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DESIGNING A GREEN MANAGEMENT MODEL IN IRANIAN SPORTS ORGANIZATIONS

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ABSTRACT

Today, organizations can properly play their role by focusing on economic responsibility and organizational wealth creation, in line with their social and environmental responsibilities. Adopting such an approach, known as the green approach, will enable the organization to achieve its economic goals. The term green human resource management (GHRM) was introduced in 1990 and has been accepted worldwide since 2000 as a concept that manages the environment within an organization by adopting green human resource policies and practices. The present study aimed at designing a GHRM model in Iranian sports organizations. This research is applied in terms of purpose and descriptive survey in terms of nature and method. The population of the study consists of experts and managers of the Ministry of Sports and Youth of Iran, 70 of whom were selected using purposive sampling. The data collection tool was a researcher-made questionnaire with validity confirmed using the content validity method. The research findings in the form of a model consist of two parts: First, through an exploratory study and expert opinion, 14 main factors of GHRM success were identified. Second, using an interpretive-structural modeling approach, relationships and sequences between variables were extracted at eight levels and finally categorized based on the degree of influence and dependence. Considering the results and also the importance and necessity of GHRM, it is suggested that organizations, especially sports organizations, pay special attention to GHRM and by using its policies and strategies, be able to achieve goals and align their activities well with environmental goals. The results showed that the support of the environment around the organization and the support of managers and shareholders act as the foundation stone of the model and have the greatest impact on other variables and cause intensification of other variables to manage organizational green human resources. This model can help managers efficiently and effectively use natural resources by applying green HRM methods and strategies.

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1. INTRODUCTION

Today, the human resource management (HRM) field is experiencing numerous pressures for change. Changes in the economy, globalization, internal diversity, and technology have created new organizational demands and have transformed the field. The term green human resource management (GHRM) was introduced as a completely new approach in 1990 and has been accepted worldwide since 2000 as a concept that manages the environment within an organization by adopting green human resource policies and practices. (Ahmad, 2015). Therefore, in order to improve environmental performance, some organizations have undertaken environmental safety and health assessments and developed green management policies and by adopting a green management policy, have improved the organizational economic performance according to changes in technology, the formation of global waves and short product life cycles; Other tangible assets such as capital, land, raw materials will not create a sustainable organizational competitive advantage. Thus, in the new millennium, the focus on human capital as the major intangible asset has become a common belief. Organizations favor resources that can not only make the organization an ideal organization, regardless of the industry, but also help it to outperform its competitors and succeed (Owor, 2017). On the other hand, weaknesses and inability to adapt to rapid change as well as environmental concerns, have forced organizations to abandon their traditional policies for long-term growth and development, as well as the effective and efficient use of all material resources. In order to achieve their environmental and organizational goals, human beings should adopt sustainable operations and green policies. Policies such as GHRM that in recent years with the emergence of new challenges facing organizations to a significant area of management (Ullah, 2017). Green human resource management refers to all activities and strategies that management uses to create awareness, information and interaction between employees about the environment and environmental factors, and green policies create social responsibility

among them and in a way leads them to sincerely fulfill the organizational goals, efficiency and effectiveness, gaining competitive advantage, etc. for the organization by performing their duties and responsibilities (Arulrajah, Opatha, and Nawaratne, 2018).

All organizations, whether engaged in producing goods or services or belonging to one of the two categories of public or private have one thing in common, and that is their human resources. Undoubtedly, in all ages, human resources have always been the most important factor in achieving development and it has been mentioned as the creator and user of technology to guide the organization toward achieving goals. In this way, the ability to manage green manpower practices and policies can bring a wide range of benefits including Awareness of employees' professional and private lives, cost reduction, and employee collaboration for the organization (Jackson et al., 2011). Therefore, success in the competitive arena for organizations, flexibility in providing services, speed and quality of responding to customer needs depend to a large extent on how to manage and enhance human capital. Therefore, organizations that manage green human resources in the best possible way in the field of interaction, commitment, morale, and quality of work life of employees can quickly grow and develop their ability to withstand all these challenges and environmental changes. Accordingly, to better understand the concept and components of GHRM, the following section reviews previous studies and theoretical foundations related to this topic.

2. LITERATURE REVIEW / BACKGROUND

An important and debatable issue in current organizations, especially sports organizations, is related to various factors such as government, sponsors, the private sector, fans, athletes, and most importantly, its relationship and interaction with social and political factors. Economic and cultural is that sports organizations like any other organization to improve their ability to respond to environmental changes must use new methods and strategies such as green human capital management to increase productivity, high flexibility, increase the wealth of the organization as well as provide timely and appropriate responses to change. Accordingly, due to the importance of providing a conceptual framework for GHRM in order to help organizations achieve environmental goals, the issue of green human capital management in sports management has received less attention from researchers. Therefore, the present study intends to provide a contingency model

for GHRM in sports organizations using the interpretive-structural modeling approach.

Changes in the business environment today not only lead to many benefits for organizations; Rather, organizations face challenges in using completely new solutions and strategies, such as green human resources to meet customer needs, including environmental protection. In this way, adopting such strategies causes organizations to create good growth and ensure that they will be well maintained and environmentally sustainable (Berber and Aleksic, 2017). Green human capital means that employees and managers use their activities and duties to help the organization achieve environmental goals, reduce waste and improve performance with high responsibility and commitment (Javed and Cheema, 2017). Green human capital while enabling operating costs, enables industry professionals to better invest in their knowledge resources. Capital is a combination of two basic elements: one includes policies and actions that do not have a negative impact on the environment but are compatible with it, and the other is provision of knowledge that is an intangible organizational asset (Bhalla and Mehta, 2017). Therefore, green human resources with an economic approach, green management, initiatives as well as providing alternative solutions to increase efficiency can achieve the organizational mission and goals in the form of their tasks and activities and practical commitment to concepts and regulations. And apply green management standards in producing goods and services (Rana and Jain, 2019).

Adikari et al. (2019) states that GHRM provides the basis for efficient and effective use of natural resources in any business by applying HRM methods and techniques (Bhutto and Aurazeb, 2017). In fact, GHRM coordinates human resource activities with the organization's environmental goals through systematic and planned coordination. By developing processes and activities designed to affect employee skills, knowledge, motivation and behaviors the organization achieves its goals (Renwick, Redman, and Maguire, 2019). The existing literature shows that green HRM falls between sustainable and strategic human resources. Thus, given the relationship between the organization and the economic and social environment, the role of HR in helping implement sustainable policies and strategic development is very important. On the other hand, the relationship between HRM and individuals and other elements within the organization such as scarce resources, employee behavior and issues related to their health and safety; having a sustainable human resource management system allows the organization to cultivate

quality human resources (Ehnert and Harry, 2012). Table 1 provides definitions of GHRM that can show some of its features and characteristics.

TABLE 1
Definitions of Green Human Resource Management

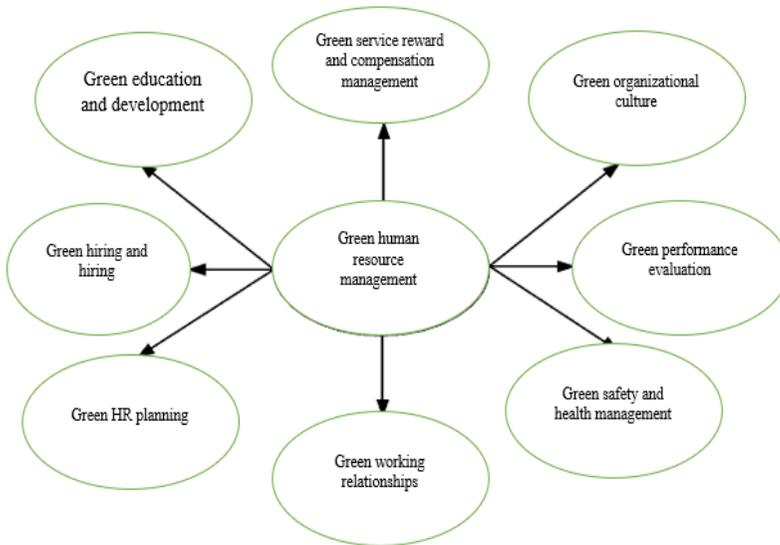
Source	Definitions	Row
Kramar (2019)	Human resource management activities that enhance the positive environmental consequences.	1
Wagner (2019)	Parts of sustainable human resource management that address environmental sustainability needs.	2
Renwick et al. (2019)	Aspects of human resource management, Environmental management	3
Ehnert and Harry (2012)	A concept that enhances economic performance by focusing on environmental sustainability	4

Green human resource management (GHRM) can also be defined as environmentally friendly strategies that lead to improved employee engagement, increased productivity and reduced costs. Accordingly, green HRM plays a key role in the organization. Because by increasing awareness and interaction among employees, it helps the organization to adapt to the environment in a desirable way (Jabbour, 2011). Renwick et al. (2019) also defines GHRM as a set of activities and theories of HRM that help reduce environmental damage (Mohammad Nejad Shurkai et al.,2016). According to Florida and Davison (2019), it can be generally acknowledged that GHRM while creating awareness among people within the organization to improve employees' understanding of environmental issues, the reasons for maintaining it can be applied to appropriate policies and procedures for increasing employee commitment to environmental issues (Daimy and Christopher, 2017).

Thus, according to Figure 1, GHRM methods to improve environmental performance in organizations will be identified and each will be briefly described. Recruitment and green selection: Green recruitment refers to providing or creating transparency regarding organizational environmental performance (past and present) when sending employment messages. In fact, it reflects the environmental policies and strategies of the organization in hiring (Arulrajah et al.,

2018). In selecting organizations, when evaluating candidates, the level of interest and desire of individuals to advocate environmental issues are considered as selection criteria. Hence, the goal is to select the ideal environmentally aware person from among the applicants for a job position (Jabbour, Santos, and Nagano, 2010).

FIGURE 1
Green Human Resource Management Process



Note: Ullah (2017), Arulrajah et al. (2018) and Deshwal (2018)

Green education and development: imparting development and environmental education to members of the organization (staff and managers) to develop the required skills and knowledge; One of the goals of GHRM is that it will be useful for the organization in implementing programs and achieving environmental goals As stated by Opatha and Arulrajah (2014), analyzing and identifying training needs as well as providing green training programs can have the most important impact on increasing staff awareness of environmental issues. **Green Service Reward and Compensation Management:** The main purpose of service reward and compensation systems is to attract, retain and motivate employees to develop new knowledge and skills in order to achieve organizational goals (Arulrajah et al., 2018). According to Deshwal (2018) the reward and service mechanism can

be a tool to change employee behavior toward green performance. In fact, the existence of such systems in the organization encourages employees to achieve green achievements and skills (Ullah, 2017).

DeNisi and Murphy (2017) describe performance appraisal systems as essential HR tools designed to enhance employee productivity through systematic evaluation of individual performance and goal achievement. Green safety and health management: Green safety and health management has a wider scope of job performance compared to traditional safety and health management. That is, in addition to addressing issues related to traditional safety and health management, it also covers some aspects of environmental management (such as biodiversity conservation) (Arulrajah et al., 2018). Yusoff et al. (2018) describe green safety and health management as providing solutions and creating plans to reduce stress and occupational diseases caused by a dangerous work environment (Yusoff et al., 2018). Harris and Crane (2002), from an environmental perspective, define organizational environmental culture as a set of shared assumptions, values, and symbols that reflect an organization's willingness to adapt and respond to environmental challenges. In fact, organizational culture can be both a factor for improvement and increase and an obstacle to the motivation and desire of individuals to take environmentally responsible behaviors and participate in organizational programs (Ones and Dilchert, 2012).

Green working relationships: Employee participation in organizational programs and activities improves the chances of better implementation of green management; It aligns the goals, abilities, motivations and perceptions of employees with green management policies and strategies (Deshwal, 2018). Renwick et al. (2019) believe that green labor relations means providing opportunities for unions to negotiate with management to reach an agreement to create a green work environment (Ullah, 2017). Green human resource planning means predicting the number and types of employees needed to successfully implement organizational programs and activities (Arulrajah et al., 2018). Thus, leading organizations to manage their environmental issues need to plan in such areas to meet environmental demands (Ullah, 2017). Mohammad Nejad Shourkaei et al. (2016) presented a framework for GHRM by studying 39 articles published in prestigious journals from 2000 to 2017 while identifying the components of GHRM and the most important factors influencing successful implementation. They identified it as well as its consequences at the individual, organizational, and extra-organizational levels. Ullah (2017) found that green HRM can

increase productivity, improve the quality of working life, optimize resource use, and reduce costs. This will improve job attitude and increase organizational efficiency. Yusoff et al. (2018) conducted an exploratory study in Malaysia to understand the nature of GHRM in multinational companies. The results showed that GHRM is very important for most of the organizations surveyed and reflects the five concepts of social responsibility, electronic human resource management, work-life balance, green policies, and maintenance programs. Arulrajah et al. (2018) GHRM practices such as job design, job analysis, human resource planning, recruitment, selection, performance appraisal, training and development, reward management, discipline management, health and safety management, and relationships. They showed the employees by doing their research. The results of Deshwal's (2018) research showed that GHRM includes methods of managing human resources with the environment and maintaining intellectual capital that helps people to be better aware of the jobs and social responsibilities of the organization.

Renwick et al. (2016) emphasized the strategic linkage between HRM and environmental sustainability. They proposed that aligning HR practices with green objectives helps organizations integrate environmental considerations into their strategic and operational activities, thereby strengthening both vertical and horizontal coordination of HR functions within the organization. They have also paid. Also, the findings of Jabbour and Santos (2008) show how GHRM actions (rewards, evaluation, management commitment and environmental education) affect employees' motivation to engage in organizational environmental actions. Tang et al. (2018) demonstrated how various stages of the HRM process — from recruitment and selection to employee exit — can be aligned with green HRM policies and practices to promote organizational sustainability.

3. METHODOLOGY

The present research is in the category of descriptive-survey research in terms of applied purpose and in terms of nature and method. Descriptive research describes what is; It includes description, recording and analysis of conditions available. And in survey research, the researcher uses questionnaires and interviews to discover the ideas, thoughts, perceptions and experiences of the people in question. In this research, the library method was used to collect data on the theoretical foundations and background of research in research-related fields.

Accordingly, first, by examining the theoretical foundations presented in the field of GHRM, the factors of successful implementation of this type of strategy in the organization were identified. Then their relevance was evaluated and finalized by 70 experts and subject matter experts using the interpretive-structural modeling (ISM) approach.

The data collection tool was a researcher-made questionnaire designed to explain GHRM. This was designed based on interpretive-structural modeling, and according to the purpose of the research, the questionnaire was provided to experts in the field of research; therefore, the statistical population of the present study consists of experts and managers of the Ministry of Sports and Youth of Iran who were selected using a purposive sampling method. It should be noted that content validity was used to evaluate the validity of the research data collection tool; The questionnaire was provided to experts and several university professors who had a theoretical mastery of the research topic and was approved. In the present study, an interpretive-structural modeling approach was used to design a GHRM model. This methodology is for creating and understanding the relationships between the elements of a complex system, which was proposed in 1974 by Warfield. In other words, ISM makes it possible to study the complexity of the system and structures it in easily understandable way (Huang, Tzeng, and Ong, 2005). This is an interpretive method in which a group of experts decide whether and how the elements are related; And is a structural model in that it is able to relate relationships between indicators that are individually or in groups; To determine and modeling method, explains specific relationships and general structure as a model. Therefore, this technique is a tool to create order in the complexity of relationships between variables and is a good option to deal with complex issues, especially when using systematic and logical thinking (Ghanbari and Ali, 2017).

4. FINDINGS

Determining the variables used in the ISM model: In this section, the variables related to the topic under discussion are identified. In this research, the variables presented in Table 2 have been used to design a GHRM model.

Obtaining the internal relations matrix of variables (SSIM): At this stage, after identifying the variables, it is time to enter them in the structural matrix of the internal relations of the variables. This matrix is a matrix with dimensions of variables that are listed in the

row and column of those variables, respectively. The relationships between variables are then determined by symbols in a pairwise comparison (Ravi and Shankar, 2015). In fact, in order to form a matrix of internal relations of variables, experts participating in the ISM process are asked to complete the matrix based on the following principles.

TABLE 2
Identified Factors of Green Human Resource Management

Identified agent	Row	Identified agent	Row
Support the environment around the organization	8	Strategic Vision	1
Optimal energy consumption	9	Environmental awareness of individuals	2
Sense of vitality and meaning of employees	10	creativity and innovation	3
Incidence of citizenship behavior	11	Coordination of HR processes	4
Sustainable Development	12	Ability to manage change	5
Create a competitive advantage	13	Support for managers and shareholders	6
Environmental improvement	14	Providing resources	7

- V: The row factor (i) can affect the column factor (j).
- A: The column factor (j) can affect the row factor (i).
- X: Both rows (i) and columns (j) affect each other.
- O: There is no relationship between the row element and the column element (i, j).

