZA (Teaching and Learning Method of al-Quran: A Study in UniSZA). *Jurnal Hadhari*, *10*(1), 93–108.

Hj. NorakyaireeHj. Mohd Raus, N. A. N. (2017). Model dan Kurikulum Pendidikan Al-Quran Holistik Bagi OKU. *J-QSS – Journal of Quran Sunnah Education and Special Needs*, *16*(06). https://doi.org/10.32964/tj16.6

Kistoro, H. C. A. K., Kartowagiran, B. K., Latipah, E. L., Naim, N. N., & Putranta, H. P. (2020). Implementation of Islamic

religious learning strategies in children with autism in Indonesia. *Specijalna Edukacija i Rehabilitacija*, *19*(4), 227-246. https://doi.org/10.5937/SPECEDREH19-28813

Mohamad, S. P., M. Y. Zulkifli Mohd. Yusoff, & Adli, D. S. H. (2014). Pengajaran Dan Pembelajaran Al-Quran Bagi Golongan KelainanUpaya Mental: Analisis Dari Sumber Tradisi Islam. *Jurnal Islam Dan Masyarakat Kontemporari*, *8*(0), 153-168.

Mohd Zin, A. A. (2006). *Dakwahdi Malaysia*. Universiti Malaya.

Sulaiman, S., Nor Rodin, M. A., Din, M. L. H., Bolkiah, A., & Sulaiman, M. A. S. (2024). *Al Quran Sebagai Terapi Bunyi BagiMasalah Kemahiran Pertuturan Dan Masalah Emosi Kanak – Kanak Autism. 5*, 20-23.

Zulkafli, N. S., Majid, L. A., & Ishak, H. (2018). Inovasi Perubatan Melalui Terapi al-Quran Terhadap Kanak-Kanak Autisme Medical Innovation Through Quran Therapy On Autistic Children. *JurnalAl-Turath*, *3*(2), 40-45.

FAMILY JUSTICE REDEFINED: UPHOLDING THE CHILD'S RIGHT TO BE HEARD IN CUSTODY DISPUTE

Asmidah Binti Ahmad[i], Aldamier Bin Hadjikain[ii] & NoorAziah BintiMohd Awal[iii]

[i](*Corresponding author*). Senior Lecturer, Fakulti Syariah & Undang-undang, Universiti Sains Islam Malaysia. asmidah@usim.edu.my
[ii]Part-time Teacher, Pusat Tamhidi, Universiti Sains Islam Malaysia. almier13@gmail.com
[iii]Professor, Universiti Kebangsaan Malaysia. naha61@gmail.com

Abstract: The expression that children should only be seen and not heard is in total contradiction to their right to be heard. In recent years, the acceptance of child's participation in matters affecting themselves has been growing, especially after the United Nations adopted the Convention on the Rights of the Child or CRC. This development is inline with Article 12 of the CRC which provides that children should be given the opportunity to express their views in all matters concerning them and that these views should be given due weight. Additionally, the concept of best interest of children, as enshrined in Article 3 of CRC, must be considered as a priority in any issues relating to children including in custody cases. In Malaysia, the concept of welfare of the child as the paramount consideration has been applied in both civil and syariah courts. Thus, in order to determine the best interest and welfare of children is given due consideration, right to be heard must be duly exercised. This research aims to assess the effectiveness of present legislations in facilitating children's right to be heard in custody dispute in Malaysia. This paper employs qualitative research which analyses data from primary and secondary sources using comparative method. This research reveals that judges have the discretion to allow children to voice their opinion in custody disputes. It also reveals the necessity for a specific guideline on child participation in family justice proceeding in Malaysia.

Keywords: child participation, custody dispute, hadhanah, parental alienation, UNCRC

INTRODUCTION

Malaysian courts value the wishes of a child as embedded in its legislation.[1] It is also evidenced through judicial practices which favor the direct approach of child participation. The court seems to favor interviewing method despite engaging expert opinions in deciding custody dispute. It is clear that uncertainty of procedures in judging family disputes lead to the use of wide discretionary power by judges in determining the best approach in upholding the children's wishes in presiding cases before them. Thus, the way that judges exercise discretion in family justice proceedings profoundly affects the extent to which children's voices can be heard in those proceedings[2] and at the same notion might jeopardize the rights of the child to be heard fairly.

METHODS

The cases for this fieldwork were chosen based on a recommendation from an officer at the Kuala

---

[1] For instance, see section 88 of the Law Reform (Marriage and Divorce) Act 1976 1976 (Act 164) and section 86 of the Islamic Family Law (Federal Territory) Act 1984 1984 (Act 303).

[2] Raitt, F.E., 'Judicial Discretion and Methods of Ascertaining the Views of a Child', (2004) 16 (2) *Child and Family Law Quarterly*, p 1-15.1.

Lumpur High Court (Family Division). Ten random cases related to custody proceedings were reviewed. The aim of the study was to better understand the court's current process in custody disputes, focusing on children's right to participate under Article 12 of the CRC. For the syariah court's perspective, fieldwork was done at the Syariah High Court in Melaka, where an interview with a judge was conducted, and ten *hadanah* (custody) cases were analyzed. In ascertaining the best model to be adopted, a comparative study to New Zealand related laws were made with the help of Lundy's model of participation.

RESULTS AND DISCUSSION

This research reveals that judges have the discretion to allow children to voice their opinion in custody disputes. This recognition forms part of respect towards their dignity and progressively acknowledging their autonomy as an individual rather than subject of adult. Further, without the child's view and active participation in custody dispute, judicial system may be unable to give weight or to consider the emotional impacts on a child which may affect their future development. In determining the child capacity and competency to participate, there is no specific range of age shall be prescribed to determine the appropriate age of maturity to express an independent opinion. In this regard, attention must be given to the level of child's understanding of their future interests in the custody decision and their ability to understand the issue.

The question of relevancy of instant issue to Malaysia family justice system is evidenced through the rulings made in the Malaysian High Court and Shariah Courts. There are similarities between both legal systems pertaining to the custody of the children. Both civil and Shariah laws are in conformity with Malaysia's international obligation under the CRC, in which the welfare of the children is the paramount consideration, and the wishes of the children as

part of the children's welfare are not being left neglected.

Both Shariah and civil laws have recognised the priority of the mother as the person who is able to give love and affection to their infant child. Both laws recognised that the mother is the closest and the most affectionate person to be entitled to the custodian right of the infant child. In addition, the child's right to express his or her view is also recognised both by the law applicable to Muslims and that applicable to non-Muslims in Malaysia.

With regard to the law applicable to Muslims, it is provided that the child may have the right to choose between the parents when he or she reaches the age of *mumaiyiz* as provided by classical Islamic law. The participation of the child in custody decision-making will commence once the child has attained the age at which they are capable of expressing their independent opinions. The court must ensure that these views are not influenced by any other parties who may have hidden agendas and motives.

Nonetheless, the laws in both legal systems need some improvement in terms of children's participation. This is particularly related to the involvement of children in case the parents are agreeable to an amicable settlement such as the Sulh proceedings.

RECOMMENDATIONS

A potential obstacle, however, is the legal system presently does not appear to guarantee the children's rights to meaningfully participate in post-separation litigations especially in custodial disputes and hence the following recommendations are made; firstly, there should be an amendment to the law particularly Section 88 (2) of the Act 164 and all state'slegislation for Islamic law on child's participation in decision-making process. The Parliament and the State Legislative Assembly should make it compulsory for the court to ensure that the child be given sufficient access to express their views without having regards to their age and maturity.

Secondly, by having a standard judicial procedure or guideline on children's participation in matrimonial proceedings. In improving the local legislation on children's participation, it is best to take New Zealand Care of Children Act 2004 as a guideline and Lundy's model of participation[3] as a benchmark in ensuring the right to participate in court is welcoming.[4]

Next judges should be assisted by child experts, either a psychologist appointed in courts, child psychiatrists, the child's counsel or trained officers from social welfare departments during the interview sessions. These persons may offer their recommendations based on their evaluations and wider experience in order to assist the judges in making wiser decisions over child custodial battles. This suggestion is in accordance with the recommendation of the Committee whereby state parties must exert all means to ensure that the child is accorded with sufficient opportunity to the rights to express views.

Lastly, the rules and regulations relating to the procedures in the Conciliation Council should be amended to include the child in concern in the proceedings. The rules that 'no other parties except parties to the dispute and the Conciliatory officer' shall be in the Conciliation process are no longer applicable to protect and advocate the rights of children to participate in the custody proceedings.

CONCLUSIONS

As in Malaysia, it is peculiar to talk about children's rights. One of the factors embedded maybe due to cultural factors whereby children must listen to their folks and that their folks know best. Changing the law may somehow open the public perspective that children's view matters. It is understood that not all legislation must be changed overnight to ensure they celebrate children. However, the most crucial situation to celebrate children's opinions if it cost their future, especially in custodian issue. They have the right to have a say in choosing their future, and it is upon the professionals who are accountable to make it a reality and, therefore, are obliged to make themselves skillful in facilitating the child's rights to be heard in the course of legal proceedings. Children's vulnerability should be seen as a challenge for us to balance their autonomy and the right to care. Such efforts, if successful, can contribute towards producing more highly participated children in any judicial proceeding as aimed by the UNCRC. In conclusion, should further research explore whether these recommendations can be effectively applied to custody cases involving parental alienation?

ACKNOWLEDGMENTS

REFERENCES

Ahmad, A. (2023). [Child's Right to Participation in Custody Dispute] (PhD thesis). Universiti Kebangsaan Malaysia.

Ahmad, A., Mohd Awal, N. A., & Samuri, M. A. A. (2019). Guideline for judicial conversation with children in court. *Pertanika Journal of Social Sciences and Humanities, 27*(S1), 109–121.

---

[3] L. Lundy, 'Voice' is not enough: conceptualising Article 12 of the United Nations Convention on the Rights of the Child' (2007) 33(6) British Educational Research Journal, p 927.

[4] The proposed guideline which this research recommended can be seen in Ahmad, A. (2023). [Child's Right to Participation in Custody Dispute] (PhD thesis). Universiti Kebangsaan Malaysia.

Inder, D. (2019). *Children's Participation in the Context of Private Law Disputes in the New Zealand Family Justice System* University of Otago]. New Zealand.

Kahar, R. & Zin, N. M. (2011). Child Related Policy and Legislative Reforms in Malaysia. *International Journal of Social Policy and Society, 8*.

Lundy, L. (2007). "Voice" is not enough: Conceptualising Article 12 of the United Nations Convention on the Rights of the Child. *British Educational Research Journal* 33(6): 927–942.

Lee-maturana, S., Matthewson, M., Dwan, C., & Norris, K. (2019, 2019/06/01). Characteristics and experiences of targeted parents of parental alienation from their own perspective: A systematic literature review. *Australian Journal of Psychology, 71*(2), 83-91. https://doi.org/10.1111/ajpy.12226.

Michail, S., Baird, K., Fattore, T., & Grace, R. (2023). Operationalising children's participation: Competing understandings of the policy to practice 'gap'. *Children & Society, 37*(5), 1576-1595. https://doi.org/https://doi.org/10.1111/chso.12708.

Nor'asyikin Hamzah & Raihanah Abdullah. 2018. Hak kanak-kanak untuk didengar: Amalan dalam prosiding ḥaḍānah di Mahkamah Syariah Wilayah Persekutuan Kuala Lumpur. *Journal of Shariah Law Research* 3(1): 35–64.

Raitt, F. E. (2004). Judicial Discretion and Methods of Ascertaining the Views of a Child. *Child and Family Law Quarterly, 16*(2), 1-15.

Strømland, M., Bahus, M. K., & Andersen, A. J. W. (2022). Too Vulnerable to Participate? A Systematic Literature Review of the Gap between a Right to Participate and Participation, in Welfare Services. *Journal of Human Rights Practice, 14*(1), 331-351. https://doi.org/10.1093/jhuman/huab061

UNLOCKING THE POTENTIAL OF DURIAN'S SEEDS: SUGAR AND LIGNIN DETERMINATION

Esmalinda Mohamad[i] & Latiffah Karim[ii]

[i](*Corresponding author*). Student, Department of Food Biotechnology, Faculty of Science and Technology, Islamic Science University of Malaysia.esmalinda.mohamad@raudah.usim.edu.my
[ii]Senior Lecturer, Department of Food Biotechnology, Faculty of Science and Technology, Islamic Science University of Malaysia.latiffah16@usim.edu.my

Abstract: Durian, a tropical fruit, is renowned for its unique odor and flavor, and is predominantly cultivated in Malaysia, Thailand, Indonesia, and the Philippines. This study investigates the potential of durian seeds as a feedstock for bioethanol production by analyzing their sugar and lignin content. Given the growing annual production of durian, particularly in Malaysia, a substantial amount of biomass waste is generated, providing an opportunity for sustainable utilization. The study involves pre-treatment processes, including acid hydrolysis and enzymatic treatment, to convert complex polymers in durian seeds into fermentable sugars. Although durian seeds exhibit low glucose content, they have a high biomass lignin content, making them a promising source for bioethanol production. Statistical analysis reveals that both Sample Weight and Molarity significantly affect Percentage Lignin Yield, with extremely low P-values indicating strong effects. The interaction between Sample Weight and Molarity is also highly significant, suggesting that the impact of one factor on lignin yield depends on the level of the other. Optimal conditions for acid pre-treatment were evaluated, showing that lower acid concentrations increase lignin yield, crucial for enhancing bioethanol production. The study underscores the environmental benefits of utilizing durian waste, such as reducing greenhouse gas emissions and promoting a circular economy, while recommending further research to optimize the bioethanol production process and address contamination issues.

INTRODUCTION

The increasing demand for bioethanol stems from a combination of environmental, economic, and geopolitical factors. As a renewable and sustainable biofuel derived from various biomass sources, including corn, sugarcane, and other plant materials, bioethanol offers a promising alternative to fossil fuels. The primary environmental motivation is the reduction of greenhouse gas emissions, particularly carbon dioxide, to mitigate climate change and lessen the transportation sector's environmental impact. Economically, bioethanol contributes to energy security by diversifying the energy mix and reducing reliance on finite fossil fuel resources. Second-generation bioethanol, produced from lignocellulosic biomass (LCB), which includes agricultural residues and forest waste, stands out as a particularly promising area, as it does not compete directly with food production and is being pursued globally for its potential to contribute to sustainable energy solutions. Lignocellulosic biomass, primarily composed of cellulose, hemicellulose, lignin, and polysaccharides, can be processed into bioethanol through a series of conversion steps. The process begins with pre-treatment methods such as acid hydrolysis and enzymatic treatment, which break down the rigid structure of the biomass, making cellulose accessible for further

conversion. Hydrolysis then breaks down cellulose and hemicellulose into fermentable sugars, which are subsequently fermented by microorganisms into ethanol. The final stages involve separating and purifying the ethanol through distillation or other separation techniques to produce high-purity bioethanol. This approach not only offers a renewable energy source but also promotes the efficient use of biomass waste, contributing to a circular economy. Durian, a tropical fruit extensively cultivated in Southeast Asia, particularly in Malaysia, generates significant biomass waste due to its high cultivation volume and the fact that nearly half of the fruit is discarded as waste. Recent research has explored the potential uses of durian biomass, particularly the skin and seeds, in various industries. For instance, durian skin has been identified as a potential lignocellulosic material for use in bio-composite insulation boards, offering a low-cost alternative to wood. Additionally, bio-char produced from durian biomass has potential applications in biodegradable plastic manufacturing. This study focuses on the potential of durian seeds as a source of bioethanol, emphasizing the importance of integrating waste management with bioethanol production to create sustainable energy solutions. By leveraging agricultural residues like durian biomass, this research aims to contribute to the development of clean, renewable fuels that help reduce greenhouse gas emissions and support environmental sustainability.

METHODS

Raw materials and reagent

Fruit seeds were obtained from the fresh durian and the selection of fruits were done due to their availability. All the chemicals and reagents used were of analytical grade, unless otherwise stated.

Sample preparation

The durian seed will undergo several washes before cut into small pieces measuring 1 to 2 cm and then dried in a hot oven set at 60°C until a constant weight is achieved. The sample will be reduced in size by using mechanical blender, prior to sieving through a mesh with a pore size of 150-300 μm. Finally, the powder will be packed into a sealable plastic bag and stored in desiccators for future utilization.

Acid pre-treatment

Based on the methodologies described by Jusoh et al. (2021), in this study, durian seed will undergo chemical pre-treatment processes, specifically using sulphuric acid. 10 g of Durian seed will be hydrolysed in an oven at 90°C overnight, using 0.2M, 0.4M. 0.6M, 0.8M and 1.0M sulphuric acid (H_2SO_4) solution. After hydrolysis, the samples will be filtered using a vacuum filter flask (Buchner funnel) and dried in a hot air oven at 70°C. The powder will be packed into a sealable plastic bag and stored in desiccators for future utilization.

Enzymatic saccharification

The untreated and pre-treated durian seed will be hydrolysed by suspending 0.1 g of seed in 10 mL of a digestion solution consisting 0.1 M sodium citrate buffer (pH 4.8, w/v), 1 mL of 2% (w/v) sodium azide, and 120 μl of cellulase. The hydrolysis reaction will be conducted in a 50 mL Erlenmeyer flask at a temperature of 50 °C and a fixed rotation of 150 rpm using a rotary shaker for 72 hours. Hydro lysates will be collected at 72 hours and a glucose meter will be used for measuring glucose.

Glucose measurement

Blood Glucose Meter (BGM) was utilized in determination of glucose content in the sample. The glucometer provided the glucose measurement in milimoles per litre (mmol/L).

Estimation of plant biomass lignin

Preparation of sample (treated Durian seed)

The methodology for sample preparation and biomass lignin estimation in this study was adapted from Dampanaboina et al. (2021). Ground tissue powder from pre-treated durian seed samples (20 mg) was weighed and transferred into 2 ml tubes, labelled based on the molarity of sulphuric acid treatment (ranging from 0.2M to 1.0M). Each sample was incubated at 60°C for one hour with open caps, followed by the addition of 1.8 ml of water. Samples were vortexed and centrifuged at 15,000 RPM for 10 minutes, and the supernatant was discarded. This was followed by two rounds of methanol treatment, including vortexing, incubation at 60°C, and centrifugation. The resulting pellets were dried in a vacuum dryer for two to three hours, and the tubes were weighed to estimate lignin content. The process continued with the addition of 1 ml of 3N hydrochloric acid and 100 μl of thioglycolic acid to each sample, followed by vortexing and incubation at 80°C for three hours. After cooling, the samples were centrifuged again at 15,000 RPM, and the supernatant was discarded. Water was added, vortexed, and centrifuged once more. Subsequently, 1 ml of 1N sodium hydroxide was added, and the samples were incubated overnight at 37°C in a shaker. Post-incubation, the supernatant was transferred to new tubes, and 200 μl of concentrated hydrochloric acid was added. The samples were gently mixed, incubated at 4°C overnight, and centrifuged. After discarding the supernatant, sodium hydroxide was added, vortexed, and incubated at room temperature before proceeding to absorbance readings. Positive control samples using industrial bamboo lignin were included at various concentrations for comparison.

Quantification of biomass lignin using UV-Spectrophotometer

The absorbance readings of the treated Durian seed samples were measured using a UV-Spectrophotometer (Secomam UviLine 9400) at a wavelength of 280 nanometres to estimate lignin content. Sodium hydroxide was used as a blank since the lignin precipitate was dissolved in it, with the blank set to zero for baseline correction. Absorbance readings were then collected for each sample, with 2 millilitres of sample used per reading. Due to the high concentration of the samples, a pre-dilution step was necessary. The Durian seed samples were diluted with a factor of 1/10, while the lignin standard was diluted with a factor of 1/50 to ensure absorbance readings remained below 1.000. Each sample was analysed in triplicate to ensure accuracy, and the results were tabulated as presented in Table 1.

Statistical analysis

All the analyses will be performed in triplicates. The generated data will be statistically analysed using Two-way Analysis of Variance (ANOVA) – with replication at p value $\leq 0.05\%$ significant level in order to obtain an appropriate interpretation and graphical interpretation of analysed data will also be adopted.

RESULTS AND DISCUSSION

Lignocellulosic pre-treatment

Pre-treatment using sulphuric acid breaks glycosidic bonds, leading to random and effective removal of hemicelluloses, and an increase in the cellulose and lignin content compared to the untreated material. Removal of hemicellulose produced an increase in growth in both external and internal surface area of the treated biomass, which exposed the cellulose fraction. However, an excessively acidic environment completely removed hemicellulose from the stem and led to cellulose degradation. As a result, lower glucose yield in enzymatic hydrolysis was obtained (Jędrzejczyket al., 2019).

Biomass lignin identification

Lignin, a complex organic polymer in plant cell walls, provides structural support and is a key component of biomass. Although not directly used in the food industry, lignin-derived products have potential applications in various sectors. These include bio-refinery processes that extract valuable products like bioethanol from lignin-rich biomass, and the use of lignin's polyphenolic compounds as antioxidants in food preservation. Lignin-based materials can also be used to create edible films and coatings for fruits and vegetables, extending their shelf life and reducing spoilage. Additionally, lignin residues contribute to dietary fibre and may serve as natural additives or flavour enhancers in food products. The result tabulated in Table 1, stating that the Highest Lignin content yield by Durian seed samples treated with 0.4 M sulphuric acid solution, yielded 14.0g, 19.0g, 43.0g, when tested with weight of 0.2g, 0.4g and 0.6g respectively. Graph as tabulated in Figure 1 and equation y= mx + c (y= 0.604x + 0.0127) was used to determine the lignin content. The dataset includes measurements of Percentage Lignin Yield (%) for different combinations of Sample Weight (g) and Molarity (M), with multiple observations for each combination. Statistical analysis was conducted to determine the significance of these factors on lignin yield. The F-value for Sample Weight was significantly greater than the critical value, with an extremely low P-value (3.4515E-86), indicating a highly significant effect of Sample Weight on lignin yield. Similarly, the F-value for Molarity was also significantly greater than the critical value, with an extremely low P-value (7.7718E-97), demonstrating that Molarity had a major impact on the yield. The interaction between Sample Weight and Molarity was further examined, revealing that the F-value for the interaction term was much higher than the critical value, with a very low P-value (1.8594E-92). This indicates a highly significant interaction effect, meaning the impact of Molarity on lignin yield depends on the Sample Weight and vice versa. It can be concluded that both Sample Weight and Molarity are crucial factors influencing Percentage Lignin Yield, and their interaction significantly affects the yield, highlighting the need to consider both factors together when interpreting their influence on the lignin extraction process.

Table 1. Table of Biomass Lignin Content

CONCLUSIONS

In conclusion, the utilization of fruit waste as a feedstock for bioethanol production through the pre-treatment techniques, particularly acid pre-treatment, shows promise in enhancing the production of bio-alternatives from glucose and biomass lignin. Based on this study, the findings indicate that durian seed yielded low glucose content but high biomass lignin content, suggesting their potential as a valuable source for bioethanol production. Optimizing the pre-treatment conditions, including the acid concentration, is crucial for maximizing sugar recovery. The choice of acid concentration in the pre-treatment process significantly influences the solubilisation of hemicellulose, resulting in increased cellulose and lignin content in the treated biomass. Lower acid concentrations, such as the 0.4M sulphuric acid used in this study, tend to yield higher lignin content compared to higher acid concentrations.

REFERENCES

Dampanaboina, L., Yuan, N., & Mendu,V. (2021). Estimation of Plant Biomass Lignin Content using Thioglycolic Acid (TGA). *Journal of Visualized Experiments*, *173*.

https://doi.org/10.3791/62055

Jędrzejczyk, M., Soszka, E., Czapnik, M., Ruppert, A. M., & Grams, J. (2019). Physical and chemical pretreatment of lignocellulosic biomass. Second and Third Generation of Feedstocks: The Evolution of Biofuels, 143-196. https://doi.org/10.1016/B978-0-12-815162-4.00006-9

Jusoh, N.A., Karim, L., Omar, S.R., & Ali, A. (2021). Pretreatment and Enzymatic Saccharification of Mango Peel for Sugar Production. *Asian Journal of Fundamental and Applied Sciences*, Vol. 1, No. 4, 28-51. e-ISSN: 2716-5957.

http://myjms.mohe.gov.my/index.php/ajfas

THE INTEGRATION OF THE EMPLOYEE ASSISTANCE PROGRAM WITH ISLAMIC PRINCIPLES: A QUALITATIVE STUDY AT THE DEPARTMENT OF ISLAMIC DEVELOPMENT MALAYSIA (JAKIM), PUTRAJAYA

Khairunneezam Mohd Noor[i], Wan Mohd Fazrul Azdi Wan Razali[ii], Norhayati Rafida Abdul Rahim[iii], Mohamad Isa Amat[iv], Muhammad Khairi Mahyuddin[v,] Mohamad Humaidi Bin Zakiyudin[vi]

[i](*Corresponding author*). Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. neezam@usim.edu.my
[ii] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. wmfazrul@usim.edu.my
[iii] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. norhayati@usim.edu.my
[iv] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. isaamat@usim.edu.my
[v] Senior Lecturer, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. muhdkhairi@usim.edu.my
[vi]Master Degree Candidate, Faculty of Leadership and Management, Universiti Sains Islam Malaysia. humaidimtsyk@gmail.com

Abstract

This study aims to examine the implementation of the Employee Assistance Program from an Islamic perspective in the Department of Islamic Development Malaysia (JAKIM) Putrajaya. The corporate world is evolving and changing at an incredible rate, modernizing in ways that make it difficult for employees to cope with the pressures that have drained them over time. Organizations can implement employee assistance programs to help employees manage stress. Such programs have helped organizations reduce turnover rates and increase overall productivity. The objectives of this study are to examine the Employee Assistance Program (EAP) and its benefits, explore the Islamic view on employee welfare, and identify the methods used by JAKIM in implementing EAP according to Islamic principles. This study involved 11 employees at JAKIM as respondents and used a qualitative research method, specifically interviews. The results show that implementing the Employee Assistance Program, in compliance with Islamic guidelines, positively impacts employees and the development of JAKIM.

Keywords: *Employee Assistance Program, Islamic Principles, JAKIM.*

INTRODUCTION

In this age where technology has provided a lifeline for many companies in various industries, there are still many companies where human capital and the corporate workforce represent an integral part of the company. In addition to managing the expectations of stakeholders, employers are responsible for creating a conducive working environment for their employees (Arthur, 2002). Companies that are

growing indicate that the workload will also increase. Often the increased workload makes employees overwhelmed and ultimately feel stressed. Conditions like this can make employees burn out and downgrade their performance. To manage the mental health issues and the minimize employee stress levels, the company provides employee counselling through the employee assistance program (Arthur, 2002).

The overall goal of any Employee Assistance Program is to ensure employees can manage their day-to-day lives and remain productive, despite life's difficult experiences. Employees should be advised about the EAP program and given direction on how to access these benefits at no cost to them if they need support. Managers may and should refer employees to EAP if they are unable to resolve issues through on-the-job guidance and support. Based on this awareness, the Department of Islamic Development Malaysia (JAKIM), implemented the Employee Assistance program as a strategy for developing employee performance in the workplace. In this study, the researchers would like to study the methods used by JAKIM in the implementation of EAP according to the Islamic perspective and what are the problems faced by JAKIM to implement the program.

LITERATURE REVIEW: EAP AND ISLAMIC PRINCIPLES

THE CONCEPTION AND DEVELOPMENT OF EMPLOYEE ASSISTANCE PROGRAM

EAP is an employee wellbeing program that provides service to employees experiencing mental problem resulted from their job and family (Kirk & Brown, 2003). It is a psychological service offered to the employees as a major technique of occupational stress management. The program is designed to provide, behavioral and occupational stress management services to support the employees having performance problem due to substance abuse, stress, anxiety, depression addiction to drugs, traumatic injury, subject to intimate partner violence, harassment, marital problems, career issues, financial troubles and workplace conflict and suicide (Kirkey, 2015). EAP is a popular intervention to reduce job stress (Cooper & Cartwright, 1997). Organizations provide EAP for legal obligation, to develop an image in the labor market as a caring organization, and to increase productivity by reducing occupational stress (Newton, et al. 2005). Authors like McLeod (2001), Cuthell, (2004) and Cooper and Sadri, (1995) reported about the success of EAP program in British companies and the operability of EAP compared to other types of alterative interventions.

EAP is a psychological therapeutic delivery system or well-being service conducted in the form counseling, consultation, assessment and referrals to ensure stress free life (personal, emotional, behavioral and psychological) and to overcome performance problem (Arthur, 2002). According to Yamatani, Santangelo, Maue and

Heath (1999), modern employee counseling programs play a crucial role in helping employees with medical, psychological, personal, family, financial, and legal problems. These counseling systems consist of problem assessment, supportive counseling, referrals to higher levels of treatment, wellness education and training, and follow-ups for employees. It is highly beneficial for the management and has become a significant issue of organizational behavior, and HRM. (McManus, 2015).

It is a management tool that helps in absenteeism management, improve workplace performance, productivity and respond to critical situation resulting in customer satisfaction, cost efficiency (Yamatani et al. 1999), corporate reputation (Agyemang, 2014) and acts as employee retention strategy (US DoL, 2009).

The Employee Assistance Professional Association (EAPA) defines an EAP as a worksite-based program designed to assist work organizations in addressing productivity issues and "employee clients" in identifying and resolving personal concerns, including, but not limited to, health, marital, family, financial, alcohol, drug, legal, emotional, stress, or other personal issues that may affect job performance.

The definitions of an EAP will vary, depending on the type of EAP, the nature of the services offered, and the country in which the EAP operates. The Employee Assistance (EA) professional serves two clients: the work organization and the individual employee. EAPs in general are worksite-based programs designed to help individual employees and the entire organization (Masi, 2000). Hence, we could simply understand that EAP is a program developed to help staff express the difficulties and problems they face, in order to reduce various workplace issues and personal issues that could affect work performance and productivity. Mohan (2000) stated that EAP is one of the branches of counseling services, representing a low-cost innovation in solving employee problems that can impact job satisfaction, performance, and productivity. It is a confidential service that guarantees each session is conducted according to procedures, codes of ethics, and relevant acts to ensure the quality of professional counseling sessions (Maynard, 2004).

According to McGowan (in Lee Yin Khai, 2002), the primary focus and difference of EAP compared to general counseling services is that it places special emphasis on employee work performance to ensure the highest level of productivity in providing services to the organization through professional guidance and consultancy programs. The main activities conducted through EAP involve professional and personal meetings, either in-person or online, to express issues and problems to help find appropriate and professional solutions. In many organizations, including in Malaysia, the objective of establishing EAP is to provide support and advice to staff facing difficulties in issues such as career, family, physical and emotional health (wellness), and personal life changes that directly impact the quality and focus of daily work.

In several research recommendations by Milot (2020) and Ann et al. (2018), EAP in organizations should have guidance and a connection with cultural and

spiritual elements, which are believed to have a better impact on employees who participate in EAP. This is supported by Xaba (2006), who emphasized that religious elements help in unraveling the complexities of employee problems, thus strengthening the effectiveness of EAP in organizations. Several respondents interviewed in Xaba's (2006) study acknowledged that religious and spiritual elements serve as catalysts for the understanding of employees/clients participating in EAP, particularly in addressing workplace issues such as stress, mental disturbances, and communication conflicts. Williams (2008) proposed the idea that spiritual/religious elements can be integrated into EAP sessions with employees, based on the human understanding that religion is among the primary references in problem-solving, including in the workplace.

Al-Ghazali, in his book Iḥyā' cUlūm al-Dīn (1982), provided explanations and descriptions of the key values that play a role in helping and guiding the heart to cultivate noble qualities and virtues. At the same time, all these key values, often translated in contemporary discussions as the concept of Qalb, must be used accurately and balanced to overcome and prevent undesirable traits and behaviors.

There are many instances where Al-Ghazali discussed the concept or principle of Qalb. In Iḥyā' cUlūm al-Dīn alone, Al-Ghazali addressed various topics regarding the Qalb in several sections, such as the chapter on Riyāḍah al-Nafs wa Tahdhīb al-Akhlāq wa Mucālajāt Amrāḍ al-Qalb (which means the training of the soul, the purification of morals, and the treatment of heart diseases); the chapter on Sharḥ cAjā'ib al-Qalb (the wonders of the heart), the chapter on Kasr al-Shahwatayn (breaking the two desires: the stomach and the private parts), the chapter on Dhamm al-Ghaḍab wa al-Ḥaqd wa al-Ḥasad (condemning anger, envy, and jealousy), and many more.

EAP is implemented as an effort by organizations to provide support and assistance to their staff. However, the implementation model of EAP varies not only according to the culture and policies of the organization but also according to different departments, including government agencies. Religious elements are a necessity in EAP (Xaba, 2006), and the four elements of Qalb according to Al-Ghazali, namely justice, wisdom, courage, and self-discipline (Mustafa, 1996), have the potential to explain the complexities of employee problems more effectively. To achieve the government's aim of providing the best services to its stakeholders, including employees, this research-based paper examines the implementation of EAP in government agencies and proposes the development of a new EAP model integrated with the principles of Qalb Al-Ghazali among staff in government agencies.

THE INTEGRATION OF EAP WITH ISLAMIC PRINCIPLES

In whatever circumstances the organization is used, the universal principles of Islamic culture may be absorbed in the organization. Likewise, the principle of

Islamic culture itself is appropriate to be practiced in an organizational setting consisting of Muslim or non-Muslim workers. The fact is that, the key to the success of the development of human capital in an organization with an Islamic culture is the culture of preaching within the organization.

In Islam, every individual Muslim, no matter what position and rank, whatever else a leader in the organization, has the responsibility to be a model to show the beauty of Islam in addition to having the duty to continue the prophetic message. With the position as chairman in the organization, in addition to achieving organizational goals, vision as a Muslim also needs to be implemented and made into a culture of life. Allah SWT said, "You are the best of mankind born for (the benefit of) mankind, because you enjoin what is good and forbid what is evil, and you believe in Allah. with true faith (Ali 'Imran, 3: 110).

According to Abdul Manan (1990) Islam is a religion of virtue. His teaching is to realize peace and goodness for all beings. At its core is the effort to uphold the truth. That is why it makes the effort to do good is in line with the duty in crowning the truth. In the Islamic thought pattern, the value of al Haq (truth) is closely related to al Khair (goodness or virtue). These two main values are important goals that must be the duty of Muslims to implement. Without truth, a struggle will deviate into the arena of falsehood. Without virtue, a struggle will be arid and will not be able to lead to any good.

According to Kamal (2012), Islam places great emphasis on the concept of virtue in appreciating the true and perfect way of life is closely related to social life, namely the concept of social responsibility among human beings where the attitude of caring for each other as the hadith of the Prophet: "Anyone who does not care about the affairs of Muslims is not one of them. And whoever in the morning prefers things other than the religion of Allah, then he is not of the group of people who are pleased with Allah ".

Al-Birr is one of the terms found in the Qur'an. Al-Birr means virtue or doing good. Doing good is pursued as much as possible and as best as possible. Man does good by imitating Allah swt. "The All-Doing Good" (Al-Barru). Humans do good in three main areas, namely the field of faith, the field of worship and the field of morality (Mansur Abdullah, 1996).

Every organization should assess the performance of its EAP, maintaining the initiative of improvement and effectiveness through regular monitoring and program evaluation (Compton & McManus, 2015; McLeod, 2001). Another major factor that contributes to an effective EAP is that the counselors should be well-trained and hired under an accredited professional development program (Taranowski & Mahieu, 2013). In addition, the counselors should also have adequate experience in the counseling field (Cooper & Sadri, 1995) and act positively toward its beneficiaries.

According to Brown (2003), EAP should cover three broad issues for its overall success. The first issue is to provide employee well-being services that help

reduce work- and family-related problems, such as job stress, conflict, harassment, and mental and family issues, through counseling services. Secondly, the counselors' performance in terms of quality and commitment should be effective enough to ensure the success of EAP. Finally, the overall result of EAP should ensure employees' individual productivity and job satisfaction.

According to Mansur Abdullah (1996), Islam emphasizes the welfare of employees, and employers must exercise these rights without any prejudice or compromise, such as in employee welfare or health. An employer cannot prioritize profits solely without taking into account the interests of the employee. The purpose of welfare in Islam is to alleviate the burden borne by employees and reduce their psychological stress in dealing with personal problems.

A harmonious employer-employee relationship is a culture that needs to be inculcated in every organization. It greatly affects the effectiveness of the organization. It involves each individual and is related to the appreciation of religion and morals. This must be understood by every member of the organization. Work ethic must be united by faith and piety to Allah without neglecting the human rights that should be protected (Ismail, 2020).

Islam attaches great importance to the welfare of workers. A Muslim employer cannot prioritize maximum profit alone without considering the interests of both the internal and external society of the organization. As a fellow Muslim, he must also look after the interests and needs of the employees. The purpose of welfare in Islam is to alleviate the burden borne by employees and reduce the psychological stress they face in dealing with personal problems that may affect their work performance. The element of welfare is not necessarily in the form of money alone (Wan Hussain, 1995).

According to Ismail (2020), among the welfare practices in Islamic-cultured organizations that can be or are being implemented in organizations in Malaysia are ensuring that organization members have savings for old age, providing accident insurance, treatment for serious illness and death, offering interest-free loan facilities with scheduled salary deductions, panel clinics for mild illnesses, quick donation collections for organization members affected by disasters, waqf space, and regular alms for struggling organization members, giving gifts and appreciation for the success of members' children, and other needs based on the current priorities of the organization members. Usually, these welfare needs should be met by the organization members to allow them to choose the aspects that are the needs and priorities of employees.

The teachings of Islam do not separate worldly tasks from the task of cultivating Islam among human beings. In fact, every aspect of Islamic culture in life is very beneficial to all members of the organization in a long-lasting way. These benefits are enjoyed by Muslims and non-Muslims in this world, as well as by Muslims in the hereafter. On the other hand, Muslims who hold positions, especially as leaders who are given authority by God in this world, but who forget their

responsibility to help their employees in dealing with problems both inside and outside the job, are failing in their duty (Aziz, 1993).

METHODOLOGY

It is essential to assure that population selection can determine the direction of a study. Islamic-oriented institution like Department of Islamic Development Malaysia (JAKIM) is seen as a sector which concerned with the EAP services and accountability of organization towards their employees' needs. This research focused on JAKIM employees in Putrajaya. Using a purposive sampling strategy, the researchers interviewed 11 JAKIM employees. The interviews were conducted at Kompleks Islam Putrajaya, Precinct 3.

Head of three department in JAKIM Putrajaya were contacted through phone calls and emails to obtain their assistance on the selection of interviewees to be the participants of the study, sharing the cover letter of invitation to participate in the study, participation information sheet, and arrangement for the physical interviews at their locality.

The researchers conducted in-depth interview sessions to get the data from the respondents. The researchers had prepared two sections of questions. Section A has been provided to get the data about demographic background. Section B contains questions related to the Employee Assistance Program (EAP) in Islamic perspectives. For each item or question, the respondents will provide their answer or statement that describes and elaborates them based on their knowledge and experience in JAKIM.

FINDINGS

11 employees in Department of Islamic Development Malaysia (JAKIM) were selected as study respondents. All information about their background is taken through an interview session. The researchers collected data on the respondents' demographic background that consisted of 3 questions: the respondent's gender, age, and department as below:

Respondent	Gender	Age	Tenure (years)	Department	Category of Service
Respondent 1	Female	47	22	Da'wah	Executive
Respondent 2	Female	26	3	Publication	Supporting Staff
Respondent 3	Male	29	7	Da'wah	Executive
Respondent 4	Female	42	17	Information Management	Management
Respondent 5	Male	34	12	Information Management	Executive
Respondent 6	Male	33	8	Publication	Supporting Staff
Respondent 7	Female	28	5	Da'wah	Supporting Staff
Respondent 8	Male	37	15	Education	Executive

Respondent 9	Female	44	20	Da'wah	Management
Respondent 10	Female	41	17	Information Management	Executive
Respondent 11	Male	47	19	Education	Executive

Table 1: Demographic Backgrounds of the Interviewees

The Concept of Employee Assistance Program (EAP) and its Benefits

Based on the pre-determined and impromptu questions related to the first objective of the study, below are the emerging themes based on the responses given by the interviewees.