Table 3 presents the Structural Matrix of Internal Relations of Variables (SSIM) for the 14 identified green HRM factors in this study. Each row and column represents a variable, and the intersections show the relationships between pairs of variables as determined by expert judgment. The symbols in the matrix indicate the type of influence between variables:

- V: The row variable influences the column variable.
- A: The column variable influences the row variable.
- X: Both variables influence each other.
- O: There is no relationship between the two variables.

TABLE 3
Structural Matrix of Internal Relations of Variables

Variables (V)	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
V1		A	A	V	O	A	V	A	V	V	V	V	V	V
V2			O	A	O	O	O	O	V	X	V	A	V	V
V3				O	V	A	A	A	V	V	O	V	V	V
V4					V	V	A	O	O	V	O	V	V	O
V5						A	A	O	O	A	O	V	V	V
V6							V	O	V	V	V	V	O	V
V7								A	V	O	O	V	V	O
V8									V	O	O	V	O	O
V9										A	A	V	V	V
V10											X	X	V	V
V11												O	V	V
V12													X	A
V13														A
V14														

Note: Strategic vision (V1), Environmental awareness of individuals (V2), Creativity and innovation (V3), Coordination of HR processes (V4), Ability to manage change (V5), Support for managers and shareholders (V6), Providing resources (V7), Support the environment around the organization (V8), Optimal energy consumption (V9), Sense of vitality and meaning of employees (V10), Incidence of citizenship behavior (V11), Sustainable Development (V12), Create a competitive advantage (V13), Environmental improvement (V14)

This matrix serves as a systematic representation of how experts perceive the interdependencies among green HRM factors, providing a foundation for further analysis. By converting the SSIM symbols into numerical values (0 and 1), the achievement matrix is generated, which allows the identification of variable hierarchies and influence levels. Ultimately, this process helps in constructing the interpretive-structural model, clarifying which factors are foundational, which are dependent, and how they collectively shape the successful implementation of green HRM in organizations.

Table 4 presents the Achievement Matrix, which is derived from the Structural Matrix of Internal Relations (SSIM) by converting expert judgments (V, A, X, O) into numerical values (0 and 1). This matrix represents the direct and indirect influences among the 14 identified green HRM factors.

The numbers marked with * indicate cells where the original value was 0 but was changed to 1 during the adaptation process to ensure internal consistency. By providing a clear view of all direct and indirect relationships, the Achievement Matrix serves as a critical step for determining the hierarchy, influence, and dependence of variables, which is then used to construct the final interpretive-structural model.

TABLE 4
Achievement Matrix

Variables (V)	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
V1	1	0	0	1	0	0	0	0	1	0	1	1	1	1
V2	1	1	0	0	0	0	0	0	1	1	1	0	1	1
V3	1	0	1	0	1	0	0	0	1	1	0	1	1	1
V4	0	1	0	1	1	1	0	0	0	1	0	1	1	0
V5	0	0	0	0	1	0	0	0	0	0	0	1	1	1
V6	1	0	1	0	1	1	1	0	1	1	1	1	0	1
V7	0	0	1	1	1	0	1	0	1	0	0	1	1	0
V8	1	0	0	1	0	0	1	1	1	0	0	1	0	0
V9	0	0	0	0	0	0	0	0	1	0	0	1	1	1
V10	0	1	0	0	1	0	0	0	1	1	1	1	1	1
V11	0	0	0	0	0	0	0	0	1	1	1	0	1	1
V12	0	1	0	0	0	0	0	0	0	1	0	1	1	0
V13	0	0	0	0	0	0	0	0	0	0	0	1	1	0
V14	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Note: Strategic vision (V1), Environmental awareness of individuals (V2), Creativity and innovation (V3), Coordination of HR processes (V4), Ability to manage change (V5), Support for managers and shareholders (V6), Providing resources (V7), Support the environment around the organization (V8), Optimal energy consumption (V9), Sense of vitality and meaning of employees (V10), Incidence of citizenship behavior (V11), Sustainable Development (V12), Create a competitive advantage (V13), Environmental improvement (V14)

TABLE 5
Compatibility Achievement Matrix

Variables (V)	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
V1	1	*1	0	1	*1	*1	0	0	1	*1	1	1	1	1
V2	1	1	0	*1	*1	*1	0	0	1	1	1	*1	1	1
V3	1	*1	1	*1	1	0	0	0	1	1	*1	1	1	1
V4	*1	1	*1	1	1	1	*1	0	*1	1	*1	1	1	*1
V5	0	*1	0	0	1	0	0	0	1	*1	0	1	1	1
V6	1	*1	1	*1	1	1	1	0	1	1	1	1	*1	1
V7	0	*1	1	1	1	0	1	0	1	*1	0	1	1	*1
V8	1	*1	*1	1	*1	*1	1	1	1	*1	*1	1	*1	*1
V9	0	*1	0	0	0	0	0	0	1	*1	0	1	1	1
V10	*1	1	0	0	1	0	0	0	1	1	1	1	1	1
V11	0	0	0	0	0	0	0	0	1	1	1	*1	1	1
V12	*1	1	0	0	0	0	0	0	*1	1	*1	1	1	*1
V13	0	0	0	0	0	0	0	0	0	*1	0	1	1	0
V14	0	0	0	0	0	0	0	0	0	0	0	*1	1	1

Note: Strategic vision (V1), Environmental awareness of individuals (V2), Creativity and innovation (V3), Coordination of HR processes (V4), Ability to manage change (V5), Support for managers and shareholders (V6), Providing resources (V7), Support the environment around the organization (V8), Optimal energy consumption (V9), Sense of vitality and meaning of employees (V10), Incidence of citizenship behavior (V11), Sustainable Development (V12), Create a competitive advantage (V13), Environmental improvement (V14)

Determining the level and prioritization of variables: To determine the level and priority of variables, input and output sets are

specified for each variable. The output set contains the variables that can be reached, and the input set contains the variables through which this variable can be reached. At this stage, after determining the input and output sets, a common set is also determined for each variable. Then, in order to prioritize, the variables whose output and common set are exactly the same are placed at the highest level of the ISM model hierarchy. To specify the next level components of the system, we remove the graded variable from the table and form the next table with the rest of the variables and continue this process until the level of all variables is determined. Table 6 shows the grading of the variables.

Model drawing: After determining the relationships and determining the level of variables, the final model can be drawn according to the adapted achievement matrix. For this purpose, the variables are first sorted from top to bottom according to their level. In the present study, the effective factors in the successful implementation of green HRM were classified into 8 levels, the first of which is sustainable development and competitive advantage; At the second level, environmental improvement and the ability to manage change; In the third level of optimal energy consumption; At the fourth level, the sense of vitality and significance of employees and the occurrence of citizenship behavior; At the fifth level, strategic vision, environmental awareness of individuals and coordination of HR processes; At the sixth level, creativity and innovation as well as resource provision; At the seventh level, manager and shareholder support; And at the eighth level is the support of the environment around the organization. Figure 2 shows the developed research model.

MICMAC analysis: In this step, the variables are divided into four categories according to penetration power and dependence power. The first category includes autonomous variables that have weak influence and dependence, or in other words, have little and weak communication with the system. Dependent variables are the second category that have low penetration power but high dependency power. The third category is called connected variables that have a lot of influence and dependence; such variables are non-static; That is, any change in them can affect the system. And the fourth category includes independent variables that have high penetration power and low dependence. Table 7 shows the degree of influence and dependence of variables.

TABLE 6
Determining the Levels of Variables

Variables (V)	Input set	Output set	Joint collection	Level
V1	1,2,3,4,6,8,10,12	1,2,4,5,6,9,10,11,12,13,14	1,2,4,6,10,12	5
V2	1,2,3,4,5,6,7,8,9,10,12	1,2,4,5,6,9,10,11,12,13,14	1,2,4,5,6,9,10,12	5
V3	3,4,6,7,8	1,2,3,4,5,9,10,11,12,13,14	3,4	6
V4	1,2,3,4,6,7,8	1,2,3,4,5,6,7,9,10,11,12,13,14	1,2,3,4,6,7	5
V5	1,2,3,4,5,6,7,8,10	2,5,9,10,12,13,14	2,5,10	4
V6	1,2,4,6,8	1,2,3,4,5,6,7,9,10,11,12,13,14	1,2,4,6	7
V7	4,6,7,8	2,3,4,5,7,9,10,12,13,14	4,7	6
V8	8	1,2,3,4,5,6,7,8,9,10,11,12,13,14	8	8
V9	1,2,3,4,5,6,7,8,9,10,11,12	2,9,10,12,13,14	2,9,10,12	3
V10	1,2,3,4,5,6,7,8,9,10,11,12,13	1,2,5,9,10,11,12,13,14	1,2,5,9,10,11,12,13	3
V11	1,2,3,4,6,8,10,11,12	9,10,11,12,13,14	10,11,12	4
V12	1,2,3,4,5,6,7,8,9,10,11,12,13,14	1,2,9,10,11,12,13,14	1,2,9,10,11,12,13,14	1
V13	1,2,3,4,5,6,7,8,9,10,11,12,13,14	10,12,13	10,12,13	1
V14	1,2,3,4,5,6,7,8,9,10,11,12,14	12,13,14	12,14	2

Note: Strategic vision (V1), Environmental awareness of individuals (V2), Creativity and innovation (V3), Coordination of HR processes (V4), Ability to manage change (V5), Support for managers and shareholders (V6), Providing resources (V7), Support the environment around the organization (V8), Optimal energy consumption (V9), Sense of vitality and meaning of employees (V10), Incidence of citizenship behavior (V11), Sustainable Development (V12), Create a competitive advantage (V13), Environmental improvement (V14)

FIGURE 2
Green Human Resource Management Model

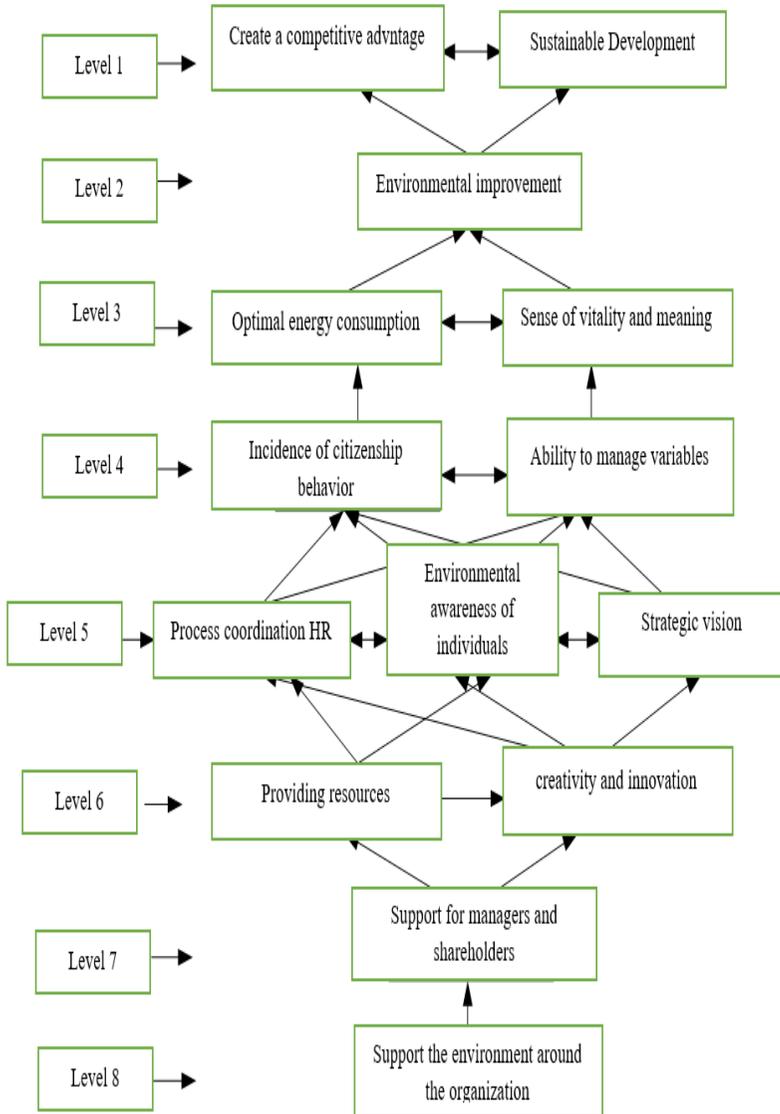


TABLE 7
Influence and Dependence

Influence power	Independent							Connected							
	14	8													
	13				5	6	4								
	12														
	11										2				
	10				7										
	9												10		
	8										1			12	
	7									5					
	6									11			9		
	5														
	4														
	3													14	13
	2														
	1	Autonomous							Dependent						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Degree of dependence															

5. DISCUSSION AND CONCLUSION

Green human resource management (GHRM) is an approach aimed at increasing employee awareness, commitment and belonging to environmental issues and also by applying green methods and policies for increasing productivity, reducing costs and also creating a better environment for participation. Employees become environmental advocates in the organization (Aggarwal and Sharma2015). This study aimed at designing a GHRM model in sports organizations. According to the purpose, the research results consist of two parts. In the first part, through an exploratory study and expert opinion, the factors of successful green HRM implementation were identified. It should be noted that strategic vision, environmental awareness, creativity and innovation, coordination of HR processes, ability to manage change, support of managers and stakeholders, resource provision, environmental support, optimal energy consumption, sense of vitality and meaningful employees, The emergence of citizenship behavior, sustainable development, competitive advantage and environmental improvement are the components and factors of successful implementation of GHRM.

The research findings in the second part indicate the design of an interpretive-structural model of the research. Accordingly, in describing the developed research model, it should be acknowledged that organizations for the proper management of green human resources should use the level of environmental support around the organization, which welcomes the organizational environmental activities; Create support for managers and shareholders in the organization. In this way, organizations can encourage employee creativity and innovation by providing resources, which in turn improves the long-term vision of employees and managers, increasing their awareness of environmental issues, besides integrating activities. Thus, with the emergence of a strategic vision and improving people's awareness of environmental issues along with the coordination of human resource activities, the organization can develop citizenship behavior and the ability of the HRM team to create and manage change within the organization. It also creates a sense of interest and vitality of employees in engaging in environmentally friendly activities as well as optimal energy measures on the environment, ensure a clean and healthy environment (environmental improvement) and then continue to operate with a competitive advantage and sustainable development. Regarding alignment of findings of the present study with past research, it should be noted that Mohammad Nejad Shourkaei et al. (2016) also presented a model to identify the consequences and preconditions (individual, organizational and extra-organizational factors) of GHRM in the organization and identified factors such as supporting the environment around the organization and supporting managers and shareholders are effective in creating GHRM. Jabbour and Jabbour (2016) emphasized that the fundamental outcome of GHRM lies in creating a sustainable competitive advantage and promoting the long-term development of organizations, which aligns with the findings of the present study. Finally, regarding the study's limitations, it should be noted that due to the research's purpose and nature, expert selection restricted the sample size; therefore, sampling limitation was the primary constraint of this study.

According to the research results, we suggest the following practical steps:

- Considering the results and also the importance and necessity of GHRM, it is suggested that organizations, especially sports organizations, pay special attention to GHRM and use its policies and strategies to achieve their goals and activities to align well with environmental goals.

- The present study suggests that successful implementation of GHRM for organizations requires special attention to the environment and social operating environment; Green HRM is very effective in accepting and moving the organization to achieve environmental goals. And paying attention to this, in turn, makes managers and stakeholders support the implementation of environmentally friendly programs and behaviors.
- It is suggested that managers create the necessary resources to support employees' environmental activities.
- Based on the developed model, the present study proposes that organizations use strategic vision, inform people about environmental issues, and coordinate human resource activities in the organization; Provide the necessary context for managing intra-organizational change, besides promoting individual conscious actions for environmental improvement.
- According to the results and findings, it is suggested that organizations create a sense of vitality and meaning in human resources by involving employees in environmentally friendly activities as well as activities in the green workspace. This causes employees to actively participate in environmental activities. On the other hand, a sense of vitality and significance, along with the optimal pattern of energy consumption while improving environmental issues, can lead to profitability and consequently sustainable development by reducing organizational costs.
- Future research should identify and prioritize the factors for successful implementation of GHRM; It is also suggested to analyze the effect or relationship of this approach with concepts with appropriate semantic intercourse.