Effectiveness of EAP

Based on question 1, all respondents agreed that the implementation of counseling program or Employee Assistance Program (EAP) is very effective and needed by an organization to ensure the development of the organization. All respondents asserted that EAP is very effective, this is evidenced by the responses below:

Respondent 7: "For me it is very effective, because the employee can share their problem and find the solution. So with this EAP, I think it is one of the way that can help them solve the problems they face."

Respondent 11: "In my opinion, the effectiveness of this program should be determined by the organization. If this EAP helps the organization it will certainly be seen in the level of efficiency of an organization in carrying out tasks as directed. But for me, I can see that EAP is one of effective method to sustain the performance of employees."

Respondent 3: "EAP can help employees who have problems, for example if the employee is depressed, they need someone to help them solve their problems. Therefore, the implementation of this EAP is very effective in helping employee performance."

Respondent 4: "For me it is very effective, because the employee is human too, there are emotional fluctuations. So with this EAP can help them solve the problems they face."

Respondent 8: "Yes, very effective, the need for two-way communication is important to solve employee problems, so for me, this EAP is very important for an organization."

Aid Platform

Based on question 2, all respondents believe that the existence of this EAP can provide many benefits to employees. Among the benefits is EAP as an aid. EAP acts as a platform that helps, aids and assist to solve employee problems. This is evidenced by the statements of respondents 2, 3, 4 and 5 below:

Respondent 2: "Among the benefits received by employees is that they can find solutions to problems faced and reduce the burden of thinking while facing the problem so as to affect their work performance."

Respondent 9: "Employees will feel fun and happy to be in an organization because there are programs that take care of their welfare."

Respondent 1: "Obviously we can reduce the stress and problems of employees, we can also help reducing suicide cases due to stress in the workplace like in Japan."

Respondent 10: "In terms of performance, it means that if EAP can help the employee solve the problem, then his work performance will increase and help improve the performance of the organization."

Mentoring

While respondent 1 argued that EAP acts as a mentoring platform that provides training and exposure to employees to build better self -identity and potential. This is shown by the response below:

Respondent 1: "for me, this EAP provides opportunities, exposure and mentoring to employees who have problems in and out of work to make them more confident and high potential."

Eligibility

To become a qualified counsellor, a person needs to have a credential and go through various tests that qualify him or her to hold the title of a counsellor. To implement the EAP, the selection of the right counsellor is a key factor for employees to share their problems. Based on question 3, respondents 1, 3 and 4 were confident to share their problems with the counsellor as they were confident that counsellor are professional and eligible people in their field. This was evidenced by the passage below:

Respondent 1: "To become a counselor, it requires credentials, screening and testing. So those who have passed this test are very trustworthy because they have ethical requirements that need to be complied with."

Respondent 3: "we consider a counselor to be a trusted person and an expert in his or her field. So there is no problem to share and talk about problems with them as long as the purpose is to solve the problem, not to spread employee weaknesses."

Respondent 4: "As for me, I really trust those counselors, because they are experts in the field and more professional in case of solving people's problems."

Situational

In contrast to the views of respondents 2 and 5. For them, although a counsellor is an expert and trained in his field, but for them to trust the counsellor depends on the situation. If the solutions and methods of help they implement are contrary to their life principles, they do not hesitate to reject the counsellor. This is shown by the statement below:

Respondent 2: "My faith in counselors is limited by the principles of life I have. If any solution or suggestion given by the counselor is less in line with my life principles, then I will avoid it for my own good"

While Respondent 5 added that we also need to do a little background investigation before we share our problem with the counsellor:

Respondent 5: "Look at who we want to refer to, certain organizations hired unqualified counselors, then we need to first consult the background of the counselor before we share the problem with him."

Responsible

To take the organization to a higher level, an employer needs to always be concerned about the performance and problems of its employees. Employees who are the assets and backbone to the development and progress of the organization. Respondents 1, 3, 4 and 5 had different ideas with respondent 2 where they stated that, it is the responsibility of an employer to care about his employees 'problems, the employer needs to provide solutions and platforms for his employees to solve their problems. The statements of respondents 1, 3, 4 and 5 are proved as follows:

Respondent 1: "To me, the attitude and thinking of an employer who does not care about the welfare of employees is not a good thing because it is the employee who is the driving force of an organization. with the presence of EAP, can solve employee problems thereby improving employee performance."

Respondent 3: "In an organization. workers are assets. Therefore, it is the responsibility of the employer to look after the welfare of his employees in case they face problems."

Respondent 4: "To me, the actions and thoughts of employers like this are unwarranted. preferably we need to devise more effective methods to help and improve the performance of employees who are in trouble."

Respondent 5: "It is very inappropriate, for an organization to go far, employees are the root, so it is very detrimental when employers do not provide EAP to employees, not only cannot develop the organization to a better level but further complicate the development of an organization."

Objective Two: The Islamic view on the welfare of employees

Based on the pre-determined and impromptu questions related to Objective Two, below are the emerging themes based on the responses given by the interviewees.

Ihsan

Based on question 5, respondents 1, 3 and 5 agreed that the implementation of EAP is a form of Ihsan in Islam. This is stated by the following passage below:

Respondent 1: "The presence of Islam itself is to look after the welfare of the ummah and the welfare of the individual. then indirectly the existence of Islam is to maintain the welfare of workers as well. Islam itself has been outlined to protect the basic needs of a person in the Maqasid Syariah, namely life, religion, intellect, property and ancestry."

Respondent 3: "Taking care of the welfare of the employee is a virtue in Islam. Islam places great emphasis on the attitude of Ihsan towards human beings, including employees."

Respondent 5: "Taking care of the welfare of the employee is a virtue in Islam. Islam places great emphasis on the attitude of Ihsan towards human beings, including employees."

Human's Right

According to respondents 2 and 4, the implementation of this EAP is a necessity and a human right. Islam protects the welfare of human beings, including employees. This is evidenced by the following statement:

Respondent 2: "Islam highly values the welfare of workers. Every employee should be given certain rights to live their lives well."

Respondent 4: "Yes, in Islam there is a concern for the welfare of employees because they are human too, and Islam is very concerned about human right."

Include Religious Class

The implementation of EAP is capable of building a vibrant, competitive and optimistic employee. As an Islamic organization, Islamic values must be applied while implementing the EAP. Based on question 6, respondents 1 and 3 agreed that the implementation of the counselling should be interspersed once with the religious class. This is because, in finding a solution to a problem, a Muslim must refer to the teachings of the religion first. This shown by the following passage below:

Respondent 1: "As we know, this counseling is more of a psychological element, but with the advent of Islam, it applies a spiritual element and helps solve employee problems according to the Islamic perspective."

Respondent 3: "Insert with the recitation of Doa, zikir and Selawat before starting a program. Create also a religious knowledge class, because it can shape and cleanse the human heart, especially employees to always be patient and calm in the face of problems."

Qudwah Hassanah

Respondent 1 and 4 stated, to implement an EAP that follows Islamic guidelines, a counsellor must have good character and morals to guide the client as Respondent 4 mentioned:

Respondent 4: "There are many effective and efficient counseling programs in Islam, but for me, the most important thing is a good example. that is, when a counselor gives a solution to a client, the counselor must have a good character when guiding the employee who is in trouble."

Advantage of Technology To Avoid Fitnah

According to Respondent 3 and Respondent 5, to conduct a counselling session, the implementation must not be contrary to the teachings of Islam. To avoid slander or *fitnah*, counselling sessions involving men and women can be done in the public area or can be done online using platform like zoom, google meets and others. The statement of respondent 5 reflects this:

Respondent 5: "To conduct counseling sessions involving 2 people, namely men and women, it is highly recommended to be done in an open place, other methods, with the development of technology, the counseling sessions also can be done through online method such as zoom and google meets to avoid fitnah and so on."

Right Knowledge

The success of the EAP depends on the counsellor who runs the program. As a counsellor, she or he becomes an image to clients who want to be mentored. Counsellors must have a good personality. Respondent 6, 8 and 9 asserted that one of the characteristics that a counsellor must have is to have the right knowledge. For example, Respondent 8 highlighted as below:

Respondent 8: "In my view, the qualities that a counselor should have is first and foremost, correct and true knowledge. with the right knowledge, the counselor will be more professional and act rationally in carrying out his duties. Indirectly, the knowledge will lead him to good nature, he will be a calm, patient, open-minded person and can control his emotions."

Thoughtful

According to Respondent 3 and Respondent 7, a counsellor must have a thoughtful personality. Clients will be more comfortable when the counsellor treats them with love. This is evidenced by the following passage by Respondent 7:

Respondent 7: "Counselors must be caring, willing to listen to problems, friendly and not easily give criticism and negative comments to his clients."

Honesty

Honesty is an important aspect in everything. For example, troubled employees are more confident to work with an honest counsellor because they believe the counsellor is trustworthy in keeping their secrets and weaknesses. This is based on the assertions by Respondents 2, 4 and 7 below:

Respondent 2: "For me, counsellor with the personality of honesty, trustworthy and integrity as well as non–punitive."

Respondent 4: "A counselor must be trustworthy and honest, as well as good at keeping his clients 'secrets. Because Islam also attaches great importance to honesty and trust in every matter."

Respondent 7: "Always be honest, be a good listener and not immediately give negative criticism before studying the client's background."

Two-way Communications

In addition to making the Quran and hadith as references in life, we also need systematic guidance through a two-way approach. EAP is one of the methods to help and solve the problems of employees who want to improve their lives. Based on question 8, respondents 2, 3 and 5 all agree that to making sure of EAP success, it needs to include two-way communications, not only depend on the Quran and hadith as below:

Respondent 2: "Religious classes only provide information theoretically and most are not bilateral, and there is no research in understanding a problem. When together with a counselor, two-way communications can be done and research and solutions can be sought more comfortably."

Respondent 3: "the Qur'an and hadith are indeed a way of life, but they are theoretical. To adhere to the teachings of Islam more accurately and well, one needs to find a teacher. The same goes to a counselor, the existence of a counselor is to provide a two-way solution not just an elusive theory."

Respondent 5: "This involves emotions, so a troubled employee needs someone to share the problem and provide a solution. So this EAP is also one of the ways to provide assistance and solutions to employees with problems."

Completeness (Syummul)

Islam is a complete system of life that is, every order is related to all aspects and areas of human life, from the biggest things to the smallest. This is also included with EAP. According to Respondents 1 and 4, they agreed that Islam is also present in counselling programs as below:

Respondent 1: "it is true that the Qur'an and hadith have an essence that is necessary and obligatory to follow. but the mode of delivery is different from the counseling method. it means that with counseling, we can better recognize the problems and personalities of employees. for example, when we deliver a solution to older employees, the way it is delivered is different from younger employees. Therefore, it is necessary for us to blend in these two knowledge to get better results."

Respondent 4: "Yes, the quran and hadith are the solution to all problems, but we are weak human beings to seek answers from the quran directly, so we need to refer those who are experts and knowledgeable in a particular field to solve the problems we face. Besides, conselling also included in the teaching of Islam which is Da'wah."

Objective Three: The methods used by JAKIM in the implementation of EAP according to the Islamic perspective

Based on the responses given by the respondents, these are among the themes found related to Objective 3.

AKRAB
Ahli Rakan Pembimbing Perkhidmatan Awam (AKRAB) is an organization established by JAKIM which is responsible for managing and assisting employees who face stress and problems inside and outside the workplace. Based on question 9, respondents 1 and 5 gave the following statements:

Respondent 1: "JAKIM does not have a special organization that handles counseling, but JAKIM has established the Ahli Rakan Pembimbing Perkhidmatan Awam (AKRAB) program which is an organization established in the circular. So in every government body there is a AKRAB program. AKRAB was only established in AUGUST 2020, so there is no clear effectiveness yet on the program due to several factors such as the covid-19 pandemic problem."

Respondent 5: "In JAKIM there is a AKRAB, where one of its duties is to look after the welfare of employees and ensure the performance and motivation of employees are always in good condition. They also always assist employees if they are facing any problems."

ILIM
Respondents 2, 3 and 4 added that in JAKIM there is also a Malaysian Islamic Training Institute (ILIM) that takes care of performance, training and modules that are appropriate to the needs of employees. This organization is to control emotions and form a more excellent employee personality when faced with problems. This is indicated by the conversation below:

Respondent 2: "There is a Human Resource Management Division where many programs and trainings are implemented for employees such as program conducted by ILIM to rebuild the spiritual and mind strength of the employees. They also constantly identify weaknesses and shortcomings in the level of employee performance for action."

Respondent 3: "In JAKIM, there is a Human Resource Management Division where many programs and training are implemented for employees to improve leadership, knowledge and employee performance. In addition, there is the Institut Latihan Islam Malaysia (ILIM) which implements programs related to personality, ethics and working principles in Islam."

Respondent 4: "There are many programs that JAKIM runs to assist and monitor employee performance. Among them is ILIM, ILIM helps employees with problems to find solutions based on Islamic guidelines."

Patience

Based on question 10, all respondents agreed that JAKIM implements the EAP by complying with Islamic guidelines, according to respondent 11, the very important Islamic values required in the EAP in JAKIM are patience. The following is his statement:

Respondent 11: "The existence of JAKIM is to provide solutions and answers to the problems of Islam in the country, therefore it is clear that all activities and implementation of JAKIM including EAP are guided by Islam. An example of Islamic values applied in JAKIM is patience and control emotions, because in the evaluation of the AKRAB program itself they emphasize on emotional control, because as counselors, we want to guide employees who are emotional and need solutions. If we provide solutions in emotions, then we cannot reach the level required in helping employees"

Honesty **and** *Responsibility*

Several respondents highlighted that honesty and responsibility are among the Islamic values in the EAP in JAKIM. This is evidenced by responses below:

Respondent 5: "Yes, among the Islamic values that I have noticed is honesty. the counselors in AKRAB are very professional and honest when they manage employee problems. To me that is an important Islamic value for a counselor."

Respondent 2: "Trained and certified counselors have been exposed to and applied the good values of Ihsan based on Islamic guidelines. Examples of Islamic values shown are responsible, caring, trustworthy and professional."

Respondent 7: "Among the Islamic values found from the EAP in JAKIM is responsibility. At JAKIM, they are very concerned about the value of responsibility. This is because, to achieve a thing's success, one must have the nature of responsibility."

Respondent 8: "Of course, for me responsibility is the greatest value in any job, this is what is shown in the management of JAKIM. When we work, we must not be complacent, have the attitude of responsibility and do our job well."

Discussion of Findings

Objective One: The concept of employee assistance program (EAP) and its benefits

The results of the study show that the implementation of the Employee Assistance Program (EAP) in any organization is highly effective. The EAP is seen to bring numerous benefits, not only to employees but also to employers and their organizations. Based on the analysis of the respondents' answers, the researchers found that the EAP serves as an essential support tool and assistance mechanism to help employees manage challenges both inside and outside the workplace. Additionally, EAP can function as a mentoring platform, providing employees with guidance beyond solving immediate problems. It also acts as a medium for building and developing employees' identities and mental resilience, helping to shape a more stable and productive workforce.

Moreover, the study highlights that for a troubled employee to feel comfortable sharing personal issues with a counsellor, certain key factors must first be addressed. The success of the EAP depends significantly on the skills and qualifications of the counsellor, which ultimately determine the program's effectiveness. However, the researchers found that even if a counsellor holds proper credentials and is an expert in their field, this alone is not sufficient to encourage employees to share their problems. Employees are less likely to open up if they feel the counsellor's advice or solutions contradict their personal values or if the suggested methods do not resonate with them. This can lead to discomfort and reluctance to fully engage in the counselling process. Therefore, it is crucial that counsellors understand these boundaries and tailor their communication to ensure they do not negatively impact the employee's experience. Sensitivity, empathy, and a non-judgmental approach are essential to build trust and foster an environment where employees feel supported.

Additionally, the researchers found that implementing an EAP is not only beneficial but also an obligation. Employers have a responsibility to provide EAP services to their organization, regardless of the specific method of implementation. A good and forward-thinking employer will recognize the importance of EAP and its positive impact on the organization. Employees are one of the most valuable assets for any organization, and when employers actively take care of their well-being, employee performance is likely to improve. As a result, the organization benefits from higher productivity and efficiency, driving its growth and advancement.

Furthermore, the EAP contributes to a culture of care within the organization, signaling to employees that their mental and emotional well-being is a priority. This can improve overall morale and foster loyalty among employees, which in turn reduces turnover and absenteeism. For employers, this means reduced costs

associated with recruitment, training, and loss of productivity, making the EAP not only a compassionate initiative but also a smart business investment. In conclusion, the implementation of the EAP, with the proper structure and counsellor engagement, is essential for both employee satisfaction and organizational growth.

Objective Two: The Islamic view on the welfare of employees

Based on the analysis, the researchers found that the implementation of the Employee Assistance Program (EAP) can be viewed as a form of Ihsan (excellence in conduct) towards human beings, as emphasized in Islam. According to the respondents, Islam places great importance on human welfare, including the well-being of workers. This is supported by the hadith of the Prophet, narrated by Muslim, which means, "Indeed, Allah obligates Ihsan (perfecting something well) in all things." This clearly shows that providing assistance to employees through the EAP aligns with the Islamic principle of Ihsan, ensuring that their problems are addressed in a compassionate and effective manner.

Furthermore, the researchers observed that the EAP plays a significant role in fulfilling the objectives of Maqasid Syariah (the higher objectives of Islamic law). If employees experience stress or face personal and professional challenges in the workplace, it can lead to negative consequences not only for their health but also for their families. Islam emphasizes the importance of protecting several core aspects of life, which include life and health (hifz al-nafs), wealth and property (hifz al-mal), and family and lineage (hifz al-nasl). By implementing the EAP, organizations contribute to safeguarding these key aspects, ensuring that employees' physical, mental, and emotional well-being are taken care of. This approach aligns with Islamic values that prioritize the holistic welfare of individuals.

In order to implement an EAP that adheres to Islamic guidelines, the researchers suggest that the program should be supplemented with religious and spiritual guidance, such as through religious classes. While conventional counselling methods can provide solutions to problems, the spiritual and ethical dimensions of Islam are also vital in shaping a person's identity and emotional resilience. Integrating religious teachings into the EAP helps employees cultivate virtues such as sabr (patience), tawakkul (trust in God), and emotional stability, allowing them to respond to problems more calmly and rationally. According to the respondents' answers, incorporating spirituality into the EAP enhances its effectiveness by addressing both the material and spiritual aspects of employee welfare.

Moreover, the researchers found that counsellors who manage the EAP must possess superior qualities and characteristics in line with Islamic teachings. Among the most important Islamic values a counsellor should embody is honesty. A responsible and

trustworthy counsellor should ensure confidentiality and refrain from spreading or discussing their clients' problems with others. Honesty also requires counsellors to avoid making negative or insensitive remarks and to steer clear of asking questions on sensitive or irrelevant matters. These ethical standards ensure that the counselling process remains respectful, supportive, and aligned with Islamic principles, thereby fostering trust between employees and their counsellors.

In addition to these considerations, the researchers also pointed out that while Islam provides the Quran and Hadith as comprehensive guides and solutions to all problems, human beings still require structured methods and systems to properly interpret and implement these teachings in practical situations. The EAP, in this context, serves as one of the key mechanisms that can help employees resolve their issues in a manner that is consistent with Islamic values. The program acts as a bridge between the theoretical guidance found in religious texts and the practical challenges faced by employees in their daily lives.

One of the respondents expressed that Islam is a Shummul (comprehensive) religion, meaning that every aspect of human life should be intertwined with Islamic teachings, with no exceptions. This implies that programs like the EAP should not merely provide solutions based on conventional approaches, but also integrate Islamic values and principles. Such an approach ensures that employees are supported holistically, addressing not only their professional challenges but also their spiritual and emotional needs.

Objective Three: The methods used by JAKIM in the implementation of EAP according to the Islamic perspective

In this section, the researchers explored the methods employed by JAKIM (the Department of Islamic Development Malaysia) in the implementation of the Employee Assistance Program (EAP) from an Islamic perspective. The findings revealed that various activities and programs are in place to ensure the welfare of employees is well-managed. One of the key initiatives involved is AKRAB (Ahli Rakan Penasihat Perkhidmatan Awam), an advisory organization established to promote well-being among public sector employees. The AKRAB program is integrated into every government body, providing support and guidance to employees. AKRAB was officially established in August 2020 and has since played an important role in creating a supportive work environment within public institutions.

Additionally, the Institusi Latihan Islam Malaysia (ILIM) is another crucial body that contributes to the welfare of employees within JAKIM. ILIM focuses on delivering programs related to personality development, ethics, and work principles from an

Islamic perspective. The institution ensures that the modules and training it provides are tailored to the specific needs of employees, making sure that they are beneficial without being overly burdensome. This allows employees to gain valuable knowledge and skills that not only improve their performance at work but also equip them to handle challenges in their personal lives. According to the respondents, ILIM's efforts in shaping employees' personalities foster a sense of enthusiasm, energy, and resilience, enabling them to tackle problems both inside and outside of the workplace with a positive outlook.

Furthermore, the researchers found that the implementation of EAP in JAKIM is highly consistent with Islamic teachings and values. Among the key Islamic values emphasized in JAKIM's approach to the EAP is the principle of responsibility. Based on the analysis, the majority of respondents agreed that the value of responsibility is crucial for the success of any task, including the execution of the EAP. The respondents highlighted that when employees and counsellors adopt a responsible attitude, it significantly improves the effectiveness of the program. This sense of responsibility extends to ensuring the well-being of employees, offering them the guidance and support they need to excel.

JAKIM's focus on responsibility reflects broader Islamic values and can serve as a model for other organizations to follow. The implementation of the EAP within JAKIM not only addresses the immediate needs of employees but also sets a benchmark for what a progressive Islamic organization should look like. By upholding the values of responsibility, integrity, and ethical conduct, JAKIM demonstrates how Islamic principles can be seamlessly integrated into modern organizational practices to create a work culture that prioritizes both the spiritual and professional development of its employees.

Moreover, the integration of Islamic values into the EAP helps create a holistic approach to employee welfare. The researchers emphasize that Islamic teachings do not separate professional life from personal and spiritual development. The methods employed by JAKIM in implementing the EAP are designed to align employees' work ethics with their faith, ensuring that their actions and decisions at work are guided by Islamic principles. This not only fosters a sense of accountability but also instills a greater sense of purpose and fulfillment in their roles.

Recommendations
Firstly, the researchers recommend that future researchers explore discussions related to the topic of the Employee Assistance Program from an Islamic perspective. It is hoped that this study will inspire new ideas for future researchers who wish to conduct studies on issues related to the Employee Assistance Program from an

Islamic viewpoint. This research may not be fully comprehensive, and future researchers may have the opportunity to produce more refined work.

Researchers who plan to use interviews as their assessment method must ensure that the questions and comments are clear, easily understandable, and relevant to the intended respondents. This is important because the accuracy of the analysis can be affected by misinterpretation of the questions. The research must focus on the details of the questions to avoid asking those that are not related to the study's purpose. Applying an appropriate research methodology and selecting suitable respondents is essential for conducting any study. Using an incorrect methodology could result in failure to achieve the study's objectives. Therefore, there are several recommendations for future researchers to improve and expand upon this research topic.

In addition, based on the data analysis results, the researchers conclude that the implementation of the Employee Assistance Program is both an obligation and a demand in Islam. Therefore, the researchers would like to make some suggestions to counsellors who are assigned to manage the EAP, encouraging them to always strive to be exemplary counsellors.

In the researchers' view, one of the most important qualities of a counsellor is having a responsible attitude. A responsible counsellor will contribute to building an efficient and effective organization. Moreover, the sense of responsibility, as emphasized in Islam, can help prevent malpractices such as corruption. As we know, corruption often stems from a lack of responsibility. Therefore, when selecting a competent counsellor, Islamic values—especially responsibility—must take precedence, without neglecting other noble values.

Conclusion

Based on the discussion, it can be concluded that Islam plays a significant role in the implementation of the Employee Assistance Program (EAP). The values of EAP are aligned with Islamic principles, and EAP also has a meaningful influence in shaping the personality of employees. Counsellors in the EAP serve as role models and public figures, especially for employees. To help and guide employees toward developing a positive personality, counsellors must first embody these attitudes themselves. In conclusion, the implementation of the Employee Assistance Program is both an obligation and a requirement in Islam. Neglecting Islamic values in the execution of the EAP can have a negative impact, particularly on the mental and spiritual well-being of employees. For an organization to grow and advance, Islamic values must be incorporated and applied throughout, including within the EAP.

REFERENCES

Abdul Manan Mulla Bar (1990) terjemahan Ishammuddin Hj. Ismail. *Kaunseling Dalam Konteks Budaya Islam*. Kuala Lumpur: Nurin Enterprise.

Agyemang, K. J., Williams, A. S., & Kim, D. Y. (2014). "Scandalous!": Reputation, impression management, and employee assistance programs (EAPs) in the NBA. *Sport Management Review*.

al-Ghazālī, Muḥammad ibn Muḥammad. (2004). Bidāyah al-Hidāyah. Beirut: Dār al-Minhāj.

Arthur, A. R. (2002). Mental health problems and British workers: A survey of mental health problems in employees who receive counseling from employee assistance programmes. *Stress and Health*, 18(2), 69-74.

Aziz Salleh (1993). *Kaunseling Islam Asas*. Kuala Lumpur: Utusan Publication dan Distributor Sdn. Bhd.

Cooper, C. L., & Cartwright, S. (1997). An intervention strategy for workplace stress. *Journal of Psychosomatic Research*, 43(1), 7-16.

Cooper, C. L., & Sadri, G. (1995). The impact of stress counseling at work. *Occupational Stress*, Washington, 271-282.

Cuthell, T. (2004). De-stressing the workforce. *Occupational Health*, 56(1), 14.

Duffy, K. G. (1989). *Employee assistance programs in higher education: The SUNY experience*. Paper presented at the 17th Annual Conference of the National Center for the Study of Collective Bargaining in Higher Education and the Professions. April 1989, New York.

Ismail, M. S. (2020). PENDEKATAN ISLAMIK IMPLIKASINYA TERHADAP AMALAN KAUNSELING [ISLAMIC ADMINISTRATION OF IMPLICATIONS FOR CONSULTING PRACTICES]. *AL-QIYAM International Social Science and Humanities Journal*, 2(4), 28-38. Retrieved from http://journal.al-qiyam.net/index.php/my1/article/view/23

Kirk, A. K., & Brown, D. F. (2003). Employee assistance programs: A review of the management of stress and wellbeing through workplace counseling and consulting. *Australian Psychologist,* 38(2), 138-143.

Kirkey, S. (2015, March 10). *Job, financial stress blamed for jump in suicide rates among middle aged, National Post*, retrieved from http://news.nationalpost.com/news/canada/job-financial-stress-blamed-for-jump-in-suicide-rates-among-middle-aged

Maizatul Haizan Mahbob, Nik Anis Syakira Megat Ali, Wan Idros Wan Sulaiman, Wan Amizah Wan Mahmud (2019). Komunikasi Strategik dan Peranannya

Untuk Mewujudkan Komunikasi Berkesan dalam Organisasi. Jurnal Komunikasi Malaysia, 35 (2),49-67.

Maynard, J. B. (2004). Maintaining our Heart. Journal of Employee Assistance. 34(2): 36.

McLeod, J. (2001). *Counseling in the Workplace: The Facts: A Systematic Study of the Research Evidence.* British Association for Counseling and Psychotherapy.

McManus, J. G., & Compton, R. (2015). Employee assistance programs in Australia: Evaluating success. *Journal of Workplace Behavioral Health*, 30(1), 32-45.

Muhd Mansur Abdullah, Siti Nordinar Mohd. Tamin (1996). *Pengantar Kaunseling*. Kuala Lumpur: Dewan Bahasa dan Pustaka.

Nurhafizah Yaacob (2016). Employee Assistance Services (EAS) Handbook Based On Teachers' Expectations And Perceptions Toward Help-Seeking Through Counseling. PhD Thesis: Universiti Sains Islam Malaysia.

United States Department of Labor (US DoL). (2009). *Employee Assistance Programs for a New Generation of Employees Defining the Next Generation*. Retrieved from www.dol.gov/odep

Wan Hussain Azmi Abdul Kadir (1995). *Kaunseling Dan Psikologi Menurut Islam*. Kuala Lumpur: Dewan Bahasa dan Pustaka, Kementerian Pendidikan Malaysia.

Xaba, J. (2006). Employee Assistance programme and retrenchment: a South African case study. South African Journal of Labour Relations Management, 30 (1), 2-3.

Yamatani, H., Santangelo, K. L., Maue, C., & Heath, C. M. (1999). A Comparative Analysis and Evaluation of a University Employee Assistance Program, *Employee Assistance Quarterly*, 15 (1), 107-118.

STEERING TOWARDS TAKAFUL: WHAT DRIVES USIM STUDENTS TO CHOOSE MOTOR TAKAFUL?

Junaidah Abu Seman [i], Isma' Ilias[ii], Shafiqal Iylia Azeman[iii], Wan Nur Solehah Wan Shariff[iv], Muhammmad Fadhlan Mursyidi Qamarul Arifin[v] & Muhammad Nurnadzem Ahmad Khairuddin[vi]

[i] (*Corresponding author*). Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia. junaidah@usim.edu.my
[ii, iii, iv, v, vi] Student, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia.

Abstract

The dominance of conventional insurance over the takaful sector remains evident. The purpose of an individual participating in motor takaful may explain takaful's poor penetration and dominance in Malaysia. This study investigates the factors influencing an individual's attitude and intention to purchase motor takaful, specifically among USIM students. A sample of 1,155 USIM students was collected with an age range of 18-35 and above. Both descriptive statistics and multiple regression analysis were utilized for the data analysis. The results showed that perceived usefulness, perceived religiosity, and knowledge have a positive and significant relationship with attitude towards the purchase intention of motor takaful. Perceived trust is not significantly related to attitude toward motor takaful. Attitude was positively related to purchase intention regarding motor takaful. This study could strengthen Malaysia's general takaful industry and Islamic financial system.

Keywords: *Motor takaful, attitude, perceived trust, perceived usefulness, perceived religiosity, knowledge.*

INTRODUCTION

Takaful is an insurance concept in Islam that is based on Sharia principles. The origin of the word comes from Arabic, kafalah and signifies "mutual assurance" (Ali et al., 2008). Takaful and traditional insurance have the common goal of providing financial protection, but they differ in their underlying principles and methods. Takaful involves individuals coming together to provide mutual assistance and support. Takaful operates as a collective effort where members support each other, rather than one individual assuming all the risk while others contribute financially. A fund is created by combining the financial contributions of multiple individuals. If a negative situation occurs, the cost is distributed among everyone.

Takaful involves the shared responsibility of all participants. Individuals contribute money to a collective fund that is used to cover expenses during difficult or unfortunate circumstances. This is consistent with the Islamic belief of providing help and solidarity to one another. Takaful operates in accordance with Islamic principles to ensure that financial transactions are in line with Sharia law. Islamic finance prohibits the use of interest and uncertainty in its practices. Takaful funds operate by distributing both the gains and losses among its participants. Any

additional funds generated from takaful activities are divided among the participants in a fair and equitable manner. Takaful companies typically manage two separate funds: one for contributions from participants, and another for the company's own funds. This ensures that the funds people donate are solely allocated for covering takaful operational expenses (Institute of Islamic Banking and Insurance, 2019). Motor Takaful provides Islamic insurance coverage for cars, safeguarding individuals from various vehicle-related issues. Shariah principles are followed to ensure that the insurance is ethically aligned with Islamic beliefs. Car insurance provides coverage for specific events related to a vehicle.

Takaful holds a 20% penetration rate in the Malaysian takaful/insurance sector, 14 percentage points lower than conventional insurance's 34% rate (Jalil, 2024). The issue of low takaful penetration and market share need to be investigated to identify the possible factors that contribute to a positive attitude toward general takaful, specifically the motor takaful.

Prior research works reflect inadequate investigation into the behavioural aspect of general takaful adoption (Husin and Rahman, 2016; Echchabi and Echchabi, 2012). The current research sets the research direction from the stance of intention-behaviour theory to explore if the antecedents of attitude can shape up a positive attitude that may lead to positive behavioural intention to buy motor takaful products.

The paper is structured as follows. The next section provides the literature review to set the background of the study. The methodology is presented in the following section followed by results and discussion. The final section concluded the study.

LITERATURE REVIEW
Purchase Intentions
Foundational intention-behavior theories comprising the theory of reasoned action-TRA (Ajzen and Fishbein, 1975) and theory of planned behavior-TPB (Ajzen, 1988) propose that intentions ultimately shape the individual's behaviors. Purchase intentions can be used to test the implementation of a new distribution channel to help managers determine whether the concept deserves further development and decide which geographic markets and consumer segments to target through the channel (Morwitz et al., 2007). Purchase intention is the willingness of a customer to buy a certain product or a certain service. The degree to which consumers intend to carry out a certain action or decide whether to buy a good or service is measured by their purchasing intention.

Purchase intentions are typically divided into four categories: transactional (conversion), navigational (consideration/awareness), investigative (consideration), and informative (awareness). To predict consumer behaviour, it is necessary to know the attitudes, assessments, and internal factors that ultimately generate the purchase intent (Fishbein and Ajzen, 1975). A consumer's purchasing intention is impacted mainly by emotions (Garg et al., 2007; Nalluri et al., 2020). Research suggests that

expected emotional outcomes are simple but useful guides driving decision processes (Mellers & McGraw, 2001), which is why commercial messages usually focus on the expected outcomes of decision-making.

Attitude and Intentions

Human beings have an evaluation scheme for the consequences of performing a particular behaviour, which is called attitude. According to Fishbein and Ajzen theory, the traditional attitude-behaviour discrepancy is caused by the necessity to take into account "other variables" in addition to attitudes, which helps explain the relationship between attitudes and conduct. As the "conative component of attitude," intentions are frequently seen, and it is generally believed that this conative component is connected to the affective component of the attitude. As a result of this conception, it is assumed that attitudes and intentions are strongly correlated (Ajzen, 2014).

Attitudes are our positive or negative evaluation of a particular behaviour — whether or not someone thinks the behaviour is a good or bad idea or if it will lead to outcomes that they personally value (Nickerson, 2023). It is a disposition to respond favourably or unfavourably towards some psychological object (Fishbein and Ajzen, 1977).

H1. Attitude positively influences individual's purchase intention to purchase motor takaful products.

Knowledge and Attitude

Individuals who possess knowledge regarding the possible financial ramifications of these risks and are aware of how motor takaful can alleviate those consequences, are more likely to get coverage favourably. Engel, Blackwell, and Miniard (1994) stated that product knowledge is a collection of various information about the product.

When consumers pursue knowledge, they will act more efficiently and appropriately in processing information and be able to recall information about the product better. With intention, consumers can make purchase decisions after product comparison and assessment (Fisbein and Ajzein, 1975).

H2. Knowledge has a big impact on influencing an individual's attitudes towards purchasing motor takaful products.

Perceived Usefulness and Attitude

Perceived usefulness is the level of someone's confidence level using a particular system which can improve its performance (Davis, 1989). Perceived usefulness votes can be used as an indicator to determine the purchase in the future because it is considered as the diagnostic lens towards the interest and the use of the influence (Awan et al., 2021).

Takaful, which aligns with the philosophy of mutual aid, provides financial insurance against unanticipated calamities. When people recognize the value of takaful in providing financial stability and assistance during tough times, they are more inclined to purchase it. Takaful follows Islamic values by avoiding interest (riba) and uncertainty (gharar). Individuals seeking Shariah-compliant financial solutions may consider the use of takaful as aligned with their religious and ethical principles, influencing their purchase decision.

H3. Perceived usefulness significantly affects attitude towards motor takaful products.

Perceived Trust and Attitude
Purchase intentions are somewhat influenced by consumers' attitudes and levels of trust. The literature on trust views it as a belief characterized by the construction of some attributes of an object (Colquitt and Rodell, 2011). In a similar vein, trust is conceptualized as a cognitive belief formed based on interactions and cognitive/affective elements (Park, 2020). Trust is one of the influential factors in determining consumer behaviour (Morgan & Hunt, 1994).

Individuals' attitudes towards obtaining motor takaful are favourably influenced by their trust in the dependability of the coverage, as they are certain that the insurance would meet its promises during times of need. Tendency to trust reduces perceived risk (Humphrey & Schmitz, 1998).

H4. Perceived trust significantly influences individual's attitude to participate in motor takaful products.

Perceived Religiosity and Attitude
The level of religiosity becomes a key determinant of Muslim consumer attitudes and behavior (Souiden & Jabeur, 2015). Religiosity (also known as religious commitment) is "the degree to which beliefs in specific religious values and ideals are held and practiced by an individual" (Delener, 1990). Saroglou et al. (2011) contend that religiosity shapes one's value framework, which further influence their attitudes and behaviours (Schwartz, 1992).

H5. Perceived religiosity significantly influences attitude to engage in purchasing motor takaful products.

Theoretical Framework
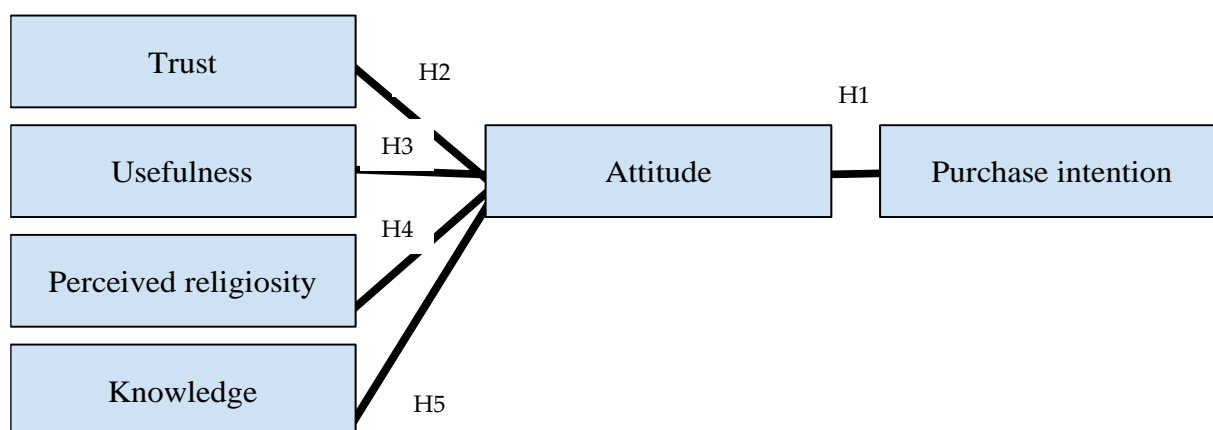The proposed relationships between the variables are illustrated in Figure 1.

Figure 1: Theoretical Model

METHODOLOGY

Using a quantitative approach, this study fits into the descriptive and correlative research design. Primary data were collected through questionnaires using Likert scale. Reliability and validity tests were employed to check the reliability and validity of the variables for the data collection. The target population of USIM students was considered in the current study. Using simple random sampling techniques, from the total number of USIM students of 13,417, a sample of 375 students was taken using Krejcie and Morgan (1970) method of determining sample size from the total population. However, the current study managed to get 1,155 respondents. Descriptive, correlation and multiple regression analyses were performed to find the relationship of variables and to check the effect of one variable on the other.

Research Instrument

Data were collected using a survey method involving questionnaires. Standardized measurement scales for the study's constructs were adopted from prior literature. Attitude items came from previous studies such as Ramayah et al. (2009) and Lajunen and Räsänen (2004). Attitude items regarding takaful are also included based on Husin and Rahman (2016). Knowledge items were retrieved from Hall (2013). Perceived usefulness as defined by Davis (1989) referred to enhancing job performance; items were adapted to the study's motor takaful context. Trust reflects belief in takaful providers' honesty and avoiding opportunism (Gefen et al., 2003). Perceived trust items measuring individuals' belief that takaful companies will meet expectations without opportunism came from Gefen et al. (2003). Perceived religiosity items addressing beliefs about motor takaful's alignment with Islamic principles came from Amin et al. (2011).

RESULTS AND DISCUSSION

Demographic Profile

The data from 1,155 respondents was examined. Table 1 presents the demographic profiles of the respondents The questionnaires were completed by 515 male respondents and 640 female respondents. According to the data, 1,120 respondents were single, 34 were married, and one was divorced. Aside from that, 132 respondents were from tamhidi, 1,017 respondents were bachelor's students, 3 respondents were Master's students, and 3 respondents were Phd students. Furthermore, Year 1 had 310 respondents, which is the greatest number of respondents. Approximately 277 responders are from Year 2, 272 from Year 3, 201 from Year 4, and 95 from Year 5. Furthermore, about 610 respondents are between the ages of 21 and 29, and 545 are between the ages of 18 and 20.