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JOB SATISFACTION DURING THE COVID-19 MOVEMENT CONTROL ORDER: A STATE-WIDE STUDY OF UTILITY COMPANIES IN SARAWAK, MALAYSIA

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ABSTRACT

Malaysia ordered a series of lockdowns (known as Movement Control Order) on 18 March 2020 to break the chain of COVID-19 infection within the community. The lockdown imposed brought drastic changes in working practices and thus forced workers to work from home. This paper investigates the changes in job satisfaction before and during the MCO. Utility services were chosen because they are essential services outlined by the Malaysian National Security Council during the COVID-19 pandemic. This study was a state-wide study (in Sarawak, Malaysia), gathering 10,320 employee data over two years (2019-2020). Based on the one-sample *t*-test, the level of job satisfaction during the COVID-19 pandemic has significantly increased. Future research should investigate possible factors that could explain job satisfaction during the pandemic. Organizations and policymakers should take note of these findings and be vigilant of inconveniences of remote working to preserve a good level of job satisfaction.

JEL Classification: C2, I310, J2

Keywords: Organizational psychology, Human resources, COVID-19, Job satisfaction, Remote working

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1. INTRODUCTION

A novel coronavirus (SARS-CoV-2) caused major worldwide outbreaks of COVID-19 disease. Association of Southeast Asian Nations (ASEAN) countries, including Malaysia, have not been spared from COVID-19. In Malaysia (as of March 15, 2022), there were 33,899 COVID-19 fatalities recorded by the Ministry of Health, including 7,076 Brought-In-Death (BID) cases (“COVIDNOW in Malaysia” 2021). Meanwhile, there were 1,644 total deaths recorded in Sarawak (“Sarawak COVID-19 Tracker” 2022). The COVID-19 outbreak forced announcement of the 2020 Movement Control Order (the first MCO) on March 18, 2020, which signified a major action taken by the Malaysian Government to contain the spread of COVID-19 (Pang et al., 2021). The Movement Control Order restricts inter-district and interstate travel while ceasing/limiting the operation of non-essential services such as recreational and entertainment facilities, cosmetics, fashion and jewelry stores, and many others. Whitelisted products and services include health services, banking, oil and gas, logistics, agriculture, utilities, and pharmacies. The enforcement of the movement restriction forced companies to make the mandatory shift from traditional forms of work to working remotely from home (or teleworking), utilizing online conferencing and collaborative tools to communicate. Various terms refer to teleworking in the literature, such as ‘work from home’, ‘remote working’, and ‘telecommuting’ (Tokarchuk, Gabriele, and Neglia, 2021). In this paper, we use these terms interchangeably. The changes in the working practices and work environment negatively affect employee well-being (Bulińska-Stangrecka, and Bagińska, 2021).

In the light of the pandemic, research on employee well-being is becoming increasingly important. As work environment and processes change, there is a dire need to reassess and rethink the possible shift in job satisfaction during the pandemic because it has brought new questions on employee adaptation to these new work norms (Nemteanu, Dinu, and Dabija, 2021; Yu, and Wu, 2021) Job satisfaction is an important aspect of working life because a low level of job satisfaction can negatively affect job performance and personal life (Karácsony, 2021).

Defined simply, job satisfaction is a measure of contentment and enjoyment at work. Job satisfaction has been extensively investigated in the past. No consensus however exists on how to

quantify it (Rainey, 2014). Job satisfaction (Awalom et al., 2015; Spector, 1997) is measured in two ways. First, Global job satisfaction" is a single-item measurement to measure the sense of how employees feel about their jobs in general. Second, multidimensional job satisfaction assesses a variety of factors, including benefits, career advancement, leadership, and job status, among others (Awalom et al., 2015; Spector, 1997).

2. LITERATURE REVIEW

2.1 DISCREPANCY IN THE JOB SATISFACTION LEVEL DURING PANDEMIC

Mandatory remote working during the pandemic increases stress and work-related burnout (Hayes et al., 2021). Chanana (2021) noted that job satisfaction level among private school teachers in India was low during the pandemic, especially for teachers with low job engagement and a sense of commitment toward their school. In Slovakia, however, the mandatory teleworking introduced had a significant positive effect on job satisfaction. Working from home improved employee work-life balance and relationship with their managers. Moreover, they would maintain teleworking norms post-pandemic (Karácsony, 2021). Țălnar-Naghi (2021) discovered that younger employees reported a higher level of job satisfaction, but during the pandemic, workers over 40 showed dramatic improvement in job satisfaction.

In the health sector, where teleworking was irrelevant during the pandemic, there is overwhelming evidence that job satisfaction is lower as reported by Labrague and de Los Santos (2021) in the Philippines and Abd-Ellatif et al. (2021) in Egypt. In both cases, the fear of COVID-19 negatively affected job satisfaction and increased turnover intention among healthcare personnel. In China, Yu et al. (2020) found that job satisfaction among healthcare personnel was decent, noting that good relationships with colleagues, work recognition, increased work fulfilment, sense of contribution, and moral value contributed to the increased job satisfaction among medical practitioners. This study contributes to the discourse on change in job satisfaction level during the COVID-19 pandemic.

3. METHODOLOGY

3.1 SAMPLES AND INSTRUMENTS

Total observation of 10,320 comprises employees from 3 companies in the utility sectors in Sarawak over 2 years (2019 and 2020). N = 5,052, male = 3,929, female = 1,123, technical = 3175 non-technical = 1,877. N=5,268, male= 4,095, female = 1,173, technical = 3,383 non-technical =1,885. During MCO, all companies require employees to work from home whenever possible. While some employees need to work on-site, most employees were required to work from home during this period. Data from 2020 were collected during October 2020, the 3rd wave of the COVID-19 pandemic

Instruments to measure job satisfaction consist of 5 Likert-type items (five response anchors). The instrument was validated using Rasch analysis, namely the Andrich Rating Scale model. The model fit indices show that the model is acceptable. The model also shows good differential item functioning for male and female employees. Ten aspects of job satisfaction are measured in this study: satisfaction with the working environment, job position, compensation and benefits, salary, facilities, job performance, work motivation, leadership/supervision, career advancement opportunity, and relationship with co-workers.

3.2 HYPOTHESIS AND ANALYSIS

The median job satisfaction score for 2019 was calculated to serve as the test value for the one-sample *t*-test. For the one-sample *t*-test in this study, the sample mean is used as the location estimate. For this test, Cohen's *d* is the indicator for the effect size. The alternative hypothesis specifies that the mean is significantly different from 79. For this analysis, the scores for the year 2019 (N = 5052) are mean =79.3, median = 80, SD =13.8. Meanwhile, the scores for 2020 (N = 5268) are as follows: Mean = 81.81, Median = 84.29, SD = 14.22.

- Null Hypothesis H0: Job satisfaction mean score is equal to 79
- Alternative Hypothesis: H1: Job satisfaction mean score is not equal to 79

This study uses the Bayesian framework to map the predictive performance of null and alternative hypotheses in addition to using p-value as frequentist null-hypothesis significance testing (NHST). The Bayesian framework provides evidence for the null as well as the alternative hypothesis. Furthermore, it is possible to use prior knowledge to develop a more informative analysis with the capacity to illustrate the change in the evidence for both hypotheses as the data accumulate (van Doorn et al., 2021). The Bayesian framework does not revolve around the notion of type I error but instead allocates relative evidence to a hypothesis given the data. Ruiz-Ruano García and López Puga (2018) mentioned that Bayesian factors are an excellent addition to the traditional NHST because they could help researchers avoid claiming false statistical findings. Therefore, they suggested that classical NHST is used in conjunction with Bayesian statistics. In JASP, the NHST also provides a more mysterious measure: the maximum Diagnosticity of p-value “Vovk-Sellke maximum p-ratio” or VS-MPR. Diagnosticity refers to the extent to which a source of data can discriminate between a particular hypothesis and its alternatives. For this maximum p-ratio for a two-tailed p-value, the maximum possible odds in favor of the alternative hypothesis over the null hypothesis equals $1/(-e p \log(p))$ for $p \leq .37$ (Sellke, Bayarri, and Berger 2001).

4. RESULTS

Figure 1 illustrates the distribution of job satisfaction scores in the study sample, showing a unimodal pattern with a mean of 81.81, a median of 84.29, and a 95% confidence interval ranging from 81.43 to 82.20. The narrow 95 % confidence interval reflects low variability in the estimated mean, implying that the observed average is a reliable indicator of the population’s job satisfaction level. Based on the classical one-sample *t*-test results in Table 1, job satisfaction level is significantly higher ($M = 81.81$, $SD = 14.22$) than the test value 79, $t(5267) = 14.537$, $p < .001$, $d = 5.753$. In addition, the VS-MPR value of $4.810e+42$ indicates there is a good case for the alternative hypothesis because it shows p-values of $< .001$ is $4.810e+42$ times more likely favoring H_1 over H_0 . This value shows a strong case for rejecting the null hypothesis. Bayesian one-sample test results in Table 2 provide more information on the hypothesis predictive quality given the data.

FIGURE 1
The Distribution of the Job Satisfaction Median Score

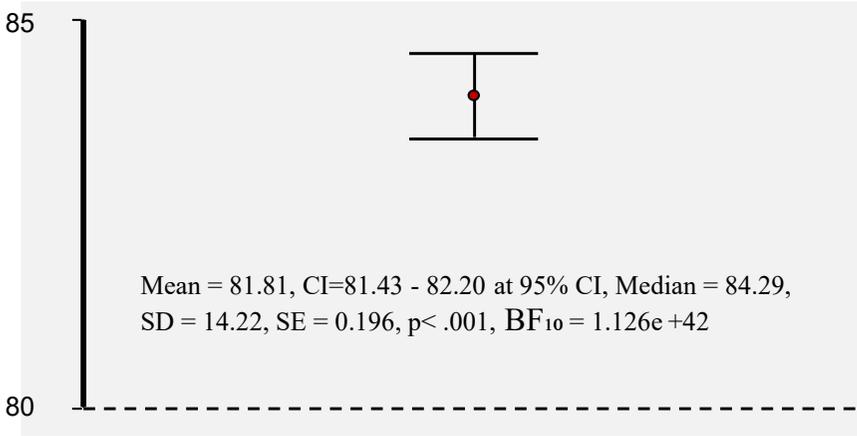


TABLE 1
One-Sample Test

t	df	p	VS-MPR*	Sample Mean	95% CI for Sample Mean		Cohen's d	95% CI for Cohen's d	
					Lower	Upper		Lower	Upper
14.35	5267	< 0.001	4.810	81.81	81.43	82.2	5.75	5.65	5.85

Note: For the one-sample t-test, the alternate hypothesis specifies that job satisfaction mean score is not equal to 79.

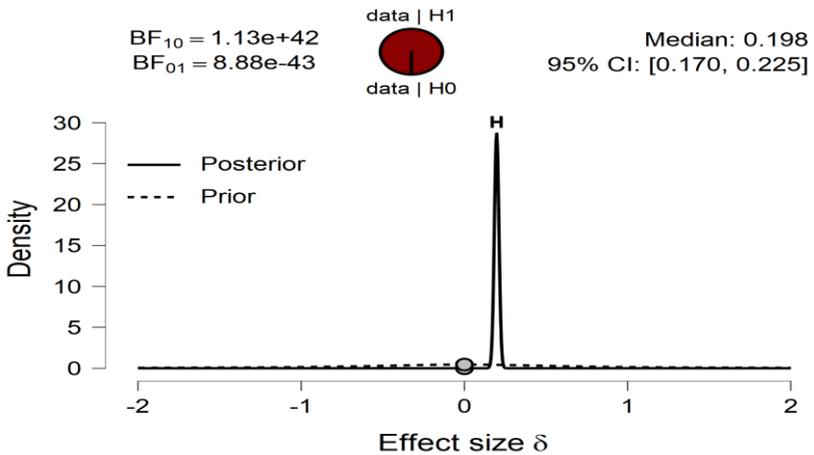
In Table 2, BF_{10} indicates the Bayes factor in favoring of alternative hypothesis over null. Bayes factors range from 0 to ∞ , and Bayes factor of 1 indicates that both hypotheses predicted the data equally well. As the Bayes factor deviates from 1, which indicates equal support for H_1 and H_0 , more support is gained for either H_1 or H_0 . Larger values of BF_{10} indicate more support for H_1 . Bayes factors >10 is considered strong evidence. As in Table 2, $BF_{10} = 1.126E+42$ also indicates overwhelming evidence for the alternate hypothesis. This is depicted in Figure 2, which illustrates the posterior and prior distributions of the estimated effect size (δ), showing a sharp posterior peak around $\delta \approx 0.20$ (median = 0.198, 95% CI [0.170, 0.225]).

TABLE 2
Bayesian One-Sample T-Test

	BF ₁₀	error %
Job Satisfaction	1.126e +42	5.131e -47

Note: For all tests, the alternative hypothesis specifies that the population mean differs from 79.

FIGURE 2
Evidence for H₁ over H₀



In Figure 3, the maximum BF₁₀ is attained when the prior, $r = 0.1959$. As stated previously, the default Cauchy prior ($r = 0.707$) gives BF₁₀ = 1.126E+42, indicating unwavering support for H₁. As in the figure, using a range of different plausible prior distributions (default, wide, or ultrawide) does not sway the qualitative conclusions. The evidence for H₁ is relatively stable across these prior distributions. In other words, this pattern indicates that the analysis is robust. Figure 4 shows the stability of the qualitative conclusion based on the sample size, n . The graph consistently shows evidence for H₁ across different sample sizes. When the sample size is small, the evidence for H₁ is not particularly convincing. However, as the sample size increases, the evidence for H₁ also increases. Current sample size gives BF₁₀ = 1.126E+42 and BF₀₁ = 8.88e-43.

FIGURE 3
BF₁₀ Values with Different Priors are Used

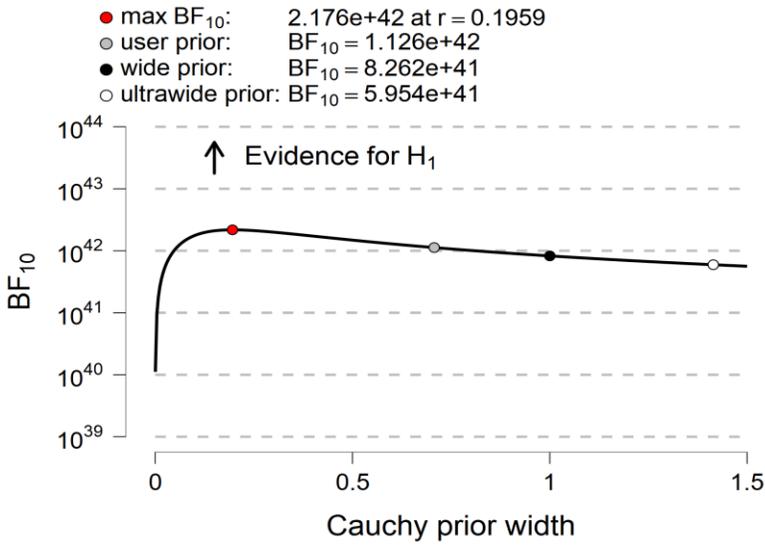
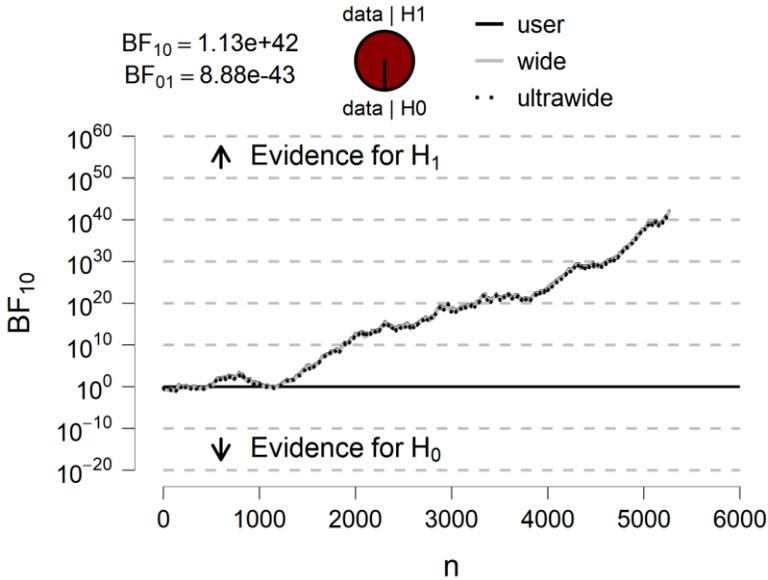


FIGURE 4
Evidence for H₁ and H₀ as the Sample Size Increases



5. DISCUSSION

One of the strengths of this study is its large sample size to characterize job satisfaction during the COVID-19 pandemic effectively. A shift in the work norms during a series of MCO in Malaysia prior to the endemic stage provides an unparalleled opportunity to address the paucity of research in this area, especially in Malaysia. A large-scale job satisfaction study during a pandemic has been unexplored until recently considering the unique circumstances arising from the pandemic.

The increase in the job satisfaction level found in this study corroborates those of several other studies conducted in different countries on the increase in job satisfaction levels during the COVID-19 pandemic. Among them was Karácsony (2021), who provided substantial evidence on an increase in job satisfaction level in Slovakia, where enforcement of more flexible work norms, namely teleworking, has also improved work-life balance. Trust-based employee relationships are the bedrock of a healthy remote working environment (Bulińska-Stangrecka and Bagieńska 2021). Therefore, managing job expectations is crucial (Irawanto, Novianti, and Roz 2021).

We are aware that while restrictive measures during the pandemic impacted all enterprises and compelled them to rely on telework, some organizations were more prepared for this shift in work norms than others. This study collected data from Government-linked companies (GLCs), which were reputable for having adequate and regionally state-of-the-art facilities and resources to facilitate the transition to alternating teleworking schedules. This readiness includes technical support for employees and bulk purchasing of teleworking tools. Tokarchuk et al. (2021) echo this sentiment, noting that different organizations may vary in teleworking readiness, especially when the lack of IT support for teleworking can reduce job satisfaction (Irawanto et al., 2021).

Further investigation into the literature found other factors that contribute to higher job satisfaction during the pandemic. For example, Sousa-Uva et al. (2021) found that the work environment and company culture significantly impacted job satisfaction. Numerous variables may enhance job satisfaction, including more work autonomy, no work commute, and improved work-life balance (Karácsony 2021). The reduction in commute time and the reduced concern of exposure to COVID-19 may contribute to higher job

satisfaction. Without several factors, such as a suitable workspace, digital social support, and an acceptable monitoring mechanism, it was discovered that long-term WFH undermines job satisfaction (X. Yu et al., 2020). Moreover, Irawanto et al. (2021) noted that while working from home, workers may develop a stronger bond with their families, potentially increasing job satisfaction as their work-life balance improves.

While some researchers discovered that workers reported high levels of job satisfaction during the pandemic, Mahmood et al. (2023) noticed a decrease in job satisfaction among teachers during the pandemic. Other sectors reported a lower level of job satisfaction, namely the healthcare sector. Frontline healthcare workers reported a lower level of job satisfaction because for this group, addressing the fear of COVID-19 could improve job satisfaction, lower stress levels, and lower turnover intention (Labrague and de Los Santos 2021).

5.1 MANAGERIAL IMPLICATIONS

The evolving labor climate and work practices created by the COVID-19 regulations present new challenges for human resource management. To accommodate the changes in the working environment following remote working, organizations must embrace sustainable human resource strategies, such as staffing, compensation, work-family balance, benefits, and workplace regulations, to guarantee a high degree of employee job satisfaction (Davidescu et al., 2020; Jonathan et al., 2020). Employees must be supported in rearranging their work styles, communicating effectively within their teams, and staying up to date on business objectives while working remotely (Tokarchuk et al., 2021). After all, workspace flexibility is linked to higher job satisfaction (Davidescu et al., 2020). It was noted that the extent to which organizations implement teleworking varies depending on their resources and preparedness (Tokarchuk et al., 2021). Organizations should anticipate that not all workers will be proficient in utilizing teleworking or collaborative tools since not all employees will have access to the same resources or prior expertise with these technologies (Mahmood et al., 2023).

Human resource managers should establish (and budget for) training plans that assist employees in acquiring the essential abilities to deal with uncommon and unexpected changes in job demands. Future recruitment processes should examine candidates' fundamental knowledge and expertise in information technology. Furthermore,

organizations should also note that it is imperative to maintain a good working relationship during remote working to guarantee optimal well-being throughout the pandemic. A sound support system and relationship with co-workers are becoming increasingly vital due to various factors impacting employee well-being, such as fear of disease and social isolation (Bulińska-Stangrecka and Bagińska 2021). However, organizations should also be aware that a high job satisfaction level does not necessarily translate into excellent job performance (Hashim et al., 2020).

5.2 THEORETICAL IMPLICATIONS

Many factors contribute to higher job satisfaction during the COVID-19 pandemic, such as flexible job arrangements, fewer distractions, enhanced autonomy, ergonomic home working environment, absence of commute, and digital social support (Vyas and Butakhieo, 2020; Yu et al., 2020; Davidescu et al., 2020). On the other hand, absence of these factors and a lack of social connection results in decreased job satisfaction (Vyas and Butakhieo, 2020). While prior studies have highlighted factors affecting job satisfaction during a pandemic, the disparity in the literature on the level of job satisfaction during a pandemic emphasizes the importance of more investigations into this matter. This study contributes to this discourse by offering evidence of higher job satisfaction during the COVID-19 pandemic.

5.3 LIMITATION AND RECOMMENDATIONS

In this study, a comparative study of job satisfaction between teleworking and on-site workers was not possible for two main reasons: First is the implementation of a rotating work system (work on-site/ at the office or working from home). Second, the utility sector is a critical service during MCO. Therefore, employees who work from home may sometimes need to report for office duty. Work meetings, on the other hand, are done online, as specified in MCO regulations. As a result, all employees engaged in telework (but not entirely).

The study focuses on utility companies. While this approach avoids heterogeneity in the sample and reduces nuisance variables that could arise when using samples from diverse sectors, the findings of this study should not be extrapolated to other sectors. For this reason, prospective studies should investigate different sectors/industries to

corroborate the findings of this study. Additional research is required to evaluate potential confounding variables that influence job satisfaction during a pandemic. We are also aware of the potential selection bias introduced by a sample with a higher level of education and a potentially better financial situation, which may imply improved working conditions at home (space, equipment, and a better working environment), thereby inflating satisfaction levels. Finally, this study utilizes a self-reported instrument to capture employee job satisfaction. Therefore, we do not rule out the possibility of information bias related to self-reporting.

6. CONCLUSION

The study's huge sample size allows it to define work satisfaction throughout the COVID-19 pandemic properly. A shift in work norms during a succession of MCO provided an opportunity to address the paucity of studies on this subject in Malaysia because large-scale job satisfaction research during a pandemic has never been conducted. Because of the disparities in the literature on the level of job satisfaction during a pandemic, more research is needed. This study adds to the discussion by showing increased job satisfaction during the COVID-19 epidemic. During the COVID-19 pandemic, job satisfaction increased significantly, according to a one-sample *t*-test. Researchers should look at possible explanations for the rise in work satisfaction during pandemics. Organizations and policymakers should take heed of these findings to maintain a high level of job satisfaction.

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IN-STORE CUSTOMER EXPERIENCE (ISCX) TOWARDS COVID-19 PREVENTIVE MEASURES OF MALAYSIAN RETAILERS: A QUALITATIVE STUDY

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ABSTRACT

This study explores In-Store Customer Experience (ISCX) in relation to COVID-19 preventive measures among Malaysian retailers. Grounded in Maslow's Hierarchy of Needs, it investigates how cognitive, affective, social, and physical experiences were influenced during the pandemic. A qualitative approach was employed, using thematic analysis on data collected through 10 in-depth interviews with Malaysian shoppers during the Movement Control Order (MCO) phases. Interviews were coded and analysed using Atlas.ti, referencing past literature to identify emerging themes. Findings indicate that affective experience especially involving negative emotions, was the most frequently cited ISCX dimension, highlighting the importance of addressing customers' psychological comfort during in-store visits. Among preventive measures, store airflow emerged as the most frequently mentioned, underscoring its significance in creating a safe shopping environment. These findings reflect the dual emphasis on physiological and safety needs within Maslow's framework. The study suggests that retailers should not only implement effective health protocols but also consider customers' emotional well-being to enhance the overall shopping experience. The paper recommends integrating additional theoretical models alongside Maslow's hierarchy for a more robust framework. Future research could adopt a mixed-method approach to strengthen the understanding of customer experience and preventive strategies. The insights offer practical implications for retailers, policymakers, and stakeholders in managing in-store operations during public health crises.

JEL Classification Code: M3, I1, I3

Keywords: Preventive measures, Consumer experience, COVID-19, Retailers, Health, SDG3

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1. INTRODUCTION

In early 2020, the world was shaken by the Coronavirus (COVID-19) outbreak, later declared by the World Health Organization (WHO) as a pandemic. A team of Harvard scientists predicted that social distancing might be needed until 2022 unless the vaccine is found (AFP, 2020). For the global community, this is the first encounter where the health crisis has resulted in worldwide socioeconomic disruption in which consumer behaviors, organizations and supply chains are expected to shift to the “new normal” (McKinsey, 2020). Experts believe these social distancing rules could significantly shrink the retailers’ in-store sales growth (Arcieri, 2020). As retailers are forced to implement new protocols that limit capacity and discourage shoppers from socializing and wandering around, the spending pattern and trends are expected to differ from those in pre-pandemic days (Arcieri, 2020).

To remain relevant, retailers prioritizing physical stores and face-to-face engagement must quickly adapt to the new normal in retail (Briedis et al., 2020). In Malaysia, following the WHO recommendations, among the social distancing guidelines that have been laid out by the country’s Ministry of Health (MOH) are for people to maintain at least a one-meter distance from each other, wash hands frequently with soap or hand sanitizer and wear a mask in crowded places (MOH, 2020). Based on this situation, the research objective for this study is to explore the in-store customer experience (ISCX) towards COVID-19 preventive measures of Malaysian retailers. This study also used the Maslow Hierarchy of Needs research framework that integrates with ISCX and Malaysian retailers’ preventive measures during the Movement Control Order (MCO) phases. This study also supports Sustainable Development Goal 3, Good Health and Well-Being, by the United Nations, which helps end the COVID-19 pandemic as an infectious disease. This goal aims at ensuring healthier lives for all ages and encouraging well-being (United Nations, 2018), which is the utmost priority during the COVID-19 pandemic. Implementing crucial preventive measures in all Malaysian stores will help reduce the risk of getting COVID-19 infection (World Health Organization, 2020).

2. LITERATURE REVIEW

2.1 CUSTOMER EXPERIENCE: IN-STORE CUSTOMER EXPERIENCE (ISCX) DIMENSIONS

This study was conducted within the retail setting of the customers' experience. To decide on its' measurements, a review of retail customer experience was done by researchers such as Bagdare and Jain (2013), Bustamante and Rubio, (2017), Deshwal, (2016), Hermes and Riedl, (2020), Ogruk, Anderson, and Nacass (2018). There were several theoretical developments in CE's measurements on retail settings previously. Considering the study's setting will take place among in-store customers, this study has chosen the measurement from Bustamante and Rubio (2017) since these researchers studied In-Store Customer Experience (ISCX) among retailers. The measurements were also not biased toward related situations that might not occur during the COVID-19 pandemic. The measurements' descriptions from these researchers were renamed Code ISCX1 to ISCX4 to facilitate future thematic analysis of this study. The ISCX codes are mentioned in Table 1, and the detailed definitions now follow:

2.1.1 COGNITIVE EXPERIENCE (CODE: ISCX1)

Cognition is gained by experience, learned knowledge, and subjective qualities to be perceived by individuals. It helps people identify and address specific issues to the detriment of others (Da Silva and Syed, 2006; David, Miclea, and Opre, 2004; Dimofte, 2010). With regard to this study, the cognitive experience will be inquired of the participants on the retailers' overall environment of their stores, including their product display, services and preventive measures taken during the COVID-19 pandemic.

2.1.2 AFFECTIVE EXPERIENCE (CODE: ISCX2)

The affective mechanism is conceptualized as a "valenced feeling state," and its structure involves mood and emotion (Erevelles, 1998; Richins, 1997; Cohen and Areni, 1991). In intensity, affective responses differ from mildly positive or negative moods to extreme positive or negative feelings (Schmitt, 1999). When researching ISCX, this study focuses on the consumer emotion rather than moods, as emotions are associated with an object that activates them and is

more intense. In contrast, moods are usually not correlated with an object that stimulates them and are low in intensity (Erevelles, 1998).

2.1.3 SOCIAL EXPERIENCE (CODE: ISCX3)

In a social context, the experience is built together with other people. Physical retail outlets are social environments where the customer perceives, interprets and communicates with the service elements to engage in individual and collective processes (Vargo and Lusch, 2008). Participants will be asked about their interactions with other people in retailers' stores, including other customers and staff of the retail outlet.

2.1.4 PHYSICAL EXPERIENCE (CODE: ISCX4)

ISCX's physical aspect relates to the customer physiological responses in their interaction with the environment (Bitner, 1992). This response can be defined as a state of well-being/comfort or lack of comfort/discomfort (De Looze, Kuijt-Evers, and Van Dieën, 2003; Kuijt-Evers, Groenesteijn, De Looze, and Vink, 2004). Through this aspect, the study participants will be required to explain their level of comfort toward the visited retailers' stores' overall environment, including preventive measures taken by these shops.

2.2 PREVENTIVE MEASURES (PM) DURING COVID-19

Preventive measures among retailers during the COVID-19 pandemic are essential to reduce the widespread virus in a country. For Malaysia, the Ministry of Health had urged all businesses to implement COVID-19 preventive measures at their respective premises (Bernama, 2020). Malaysia's Ministry of Domestic Trade and Consumer Affairs had detailed a standard operating procedure (SOP) for certain retailers during the movement control order in the country (KPDNHEP, 2020). Several differences among preventive measures however occurred during COVID-19 compared to this SOP. This study gathered several other reliable articles and SOP provided by the Malaysian Ministry to develop related substantial preventive measures components. Concerning this matter, preventive measures (PM) codes during COVID-19 among literature were extracted from 31 articles, including past research, company press releases, procedures, and newspapers (Suib, Maulan, and Ahmad Suki, 2021). The preventive measure (PM) codes from past literature are given in Table 1 as the initial codes for this study.

TABLE 1
A Summary of Initial Study Codes

No.	Codes	Study Items
1	ISCX1	Cognitive Experience
2	ISCX2	Affective Experience
3	ISCX3	Social Experience
4	ISCX4	Physical Experience
5	PM5	Social Distancing
6	PM6	Hand Sanitizers
7	PM7	On-Premise Sanitation
8	PM8	Face Mask
9	PM9	Temperature Detection
10	PM10	Effective Payment Checkout
11	PM11	Store Airflow

Source: Suib, Maulan and Suki, (2021)

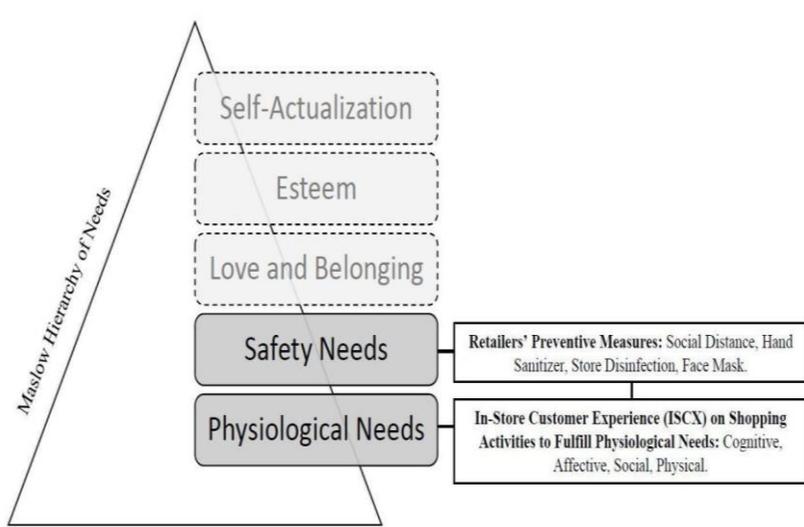
2.3 MASLOW HIERARCHY OF NEEDS

Maslow's Hierarchy of Needs was introduced by Abraham Maslow (Maslow, 1962), and his concept was based on psychological needs (self-esteem, love, self-actualisation) and other basic needs (physiological and safety). According to the author, psychological needs will only become significant after the basic needs have been fulfilled. During the COVID-19 pandemic, Malaysian are focusing on buying more necessity items such as raw materials for cooking, household cleaners, and personal care items (Kong, 2020) that fulfil their physiological and safety needs.