In addition, nine faculties are involved in this research: Fakulti Pengajian Quran dan Sunnah (FPQS), Fakulti Syariah dan Undang-Undang (FSU), Fakulti Kepimpinan dan Pengurusan (FKP), Fakulti Ekonomi dan Muamalat (FEM), Fakulti Pengajian Bahasa Utama (FPBU), Fakulti Sains dan Teknologi (FST), Fakulti Kejuruteraan dan Alam Bina (FKAB), Fakulti Perubatan dan Sains Kesihatan (FPSK), and Fakulti Pergigian (FPg). Around 21% of respondents are from FEM, which has the largest proportion of all faculties, while 4.2 percent of respondents are from FPg, which has the lowest percentage of all faculties.

Demographic	Number of respondents	%	Cumulative %
Gender			
Male	640	44.6	44.6
Female	515	55.4	100
Age			
18-20	545	47.2	47.2
21-29	610	52.8	100
Year			
1	310	26.8	26.8
2	277	24	50.8
3	272	23.5	74.3
4	201	17.4	91.7
5	95	8.2	100
Faculty			
FPQS	171	14.8	14.8
FSU	167	14.5	29.3
FEM	242	21	50.3
FPBU	123	10.6	60.9
FST	98	8.5	69.4
FKAB	98	8.5	77.9
FPSK	68	5.9	83.8
FPG	49	4.2	100

Demographic	Number of respondents	%	Cumulative %
Marital status			
Single	1,120	97	97
Married	34	2.9	99.9
Divorce	1	0.1	100
Current student			
Tamhidi	132	11.4	11.4
Bachelor's degree	1,017	88.1	99.5
Master's degree	3	0.3	99.8
Phd	3	0.3	100

Table 1: Demographic profiles of the respondents

Descriptive Analysis

The descriptive results of this study are shown in Table 2. Based on the responses of 1,155 respondents, the study illustrates the elements that encourage students to purchase motor takaful. Attitude is a crucial factor determining an individual's desire to purchase motor takaful, with the highest mean of 4.567 when compared to the other variables. It demonstrates that an individual's attitude towards purchasing motor takaful might impact their purchase intention depending on their opinion that purchasing motor takaful is a good, beneficial, and worthwhile thing to do. This factor's median and standard deviation are 5 and 0.58, respectively. Aside from that, perceived religiosity is a factor that impacts an individual's desire to purchase motor takaful, with the second highest mean of 4.445, a median of 4.6, and a standard deviation of 0.613. Furthermore, the usefulness factor has the lowest mean at 3.734. This factor's median and standard deviation are 3.75 and 0.809, respectively. This indicates that the majority of people consider that obtaining a motor takaful scheme is ineffective in dealing with financial needs.

	Intention	*Attitude*	*Trust*	*Usefulness*	*Religiosity*	*Knowledge*
Mean	4.213	4.567	4.345	3.734	4.445	4.440
Median	4.250	5.000	4.500	3.750	4.600	4.500
Mode	4.000	5.000	4.500	4.000	5.000	5.000
Standard Deviation	0.623	0.580	0.579	0.809	0.613	0.637
Sample Variance	0.388	0.336	0.335	0.654	0.376	0.406
Range	4.000	3.250	3.750	4.000	3.600	4.000
Minimum	1.000	1.750	1.250	1.000	1.400	1.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000
Count	1155	1155	1155	1155	1155	1155

Table 2: Descriptive statistics; Independent variables and dependent variables

Correlation Analysis

Correlation analysis was used to analyze the factors. Table 3 exhibits the correlation coefficients for each variable. The above correlation table shows the relationship

between each variable. The correlation coefficient between the same variable is 1, indicating a perfect positive correlation. Each variable's coefficient correlations are positive. This demonstrates that each variable is connected to the others. However, not every variable is tightly related to another. Because 0.254 is significantly closer to 0 than to 1, the correlation coefficient between usefulness and attitude is weak. The correlation coefficient between trust and attitude, on the other hand, has a positive connection with 0.633 since 0.633 is closer to 1, implying that the relationship between perceived trust and attitude is strongly correlated. This indicates that while deciding whether to purchase motor takaful, perceived trust is crucial. People's views towards getting motor takaful are positively impacted by their confidence in the coverage's reliability since they know that the insurer will fulfil its commitments in an emergency.

	Intention	Attitude	Trust	Usefulness	Religiosity	Knowledge
Intention	1					
Attitude	0.563	1				
Trust	0.495	0.633	1			
Usefulness	0.281	0.254	0.361	1		
Religiosity	0.569	0.576	0.595	0.260	1	
Knowledge	0.483	0.535	0.541	0.263	0.575	1

Table 3: Correlation analysis for each variable

Multiple Regression Analysis

Multiple regression analysis was also used to analyze the factors. The influence of knowledge, usefulness, trust, and perceived religiosity on individual's attitude and intentions towards motor takaful schemes was investigated using multiple regression analysis. This study manages to access the unique contributions of each element while adjusting for any confounding variables using multiple regression analysis, offering a thorough insight into the factors influencing individuals' intentions to purchase motor takaful. Table 4 presents the multiple regression analysis. Based on the results, the findings on the relationship between the factors involved are shown in Table 5, respectively.

Regression Statistics	
Multiple R	0.654
R Square	0.428
Adjusted R Square	0.425
Standard Error	0.472
Observations	1155

ANOVA				
	df	SS	MS	F
Regression	5	191.622	38.324	171.854

Regression Statistics				
Multiple R	0.654			
R Square	0.428			
Adjusted R Square	0.425			
Standard Error	0.472			
Observations	1155			
Residual	1149	256.233	0.223	
Total	1154	447.855		

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.541	0.128	4.231	0.000
A	0.302	0.033	9.035	0.000
T	0.056	0.035	1.597	0.110
U	0.066	0.019	3.581	0.000
PR	0.291	0.031	9.297	0.000
K	0.115	0.029	4.016	0.000

Table 4: Multiple regression analysis

Testing of hypotheses	b	Sig	Results	
H1: There is a significant relationship between attitude and individual's purchasing intention.	0.302	0.000	Significant	Accepted
H2: There is a significant relationship between perceived trust and an individual's attitude.	0.056	0.110	Not Significant	Rejected
H3: There is a significant relationship between usefulness and an individual's attitude.	0.066	0.000	Significant	Accepted
H4: There is a significant relationship between perceived religiosity and an individual's attitude.	0.291	0.000	Significant	Accepted
H5: There is a significant relationship between knowledge and an individual's attitude.	0.115	0.000	Significant	Accepted

Table 5: Results of multiple regression analysis

Data analysis is based on the significance level of the P-value for each of the factors. When the degree of significance is less than 5 percent, it shows that the all the factors have a significant effect on an individual's purchasing intention toward motor takaful except for trust.

The present study examined the determinants shaping individuals' attitudes toward motor takaful among USIM students. Grounded in the TPB, the research model outlined attitudinal antecedents. Additionally, the relationship between attitude and intention to purchase motor takaful was explored. The findings indicate that an individual's purchasing intention towards motor takaful is more influenced by attitude, usefulness, perceived religiosity, and knowledge.

This study suggested that attitude is positively related to purchase intention, while usefulness, religiosity and knowledge are antecedents of attitude, along with the positive result obtained for attitude towards purchasing motor takaful scheme. The results depict that attitude and intention aspects are positively related. This means that a positive attitude to purchase motor takaful products will lead to positive purchase intentions. The current findings in line with the past literature (Amin et al., 2011). Apart from that, the results reported that the relationship of knowledge with attitude is significant. The results support previous studies that if a consumer is knowledgeable about the family takaful scheme, this will develop a positive attitude about it (Ahmed et al., 2015; Hidayat and Rafeea, 2014). Moreover, the findings of the current study implied that usefulness has a positive relationship with attitude. The results confirm the prior literature (Jamshidi and Hussin, 2016), stating that if the potential consumers find the family takaful scheme useful, they will exhibit a positive attitude to purchase family takaful scheme. On the other hand, trust shows a positive but insignificant result with respect to attitude, thus contradicting the results of the previous research work (Pavlou, 2003; Suh and Han, 2003) but in agreement with study by Malonda et al. (2020).

Additionally, the outcomes show that religiosity can have a positive impact on attitude. Within the takaful domain, Mansor et al. (2015) demonstrated that religiosity is crucial. Prior research confirms the present results that attitude to purchase motor takaful schemes is influenced by customers' religious beliefs to safeguard against life and financial risks.

Theoretical and Practical Contributions

This research investigates factors influencing individuals' attitude as determinants in purchasing motor takaful coverage. The study concludes that attitude, usefulness perceptions, religios belief and knowledge emerge as stronger drivers relative to alternative considerations in shaping an individual's intention to buy motor takaful. Along with perceived usefullness and knowledge, if the consumer perceives the product to be religious, then the individual is very likely to show positive purchase intentions.The study also suggests trust does not impact the attitude to purchase motor takaful products. One possible explanation for this findings is that the role of religiosity has relationship with trust. This is true based on study by Aziz et al (2019) which found that perceived trust completely mediated the relationship between perceived religiosity and attitude.

It is important to have programmes and collaborative initiatives that could shape positive perceptions in the minds of potential consumers. Furthermore, it is crucial to address any misconceptions or doubts that potential consumers may have about motor takaful. This can be achieved through clear and transparent communication, providing detailed information about the coverage and benefits of the motor takaful coverage. Additionally, offering personalised and tailored solutions based on individual needs can help instill confidence in the product and its ability to meet the specific requirements of each customer.

Implementing trust-building measures within motor takaful services is a practical step to enhance consumer trust and confidence. Transparency, fair practices, and reliable customer service are suggested as practical measures to establish and maintain trust. These measures can include regularly updating customers on any changes to their coverage or benefits, as well as promptly addressing any concerns or complaints they may have. Furthermore, providing clear and easily accessible information about the claims process and ensuring a smooth and efficient claims experience can also contribute to building trust in motor takaful services.

Designing user-friendly and relevant motor takaful products is a practical approach to further improve perceived usefulness. Practical adjustments in product design and features can significantly influence perceived usefulness, ultimately impacting purchase decisions positively. In addition, offering personalised and tailored motor takaful options can also enhance the perceived value of the services. By understanding the specific needs and preferences of customers, insurers can create customised packages that meet their individual requirements, further increasing their satisfaction and trust in the services. Moreover, regularly reviewing and updating the motor takaful products to align with changing customer demands and market trends can ensure that the offerings remain relevant and competitive in the industry.

CONCLUSION

In conclusion, the exploration of takaful and motor takaful reveals not only a distinctive approach to takaful but also sheds light on the important factors influencing individuals' attitudes toward purchasing motor takaful products. The concept of takaful, founded on the principles of mutual assurance and shared responsibility, stands in contrast to traditional insurance, emphasizing collective support over individual risk assumption. Motor takaful, an application of Takaful principles to vehicle coverage, aligns ethically with Shariah beliefs, safeguarding individuals from a range of potential issues. The pivotal element of purchase intentions, influenced by attitudes, perceived usefulness, religiosity, and knowledge, underscores the complex interplay of emotional, religious, and informational factors in shaping consumer decisions. In essence, the influence of these factors delineates a holistic understanding of consumer attitudes toward motor takaful, providing valuable insights for both practitioners and policymakers in fostering the adoption of takaful products within diverse communities.

REFERENCE

Ahmed, W., Shahid Soroya, M. and Malik, G.F. (2015). Service quality of library front desk staff in medical colleges of Lahore. *Library Management, 36*, 12-22.

Ajzen, I. (2014). *Attitude structure and behavior*. In Attitude structure and function (pp. 241-274). Psychology Press.

Ali, E.R.A.E., Odierno, H.S.P. & Ismail, A. (2008). *Essential guide to takaful: (Islamic insurance)*. CERT Pubs. Sdn. Bhd.

Amin, H., Rahim Abdul Rahman, A., Laison Sondoh, S. Jr and Magdalene Chooi Hwa, A. (2011). Determinants of customers' intention to use Islamic personal financing: the case of Malaysian Islamic banks. *Journal of Islamic Accounting and Business Research, 2*(1), 22-42.

Awan, M. J., Yasin, A., Nobanee, H., Ali, A. A., Shahzad, Z., Nabeel, M., ... & Shahzad, H. M. F. (2021). Fake news data exploration and analytics. *Electronics, 10*(19), 2326.

Aziz, S., Md Husin, M., Hussin, N., & Afaq, Z. (2019). Factors that influence individuals' intentions to purchase family takaful mediating role of perceived trust. *Asia Pacific Journal of Marketing and Logistics, 31*(1), 81–104. https://doi.org/10.1108/apjml-12-2017-0311

Brucks, M. (1985). The Effects of Product Class Knowledge on Information Search Behavior. *Journal of Consumer Research, 12* (June), 1- 16.

Colquitt, J. A., & Rodell, J. B. (2011). Justice, trust, and trustworthiness: A longitudinal analysis integrating three theoretical perspectives. *Academy of Management Journal, 54*(6), 1183-1206.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 35*(8), 319-340.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 35*(8), 319-340.

Delener, N. (1990). The Effects of Religious Factors on Perceived Risk in Durable Goods Purchase Decisions. *Journal of Consumer Marketing, 7*(3), 27–38. http://doi.org/10.1108/EUM0000000002580

Echchabi, A. and Aziz, H.A. (2012). The relationship between religiosity and customers' adoption of Islamic banking services in Morocco. *Oman Chapter of Arabian Journal of Business and Management Review, 1*(10),89-94.

Engel, F. James; Roger D. Blackwell; Paul W. Mi-niard. 1994. *Perilaku Konsumen*. Jakarta: Bi-narupa Aksara.

Fishbein, M. and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley Pub. Co.

Garg, N., Wansink, B., & Inman, J. J. (2007). The Influence of Incidental Affect on Consumers' Food Intake. *Journal of Marketing, 71*(1), 194-206. https://doi.org/10.1509/jmkg.71.1.194

Gefen, D., Karahanna, E. & Straub, D.W. (2003). Trust and TAM in online shopping: an integrated model. *MIS Quarterly, 27*(1), 51-90.

Hall, G. E. (1977). Measuring stages of concern about the innovation: A manual for the use of the SoC Questionnaire.

Hidayat, S.E. and Rafeea, A.M. (2014). Public awareness towards takaful concept and principles: a survey in Bahrain. *International Journal of Excellence in Islamic Banking and Finance, 4*(2), 1-16.

Humphrey, J., & Schmitz, H. (1998). Trust and inter-firm relations in developing and transition economies. *The Journal of Development Studies, 34*(4), 32-61.

Husin, M.M. and Rahman, A.A. (2016). Do Muslims intend to participate in Islamic insurance?. *Journal of Islamic Accounting and Business Research, 7* (1), 42-58.

Institute of Islamic Banking and Insurance. (2019). *Islamic Insurance (Takaful).* https://www.islamic-banking.com/explore/islamic-finance/islamic-insurance-takaful

Jalil, Asila. (2024 February 7). *MTA to double Malaysia's takaful penetration to 40pct in four years.* https://www.nst.com.my/business/corporate/2024/02/1010726/mta-double-malaysias-takaful-penetration-40pct-four-years

Jamshidi, D. and Hussin, N. (2016). Forecasting patronage factors of Islamic credit card as a new e-commerce banking service: an integration of TAM with perceived religiosity and trust. *Journal of Islamic Marketing, 7*(4), 378-404.

Junaidi, J., Wicaksono, R., & Hamka, H. (2022). The consumers' commitment and materialism on Islamic banking: the role of religiosity. *Journal of Islamic Marketing, 13*(8), 1786-1806.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*, 607-610.

Lajunen, T. & Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the health belief model, theory of planned behavior and the locus of control. *Journal of Safety Research, 35*(1), 115-123.

Malonda, R. C., Tulung, J. E., & Arie, F. F. (2020). The Effect of Technology Acceptance Model, Perceived Trust, Security, and Attitude Toward OVO Usage. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi, 8(*1), 401 – 410.

Mansor, K.A., Masduki, R.M.N., Mohamad, M., Zulkarnain, N. and Aziz, N.A. (2015). A study on factors influencing Muslim's consumers preferences towards takaful products in Malaysia", Romanian Statistical Review, Vol. 63 No. 2, pp. 78-89.

Mellers, B., & McGraw, A.P. (2001). Anticipated emotions as guides to choice. *Current Decisions in Psychological Science, 10*(6), 210-214.

Morgan, R.M. and Hunt, S.D. (1994). The commitment-trust theory of relationship marketing. *The Journal of Marketing, 58*, 20-38.

Morwitz, V.G., Steckel, J.H. and Gupta, A. (2007). When do purchase intentions predict sales?. *International Journal of Forecasting, 23*(3), 347-364.

Mulyani, V. G., Najib, M. F., & Guteres, A. D. (2021). The effect of perceived usefulness, trust and visual information toward attitude and purchase intention. *Journal of Marketing Innovation (JMI), 1*(1).

Nalluri, V., Reddy, M. S., & Kumar, V. (2020). Consumers' intention for green purchase: an empirical analysis on foreign products. *Journal of Critical Reviews, 7*(8), 961-965.

Nickerson, C. (2023, October 16). Theory of Reasoned Action. Www.simplypsychology.org. https://www.simplypsychology.org/theory-of-reasoned-action.html

Park, S. (2020). Multifaceted trust in tourism service robots. *Annals of Tourism Research, 81*, 102888.

Pavlou, P.A. (2003). Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce, 7*(3), 101-134.

Peterson, S. (2021, April 12). Customer Purchase Intention: Definition, Why (+ How) to Measure & Convert. Namogoo. https://www.namogoo.com/blog/consumer-behavior-psychology/customer-purchase-intention/

Ramayah, T., Rouibah, K., Gopi, M. & Rangel, G.J. (2009). A decomposed theory of reasoned action to explain intention to use Internet stock trading among Malaysian investors. *Computers in Human Behavior, 25*(6), 1222-1230.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review, 23*(3), 393-404.

Saroglou, V. (2011). Believing, bonding, behaving, and belonging: The big four religious dimensions and cultural variation. *Journal of Cross-Cultural Psychology, 42*(8), 1320-1340.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1–65. http://dx.doi.org/10.1016/S0065-2601(08)60281-6

Souiden, N. and Jabeur, Y. (2015). The impact of Islamic beliefs on consumers' attitudes and purchase intentions of life insurance. *International Journal of Bank Marketing, 33*(4), 423-441.

GLOBALIZING CYBER HASANAT: CULTIVATING DIGITAL LITERACY AND ETHICAL RESPONSIBILITY FOR THE RESILIENCE COMMUNITY

Sakinah Ali Pitchay[i], Farida Ridzuan[ii], Azni Haslizan Ab Halim[iii] &
Najwa Hayaati Mohd Alwi[iv]

[i] (*Corresponding author*). Cybersecurity and Systems Research Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia. sakinah.ali@usim.edu.my
[ii] Cybersecurity and Systems Research Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia. farida@usim.edu.my
[iii] Cybersecurity and Systems Research Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia. ahazni@usim.edu.my
[iv] Cybersecurity and Systems Research Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia. najwa@usim.edu.my

Abstract

The Cyber Hasanat project is a continuous social innovation carried out globally via the Global Islamic Student Outreach in Vietnam, Taiwan, and Yogyakarta, Indonesia, in 2024. It aims to cultivate digital literacy and ethical responsibility in building resilient communities. This initiative comprises three key modules: (i) Protect Identity Campaign, which increases personal data security awareness while promoting digital transformation; (ii) Secure Cybercitizenship (SET) board game, leveraging gamification for interactive cybersecurity education, and (iii) Hasanat Cyber Mind Exploration, addressing the societal impact of digital literacy and contributing to Sustainable Development Goal 4 (quality education). This community engagement aligns with the Malaysian National Cyber Security Agency (NASCSA), "Be a better-informed netizen". A preliminary survey assessed participants' baseline knowledge of cybersecurity, revealing significant gaps in understanding. Through a combination of transfer knowledge and gamification in community engagement, the project builds resilient communities by fostering a secure digital environment. It empowers individuals to navigate the complexities of the digital age with confidence, ethical awareness, and cybersecurity knowledge. This global initiative provides a scalable model for disseminating cybersecurity awareness and promoting digital inclusiveness, enhancing resilience across diverse regions through interactive and engaging methods.

Keywords: *Cyber Hasanat, cybersecurity awareness, gamification, global, digital literacy*

INTRODUCTION

The Internet plays a crucial role in today's world. According to the Malaysian Communications and Multimedia Commission's (MCMC) 2024, Internet Users Survey (IUS) 2022 reported that Internet usage in Malaysia increased by 4.3%, from 88.7% in 2020 to 92.7% in 2022. The survey also aims to estimate the number and

percentage of Internet users nationwide. IUS 2022 also reported that fraud and scams were the most common types of cybercrime, with 68.5% of respondents indicating they had experienced them. Many organizations still experience security breaches of personal information. Human error is a significant contributing factor to many data breaches occurring. According to Verizon's 2022 Data Breach Investigations Report, more than 82% of breaches involve the human element, including social engineering attacks, email phishing and misuse of personal data. In Verizon's 2023 Data Breach Investigations Report, 83% of breaches involved external actors, with financial gain being the primary motive in 95% of cases. The top methods attackers use to infiltrate organizations are stolen credentials, phishing, and exploiting vulnerabilities. Statistics from the Commercial Crime Investigation Department of the Royal Malaysian Police (PDRM) Bukit Aman recorded 19,224 online crime cases in the period from January to September 2023, an increase of 23 percent compared to 15,659 cases recorded for the same period last year from the official portal of the Ministry of Communications reported by Bernama article in 2023. Malaysia Computer Emergency Response Team (MyCert) by Cyber Security Malaysia recorded 5917 cybercrime incidents from January to Dec 2023, with online fraud topping the list with 3507 incidents. Cyberattacks can have severe consequences for individuals, businesses, and governments, leading to financial losses, personal data breaches, and the disruption of essential services.

Therefore, in the digital era, cyber security awareness is important in line with the concept highlighted in Cyber Hasanat. Hasanat is an Arabic word meaning "good deeds" that should be applied in cybersecurity to develop ethical behaviour. The program uses a Secure Cybercitizenship (SET) physical game board and an exploration mind that applies cybersecurity knowledge. There are three main issues that Cyber Hasanat aims to address: firstly, learning behaviour changes, lack of cyber attack prevention knowledge, and reduction of the statistical rate of cyber threats and financial losses to create a resilient society. Therefore, an understanding of personal data security needs to be fostered in the daily use of Internet technology that aims to educate about potential risks, related threats, and early prevention measures through the interactive learning medium of SET board games.

Besides, one of the challenges in education is how the edutainment approach can be applied to foster awareness and maintain motivation and learning momentum. Work by Masakazu and Megumi (2019) also suggests that gamification appeals to many people of any generation and, thus, may be effective in increasing and maintaining their motivation to learn. In the previous project 2023, key findings for community-based learning for Cyber Hasanat projects show that 83% of respondents agree they are more aware of cyber security. 85% strongly agreed that the Cyber Hasanat program should be rerun in the future to meet lifelong needs. In the long term, Cyber Hasanat aims to reduce cases of cyber attacks that can benefit the country and is in line with the motto of the Malaysian National Cyber Security

Agency (NASCSA), which is "Be a better-informed netizen" and in line with the Department Royal Malaysian Police Commercial Crime Investigation which is "Be Smart Stay Alert".

In 2024, the Cyber Hasanat project was carried out globally as one of the community engagement activities via the Global Islamic Student Outreach (GISO) in Vietnam and Taiwan was held in February and August 2024. Social innovation projects aim to transfer knowledge to improve cybersecurity awareness worldwide. Impactful community service contributions can also increase Malaysia's international visibility as a higher educational institution.

BACKGROUND

The Cyber Hasanat project aims to fulfil four objectives which are (i) meet social needs in educating the community at an early age to increase awareness of cyber security and risks if technology is not handled carefully, (ii) build ethical behaviour among the youth community towards reducing cybercrime through the Cyber Hasanat project which includes lectures, interactive board games (Secure Cybercitizenship) and exploration, (iii) empowering resilient communities through edutainment with the integration of INAQ knowledge (Naqli & Aqli) by learning potential cyber security threats and solutions and (iv)) carry out knowledge transfer activities related to digital data security in line with the goal of the Permanent Sub-Committee (JKT) on Communications - Ministry of Digital Malaysia in reducing the statistical rate of cyber threats and crimes. The objective is to transfer knowledge related to digital data in cybersecurity.

Cyber Hasanat provides a different approach by incorporating a quiz-based element of cyber security awareness as a starting salary before playing the SET board game and encouraging the integration of Naqli & Aqli (iNaQ) knowledge through iNAQ Ta'alim (education) where users can learn ethics or good practices in the field cyber security. SET also offers the concept of portability, accessibility, offline services (anytime, anywhere) and lifelong learning and increases cyber security awareness through gamification with iNAQ integration. SET is an extension of the Cyberpoly mobile application that focuses on cyberattack awareness through edutainment (Sakinah, A.P. et al., 2022).

Cyber Hasanat is a continuous social innovation carried out yearly for community service by increasing the community's cyber security awareness at a young age. Cyber Hasanat's motto is "Protecting Our Digital Community" as the cybersecurity awareness theme. Therefore, two community-based learning courses for the "Inclusive Digital Society" course were implemented by Universiti Sains Islam Malaysia (USIM) undergraduate Computer Science students at Bandar Baru

Sekolah Agama Menengah Salak Tinggi (SAMBBST) on June 8, 2023 and at Taman Tasik Jaya Public Hall with the collaboration Sekolah Taman Tasik Jaya (STAJA) on June 14, 2023. 1000 primary school students, consisting of Taman Tasik Jaya National School and 16 invited schools, including secondary school students. This project is in high demand to be implemented periodically under the alignment of the Malaysian Science, Technology, Innovation and Economy (MYSTIE) 10-10 Framework, which emphasizes education and improving the level of cyber security literacy of the community. SET board game supports the development of cybersecurity skills, which are in line with the RMK12-Digital talent development goals and have been tested by end users.

METHODS OF IMPLEMENTATION

The Cyber Hasanat Project 2024 was carried out globally via Global Islamic Student Outreach in Vietnam, Taiwan and Yogyakarta, Indonesia. In Indonesia, the Cyber Hasanat took place at SMA Muhammadiyah 1 and Universitas Gadjah Muda. However, only two countries were involved in the implementation survey: Ho Chi Minh City, Vietnam, and Taipei, Taiwan. The community engagement committee identified the higher education institution through the Malaysian embassy and sent the invitation letter. Once the committee received the acceptance feedback from the institution, they prepared the Cyber Hasanat materials based on the allocated time.

This project involves three main modules, namely (i) Protect Identity Campaign, Together Driving Digital Transformation, which raises awareness about cyberattacks; (ii) Secure Cybercitizenship (SET) game board, which uses gamification to facilitate cyber security learning in a way that interactive and fun, and (iii) Cyber Hasanat Mind Exploration, which encourages participants to think creatively about cybersecurity. In the first module, the Protect Identity Campaign aims to raise awareness about cyberattacks by educating communities on safeguarding personal data via face-to-face talk and interesting sharing. It promotes collective action toward digital transformation, empowering individuals to protect their online identities while fostering secure digital practices in an increasingly interconnected world.

In the second module, the Secure Cybercitizenship (SET) game board aims to teach cybersecurity concepts through interactive gamification. Featuring cards like Ta'alim iNAQ, Ta'alim Cybersecurity L1 (beginner) and L2 (advance), Buy Item, Do This, InfoSec, Qada' and Qadar, it promotes ethical digital behaviour and informed decision-making. By engaging players in real-life scenarios, the game fosters awareness of cyber risks, identity protection, and secure practices, empowering communities to navigate the digital landscape with confidence and responsibility.

The third module, The Cyber Hasanat Mind Exploration module, aims to foster creative thinking in participants regarding cybersecurity challenges. Encouraging innovative problem-solving enhances participants' ability to critically assess digital threats and develop effective strategies for cybersecurity in a fun way, promoting awareness and proactive digital safety. A preliminary survey is

conducted using the online form via a QR code to investigate their cybersecurity awareness. Three questions on demographic respondents and ten close-ended questions. This quick survey was conducted on 21 Feb 2024 for Vietnamese communities and 19 Aug 2024 for Taiwanese communities.

RESULTS AND DISCUSSION

This preliminary survey was completed online before implementing Cyber Hasanat. It aims to identify the general knowledge of the cybersecurity field among high school and university students in Vietnam and Taiwan. The respondent institutions in Vietnam are The University of Social Sciences and Humanities and Van Lang University. The respondents were from The University of Social Sciences and Humanities and Van Lang University for the community in Vietnam. At the same time, the respondents in Taiwan were from New Taipei Vocational High School and Yadong University of Science and Technology. The project was conducted at Asia Eastern University of Science and Technology, Taipei. The respondents' demographics are summarized in Tables 1 and 2. The age distribution of the respondents is shown in Table 1. In this preliminary survey, users from the university are the majority.

Table 1: Age demographic of the respondents for university and school students in Ho Chi Minh & Taipei, Taiwan

Age	Percentage (%)
17 -19	44
20 - 22	56

Table 2: Type of institution of the respondents for university and school students in Ho Chi Minh, Vietnam and Taipei, Taiwan

Type of Institution	Percentage (%)
High School	13
University	87

The following survey shows the findings in Figure 1-9. Based on Figure 1, the majority of respondent in Vietnam and Taiwan agree that they received information about cybersecurity in their educational institution. However, it is less than 50%, and the awareness should be spread widely. The second highest vote shows a lack of cybersecurity dissemination, showing that 33% do not get the information in their educational institution.
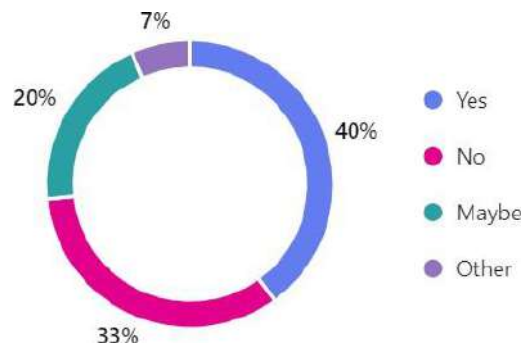

Figure 1: Have you received any information about cyber security at the university/ school?

In Figure 2, the majority of respondents are not sure whether it is safe to use their personal information for a character or account that they have created on the Internet, with the highest votes, 40%. Figure 2 summarizes the respondent option's unsure whether it is safe to use their personal information to share on social media, with 47%. The second highest votes, with 27%, agree that using their personal information to share on social media is safe. Looking at these early findings before Cyber Hasanat implementation, increasing their cybersecurity awareness to avoid further cyber threats is highly significant.
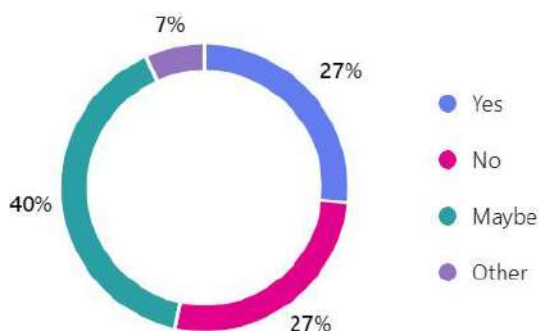
Figure 2: Is it safe to use your personal information for a character or account you created on the Internet?
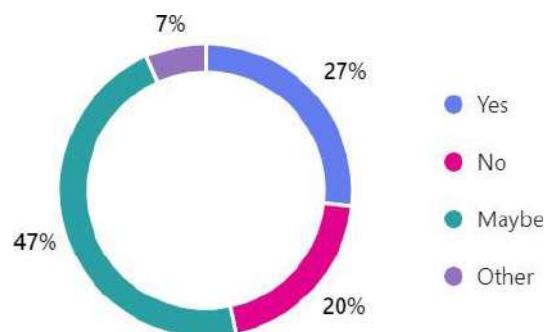
Figure 3: Is it safe to use your personal information to share on social media?

In Figure 4, 60% vote for the strong characteristics of a strong password, which shows that they have good practices and ethics in cybersecurity. However, the second highest preference is to choose "easy to remember" as the characteristic of a strong password. Thus, cybersecurity knowledge must be broadly disseminated in educational institutions.

● Easy to remember	4
● Combination of upper and lower case letters	1
● Combination of upper and lower case letters, numbers and symbols.	9
● Not sure	0
● Other	1

Figure 4: In your opinion, what are the characteristics of a strong password?

In Figure 5, 53% agree that password is a personal information that needs to be kept personally. Nevertheless, 40% still share their password with friends or family members. Figure 6 explores the awareness of multiple authentications for online accounts, and 67% have heard about it. This awareness can increase if more cybersecurity knowledge is disseminated in informal learning.
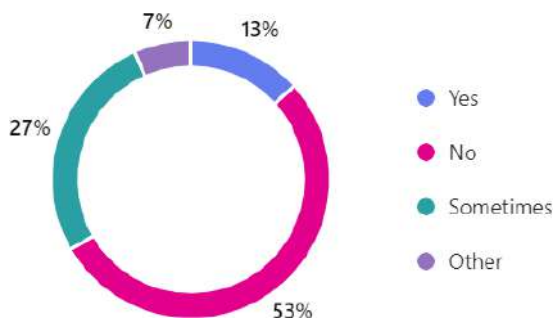
Figure 5: Do you share your password with friends or family members?
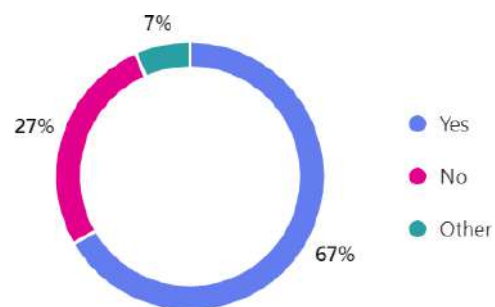
Figure 6: Do you know about two / three-factor authentication (multiple authentication) for your online account?
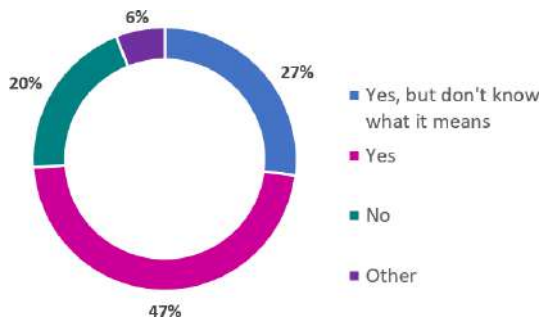
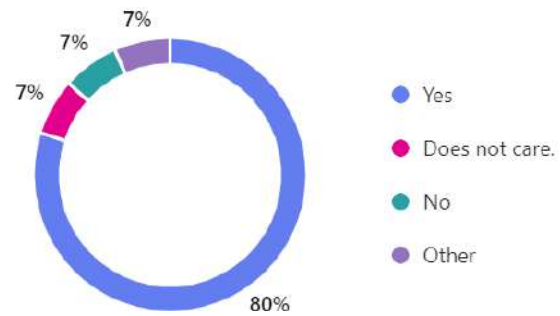Figure 7: Have you heard of social engineering attacks, such as scams or attempted identity fraud?

Figure 8: If you play online games, are you aware of the potential security risks associated with in-game purchases or interactions with other players?

In Figure 7, 74% have heard about social engineering, and 27% do not know its meaning. Nevertheless, 40% still share their password with friends or family members. Figure 8 explores the awareness of potential security risks while interacting online with 80%. Figure 9 shows that 73% have connected to a public Wi-Fi network and are aware of secure precautions.
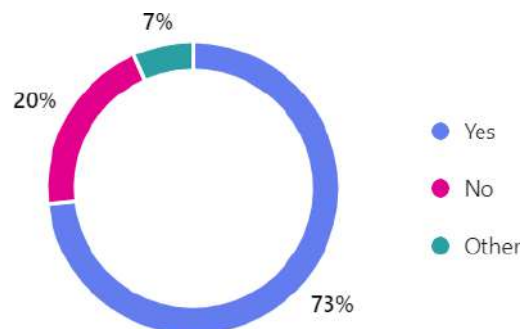
Figure 9: Have you ever connected to a public Wi-Fi network and taken any precautions to secure your connection?

Figures 1-9 summarize that the Cyber Hasanat project can help increase cybersecurity awareness in society, specifically among school and university students. Overall, findings from two higher education institutions in Vietnam and Taiwan show that there is still a need to globalize cybersecurity awareness to educate the young generation in building a resilient community in the long term.

CONCLUSION

The Cyber Hasanat program has achieved its primary objective by globalizing to other countries such as Vietnam, Taiwan, and Indonesia, as well as cultivating awareness about cybersecurity among high school and university students as the community. Through interactive and entertaining educational activities, the

participants have gained in-depth knowledge about the risk of social engineering tactics and measures to protect themselves from cyber threats. Apart from benefiting the participants, this program has allowed USIM's Computer Science (Assurance and Information Security) students to polish their leadership, communication, and teamwork skills. The active involvement of students in this program has fostered the value of volunteerism and increased their awareness of the importance of contributing to the community.

This life-long learning program significantly impacts community well-being and sustainability of innovation practices and empowers cybersecurity ethical practices by building critical thinking and sustainable digital knowledge. This aligns with efforts to reduce the risk of cybercrime, making this project relevant and high-impact in building a more cyber-literate society. The Cyber Hasanat project is also a requirement for the 2024 UNESCO Malaysia National Commission grant.

ACKNOWLEDGEMENT

REFERENCE

Bernama, 23 Pct Rise in Online Criminal Cases From Jan-Sept, 14 November 2023. https://www.bernama.com/en/news.php?id=2244475

Cybersecurity Malaysia, Malaysia Computer Emergency Response Team (MyCert). Reported Incidents based on General Incident Classification Statistics (2023) https://www.mycert.org.my/portal/statistics-content?menu=b75e037d-6ee3-4d11-8169-66677d694932&id=2862eb40-2bc0-4b4e-90ed-07d4eef73b7b

Data Breach Investigations Report. (2022). https://www.verizon.com/business/en-gb/resources/2022-data-breach-investigations-report-dbir.pdf

Data Breach Investigations Report. (2023). https://inquest.net/wp-content/uploads/2023-data-breach-investigations-report-dbir.pdf

Malaysian Communications and Multimedia Commission (2024). Internet Users Survey 2022. https://www.mcmc.gov.my/skmmgovmy/media/General/IUS-2022.pdf

Masakazu and Megumi (2019). A Challenge of Developing Serious Games to Raise the Awareness of Cybersecurity Issues. Proc. of DiGRA International Conference: Game, Play and the Emerging Ludo-Mix.

Sakinah Ali Pitchay, Anis Syahira Suhaimi, Najwa Hayaati Mohd Alwi, Farida Ridzuan & Azni Haslizan Ab Halim. (2022). Enhancing Cyber-attacks Awareness via Mobile Gamification Techniques, *International Journal of Advanced Research in Technology and Innovation*, Vol 4(2), ISSN 2682-8324.

CRYPTOLEARN: AI-DRIVEN ADAPTIVE CRYPTOGRAPHY LEARNING

Azni Haslizan Ab Halim[i,ii,iii], Farida Ridzuan[ii,iii], Najwa Hayaati Mohd Alwi[ii,iii], Sakinah Ali Pitchay[ii,iii] & Shah Muhammad Ash-Syafiq Shahril[ii]

[i] (*Corresponding author*). Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia
[ii] Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia
[iii] Cyber Security and Systems (CSS) Research Unit, Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia

Abstract

This paper presents CryptoLearn, an innovative tool designed to transform cryptography education using AI-driven adaptive learning technologies. Built following the Agile Software Development Life Cycle (SDLC), the tool prioritizes a user-centric approach, enhancing engagement and knowledge retention. CryptoLearn leverages artificial intelligence to personalize educational content based on individual learner needs, addressing the limitations of traditional cryptography teaching methods. The tool generates adaptive quizzes, offers detailed feedback, and tailors learning paths to track and respond to user progress, which caters effectively to both novice and advanced learners. With comprehensive planning, design, development, and rigorous testing phases, CryptoLearn ensures high functionality and effectiveness. By improving how cryptography education is delivered, this tool sets a new benchmark for adaptive learning technologies within cybersecurity education, offering an engaging and comprehensive experience that prepares learners for real-world cryptographic challenges.