Due to this change in consumer buying behaviour, Maslow's theory of human needs fits well in the context of COVID-19, as the basic needs are hierarchically arranged and supersede the others when satisfied. The basic physiological needs are the lowest and most fundamental for the survival of individuals. In this case, these needs overlap with safety and security needs. Such needs usually emerge from deprivation, and the absence of which develops a sense of anxiety and stress. It can be attributed to the idea that people may think an empty stomach (without food, water, and other routine essentials during lockdown) would take their life away before the coronavirus (Singh, 2020).

This study will emphasise the basic human needs within Maslow's theory, which consists of physiological and safety needs. The consumer's buying experience in the retailers' store (ISCX) on fulfilling their physiological needs will be placed on the lowest fundamental of Maslow's model, while their experience facing retailers' preventive measures as the means to ensure their safety will be in safety needs. Figure 1 illustrates the study's conceptual model to enlighten the organisation of ideas within the Maslow Hierarchy of Needs theory.

FIGURE 1
Conceptual Framework: In-Store Consumer Experience (ISCX) and Retailer's Preventive Measure in Maslow Hierarchy of Needs



Adapted from Bustamante and Rubio, (2017), Maslow, (1962), and Suib, Maulan and Suki, (2021)

2.4 EMPIRICAL FOUNDATIONS FOR FRAMEWORK DEVELOPMENT

While the theoretical dimensions of customer experience—cognitive, affective, social, and physical—are well-established, recent empirical studies have also operationalized these constructs in both qualitative and quantitative settings. For instance, Bagdare and Jain (2013) conducted a quantitative study to measure retail customer experience, providing validated scales that support the multidimensional nature of

ISCX. Similarly, Bustamante and Rubio (2017) empirically tested ISCX constructs in physical retail environments, which form the conceptual basis for this study.

Qualitative approaches have also been employed to understand retail experiences. Ogruk et al. (2018) conducted in-depth interviews to examine customer emotional states in physical stores, aligning with the affective and social dimensions highlighted in this research. Hermes and Riedl (2020) explored cognitive and emotional responses in retail settings using mixed methods, further validating the integration of Maslow's hierarchy in retail experience studies. The inclusion of preventive measures, such as store airflow, hygiene, and crowd control, has been empirically studied in response to COVID-19 (Suib, Maulan, and Ahmad Suki, 2021), supporting the relevance of safety and physiological needs in retail research frameworks.

These studies collectively justify the adoption of a qualitative methodology in this paper, particularly thematic analysis of in-depth interviews, as a suitable approach to explore how ISCX and COVID-19 preventive measures interact in shaping customer experience during crisis periods.

3. RESEARCH METHODOLOGY

This study employed a qualitative research design to explore how in-store customer experiences (ISCX) and observed COVID-19 preventive measures shaped shopping behavior during the Movement Control Order (MCO) in Malaysia. The research was grounded in Maslow's Hierarchy of Needs, with focus on the physiological and safety needs as experienced during retail visits. A qualitative design was selected because of its suitability in exploring lived experiences, emotions, and perceptions in depth.

3.1 SAMPLING AND PARTICIPANT SELECTION

A purposive sampling strategy was used to select 10 Malaysian participants who had engaged in in-person shopping during MCO phases 1 to 3. Participants were recruited via social media and academic networks. Inclusion criteria were: (i) Malaysian citizen, (ii) aged 18 and above, (iii) had visited a physical retailer at least once during the MCO (Table 2). This sampling approach aligns with qualitative best practices (Creswell, 2013) for capturing rich, context-specific experiences.

The participants also had face-to-face retail experiences and were able to recall their shopping experiences in these retailers. The interviews were recorded from online meetings through Google Meet. These semi-structured interviews were composed of 10 open-ended statements that allowed participants to share their knowledge on the study topic. With consent from the participants, the researchers agreed to replace their respective names with numbers (P1 until P10).

TABLE 2
Participants Profiles

Participant (P)	Age	Occupation	Address	Chosen Retailer	Visit on MCO Phase
P1	26	Teacher	Klang, Selangor	Giant Hypermarket	1, 2, 3
P2	27	Admin Executive	Tawau, Sabah	Taih Yang Supermarket	1, 2, 3
P3	23	Entrepreneur	Bangi, Selangor	Parkson	1 and 2
P4	25	Auditor	Shah Alam, Selangor	Aeon Mall	1 and 2
P5	48	Trainer	Bangi, Selangor	Mr DIY	3
P6	25	Service Sales Engineer	Petaling Jaya, Selangor	Tesco	2
P7	36	Lecturer	Shah Alam, Selangor	Jaya Grocer	1 and 2
P8	36	E-Hailing Rider	Shah Alam, Selangor	i-City Mall	1 and 2
P9	37	Lecturer	Klang, Selangor	Aeon Mall	1 and 2
P10	28	Student	Raub, Pahang	Tong Fatt Trading Sdn Bhd	3

3.2 DATA COLLECTION PROCEDURES

Semi-structured interviews were conducted via Google Meet to comply with COVID-19 safety guidelines. Each interview lasted 30–45 minutes and was audio-recorded with participant consent. The interview protocol was developed based on:

- The four ISCX dimensions (Bustamante and Rubio, 2017),
- Common COVID-19 preventive measures (Suib, Maulan and Suki, 2021),
- Maslow’s physiological and safety needs (Maslow, 1962).
- Sample questions included:
- “How did you feel emotionally while shopping in-store during MCO?”
- “What preventive measures did you notice and how did they affect your shopping experience?”

3.3 JUSTIFICATION FOR CUSTOMER-ONLY SAMPLE

This study intentionally focused on the consumer perspective, as the aim was to assess how customers experienced and interpreted in-store preventive measures, not to evaluate the measures themselves from the retailer's operational standpoint. While the preventive measures were implemented by retailers, their effectiveness and emotional impact were best evaluated through customer experiences. Thus, gathering data from retailers was beyond the intended scope of this study. Future mixed-method research, however, could include retailer input for triangulation and deeper analysis.

3.4 DATA ANALYSIS

Interview transcripts were coded using Atlas.ti and analyzed thematically following Braun and Clarke’s (2006) six-step approach. Codes were both theory-driven (Maslow’s framework) and data-driven, allowing emergent themes to surface organically. ISCX and PM codes were adapted from prior literature (Bustamante and Rubio, 2017; Suib et al., 2021) and modified based on interview data.

4. FINDINGS

The analyses of this study's findings were run through Atlas.ti software from the interview transcriptions. The results were analyzed into safety needs represented by In-Store Customer Experience (ICSX) dimensions and physiological needs represented by retailers' preventive measures (PM).

4.1 IN-STORE CUSTOMER EXPERIENCE (ICSX) DIMENSIONS

The shopping experiences of the participants were labelled as ICSX codes in the findings' transcriptions. Initial codes were mentioned in Table 1, and the arrangement of these codes was changed based on the code's identification frequency (highest to lowest) among the interviews; transcripts. Table 3 showed that affective experience had the highest frequency when all participants mentioned their affective experiences the most, while physical experience had the lowest frequency or mentions.

TABLE 3
Findings for In-Store Customer Experience (ICSX) Codes

ICSX Codes	Quotation Frequency	Sources from Participants
ISCX2: Affective Experience	32	All participants
ISCX1: Cognitive Experience	18	All participants
ISCX3: Social Experience	15	All participants
ISCX4: Physical Experience	10	P1, P2, P5, P6, P7, P10

The researcher further categorized the ICSX codes into negative and positive emotions mentioned by the participants. Affective experience with negative emotion had the highest frequency and mentions, while physical experience with negative emotion had the least frequency and mentions.

TABLE 4
Findings on Positive and Negative Emotion of In-Store Customer Experience (ISCX)

ISCX Codes	Quotation Frequency	Sources from Participants
ISCX 2: Negative Emotion	18	P1, P2, P3, P7, P8, P9, P10
ISCX 3: Negative Emotion	13	All participants
ISCX 2: Positive Emotion	10	P4, P5, P6, P7, P8, P9, P10
ISCX 1: Positive Emotion	10	P2, P3, P4, P5, P6, P7, P10
ISCX 1: Negative Emotion	10	P2, P3, P4, P8, P9, P10
ISCX 4: Positive Emotion	8	P1, P4, P5, P6, P7, P10
ISCX 3: Positive Emotion	6	P1, P2, P4, P5, P8, P9, P10
ISCX 4: Negative Emotion	2	P2, P7

4.1.1 ISCX 1: COGNITIVE EXPERIENCE WITH POSITIVE AND NEGATIVE EMOTIONS

The cognitive experience was the inquiries of participants' overall retailers' environment of their stores, including their products' display, services, and preventive measures taken during the COVID-19 pandemic. The positive emotion of satisfaction shown by participant 2 (P2) on her visit to the chosen retailer's overall environment:

“I think it is good enough because the retailer is really umm.. adapting to the new norm and really take the initiative to follow the SOP by the government.” (P2)
 [Cognitive Experience with Positive Emotion]

On the other hand, participant 3 (P3) mentioned she was being cautious of the environment of her chosen retailer. This emotion was recognized as being negative in her cognitive experience:

“I can feel the umm.. You can say that all the staff, including me and all the customers, are being cautious with each other.” (P3) [Cognitive Experience with Negative Emotion]

4.1.2 ISCX 2: AFFECTIVE EXPERIENCE WITH POSITIVE AND NEGATIVE EMOTIONS

The affective experience is conceptualized as a “valenced feeling state,” and its structure involves mood and emotion (Cohen and Areni, 1991; Erevelles, 1998; Richins, 1997). In affective experience, participant 6 felt excited (positive emotion) during her overall shopping experience in her chosen retailer:

“I would feel that I’m very excited during shopping in MCO. The only time we can go out during MCO. I’m enjoying the moment.” (P6) [Affective Experience with Positive Emotion]

In contrast, participant 3 (P3) felt some discomfort during her visit to the retailer during MCO:

“I did feel quite cautious and umm.. there are some discomforts during shopping because you are exposed to the possibility of getting the virus since I don’t get the vaccine yet during that time.” (P3) [Affective Experience with Negative Emotion]

4.1.3 ISCX 3: SOCIAL EXPERIENCE WITH POSITIVE AND NEGATIVE EMOTIONS

For social experience, the participants were asked about their interactions with other people in retailers’ stores, including other customers and staff of the retail shop. Participant 5 (P5) reflects the positive emotion in this experience by having some normal conversations with the retailer’s staff and other customers despite the MCO:

“The interaction with the staff was normal. I have to ask aaa.. Certain of their staff to aaa.. To get to know where is the location of the one [product] that I was looking for. It was a normal interaction between a customer and the staff of the outlet.” (P5) [Social Experience with Positive Emotion]

However, participant 1 (P1) lacked interactions with the retailer’s staff, only to help her find her desired product at the store.

This situation reflects a decrease in communication between a customer and retailer's employees; thus, a negative emotion in social experience.

“Not really having interaction with the store assistant coz I just went to buy my stuff.. unless I have something to ask the assistant where I can find my things that I want to buy.”
(P1) [Social Experience with Negative Emotion]

4.1.4 ISCX 4: PHYSICAL EXPERIENCE WITH POSITIVE AND NEGATIVE EMOTIONS

The study participants were required to explain their level of comfort toward the overall environment of the visited retailers' stores, including preventive measures taken by these shops in the physical experience of this study. Participant 4 (P4) felt comfortable during her overall shopping experience, which reflects the positive emotion of physical experience:

“Umm.. Yes, surprisingly I feel comfortable shopping in the shop during MCO.” (P4) [Physical Experience with Positive Emotion]

On the other hand, participant 7 did not feel comfortable with her shopping experience during MCO because of the retailer's cleanliness and preventive measures:

“Umm.. As we know we need to keep ourselves, we still keep hygiene and keep our safe, sanitise where we touch things, so it's not comfortable during shopping in MCO. In terms of security wise, that make me feel so not comfortable of going out to the retail shop. same as inside the retail shop.” (P7) [Physical Experience with Negative Emotion]

4.2 PREVENTIVE MEASURES (PM) OF MALAYSIAN RETAILERS DURING COVID-19

Preventive measures (PM) codes were collected and analyzed from interview transcripts concerning Malaysian retailers' preventive measures during MCO phases. The frequencies of these codes (PM5 to PM13) are mentioned in Table 4. In contrast to the initial codes in

Table 1, there were two additional preventive measure codes added as new codes (Scan MySejahtera (PM 13) and Gloves (PM12)) found among the interview transcripts. All participants mentioned how the retailers keep the store airflow low and balanced during MCO, which achieved the highest frequency and mentions among the preventive measures, while only one participant (P1) mentioned store payment as the preventive measure she noticed during her visit to the chosen retailer.

TABLE 4
Findings on Preventive Measures (PM) Codes

PM Codes	Quotation Frequency	Sources from Participants
PM11: Store Airflow	19	All participants
PM5: Social Distance	18	P2, P3, P4, P5, P6, P7, P8, P9, P10
PM7: Face Mask	13	P2, P3, P5, P6, P7, P8, P9, P10

TABLE 4 (continued)

PM Codes	Quotation Frequency	Sources from Participants
PM13: Scan MySejahtera	13	P2, P3, P6, P7, P8, P9, P10
PM6: Hand Sanitizers	12	P1, P2, P3, P7, P8, P9, P10
PM9: Temperature	10	P2, P3, P5, P6, P7, P8, P9, P10
PM8: On-Premise Sanitation	4	P1, P7.
PM12: Gloves	4	P3, P4, P7, P8, P9
PM10: Store Payment	1	P1

5. IMPLICATIONS AND LIMITATIONS

5.1 PRACTICAL IMPLICATIONS

The findings of this study offer several practical implications for Malaysian retailers and public health policymakers. First, the affective experience, particularly negative emotional responses such as anxiety,

discomfort, and fear of infection, was the most frequently reported dimension by participants. This indicates that emotional well-being is a crucial factor in customer satisfaction during pandemics. Retailers should therefore go beyond enforcing SOPs and invest in creating emotionally safe environments through clear signage, empathetic staff interactions, and transparent communication about hygiene protocols. Second, the preventive measure most frequently mentioned was store airflow, highlighting its perceived importance in making customers feel physically safe. This suggests that store layout and ventilation design should be prioritized in retail planning during health crises. Policymakers may also consider incorporating customer perception feedback into SOP revisions.

5.2 THEORETICAL IMPLICATIONS

The study supports the relevance of Maslow's Hierarchy of Needs, particularly the role of physiological and safety needs in shaping in-store experiences during a public health crisis. It extends existing ISCX models by embedding them in the pandemic context, showing that emotional and environmental triggers are interconnected. Future research may further explore how Maslow's theory integrates with crisis or health behavior models in retail settings.

5.3 LIMITATIONS

This study is limited in several ways. First, the sample was restricted to 10 Malaysian customers who had in-store shopping experiences during MCO phases. While thematic saturation was reached, the findings may not generalize to different demographics or post-pandemic conditions. Second, the study relied solely on customer perspectives, despite evaluating retailer-initiated preventive measures. Although the customer viewpoint was sufficient for assessing perception and emotional response, incorporating retailers' perspectives could have provided a more holistic understanding. Third, this research employed a purely qualitative design. While appropriate for exploratory purposes, future studies could adopt a mixed-methods approach to quantify the relationship between ISCX dimensions and specific preventive strategies.

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CORPORATE GOVERNANCE AND CREDIT RATING IN MENA REGION

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ABSTRACT

This study attempts to detect the impact of governance mechanisms on the credit rating of MENA region companies. This research uses the Logit model. It is most widely used in failure early warning models. Using a sample of 23 firms in the MENA region rated by the rating agency "Fitch Ratings" during the period 2010-2020, this study found that increasing board size and ownership concentration have positive effects on firm credit rating, while increasing duality, institutional ownership, and managerial ownership have a negative effect. These results offer valuable insights for companies looking to enhance their governance systems and make informed investments in favorable conditions. The findings have significant implications for investors, since incorporating governance mechanisms into the rating process can assist companies in enhancing ratings. Indeed, rating agencies assess corporate governance by focusing on four key elements: ownership structure and influence, rights and relationships with financial stakeholders, financial transparency, and the structure and process of the board of directors. They strongly believe that rating agencies evaluate corporate governance based on four primary factors: ownership structure and influence, rights and relationships with financial stakeholders, transparency and financial structure, as well as the board's procedures. It is their belief that inadequate corporate governance can compromise a company's ability to meet its debt obligations and increase potential losses for its creditors. As capital markets are an important source of financing for emerging markets, the importance of credit rating agencies in providing standardized credit risk assessments for emerging market investments has continued to grow.