Keywords: *Cryptography, Adaptive Learning, AI, Cybersecurity Education, Agile SDLC.*

INTRODUCTION

Cryptography is an essential part of information security, used in everything from protecting personal messages to securing financial transactions and government data. Despite its importance, many learners find cryptography challenging due to its complex math and technical ideas. While online learning platforms have made educational resources more accessible, there is a need for more interactive and adaptive tools to enhance the learning experience.With our increasing dependence on digital communication and data storage, the need for strong cryptographic techniques has never been more critical. Learning about cryptographic techniques requires a deep understanding of complex mathematical principles and algorithms (Andaloussi, K. S., et. al 2017). Traditional educational resources often fail to make these concepts accessible, especially for learners with different backgrounds and

learning styles. The use of AI in education offers a chance to transform the way cryptography is taught. AI-driven adaptive learning technologies can provide learning experiences that adjust to each learner's needs (Wang & Chen, 2022). This adaptive approach can enhance understanding and retention by offering tailored content and feedback, making the learning process more effective and enjoyable
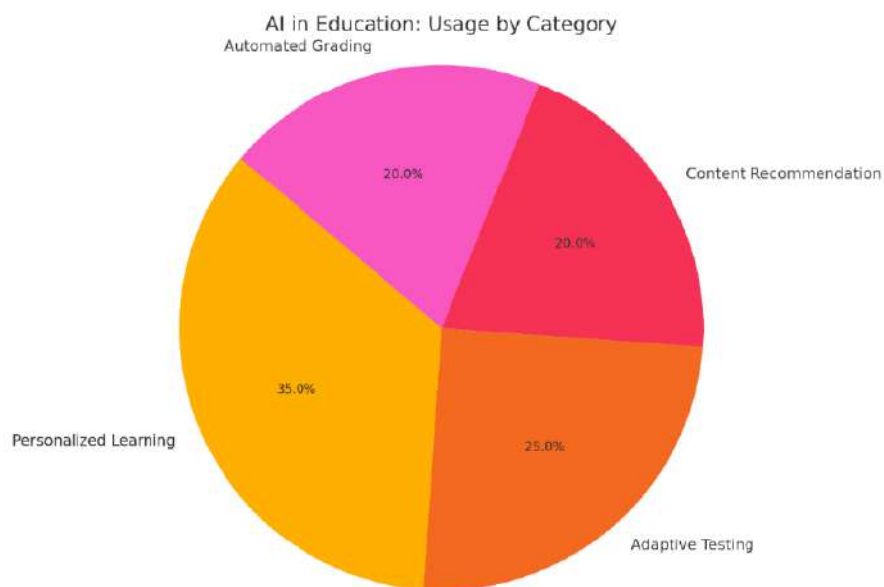

Figure 1: The usage of AI in Education by Category (Wang & Chen, 2022)

The diagram in Figure 1 illustrates the utilization of AI in education, categorized into four distinct segments. The predominant portion, at 35%, is allocated to personalized learning, where AI tailors individualized learning paths based on the unique strengths and needs of each student. Adaptive testing constitutes 25%, employing AI to dynamically adjust question difficulty according to student responses to provide a more customized assessment (Mwakamo & Kalimuthu 2021). Both automated grading and content recommendation make up 20% each. Automated grading utilizes AI for swift and equitable assignment assessment (Brown, 2020), while content recommendation suggests learning materials based on student performance and individual interests (Andaloussi, et. Al 2017). In summary, AI predominantly serves personalized learning, with adaptive testing, grading, and content recommendation also playing vital roles in enriching the educational landscape.

This paper introduces CryptoLearn: an AI-Driven Adaptive Cryptography Learning Platform. It aims to transform cryptography education by offering a more interactive, personalized, and effective learning experience. The platform focuses on a wide range of cryptographic techniques and utilizes AI-driven adaptive learning

technologies to address the evolving needs of learners in the digital age while bridging the gap between traditional educational methods.

RELATED WORKS

Educational platforms have revolutionized the delivery of learning by providing accessibility, flexibility, and a wide array of resources to learners across the globe. Examples such as Coursera and Khan Academy showcase the advantages of online education through their diverse courses, interactive content, and adaptive learning features. Coursera collaborates with top universities and organizations to offer high-quality courses, often incorporating personalized learning paths and adaptive quizzes to enhance learner engagement and retention (Liu et al., 2017). Meanwhile, Khan Academy, renowned for its mastery learning approach, ensures that students grasp a topic thoroughly before moving on, using interactive exercises and immediate feedback to facilitate learning. Both platforms harness Natural Language Processing (NLP) to analyze learner data and provide tailored content and feedback, thereby creating a more customized and effective educational experience (Morze, N., et. Al 2021). These platforms illustrate the potential of integrating advanced technologies in education to address diverse learner needs and enhance educational outcomes.

Coursera and Khan Academy have established themselves as pioneers in the online education field, utilizing cutting-edge technologies to create a stimulating learning environment. Their incorporation of adaptive learning features and natural language processing showcases how technology can tailor education to individual needs, enhancing its efficacy. Through ongoing enhancements to user experience design and the pursuit of innovative learner engagement strategies, both platforms exemplify the capacity of online education to address varied learning requirements and enhance global educational outcomes (Tavakoli, M. 2023). Both platforms utilize adaptive learning systems to personalize educational content based on each learner's progress and performance, effectively addressing individual needs and knowledge gaps. Coursera's machine learning algorithms use user preferences and progress to recommend courses and materials, while Khan Academy's mastery learning system ensures that learners have fully comprehended a topic before moving on. This approach not only enhances the learning experience but also improves retention and comprehension (Brusilovsky, et. al (2017). Additionally, both platforms offer interactive quizzes (Coursera) and exercises (Khan Academy) that provide immediate feedback and adjust difficulty levels based on the learner's responses, further tailoring the learning journey.

Both platforms excel in NLP integration, harnessing the power of NLP technologies to analyze learner data, personalize content, and effectively manage interactions. Coursera leverages NLP to analyze course descriptions, reviews, and learner profiles, offering relevant course recommendations. Meanwhile, Khan Academy utilizes NLP to provide personalized content and exercises based on user

interactions and progress. In addition, Coursera's NLP tools moderate discussion forums, ensuring relevance and providing automatic responses to common questions, and Khan Academy employs NLP to power intelligent tutoring systems that offer tailored hints and explanations. These NLP applications enhance the learning experience by providing personalized support and ensuring the relevance and engagement of the content.

The current strengths of both platforms notwithstanding, there are areas where they could further improve their educational offerings. Introducing adaptive quizzes that adjust difficulty levels based on user performance and a mastery learning system to ensure comprehensive understanding before progression could greatly benefit users on both platforms. Additionally, providing detailed progress-tracking tools would enable users to monitor their learning journey more effectively and gain insights into areas that need improvement. Moreover, by incorporating features that facilitate peer assessment and collaborative learning, the learning experience could be enhanced, allowing users to learn from and with each other (Vashishth, T. K., et. Al 2024).). By leveraging these shared components, Coursera and Khan Academy continue to innovate and enhance their educational offerings, making high-quality learning accessible to a global audience. Their commitment to integrating advanced technologies and fostering an engaging learning environment sets a high standard for online education platforms, demonstrating the potential of online education to meet diverse learning needs and improve educational outcomes globally. As they continue to evolve, both platforms have the potential to further revolutionize the way education is delivered, making learning more personalized, accessible, and effective for learners around the world.

METHODOLOGY

To ensure an efficient and user-friendly learning experience, the methodology behind CryptoLearn is centered around an intuitive system design. The platform architecture is structured to streamline the learning process, providing seamless navigation and interaction for users. At the core of this design is a system flowchart as shown in Figure 2 that illustrates the operational sequence of the platform's features. The System Flowchart provides a clear, visual guide to the step-by-step processes within the CryptoLearn platform. It shows the sequence of actions from the moment a user starts the platform, through logging in or registering, accessing learning materials, taking quizzes, and receiving feedback. The flowchart starts with the user accessing the CryptoLearn platform. The first step is user authorization, where users either log in or register. Once authorized, they reach the main menu, which serves as the central point for accessing various features. From here, users can manage their profiles, access learning materials, take quizzes, view their quiz results, and receive feedback. Administrators have additional options to manage content and user accounts. Finally, users can log out to end their session.

The flowchart starts with the user accessing the CryptoLearn platform. The first step is user authorization, where users either log in or register. Once authorized, they reach the main menu, which serves as the central point for accessing various features. From here, users can manage their profiles, access learning materials, take quizzes, view their quiz results, and receive feedback. Administrators have additional options to manage content and user accounts. Finally, users can log out to end their session.
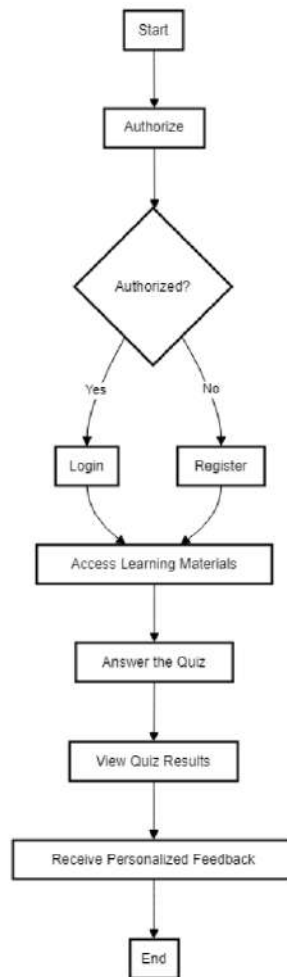

Figure 2: CryptoLearn Flowchart

Figure 2 illustrates how the System Flowchart enables designers and developers to understand the flow of data through the CryptoLearn platform. This detailed visualization highlights the connections and interactions between different parts of the system. Understanding this flow is critical for several reasons. It ensures that each component of the system operates harmoniously, such as when a user completes a quiz and their results are accurately recorded to provide personalized feedback. The flowchart clarifies these connections, ensuring nothing is missed.

It also plays a key role in designing a user-friendly platform. When developers have a clear understanding of data flow, they can create interfaces that guide users smoothly through each step, making the platform easy to navigate even for those less familiar with technology. Additionally, the flowchart helps identify potential issues or bottlenecks (Xie, X., 2023).). By visualizing the entire system, developers can detect areas where data might get stuck or processes might slow down, allowing them to address these problems early on. Ultimately, the flowchart ensures that the system delivers a smooth and efficient experience for users.

WEBSITE DESIGN AND DEVELOPMENT

The interface of the CryptoLearn platform is meticulously crafted to enrich the learning journey by seamlessly integrating functionality with user-friendly design principles. Emphasizing clarity and simplicity, the platform guarantees intuitive navigation while delving into cryptographic concepts. The interface will showcase a polished and user-friendly design, as depicted in the provided mock-ups. Key components of the interface encompass a welcoming home page with effortless access to sections such as courses, quizzes, and user profiles.

Within the dashboard, users will gain insights into their progress, including their enrolled topics, completed topics, and quizzes attempted. Adaptive quizzes will play a pivotal role in the learning process, offering tailored questions that dynamically adjust in difficulty based on the user's performance, accompanied by immediate feedback to reinforce learning. Furthermore, the interface will encompass comprehensive user profiles, enabling learners to monitor their progress and accomplishments. In essence, the design will prioritize accessibility and responsiveness, ensuring a seamless experience across diverse devices while incorporating robust security measures to safeguard user data. Through these capabilities, the CryptoLearn platform endeavors to revolutionize cryptography education, making it more engaging, personalized, and impactful.

The login interface for CryptoLearn is designed with a sleek, modern aesthetic. As shown in Figure 3, the interface is divided into two sections. On the left, users are greeted by the platform's name and its tagline: "Your cryptography educational platform with AI-driven adaptive questions." On the right, there is a login form where users can input their username or email and password to access the platform. Below these fields, a "Sign in" button facilitates authentication, while new users are offered an option to register. Users who are new to the platform can begin by clicking the "Register?" link located below the login form on the right side of the page. This link directs users to a registration page where they will be prompted to provide essential information, such as their username, email address, and a secure password. After completing these fields, users can submit the form to create their account. The system also includes a verification step, such as confirming the email address through a link sent to their inbox, to ensure the security and

authenticity of the registration process. Once verified, users will have full access to CryptoLearn's AI-driven adaptive cryptography education tools.
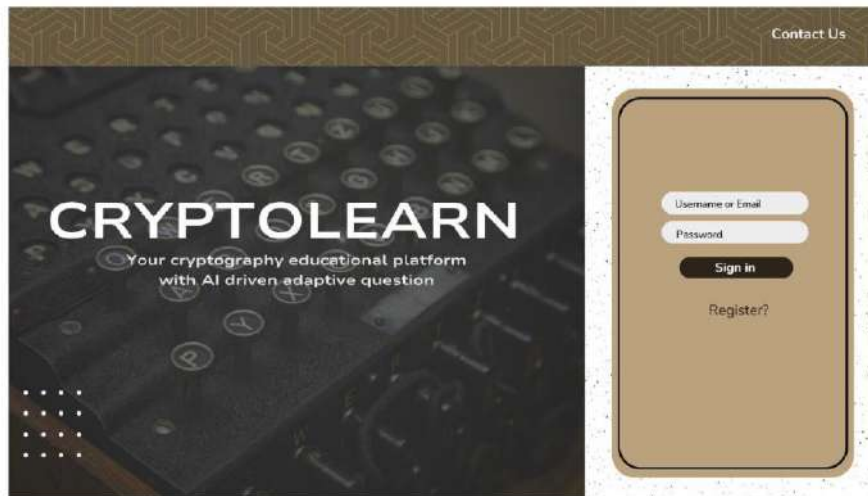

Figure 3: Login Interface for CryptoLearn

The homepage interface is a crucial element of this design, offering users an intuitive and engaging entry point to the platform (Ab Halim, et al 2024). After logging in, users receive a personalized welcome message that addresses them by name and provides a brief overview of their learning progress, including the number of topics enrolled, topics completed, and quizzes taken. The main section of the homepage presents a comprehensive view of the user's progress in various topics, featuring visual indicators that display the percentage of completion for each topic, such as "AES Encryption System," "Web Mining," and "Blockchain." Additionally, a section on the right side of the page showcases recently accessed topics, enabling users to quickly resume their studies. The navigation bar at the top ensures easy access to the dashboard, quizzes, and support, facilitating seamless navigation through the platform. Overall, the homepage interface is designed to be visually appealing and user-centric, delivering a seamless and engaging experience that supports each user's personalized learning journey.
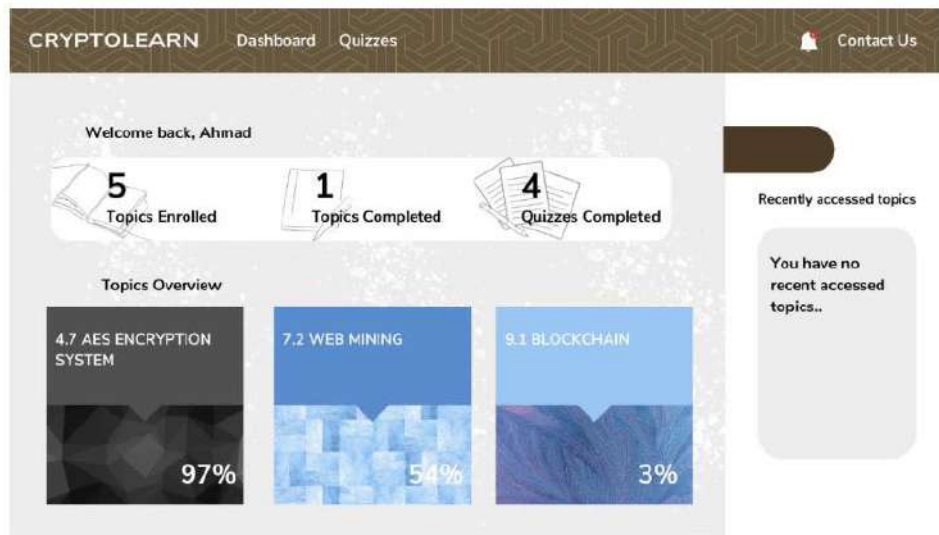
Figure 4: Homepage for CryptoLearn

The question generator interface is a key feature designed to provide an interactive and adaptive quiz experience. It presents questions in a simple and straightforward manner, allowing learners to concentrate on their responses without distractions. At the top of the interface, the quiz title (e.g., "AES Encryption System") is prominently displayed, offering context for the quiz content. Additionally, users can track their progress with real-time updates on their current score, the total number of questions in the quiz, and the number of correct answers they've submitted so far.
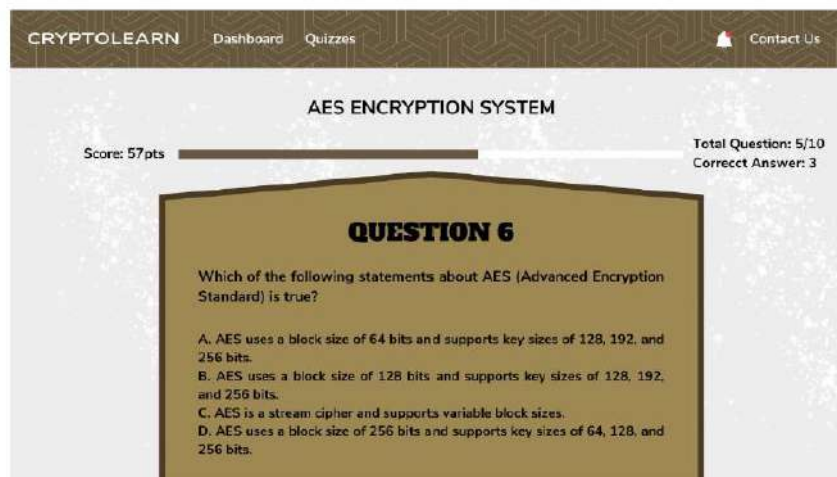

Figure 5: Question Generator Interface of CryptoLearn

The interface is also designed with user experience in mind, ensuring that the layout is intuitive and responsive across various devices. Each question is displayed one at a time, allowing users to focus fully on the current task without feeling overwhelmed. Navigation buttons, such as "Next" or "Previous," are conveniently placed, allowing users to move through the quiz at their own pace. For adaptive

quizzes, the system can dynamically adjust the difficulty level based on the learner's performance, ensuring that the questions remain challenging yet manageable. This adaptive feature enhances the learning process by catering to individual skill levels, making the quiz more engaging and personalized.

CONCLUSION

The CryptoLearn project presents a forward-thinking approach to cryptography education, leveraging AI-driven adaptive learning technologies to create an engaging and personalized experience for users. The platform is designed with accessibility, responsiveness, and security at its core, ensuring a seamless user experience across devices. Key features, such as a welcoming homepage, easy navigation, and an adaptive question generator, offer users a personalized learning journey that adapts to their progress and needs. Immediate feedback on quizzes further enhances comprehension of cryptographic concepts, making the learning process interactive and effective.

By focusing on user-friendly design and adaptive learning tools, CryptoLearn not only simplifies the complexities of cryptography but also provides an inclusive environment for learners of all backgrounds. This platform represents a significant step forward in cryptography education, promoting both deep understanding and practical application in a secure and accessible way. As it continues to evolve, CryptoLearn has the potential to reshape how students approach and master cryptography, making it an essential tool for the next generation of cybersecurity professionals.

REFERENCE

Ab Halim, A. H., Ridzuan, F., Zakaria, N. H., Zakaria, A. A., Mohd Alwi, N. H., Ali Pitchay, S., Az-Zuhar, I., & AlSabhany, A. A. . (2024). SAKTI©: Secured Chatting Tool Through Forward Secrecy. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *49*(1), 54–62.

Adamovic, S., Sarac, M., Stamenkovic, D., & Radovanovic, D. (2018). The importance of the using software tools for learning modern cryptography. *International Journal of Engineering Education*, *34*(1), 256-262.

Andaloussi, K. S., Capus, L., & Berrada, I. (2017, March). Adaptive educational hypermedia systems: current developments and challenges. In *Proceedings of the 2nd international Conference on Big Data, Cloud and Applications* (pp. 1-8).

Brusilovsky, P., & Millán, E. (2007). User models for adaptive hypermedia and adaptive educational systems. In The adaptive web: methods and strategies of

web personalization (pp. 3-53). Berlin, Heidelberg: Springer Berlin Heidelberg.