JEL Classification: G01, G24

Keywords: Credit rating, Corporate governance

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1. INTRODUCTION

The development of financial markets and credit risk growth necessitates a better understanding of the credit process. Rating agencies adapt their credit rating process by incorporating additional variables that impact a company's capital structure and borrowing decisions. Besides the conventional debt explanatory factors, the unique characteristics of a company and its partners can significantly influence debt exposure. Therefore, studying the relationship between credit ratings and corporate governance mechanisms becomes relevant. In financial analyses, corporate governance is deemed a crucial determinant of company solvency and overall performance. Strong corporate governance practices indicate effective management, transparency, and accountability, which can result in higher credit ratings.

In addition, financial ratings have grown considerably worldwide, as they are a crucial concept for financial market participants in both developing and developed countries. As capital markets are an important source of financing for emerging markets, the importance of credit rating agencies in providing standardized credit risk assessments for emerging market investments has continued to grow. Consequently, corporate governance is now seen as an important determinant of credit ratings.

How do corporate governance mechanisms influence credit ratings?

This study seeks to investigate the impact of corporate governance on the credit rating of a company. Corporate governance is analyzed from the aspects of company structure (Size of the Management board, Duality, and proportion of independent directors in the board), ownership structure (institutional ownership, Managerial property, and Ownership concentration). To structure our analysis, we adopted a framework developed by Fitch's Rating for assessing firms' corporate governance structures and practices. Not all countries have comprehensive corporate governance codes in place. Many countries, however, especially those with developed financial markets, have implemented corporate governance guidelines or codes to improve corporate sector functioning. Code presence and

effectiveness can vary widely from country to country. In an analysis involving credit ratings and corporate governance, it is essential to consider whether the countries included have relevant corporate governance frameworks, as this can impact on the results and conclusions of the study. Lack of strong corporate governance practices can be a red flag for investors and may influence credit ratings.

2. LITERATURE REVIEW

Corporate governance is based on three main theoretical currents.

According to agency theory, corporate governance mechanisms (such as board structures, executive compensation, and oversight mechanisms) are designed to align the interests of executives with those of shareholders and mitigate agency costs. Effective corporate governance practices should reduce information asymmetry, reduce agency costs, and increase firm value. Alkhawaldeh et al. (2021) believe that good corporate governance practices may provide a means of enhancing competitiveness to attain a high credit rating. Bhattacharya and Sharma (2019) show that the governance attributes are designed to increase monitoring of management actions to promote effective decision making, limit opportunistic behavior and reduce the information asymmetry between the firm and its external stakeholders. Elbannan (2009) points out that companies with good governance have better credit ratings.

Resource rights property theory is applicable here as board property is seen as indicating better board governance, and therefore more skills and expertise available to the company. In the credit rating context, companies need access to external capital markets to finance operations and growth. Organizations with strong governance structures and good relationships with external stakeholders, including investors and creditors, are better positioned to achieve favorable credit ratings. These organizations may have more transparent financial reporting, reduced agency costs, and reduced likelihood of default, which are factors that credit rating agencies consider when assessing creditworthiness.

The specific governance variables chosen in the study may be based on the theoretical underpinnings of agency theory and resource dependence theory, as well as the relevant empirical literature. Prior studies found the role of the board of directors crucial in controlling managerial action and in limiting managerial discretionary power over other company stakeholders. Also, the relationship between board size

and credit rating has been well investigated. Agency theory focuses on the relationship between shareholders (principals) and management (agents) in a corporation. It suggests that conflicts of interest occur between these two groups. One of the main ways to mitigate these conflicts is through effective corporate governance mechanisms, including the composition and functioning of the board of directors. A larger board size may bring more diverse perspectives and expertise to the decision-making process, reducing the likelihood of self-interested actions by management.

In this sense, Anderson, Mansi, and Reeb (2004) and Bhojraj and Sengupta (2003) tested the relationship between size, as an efficiency factor of the directors' board, and credit rating. The results of their studies show that a company with a large board of directors size benefits from a better rating and a lower bond yield. Indeed, larger boards might be seen as a mechanism to enhance monitoring and reduce agency conflicts. More diverse perspectives from a larger board could lead to better oversight of managerial decisions.

H1: There is a positive association between the size of directors' board and the credit rating.

Previous studies highlight the need for an independent board of directors. The degree of independence is closely related to the board of directors composition, and more specifically to the proportion of outside directors in the board (Klein, 2000). According to Orozco, Vargas, and Galindo-Dorado (2018), external directors within the board increase the efficiency of its missions. Switzer and Wang (2013) indicate that outside directors are recruited for their skills and independence from management. They are also a source of varied skills in terms of training, professional and organizational experience. Their independence from the management allows them to oppose the most controversial decisions such as fixing of their remuneration and their replacements. Abdullah and Mohd Nasir (2004), however, find that the board independence does not influence the level of accrual management.

Coles et al. (2008) find that the appointment of an independent director has a positive impact on the credit rating (the bond ribs). They argue that the efficiency of the review of ratings assigned to a firm by rating agencies is positively influenced by the number of outside directors.

Then, independent directors play a crucial role in overseeing company management, ensuring that the interests of shareholders and other stakeholders are protected. Credit ratings, on the other hand, provide an assessment of a company's creditworthiness, which is important for investors and creditors.

H2: There is a positive relationship between the proportion of independent directors and the credit rating.

Previous empirical developments dealing with corporate governance highlight the necessity of separating functions between the chairman of the board of directors and the company's general manager, to avoid any concentration of power. Indeed, agency theory proposes that duality (multiple functions) compromises the board's ability to perform its monitoring role in an effective manner and subsequently reduces its independence. This is likely to have negative consequences for the company. This allows us to anticipate that the combination of the Chairman's Board functions and the Chief Executive Officer does not favorably affect the rating given by the rating agencies. The findings of Abdullah, Che A. Halim and Puat Nelson (2014) suggest that having a board of directors with a separate CEO and board chair may also improve financial reporting quality.

H3: Duality has a negative impact on the rating given.

Several researchers have affirmed the importance of institutional ownership within a firm. Indeed, institutional investors can exercise effective control since they can lower the cost of this control. Nguyen (2012), Bhojraj and Sengupta (2003) and Ashbaugh-Skaife, Collins, and Lafond (2006) reveal that a firm whose institutional ownership is large is more likely to have stable performance and better investor protection. In fact, financial and institutional shareholders having significant stake in the capital are more interested in the governance system and exercise their right to vote, to correct the policies of the directors. As a result, the presence of this type of shareholder has a positive influence on credit ratings.

H4: Institutional ownership has a positive impact on credit rating.

Many studies support the idea that managerial property can align the interests of the leaders and the other parties: agency theory

suggests that the divergence of interests can be limited by the increase of the share capital held by the directors. This solution, on the one hand, modifies the arbitration of the managers in favor of maximizing firm value. On the other hand, it makes it possible to reduce the cost of control supported by the shareholders, because it is supposed to reduce the opportunism of the leaders towards them (Louizi and Kammoun, 2016).

Ashbaugh-Skaife et al. (2006) confirm in their work the hypothesis of a positive association between managerial property and credit ratings. They argue that the leader who holds a significant share of the capital is more motivated to work in the company's interest to improve its rating. Indeed, the manager of a company with a high score benefits from overcompensation compared to the leader of a low-rated company.

In other words, managerial property can reduce the tendency of managers to take advantage of their position, expropriate shareholder wealth and engage in decisions that do not maximize firm value. In this case, the rating agencies will give a higher rating to a firm whose managerial property is important.

H5: Managerial property has a positive impact on the credit rating.

The property structure is a variable that has attracted increasing interest from finance researchers and is becoming increasingly important in explaining some aspects of the financial theory of business. It is considered like a control mechanism. Alissa et al. (2013) argue that the ownership concentration of capital in the hands of a small number of shareholders is a source of agency conflicts. Indeed, majority shareholders can influence management to obtain a detrimental benefit to bondholders. The result of their study came to an interesting conclusion that property concentration is attributing to degradation of the rating awarded.

H6: There is a negative association between the concentration of property and the rating given.

3. RESEARCH METHOD

The model analysis defines the determinants of a credit rating is as follows:

$$\begin{aligned} RATE_{it} = & \alpha_0 + \alpha_1 ABS_{it} + \alpha_2 INDB_{it} + \alpha_3 CUMUL_{it} \\ & + \alpha_4 MARPRO_{it} + \alpha_5 OWCON_{it} + \alpha_6 INVI_{it} \\ & + \alpha_7 SIZE_{it} + \alpha_8 APR_{it} + \alpha_9 DEBT_{it} \\ & + \alpha_{10} CAINT_{it} + \alpha_{11} LINB + \varepsilon_{it} \end{aligned}$$

Where:

I represents the company and t the period considered for the estimate.

$\alpha_0, \alpha_1, \dots, \alpha_{11}$: represent the unknown parameters of the equations to be estimated.

Where RATE: Credit rating, divided into eight groups following Ashbaugh-Skaife, where 1 is the lowest rating and 8 is the highest rating (we consider the long-term debt ratings of the international rating agency "Fitch Ratings"), ABS: Number of Directors comprising the Board, INDB: Total External Directors / Total Board Directors, CUMUL: 1: If the executive preside the council, 0: if not, MARPRO: The percentage of capital owned by executive, OWCON: 1: if a majority shareholder holding more than 50% of the capital exists, 0: if not, INVI: The percentage of capital held by institutional investor, SIZE(Size of company): Log (total assets), APR(Asset profitability): Profit before interest and taxes / total assets, DEBT(Level of debt): Total debt/equity, CAINT(Capital-intensive): Total assets/turnover, LINB(Line of business): 1 if the company belongs to a high-tech sector, 0 if not.

4. RESULTS AND DISCUSSION

We have developed an operational framework that will allow us to respond to our problem by providing the most concrete empirical references through the construction of variables and indicators.

Our sample is made up of the 23 MENA companies (Tunisia (4), Algeria (2), Egypt (3), Bahrain (3), Kuwait (4), Morocco (4), Saudi Arabia (3)) rated by the Fitch Ratings agency for the period from 2010 to 2020, thus a panel of 230 observations. We have excluded financial institutions and insurance companies after considering data availability and operational specificity. The company's financial data used in this study comes from the DATASTREAM.

The choice of companies in the MENA region is justified by our prospects for analysis. Indeed, the majority of academic studies

dealing with the effect of governance mechanisms on credit ratings have focused on samples of the US and Korean companies. Our study is to identify the determinants of a credit rating by focusing on the relationship between governance mechanisms and certain factors related to the firm and its operating environment. The ordinal nature of our dependent variable requires us to ensure that the condition of normality is met. In fact, the normality of the distribution of variables can be verified either by the Kolmogorov-Smirnov test or by the Shapiro-Wilk test. For a medium-sized sample (23 companies), the second test is more appropriate. This test depends on the nature (qualitative/quantitative) of the explanatory variables.

The following is a summary table of the normality test of the Shapiro-Wilk quantitative variables.

TABLE 1
Normality Test of Quantitative Variables

Variables	Statistics W	Value of Z	Signification
INDB	0.824	7.844	0.000
ABS	0.997	-2.299	0.989
INVI	0.749	8.677	0.000
MARPRO	0.615	9.663	0.000
SIZE	0.832	7.737	0.000
DEBT	0.975	3.311	0.000
APR	0.924	5.882	0.000
CAINT	0.980	2.775	0.002

This table shows a high significance (p-value 0.05) for all variables except for the ABS variable (size of the board of directors); the null hypothesis of normality is therefore rejected. In this case, the appropriate test is the Spearman or Pearson rank correlation test. Table 2 presents the results of the Spearman rank correlation test.

This table shows that companies with a large board have the highest rating compared to those with a small board. This result confirms a priori the H1 hypothesis and suggests the positive effect of board size on the credit rating.

With regard to the ownership share of institutional investors, we note that companies with low ownership by institutional investors have a better rating than those with high ownership by this type of investor.

With regard to managerial ownership and the independence of Board members, the Spearman test result is insignificant.

TABLE 2
Spearman Rank Correlation Test

Variables	RHO de Spearman	Signification
INDB	-0.102	0.122
ABS	0.363	0.000
INVI	-0.123	0.060
MARPRO	0.016	0.802
SIZE	0.121	0.065
DEBT	0.112	0.088
APR	0.077	0.243
CAINT	-0.078	0.234

Recalling that the Shapiro-Wilk test is used to test the normality of continuous variables, Table 3 refers. From Table 3, we see that the distribution of the RATE variable according to the CUMUL, OWCON and LINB categorical variables does not follow a normal distribution, in which case the appropriate test to use is the Mann-Whitney non-parametric test (rank comparison test). This test is based on the idea that if we mix the two sets of values for a variable from two samples and order it by increasing values, we must obtain a homogeneous mixture. The more homogeneous, the more we are certain that the two series come from the same population.

TABLE 3
Normality Test of Qualitative Variables

Variables	Statistiques W	Valeur de Z	Signification
RATE	0.989	1.363	0.086
CUMUL	0.998	-2.748	0.997
OWCON	0.999	-5.387	1.000
LINB	0.988	1.875	0.072

Table 4 summarizes the results of Mann-Whitney's non-parametric comparison tests on continuous variables.

The non-parametric test shows that the scores vary significantly according to the CUMUL variable ($\text{Prob} > |z| = 0.0002$). Indeed, this result shows that companies headed by a person combining the functions of general manager and board chair benefit from a higher rating than those headed by a person who does not perform the function of board chair. This result, contrary to what was

expected in H3, shows the positive effect of the accumulation of functions on credit ratings.

TABLE 4
Rank Comparison Test for Continuous Variables

Variables	Value of Z	Signification
CUMUL	3.773	0.000
OWCON	-0.557	0.577
LINB	3.288	0.001

Descriptive statistics for the variables included in the study are presented in Table 5.

TABLE 5
Descriptive Statistics

Variables	Mean	Median	S. D	5%	95%
RATE	3.59	3.00	1.40	3.00	5.00
INDB	9.74	8.00	3.50	4.00	15.00
CUMUL	0.16	0.00	0.37	0.00	1.00
ABS	8.54	7.98	1.30	5.54	10.65
INVI	60.00	44.50	70.67	1.00	157.00
OWCON	0.50	1.00	0.55	0.00	1.00
MARPRO	50.44	39.77	60.44	2.00	98.00
SIZE	7.98	7.67	1.34	5.76	10.65
DEBT	7.94	4.52	7.65	0.59	28.75
APR	0.81	0.69	0.45	0.23	1.43
CAINT	0.14	0.13	0.80	0.02	0.39
LINB	0.54	1.00	0.65	1.00	0.00

Before starting the multivariate analysis, we want to check the possible multicollinearity between the independent variables of our model. Multicollinearity is likely to alter the estimates of the variance of the coefficients in our regression. To do this, we develop the correlation matrix.

TABLE 6
Pearson Correlation Matrix

	RATE	INDB	ABS	INVI	MARPRO	SIZE	DEBT	APR	CAINT
RATE	1								
INDB	-0.131**	1							
ABS	0.344	0.135**	1						
INVI	-0.259**	0.183**	-0.007	1					
MARPRO	-0.058	0.037	-0.008	-0.179**	1				
SIZE	0.005	0.188**	-0.034	-0.006	0.013	1			
DEBT	0.027	0.011	-0.038	-0.001	0.018	0.042	1		
APR	0.063	-0.002	0.042	0.074	0.345*	0.313**	-0.276**	1	
CAINT	-0.003	0.150**	-0.054	0.090*	0.093*	-0.112*	0.077	-0.018	1

Notes: *, ** indicate the correlation is significant at the level 0.05 and level 0.01, respectively.

Examination of the Pearson correlation matrix reveals no extremely high level of correlation between the independent variables. In fact, all correlation coefficients between these variables do not exceed the limit value from which we can assume the presence of a serious multicollinearity problem, namely 0.8 (Kennedy, 2003).

Before presenting the results of the model linking governance mechanisms and credit rating, however, it is advisable to validate the hypothesis that there is no correlation between the explanatory variables. Since the functional form of category-dependent variable models does not allow the use of the VIF test, we use the Farrar and Glauber test (1967).

This test is established in two steps. The first is to determine the matrix R of correlation coefficients between the explanatory variables. When the determinant of this matrix tends toward zero, the risk of correlation is high. If their determinant is equal to one, the matrix is called orthogonal, which reflects the absence of correlation between the explanatory variables.

The second step is based on the Chi-square test, based on the following two assumptions:

H0: The orthogonality of the explanatory variables

H1: The dependence of explanatory variables

The Farrar and Glauber test statistics are calculated as follows:

$$\chi^2 = -[n-1-1/6(2K+5)] \ln|R|$$

Where R is the determinant of the correlation coefficient matrix, n is the sample size and K is the number of explanatory variables.