Liu, M., Kang, J., Zou, W., Lee, H., Pan, Z., & Corliss, S. (2017). Using data to understand how to better design adaptive learning. Technology, Knowledge and Learning, 22, 271-298.

Morze, N., Varchenko-Trotsenko, L., Terletska, T., & Smyrnova-Trybulska, E. (2021, March). Implementation of adaptive learning at higher education institutions by means of Moodle LMS. In *Journal of physics: Conference series* (Vol. 1840, No. 1, p. 012062). IOP Publishing.

Mwakamo, E. C., & Kalimuthu, R. (2021). E-Crypto Learning and Applying Data Mining in Education Sector to Improve Learner's Performance. *Int. J. Sci. Res. in Multidisciplinary Studies Vol*, 7(5).

Tavakoli, M. (2023). Hybrid human-AI driven open personalized education.

Wang, L., & Chen, X. (2022). Adaptive Learning Systems: A Review of Technologies and Applications. Educational Technology Review, 38(3), 215-230.

Vashishth, T. K., Sharma, V., Sharma, K. K., Kumar, B., Panwar, R., & Chaudhary, S. (2024). AI-driven learning analytics for personalized feedback and assessment in higher education. In *Using traditional design methods to enhance AI-driven decision making* (pp. 206-230). IGI Global.

Xie, X. (2023). Influence of AI-driven Inquiry Teaching on Learning Outcomes. *International Journal of Emerging Technologies in Learning*, 18(23).

EXPLORING THE ADDICTION BEHAVIOR IN INDIVIDUALS WITH PSYCHOPATHIC TRAITS

Farhana Sabri[i] & Khairon Zainee Basiron[ii]

[i](*Corresponding author*). Senior Lecturer, Universiti Sains Islam Malaysia, farhanasabri@usim.edu.my
[ii]Assistant Superitendant Police, Polis Diraja Malaysia, khaizana84@gmail.com

Abstract

Psychopathic traits and drug addiction tend to co-occur in the same individuals. This article discusses the lived experiences of individuals with substance abuse problems and psychopathic traits and how these experiences relate to their treatment course. A qualitative design was utilized, two participants were interviewed to learn about their experiences. Interviews were recorded and transcribed verbatim, from which were analyzed using thematic analysis. The findings of the analysis revealed four main themes, namely self-control, lack of empathy, abuse, and family neglect in childhood. The findings of this study show that upbringing plays an important role in shaping individual experiences. These bad experiences contribute to feelings of abandonment that lead them to seek satisfaction in substance abuse. In addition, psychopathic traits such as lack of self-control and lack of empathy appear to serve as coping mechanisms for the complexity of their lives. This study provides a comprehensive examination of the lived experiences of substance abuse individuals with psychopathic traits. By incorporating the findings from this study into counseling practice, professionals can promote an empathetic and tailored approach that better meets the needs of these individuals.

Keywords: *Psychopathic traits, drug addiction, substance abuse.*

INTRODUCTION

A psychopath is not a stand alone diagnosis, however it often refers to someone with antisocial personality disorder (ASPD). Psychopathy is a personality construct characterized by lack of empathy and remorse, inability to distinguish right and wrong, behavior that conflicts with social norms, and manipulating and/or hurting others. These traits are often masked by superficial charm and immunity to stress, which create an outward appearance of apparent normalcy.

In general, the relationship between antisocial and psychopathic personality disorders is asymmetrical. Most people with antisocial personality disorder are not necessarily psychopaths, whereas most psychopaths meet the diagnostic criteria for antisocial personality disorder. Rozali et al., (2019) disxussed that there are three forms of psychopathic behavior (1) mild psychopathic behavior: psychopathic beaviors that generally deviates from social norms, such as antisocial behavior and manipulation, (2) moderate psychopathic behavior: psychopathic that generally deviates from the law. Psychopaths rely on violence without murder, such as aggressive behavior without killing, and (3) severe psychopathic behavior: A

psychopath's behavior generally deviates from social, legal, and even religious norms. Severe psychopaths use violence in conjunction with murder, e.g., aggression in conjunction with killing, sadistic behavior, no remorse, and no guilt

Based on these characteristics, there is a relation between psychopathic behaviors and criminality and other social problems including addiction. In regards to drug addiction, individuals with psychopathy often exhibit impulsive antisociality that jeopardizes their recovery and increases the likelihood of relapse into destructive behaviors such as substance abuse and physical violence. Abstinence from substance abuse is a primary goal of treatment, but other areas such as impulse control, emotional regulation, stress tolerance, and social skills are also prioritized. Thus, the purpose of the study was to understand the lived experiences of substance abuse individuals with psychopathic traits in regardes to their drug treatment.

LITERATURE REVIEW

People who are addicted to drugs may repeatedly seek and use drugs because their system of incentive salience has become sensitive (Robinson & Berridge, 2008). In regards to psychopathic traits, Buckholtz et al., (2010) found a positive association between dopamine release from psychostimulants and psychopathic traits. This contradicts the notion that psychopaths have a mesolimbic dopamine system that is not very active (e.g., participants were volunteers from the general population with no history of drug use, and psychopathy was measured using the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996). In addition, it should be noted that in the Buckholtz et al.'s study, the Impulsive Antisociality factor of the PPI (which most closely corresponds to PCL-R Factor 2) was associated with dopamine release. The results of this study in relation to the findings of Buckholtz et al. and the functioning of dopamine in psychopathy in general should be examined in more detail.

Based on these findings, it seems likely that psychopaths have different experiences of the symptoms that make up the diagnostic criteria for substance use disorders. Studies show that people with psychopathy start using drugs at an earlier age (Corrado et al., 2004) and are more likely to become dependent on more than one drug (Mailloux et al., 1997). It will be difficult to test these ideas directly in the fMRI scanner because there is much overlap between areas that respond to drug stimuli and areas that respond to evocative nondrug stimuli (Garavan et al., 2000). Moreover, opioid and dopamine receptors are often located in the same structure (e.g., in the shell of the nucleus accumbens, in the ventral pallidum), and the two systems may even be directly connected, making it difficult for humans to distinguish between them. Although difficult, future research should attempt to separate the processes associated with physiological dependence from those associated with compulsive use.

Cope et al., (2014) research shows that psychopathy is associated with abnormal structures and functions in the limbic and paralimbic areas of the brain. Psychopathy and substance use disorders often co-occur. However, clinical experience shows that psychopaths use drugs for different reasons than people who are not psychopaths, and psychopaths in prison usually do not show withdrawal symptoms or craving for drugs. Psychopaths may use drugs for different reasons, and because of these differences in their brains, they may show different signs of drug use. This study examined how psychopathic traits alter the brain and body's response to images of drugs. Participants were shown drug-related and non-drug-related images and asked to rate them. At the same time, hemodynamic activity was monitored using functional magnetic resonance imaging. The Mind Research Network mobile magnetic resonance imaging system was used to collect these data in two New Mexico prisons. The sample consisted of 137 inmates with a history of drug addiction, including 93 women. The outcome of interest was the relationship between psychopathy scores (using the Hare Psychopathy Checklist-Revised) and hemodynamic activity elicited by viewing drug-related images compared with neutral images. There was a negative relationship between psychopathy scores and blood flow in the anterior and posterior cingulate, hippocampus, amygdala, caudate, globus pallidus, and parts of the prefrontal cortex when drug-related cues were shown. The neurobiological response to drug craving is altered by psychopathic traits, demonstrating that individual differences are important for understanding and treating substance abuse.

Long (2015) examined the relationship between primary psychopathic traits when controlling for other psychopathic traits and the effects of cocaine use as a function of induced mood. This study provided an experimental examination of the relationship between primary psychopathic traits, affect, and an explicit and implicit measure of crack/cocaine craving to understand the functional role of drug use in relation to an individual's level of psychopathic traits. Less is known about the relationship between primary traits and drug use and the different ways in which people with more or less primary psychopathic traits use drugs. Not much research has been done to identify these different drug use profiles, but it has been found that people with high levels of primary psychopathy used a wider range of drugs and used them for less time than people with low levels of primary psychopathy. Corrado et al., (2004) found that primary traits were associated with more years of regular drug use and starting drug use at a younger age, while secondary traits were associated with meeting more criteria for drug dependence (Cope et al., 2014). Finally, researchers found significant main effects of primary psychopathy traits and mood states in predicting so-called implicit measures of craving (attentional bias), but not in predicting more explicit, self-reported measures of craving (CCQ letter scores). This could be due to a bias toward social acceptance when people report their craving, or it could be because attentional bias and craving are differentially influenced by mood and primary characteristics. Regarding the relationship between

self-reported craving and mood, previous research has shown that cocaine-addicted individuals report more craving after manipulating stressful images than after manipulating neutral images (Sinha et al., 2006). Previous research is not consistent with our findings on the relationship between mood and self-reported craving. Cope et al., (2014) also found that there was no significant association between self-reported cocaine craving and primary psychopathic traits (factor 1 of the PCL-R in this study).

Furthermore, research conducted by Cordelia (2019) examined correlations to investigate the relationship between a substance-abusing environment, types of abuse or neglect, and psychopathic traits in participants. The study was conducted using an experimental quantitative design. The aim was to examine the association between exposure to a substance-abusing, abusive, or neglectful childhood environment and the development of psychopathic traits. In addition, the study examined whether childhood abuse or neglect is a mediator between the effects of exposure to an environment conducive to substance abuse and the development of psychopathic traits.

Cordelia's study (2019) examined a specific environment, namely a childhood of substance abuse, and how such an environment may lead to children being exposed to forms of abuse or neglect that may ultimately lead to the development of psychopathic traits and behaviour and lifestyle. Previous studies have shown that physical and emotional abuse, common in households with prevalent drug dependence, can contribute to the development of psychopathic traits (Krstic et al., 2016). Moreover, environmental risk factors for psychopathic traits can be better understood by examining the relationships between different types of abuse or trauma, such as physical abuse, sexual abuse, neglectful home environments, and psychopathic traits. The results of the study support the prediction that participants who experienced greater levels of abuse or neglect as children will exhibit a greater number of psychopathic traits. These traits indicate the choices psychopaths make regarding their behaviour and lifestyle.

This further supports that individuals who were exposed to environments that promoted substance abuse are more likely to exhibit psychopathic traits, i.e., antisocial traits of psychopathy and high risk to choose addiction behavior.

METHODOLOGY

This study utilized a case study type of qualitative research design as this allows the researcher to do in-depth examinations of individuals with psychopathic traits and substance abuse problems. The study focused on the meaning of live experiences to subjects using semi-structured interviews.

In selecting research participants for this study, several criteria were established to meet the requirements of purposive sampling methods. The criteria are as follows (1) subject in this study is objective and voluntary, (2) the subject exhibits psychopathic traits based on the Hare Psychopathy Checklist-Revised and

the Mental Status Examination, (3) the subject is addicted to drugs, and (4) the subject has a criminal record and is violent. Two subjects were participated in the study.

In regards to data collection, interviews were recorded and stored on the researcher's password-protected laptop and all recordings were destroyed after use. In addition to the interview, he researcher had made field notes and documents that were relevant in observing the study subject. Each participant had received a document stating the confidentiality of the data, privacy protections, the purpose of the study, and the researcher's contact information. Participants were informed that they could equest deletion of their data from the study at any time after the study is completed.

For data analysis, the recorded interviews were transmitted verbatim in the form of a transcript and were analyzed based on the research questions. Then, a content analysis of the document were conducted. This is in accordance with the recommendation of Krippendorff (2004), who suggests that the content analysis of a document begins with a research question, which then reads the document with a specific goal in mind, rather than the pattern that the researcher wants to form. This study adhered to proper validity using triangulation method (member checking).

RESULTS AND DISCUSSION

The findings of the analysis revealed four main themes, namely self-control, lack of empathy, abuse, and family neglect in childhood. Lack of self-control is a pressing problem that often leads to criminal activity and drug addiction. The first area of concern is the participants' low self-control. Participants find it difficult to resist temptations that lead them astray, so they easily become more involved in criminal activities and succumb to drug addiction. These participants often prioritize immediate gratification over the long-term effects of their actions. Immediate gratification, an important factor that attracts participants to the immediate gratification they experience. In the early stages, people rarely think about the negative effects of drug use. Their main focus is on seeking immediate gratification and arousal. The pursuit of gratification becomes their main goal and overshadows any concerns about personal well-being. Behavioral theory offers insights into the relationship between drug use and reward. Taking drugs provides a sense of pleasure or satisfies a specific need, which reinforces the behavior and increases the likelihood of repetition. For some, drug use involves courage and boldness, and not everyone is willing to take that risk. Such behavior can attract the attention and praise of peers, perpetuating the cycle.

Second theme is lack of empathy or no remorse. Both participants were honest when they said they did not feel guilty for their crimes, they committed them and blamed themselves for the crimes they committed because of their parents. Both participants described the remorseless feeling when thinking about the crime they committed and its consequences. No disturbing thoughts or triggers for various

negative, painful, sad and unwanted feelings. No remorse even triggers other emotional reactions such as satisfaction and joy about what has happened.

Third theme emerged was growing up in an abusive family. The abuse took the forms of physical, verbal, and emotional abuse, which later drove the participants to drug addiction. They both grew up in families where they were physically, emotionally, and verbally abused. From this experience, participants are taught the objective process that leads to addiction. Addicts treat others as objects, and this is what happens to the child, whether he is abused himself or witnesses of abuse. The participants grew up in a family where one parent abused the other. They were forced to see how other people treated others as objects rather than people. They were dehumanized and experienced people as objects that could be controlled and manipulated for their own benefit. This severely impacted self-development and led to low self-esteem and self-confidence. Participants learn to have low impulse control by example. Addiction is a disorder of impulse control. When they see their parents hit, yell at, or sexually abuse others to cope with their emotional distress, they learn how undisciplined they are with their own emotional impulses. They are more likely to react and not take the initiative but only to wait for something to happen. When they grow up in an abusive family, they also learn not to trust people.

Finally, growing up in a neglectful family. Both participants reported "feeling abandoned" when they were kids and up to teenagers. When participants are outside their homes, they are idle and more exposed to the elements that interest them and are present in the addictive process. Both participants grew up in families that lost, and they had learned to be passive. They feel dead and empty inside and often look for someone or something to make them feel whole again or to fill the void. They tend to see power in others or in objects, but not in themselves.

Participants stated that their drug addiction and involvement in crime makes them feel happy and they like to sit and hang out with their friends. They feel more confident and needed by their friends. However, after acting out, they are forced to behave badly, with what he calls "a "dull and empty world inside" It is a shortcoming for them, as if his free pleasure was a break with the passivity they had learned from their family of origin. Participants who grew up in passive and neglectful families became hangers-on, looking for people to tell them how to behave. They would search of life and fun, which is the case in their childhood. The mood swings they experience in their addiction create feelings of self-remembering and arousal. Participants who grew up in neglectful homes are especially susceptible to this false sense of self-confidence and excitement. They become quite depressed when the game is over, and their passive nature returns. Both participants were involved in drug addiction at a young age because they were neglected and there was no space where they could get support in decision making. The bad actions fill the void that exists within them.

CONCLUSION

The findings of this study show that upbringing plays an important role in shaping individual experiences. These bad experiences contribute to feelings of abandonment that lead them to seek satisfaction in substance abuse. In addition, psychopathic traits such as lack of self-control and lack of empathy appear to serve as coping mechanisms for the complexity of their lives. This study provides a comprehensive examination of the lived experiences of substance abuse individuals with psychopathic traits.

By incorporating the findings from this study into counseling practice, professionals can promote an empathetic and tailored approach that better meets the needs of these individuals. As for addiction counselors in particular, these for themes are worth to explore further in the session and could be the direction of the intervention in psychotherapy treatment. This is critical as psychopathic traits remains in the individuals even though they have sobered, which could jeorpadize the recovery if left untreated.

REFERENCE

Buckholtz, J. W., Treadway, M. T., Cowan, R. L., Woodward, N. D., Benning, S. D., Li, R., Ansari, M. S., Baldwin, R. M., Schwartzman, A. N., Shelby, E. S., Smith, C. E., Cole, D., Kessler, R. M., & Zald, D. H. (2010). Mesolimbic dopamine reward system hypersensitivity in individuals with psychopathic traits. *Nature neuroscience*, *13*(4), 419–421. https://doi.org/10.1038/nn.2510

Cope, L. M., Vincent, G. M., Jobelius, J. L., Nyalakanti, P. K., Calhoun, V. D., & Kiehl, K. A. (2014). Psychopathic traits modulate barin responses to drug cues in incarcerated offenders. *Journal of Frontiers in Human Neuroscience, 8 (87)*, 1 – 16. Doi: 10.3389/fnhum.2014.00087.

Cordelia D. Chou. (2019). *Examining the Association Between Childhood Exposure to Substance-Abusive Environments and Factor Two Psychopathic Traits*. John Jay College of Criminal Justice, City University of New York.

Corrado, R. R., Vincent, G. M., Hart, S. D., & Cohen, I. M. (2004). Predictive validity of the psychopathy checklist: Youth version for general and violent recidivism. *Behavioral Sciences & the Law*, *22*(1), 5–22.

Garavan, H., Pankiewicz, J., Bloom, A., Cho, J. K., Sperry, L., Ross, T. J., Salmeron, B. J., Risinger, R., Kelley, D., & Stein, E. A. (2000). Cue-induced cocaine craving: neuroanatomical specificity for drug users and drug stimuli. *The American journal of psychiatry*, *157*(11), 1789–1798. https://doi.org/10.1176/appi.ajp.157.11.1789

Krippendorff, K. (2004). *Content Analysis: An introduction to its methodology (2nd ed.).* (2nd ed.). Thousand Oaks, Sage Publications.

Lilienfeld, S. O., & Andrews, B. P. (1996). Development and preliminary validation of a serf-report measure of psychopathic personality traits in noncriminal populations. *Journal of Personality Assessment, 66,* 488-524.

Long, K. E. (2015). *Psychopathic traits, affect and cocaine use-related outcomes.* University of Maryland, College Park.

Mailloux, D. L., Forth, A. E., & Kroner, D. G. (1997). Psychopath and substance use in adolescent male offenders. *Psychological Reports, 81 (2),* 529-530.

Robinson, T. E., & Berridge, K. C. (2008). The incentive sensitization theory of addiction: Some current issues. *Philosophical Transactions of the Royal Society B, 363,* 3137–3146.

Rozali, R., Mu, M., & IRP, M. I. A. (2019). Fenomena perilaku psikopat dalam novel katarsis karya anastasia aemilia: kajian psikologi sastra. *Jurnal Sastra Indonesia, 7*(3). https://doi.org/10.15294/jsi.v7i3.29841.

Sinha, R., Garcia, M., Paliwal, P., Kreek, M. J., & Rounsaville, B. J. (2006). Stress-induced cocaine craving and hypothalamic-pituitary-adrenal responses are predictive of cocaine relapse outcomes. *Archives of general psychiatry, 63*(3), 324–331. https://doi.org/10.1001/archpsyc.63.3.324

SAIS 2024

INTERNATIONAL SEMINAR ON ISLAM AND SCIENCE

FULL PAPER

This e-proceeding aims to publish and highlight the papers written by academicians and researcher that are reviewed by experience scholars in the subject of all across the theme selected by this year's International Seminar on Islam and Science 2024 (SAIS 2024). The SAIS 2024 conference theme is aligned with Universiti Sains Islam Malaysia (USIM) inspiration and focus on the integration of Naqli and 'Aqli knowledge. The 7th SAIS 2023 conference theme is 'Enlighting Madani's Principle in Islamic Science'. The theme hopes for a productive discussion among academicians accross expertise in the areas of Science and Technology, Medicine and Health Sciences, Dentistry, Architecture & Engineering fields as well as other fields such as Shariah & Law, Quranic and Sunnah, Leadership and Management, Major language, Economy, Muamalat and Civilisation and Thoughts.

pkausim
Persatuan Kakitangan Akademik Universiti Sains Islam Malaysia

USIM

ISLAMIC SCIENCE INSTITUTE ISI

USIM

INSTITUT FATWA DAN HALAL
INSTITUTE OF FATWA AND HALAL
مجمع الفتوى والحلال

FAKULTI PENGAJIAN BAHASA UTAMA
Faculty of Major Language Studies
Universiti Sains Islam Malaysia