It is the chi-square distribution with degrees of freedom (v):
 $v = 1/2k(k-1)$.

If the determined value is greater than the tabulated critical value, the orthogonality hypothesis of the variables is rejected. On the other hand, if the calculated value is lower than the critical value, the orthogonality hypothesis of the variables is accepted and therefore the multicollinearity problem is not significant.

TABLE 7
The result of Farrar and Glauber's test

Farrar and Glauber	χ^2 emp
Model	14.15

The result of this test shows that the Chi-square value determined is much lower than the tabulated value (with a degree of freedom of 55 at the statistical threshold of 5%). This confirms that there is no multicollinearity problem.

It should be recalled that the objective of our multivariate analysis is to develop an empirical model for determining the factors that may explain credit rating.

To achieve this objective, we use a Logit model since it is the most widely used in early warning failure models and thus as part of our rating prediction work, which is one of several indicators of both corporate strength and failure.

The principle of the Logit method is to link the probability of responding to one of the modalities of the variable to be explained according to explanatory variables. The analytical expression of the models is as follows:

$$\text{Log} [p(y=j | x_i) / p(y=1 | x_i)] = \beta_j + \alpha_j X_i$$

In ordered logistic regression model, a reference modality must be selected, the estimated coefficients will be interpreted according to this reference modality. The probability of choosing modality "j" considering that the reference modality is modality 1 is therefore:

$$P(y=j | x_i) = \frac{\exp(\beta_j + \alpha_j X_i)}{[1 + \sum_{k=2}^J \exp(\beta_k + \alpha_k X_i)]}$$

For modality 1, we have: $P(y=1 | x_i) = 1 / [1 + \sum_{k=2}^J \exp(\beta_k + \alpha_k X_i)]$

We can thus obtain the log-likelihood of the sample:

$$l(\beta, \alpha) = \sum_{i=1}^n y_i \log(p(x_i)).$$

To estimate the coefficients of the linear function (α), we try to maximize the likelihood function.

The maximum likelihood method makes it possible to estimate the coefficients of the parameters α , which represent the weighting of the explanatory variables X having a considerable effect on credit ratings.

TABLE 8
Result of the Logistic Regression

Variables	Coefficient	Z-Statistic	Signification
ABS	0.528	6.37	0.000***
INDB	0.299	0.51	0.609
CUMUL	-1.166	-3.57	0.000***
INVI	-4.868	-4.88	0.000***
MARPRO	-4.533	-2.63	0.009***
OWCON	0.585	1.87	0.061*
SIZE	0.630	4.21	0.000***
APR	1.725	0.79	0.430
DEBT	-0.322	0.42	0.000***
CAINT	0.514	1.44	0.149
LINB	-1.491	-4.04	0.000***

Notes: *, **, *** indicate the level of significance coefficient at 10%, 5%, and 1%, respectively.

Regarding the INDB variable, the estimate of our regression model includes the proportion of independent directors present on the board, which shows that this variable has no significant effect on this rating. This result is not in line with the assumption we have made. The insignificance of these variable results from the difficulty experienced by this type of administrator in adapting to the institutional and economic environment.

According to Fitch Rating's report (2009), the presence of an independent director reduces credit risk. Nevertheless, the role played by these directors seems weak and limited due to the high ownership concentration.

In 2011, the Central Bank of Tunisia, aware of the weakness of governance and to strengthen the independence of the boards of directors, published a circular emphasizing the efficiency of the board's mission.

The positive sign of the coefficient attached to the board of directors size is in line with that anticipated. This finding is aligned with the conclusions of the work carried out (Anderson et al., 2004). A large board size allows for better control, preservation and balancing of varied stakeholder interests. From this perspective, as the Board size increases, the skills, experience and expertise of its members will increase. An expanded Board of Directors brings a variety of experience and knowledge to the Board. As a result, large board size ensures control over management and encourages effective strategic decision-making to improve the company's rating. This result is consistent with that of Anderson et al. (2004) and Tariggan and Fitriany (2017), who show that a company with a large board size benefits from a higher rating.

Duality or accumulation of functions concentrates information and decision-making power in the hands of a single individual who is the leader. In this case, the decision and control functions are combined. This association has a negative and significant impact on credit ratings. The H3 hypothesis attesting to the negative effect of the accumulation of functions on scores is therefore confirmed.

As a result, it is preferable for a company to opt for separation of the functions of Chairman of the Board and Chief Executive Officer to avoid a considerable concentration of power and to limit the discretion of officers. This option prevents managers from having the opportunity to hide the real solvency of the company. As a result, rating agencies do not perceive as desirable the combined functions of Chairman of the Board of Directors and Chief Executive Officer.

We can deduce that the Chairman of the Board of Directors, while also being the President and Chief Executive Officer, has an impact on the credit policy and, therefore, on the credit rating.

Inconsistency however exists in results between Table 8 and Table 4. This could entail conducting further analyses, exploring potential moderators, or conducting qualitative research to gain insights into the contradictory findings.

Analysis of the effect of the ownership structure on the rating shows that, contrary to what has been expected (H4), the participation of institutional investors in the company's capital has a negative and

significant effect (1%) on the credit rating. Institutional investors only aim for short-term performance and force managers to adopt strategies that meet their expectations. According to this argument, they are less able to exercise effective control. As a result, the credit rating is poor in companies with significant institutional ownership.

The same result is obtained by using the percentage of capital held by managers as a measure of managerial ownership. Rating agencies give a lower rating to a firm when its managers are owners. The ownership of managers is a source of significant agency costs and is likely to accentuate problems of managerial opportunism. Executives tend to maximize their personal utility rather than shareholder wealth. From these considerations, credit ratings may not be guaranteed as a result of opportunistic behavior by executives.

This result is consistent with that of Ashbaugh-Skaife et al. (2006), who confirm in their work the hypothesis of a positive association between managerial ownership and credit rating. They claim that the manager who holds a significant share of the capital has a greater incentive to work in the company's interest to improve its rating. Indeed, the manager of a company with a high rating benefit from overcompensation compared to the manager of a company with a low rating.

Concerning the OWCON variable, observation of the table shows that this variable has a positive and significant effect on the rating. This result confirms the H6 hypothesis that ownership concentration has a positive moderating effect on credit ratings

Such a result indicates that ownership concentration is a factor that favors shareholder control over the management of executives. A well-balanced ownership structure that ensures protection of minority shareholder rights, fosters transparency, and promotes good governance practices is more likely to positively influence a company's credit rating.

As for the control variables, the regression result shows that, as expected, the relationship between company size and rating is significantly positive (at the 1% level). We can conclude that large companies reflect better operating performance. They are looking for more diversified product lines and more varied income sources with a lower default rate; Therefore, a better rating.

Debt has a negative impact on credit ratings. In this context, when the level of debt is higher, more companies are exposed to default risk. Consequently, debt seems to be a signal to the market of the company's quality. Poor quality borrowers cannot report themselves by increasing their debts, otherwise they risk their

businesses and going bankrupt. Rating agencies are uncertain about the quality of the company.

As for the sector of activity, the coefficient associated with this variable is negative and statistically significant at the 1% threshold.

5. CONCLUSION

This study aimed at verifying the impact of governance attributes on company credit ratings. The study covered 23 companies in the MENA region that received ratings from Fitch Ratings over the period 2010-2020.

Under agency theory, shareholders/managers do not have the same interests as creditors. Shareholders are encouraged to invest in risky projects. Creditors are rather at risk since they only receive a fixed remuneration for their deposits. Jensen and Meckling (1976) show that the increased risk only benefits shareholders at the expense of creditors. In the event of a gain, only shareholders benefit from the increase in asset value. While in the event of failure, the limited liability of shareholders limits their losses and the costs will be borne by all creditors. From the moment they entrust their money, depositors will be required to control and monitor the evolution of the ratings given to the issuing entity in order to assess the risk. The evolution of ratings is therefore a matter for corporate governance mechanisms.

Thus, we propose to test empirically, in the context of MENA companies, the effect of ownership structure and the board of directors on credit rating. To achieve this objective, we used a binomial logistics model. The relevance of using this type of model is the ordinal nature of our dependent variable.

Our results show that certain governance mechanisms, namely: size of the board of directors, the combination of functions, the ownership structure and certain external factors such as the size of the company and its level of debt, can impact on the ratings given by the rating agency.

Political stability and effective governance are crucial factors in determining a country's creditworthiness. A stable political environment, strong institutions and the rule of law contribute to investor confidence and can lead to higher credit ratings. Conversely, political instability, corruption and poor governance can have a negative impact on a country's solvency.

MENA governments that pursue prudent economic policies, prioritize transparency and accountability, have faced various

geopolitical challenges, and the majority that have diverse governance structures, economic conditions, and political dynamics, are more likely to benefit from favorable credit ratings.

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THE IMPACT OF SUSTAINABILITY AND CYBER SECURITY POLICIES ON FIRM PERFORMANCE: EVIDENCE FROM ASEAN LISTED COMPANIES

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ABSTRACT

This paper explores firm performance evaluation, expanding beyond traditional return on assets to include Tobin's Q. Sustainability and cybersecurity policies are identified as crucial factors influencing corporate success. The study analyzes 206 publicly listed companies in Malaysia, Thailand, and Singapore within the ASEAN region, using data from Refinitiv Eikon and multiple regression techniques. The results reveal a significant impact of sustainability and cybersecurity policies on firm performance as measured by Tobin's Q. The findings support the theoretical frameworks of agency cost and stakeholder theories. Future research should consider broadening the study's scope to include additional datasets from other ASEAN-listed companies to enhance the understanding of the relationship between policies and firm performance.

JEL Classification: M40, M42

Keywords: Sustainability, Cyber security, ASEAN, Firm performance, Tobin's Q

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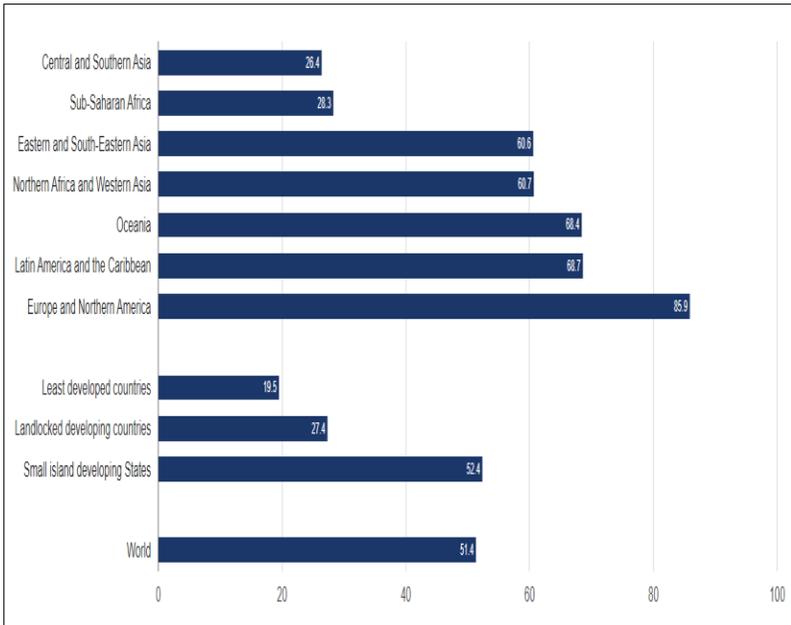
1. INTRODUCTION

In today's digitalized business environment, artificial intelligence (AI) tools play a crucial role in enhancing operations and corporate reputation for publicly listed companies. The use of internet and cyber technologies has significantly enriched societal knowledge (Mishra et al., 2022a). Malaysia has experienced substantial economic growth since gaining independence, transitioning from agriculture to an industrial-driven economy, notably through projects such as the Multimedia Super Corridor promoting information technology (Ahmad, 2013). Similarly, Singapore's recent amendment to the Cybersecurity Act aims at strengthening critical information infrastructure resilience (FTI, 2024). In the realm of firm performance, sustainability practices and cybersecurity policies are pivotal and kept emerging (Atkins et al., 2023). In fact, the literature emphasizes their impact on financial performance, stock market behavior, and stakeholder trust across various industries and company sizes (Hassan et al., 2020; Frizzo-Barker et al., 2020; Wang, Han, and Beynon-Davies, 2019; Cantele and Zardini, 2018), prompting further exploration. This study focuses on ASEAN-listed companies to elucidate how these factors influence financial outcomes, stock market performance, and stakeholder trust in this regional context.

The United Nations Sustainable Development Goal (SDG) 17 emphasizes global partnerships for shared objectives (SDG, 2019). The COVID-19 pandemic accelerated digitalization, raising cybersecurity concerns with increased internet usage, particularly in Europe and Northern America (Mishra et al., 2022a; Chang et al., 2020). Simultaneously, global sustainability efforts surged, prompting companies to adopt ESG policies and transparent reporting (Atkins et al., 2023; Fahad and Busru, 2021). The ESG Score introduced by Refinitiv Eikon in 2021 aids in evaluating corporate sustainability (Khunkaew, Wichianrak, and Suttipun, 2023). The growing threat of cyber-attacks necessitates robust cybersecurity measures, prompting evolving regulatory frameworks for data protection, especially in Malaysia. This study investigates cybersecurity policies among

publicly listed Malaysian companies using the Refinitiv Eikon database.

FIGURE 1
Frequency using the Internet (Source: SDG, 2019)



Challenges with ESG metrics impacting firm performance have been highlighted, particularly in IT sectors (Egorova, Grishunin, and Karminsky, 2022). Further research is needed in non-IT sectors to understand the adoption of sustainability practices and their implications for financial performance and stakeholder relations. Broader studies are required to generalize findings across countries and sectors, as shown by Wu et al. (2022) with Chinese manufacturing firms. Establishing governance for AI to align with ethical principles is crucial (Minkkinen, Niukkanen, and Mäntymäki, 2024; Brusseau, 2023). Integrating AI into ESG assessments could enhance social welfare and human capital but require standardized metrics and addressing knowledge gaps (Dwivedi et al., 2021).

Our research examines the impact of security and sustainability policies on firm performance in Malaysia, Thailand, and Singapore. Building on Wu et al. (2022) and Minkkinen et al. (2024),

we analyze sustainability metrics and cybersecurity policies using Refinitiv Eikon data. We also explore AI's role in enhancing firm performance and hypothesize that these policies significantly affect Tobin's Q. Our study aims at informing academics and policymakers about factors influencing firm performance, emphasizing cybersecurity measures based on the ASEAN Cyber Threat Assessment 2020 (ASEAN, 2023).

2. LITERATURE REVIEW

2.1 SUSTAINABILITY AND FIRM PERFORMANCE

Demand for strong ESG scores has influenced corporate strategies in the ASEAN region (Egorova et al., 2022). Pre-COVID-19, firms enhanced sustainability metrics to boost reputations (ASEAN, 2023). Low sustainability ratings deter investors and harm financial performance (Halabi and Samy, 2009; Zhicheng et al., 2016). Investors now fund improved sustainability reporting, expecting long-term gains (Shaikh, 2022; Fatemi, Glaum, and Kaiser, 2018).

This study examines the direct relationship between sustainability and firm performance, using Tobin's Q as the indicator (Bissoondoyal-Bheenick, Brooks and Do, 2023; Bose and Luo, 2014; Bharadwaj, Bharadwaj, and Konsynski, 1999). Inspired by Galbreath (2006), we find sustainability positively impacts firm performance in Malaysia, Thailand, and Singapore, informing future research on this robust link. Moreover, scientific literature and business practice agree that appropriate sustainability indicators can enhance firm value by improving performance (FTI, 2024; Shaikh, 2022). This study investigates the relationship between sustainability metrics and firm performance for companies listed in Malaysia, Thailand, and Singapore (ASEAN, 2023). Using a broad dataset from Refinitiv Eikon, including the ESG Combined Score and ESG Controversies overlay (Saini et al., 2023; Bendig et al., 2023), we provide a comprehensive understanding of how sustainability metrics impact firm performance.

2.2 CYBER SECURITY POLICY AND FIRM PERFORMANCE

Minkkinen et al. (2024) explore AI's impact on sustainability and ESG investment analysis, highlighting its importance for investor decisions. This study compares these insights with the ongoing

debates about AI effect on firm reputation. Our research focuses on cybersecurity policies, examining firms' willingness to invest in or neglect cybersecurity controls. We believe companies in Malaysia, Thailand, and Singapore have enhanced IT skills and adopted AI technologies (ASEAN, 2023), necessitating robust cybersecurity policies to manage knowledge asymmetries and cyber risks (Yadegaridehkordi et al., 2020).

Mishra et al. (2022a) identify AI cybersecurity threats from cloud computing, online banking, e-commerce, identity theft, privacy breaches, and the smart grid. Effective policies should manage these areas. Cybersecurity is a critical concern for academia and policymakers, impacting citizens, professionals, and company stability. In the ASEAN region, internet connectivity has advanced, increasing cyber threats to users, government agencies, businesses, and non-profits (Khan et al., 2023; Bissoondoyal-Bheenick et al., 2023)

This research aims at examining the interplay between AI, cyber security policies, and firm performance in the ASEAN region, focusing on companies listed in Malaysia, Thailand, and Singapore. By examining the proactive measures taken by these firms to enhance their IT capabilities and adopt AI technologies, we underscore the critical importance of implementing robust cyber security protocols to safeguard against cyber risks and ensure sustainable firm performance.

2.3 HYPOTHESIS DEVELOPMENT

This research investigates the relationship between sustainability practices and firm performance, hypothesizing that companies integrating sustainability initiatives will achieve improved financial, environmental, and social outcomes (Mishra et al., 2022b). It also explores how well-developed cyber security policies impact financial, operational, and reputational performance compared to weaker measures.

The study evaluates the adoption of environmentally sustainable practices among companies in Malaysia, Thailand, and Singapore, and considers policy implications. It suggests governments promote sustainability among publicly listed firms. Previous literature, such as Khan et al. (2022), highlights how sustainability metrics such as ESG Scores influence stakeholder preferences and

firm performance. Despite evolving understanding, unresolved issues in ESG scores may reflect diverse stakeholder views (Boulhaga et al., 2022; Wu et al., 2022; Kang et al., 2022; Linnenluecke, 2022).

This research analyzes the composite ESG score, including total ESG Score, ESG Combined Score, and individual pillar scores, following past literature (Bendig et al., 2023; Bătae, Dragomir, and Feleagă, 2021). It includes a comparative analysis across ASEAN regions to explore regional variations in sustainability's impact on firm performance. Building on Masocha's (2018) work in South Africa, this study extends to diverse countries for a broader understanding. It examines both short-term and long-term consequences of sustainability practices (Kang et al., 2022; Masocha, 2018), hypothesizing a positive relationship with firm performance in Malaysia, Thailand, and Singapore.

H1: A positive relationship exists between sustainability and firm performance in firms with cyber policies among Malaysia, Thailand, and Singapore listed companies.

H1_a: A positive relationship exists between environmental pillar and firm performance in firms with cyber policies among Malaysia, Thailand, and Singapore listed companies.

H1_b: A positive relationship exists between social pillar and firm performance in firms with cyber policies among Malaysia, Thailand, and Singapore listed companies.

H1_c: A positive relationship exists between governance pillar and firm performance in firms with cyber policies among Malaysia, Thailand, and Singapore listed companies.

Previous research by Bowman and Steelman (2019) and Kang et al. (2022) has explored Information Security technology and firm performance. Building on Kang et al. (2022), who linked cyber security policies and intellectual property to market capitalization and ROI in US listed firms, we investigate this connection among companies in Malaysia, Thailand, and Singapore to challenge ASEAN's (2023) findings.

From a managerial perspective, differences in how customers and investors value a firm's InfoSec patents, copyrights, and Intellectual Property portfolios are notable. Future studies may benefit

from collecting additional data from diverse patent sources and security policy documents (Ahmad, 2013). Rapid digitalization underscores the need for AI tools to assess organizational performance, particularly in non-financial areas such as ESG, yet debate on mainstream AI use for investor protection remains limited (Brusseau, 2023; Minkkinen et al., 2024; Dwivedi et al., 2021). Our study aims at addressing these gaps.

Hovav, Gnizy, and Han (2023) explore knowledge management's strategic role, highlighting gaps in understanding recent cyber regulations' impact on knowledge management effectiveness (Hongming et al., 2020). Their findings diverge, revealing unexpected outcomes on external knowledge sharing and organizational performance, amidst industry emphasis on modern knowledge management's strategic advantages and privacy concerns. The researchers collected data from firms via an online survey through a professional panel company. Exploring secondary data sources such as the Refinitiv Eikon database could enhance understanding of these findings. Based on mixed results, companies prioritizing cyber security policies are anticipated to outperform peers across various performance dimensions. The compilation of the previous articles on this study is reported in Table 1. Based on the above explanation, we propose the following hypothesis:

H2: There is a positive relationship between cyber security policies and firm performance among Malaysia, Thailand, and Singapore listed companies.

TABLE 1
Literature Matrix Review

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
1	Khan, I., Jia, M., Lei, X., Niu, R., Khan, J., and Tong, Z.	2023	Total Quality Management and Business Excellence	Corporate social responsibility and firm performance	China	firm performance	Corporate social responsibility, firm size and CEO salary	Results show that the silent donations of firms positively influence their performance.	This study advances our understanding of how and under what conditions non-SOEs make silent charitable donations and enhance their performance by highlighting the important role of these donations, thereby contributing to the literature on corporate social responsibility and silent charitable donations.
2	Bissoondoyal -Bheenick, E., Brooks, R. and Do, H. X.	2023	Economic Modelling	ESG and firm performance: The role of size and media channels	G20 Countries	Firm Performance (Tobin's Q)	ESG (Environmental Score, Social Score, and Governance Score) Moderating Variables: Role of the Size and Media Channels	The firm size channel suggests that larger firms tend to invest into the ESG activities due to economies of scale to better reflect stakeholders' demands. Meanwhile, under the media channel, firms with better media coverage can reduce information	The results deliver important implications to policy makers and firms' stakeholders, including investors and firm managers, regarding investment in ESG and portfolio management. Investment in ESG can improve firm value through creating value for a firm's stakeholders

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
								asymmetry regarding ESG investments for their stakeholders. As a result, firms can avoid various costs following the stakeholder theory view (e.g., stakeholders' punishment costs), and hence, have better performance.	in general rather than focusing on maximizing the shareholders' value alone. Moreover, engaging in ESG commitments can help firms reduce ESG-associated risks and provide better protection to investors, supporting the portfolio diversification and hedging benefits of ESG.
3	Mishraa, A., Alzoubi, Y.I., Anwar, M.J., and Gill, A.Q.	2022	Computers and Security	Attributes impacting cybersecurity policy development: An evidence from seven nations	USA, EU, Australia, Canada, China, India and Malaysia	Cybersecurity Policies	14 attributes: i. Telecommunication ii. Network iii. Cloud Computing iv. E-Commerce v. Online Banking vi. Smart Grid vii. Consumer Rights viii. Cybercrime	The CS policy should be adaptable, allowing the state to enhance it as technology improves. It is advised that all nations examine the policies of other nations to get inspiration and incorporate topics relevant to their setting. This method can aid in creating a complete and successful policy.	Since cybercrime has the potential to jeopardize national security, it is critical to combat these crimes decisively. To combat cybercrime, there should be well-established policies, as well as the identification of critical CS traits so that a comprehensive policy can be devised.

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
							ix. National Encryption x. Privacy xi. Identity Theft xii. Digital Signature xiii. Data Security xiv. Spam	Also, the growing information-sharing mechanism under the cyber protection act should promote communication between all governmental and private sectors. In terms of digital signatures, any government must embrace this technology in order to protect digital material. Improved technology and legislation that encourages consumers to provide their identities, increasing meetings between decision-makers and service providers;	A variety of stakeholders contribute to the development of CS policy, but the government is the driving force behind the policy's creation and modification.

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
								<p>society leaders lead to more worldwide appropriate privacy rules are all needed to combat identity theft.</p> <p>Network security laws have to be improved in several nations, such as the EU, India, and Canada, where IoT security rules fail to collect private data securely. With the growing number of international data protection rules, including a policy that allows service providers to offer sufficient security for users and simply data encryption can be effective solutions.</p>	

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
								The publication of data privacy and consumer rights is a major concern, particularly in the social media space; as a result, a new strategy that protects consumer rights and privacy is an effective solution.	
4	Shaikh, I.	2022	Journal of Business Economics and Management	Environmental , Social, And Governance (ESG) Practice And Firm Performance: An International Evidence	Australia, Brazil, Canada, China, Europe, France, Germany, India, Indonesia, Italy, Japan, Mexico, South Africa, South Korea, Taiwan, UK, USA	Firm's Financial Performance (measured by Returns on Assets (ROA), Returns on Equity (ROE), and Tobin's-Q)	ESG compliance	The descriptive and inductive statistical analysis shows that ESG compliance is more pronounced in European companies. Simultaneously, Asian firms are more disciplined concerning the energy sector, and the Asia-Pacific counterpart is more inclined toward technology firms.	Policy implication/ practical recommendations: (i) Firms must ensure higher GRI compliance by introducing Industry-leading practices like independent committees

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
								<p>The study shows that Global Reporting Initiative (GRI) and non-GRI companies differ significantly in their accounting performance (ROA and ROE) and market valuations (Tobin's-Q).</p> <p>The environmental dimension appears intimidating across accounting and market-based firm performance, while the social dimension contributes adversely, and governance positively affects operational efficiency.</p>	<p>(ii) In order to have a swift implementation of sustainability standards; firms can constitute sub-dimension committees broadly covering various aspects of Economic, Environmental, Labour, Human rights, Society and Product responsibility.</p> <p>(iii) The empirical outcome shows that a firm's performance responds positively to the governance aspects; hence board diversity,</p>

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
									Executive compensation, board meetings, and board independence should have enhanced the reporting.
5	Boulhaga, M, Bouri, A, Elamer, A. A. and Ibrahim, B. A.	2022	Corporate Social Responsibility Environmental Management.	Environmental, social and governance ratings and firm performance: The moderating role of internal control quality	France	Firm Performance	ESG Moderating Variable: Internal control weaknesses (ICW)	<p>The results show that both ICW and ESG ratings have a positive and significant influence on firm performance.</p> <p>The results also indicate that ICW negatively and significantly moderates the relationship between ESG ratings and corporate performance.</p>	<p>This study offers theoretical and practical implications to drive policymakers and businesses to assure sustainable development.</p> <p>This study expects that can help managers to strengthen their internal resources, such as the internal control (IC) and ESG ratings to improve a firm's performance.</p>

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
6	Wu, S. Li, X. Du, X., and Li, Z.	2022	Sustainability	The Impact of ESG Performance on Firm Value: The Moderating Role of Ownership Structure	China		ESG Performance Moderating Variable: Ownership Structure	The results show that: 1. ESG performance is important in improving firm value 2. Executive ownership and institutional ownership positively and significantly affect firm value, while ownership concentration and equity balance have no impact and 3. Executive ownership and institutional ownership moderate the link between ESG performance and firm value, whereas the moderating role of ownership concentration and equity balance is insignificant.	The study contributes to the existing literature on ESG and will aid corporations to enhance firm value through improving ESG performance.

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
7	Kang, M., Miller, A., Jang, K. and Kim, H.	2022	Technological Forecasting and Social Change	Firm performance and information security technology intellectual property	USA	Firm Performance	Information Security Technology Intellectual Property (InfoSec IP)	<p>Results suggest that InfoSec IP is positively related to both return on investment and market capitalization.</p> <p>Further, we find that diverse InfoSec IP portfolios strengthen the effects of a firm's InfoSec patents and copyrights on market capitalization.</p>	<p>Several Contributions:</p> <p>1. It is one of the first studies to gauge the contributions of InfoSec IP to firm performance both empirically and objectively (e.g., InfoSec Patent and InfoSec copyrights).</p> <p>2. This study extends the empirical understanding of InfoSec IP using Real Option Theory (ROT).</p> <p>3. Their empirical understanding of InfoSec IP and ROT contributes to the existing knowledge related to InfoSec technology and firm performance, i.e.</p>

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
								their findings suggest that InfoSec Patent, InfoSec Copyrights, and InfoSec Patent Portfolio are positively associated with Market Capitalization and ROI.	
								4. This study has managerial implications. Based on their findings, customers and capital investors differently value a firm's InfoSec Patent, Copyrights, and IP Portfolio.	
								5. The observations of the different interaction effects between InfoSec Patent Portfolio and InfoSec IP Patent and InfoSec	

TABLE 1 (continued)

No.	Authors Name	Year	Journal	Title	Country	DV	IV	Findings	Conclusion
									<p>Copyrights provide additional theoretical and managerial implications.</p> <p>6. This study makes empirical contributions by devising InfoSec Patent Portfolio using a machine learning method based on archival data (USPTO and USCO).</p>

3. METHODOLOGY

3.1 SAMPLE AND DATA COLLECTION

The total population of the study consisted of 246 firms from Malaysia, Singapore and Thailand listed companies. Malaysian listed companies possess a greater volume of data in comparison to their Singaporean counterparts, influenced by geographical considerations. Conversely, Thailand imposes stricter regulations, particularly regarding disclosure of cybersecurity measures. Meanwhile, to determine firm performance, we examined Tobin Q, along with sustainability metrics (indicated by ESG Score and ESG Combined Score) and cyber security policies of the selected countries, using data collected from Refinitiv Eikon database for the year 2022. We categorized the presence of sustainability and cyber security policies within the population, as detailed in Table 2. After filtering the observations by removing firms with incomplete performance data, unclear cyber security policies, and questionable information, the final sample comprised 206 companies listed in Malaysia, Singapore, and Thailand.

TABLE 2
Selected Countries with Policy Cyber Security

	Countries					
	Malaysia		Singapore		Thailand	
Number of Observations	116		10		80	
ESG Score	116		10		80	
ESG Combined Score	116		10		80	
ESG Combined Score	Yes	No	Yes	No	Yes	No
Policy Cyber Security	73	43	5	5	73	7

Furthermore, Table 3 categorizes the cyber security policy status as either No (0) or Yes (1) for firms in various sectors, including Basic Materials, Consumer Discretionary, Consumer Staples, Energy, Health Care, Industrials, Real Estate, Technology, and Utilities, while excluding the financial sector given its stricter financial regulations. Notably, 156 firms reported having a cyber security policy, whereas 50 firms did not. All data were collected from Refinitiv Eikon database with strict filtering and observation. Next, cyber security policies were defined as security documents that outline the rules, expectations, and approaches for organizations to maintain the confidentiality, integrity, and data availability (Mishra et al., 2022b). We selected companies listed in Malaysia, Singapore, and Thailand because these countries are among Asia's fastest-growing economies and have a high rate of Internet subscribers (Statista, 2022).

The Industrials sector had the highest number of observations (63 firms), with 46 implementing cyber security policies. In contrast, the Real Estate and Technology sectors had only two firms and one firm respectively with such policies. Tobin Q,

used to measure company performance (DV), is preferred for its independence from accounting practices and earnings manipulation compared to ROA and ROE (Jubilee, Khong, and Hung, 2018). ESG variables—ESG, ENV, SOC, GOV, and ESG Combined Score—are used to describe how firms deploy resources to influence performance and reputation (Bendig et al., 2023; Bătae et al., 2021). Cyber Policy is measured by a dummy variable (0 = no policy, 1 = policy), detailed in this study. Control variables (CV) include free float ownership and number of analysts, as in prior studies (Güngör and Şeker, 2022; Di Vaio and Varriale, 2020; Jatmiko, 2017; Sila, 2010).

TABLE 3
Policy on Cyber Security

No	Sectors	Policy Cyber Security		Total
		No	Yes	
1	Basic Materials	6	7	13
2	Consumer Discretionary	7	28	35
3	Consumer Staples	14	25	39
4	Energy	4	18	22
5	Health Care	1	12	13
6	Industrials	17	46	63
7	Real Estate	0	2	2
8	Technology	0	1	1
9	Utilities	1	17	18
	Total	50	156	206

TABLE 4
Operational Definitions and Measurement of Variables

Item	Variables name	Acronym	Measurements	Sources	References
DV	Firm performance	TobinQ	Market Value for Company divided by Net Asset Value.	Hand-collect	Brahma et al., (2021); Bharadwaj et al., (1999); Bose and Luo (2014)
IV	ESG Score	ESG	Overall company score based on self-reported information in the environmental, social and corporate governance pillars.	Secondary data	Bătae et al., (2021)

TABLE 4 (continued)

Item	Variables name	Acronym	Measurements	Sources	References
	Environmental Score	ENV	Measures a company's impact on living and non-living natural systems.	Secondary data	Bătae et al., (2021)
	Social Score	SOC	Measures a company's capacity to generate trust and loyalty with its workforce, customers and society.	Secondary data	Bătae et al., (2021)
	Governance Score	GOV	Measures a company's systems and processes.	Secondary data	Bătae et al., (2021)
	ESG Combined Score	ESG Combined	Is an overall company score based on the reported information in the environmental, social and corporate governance pillars with an ESG Controversies overlay.	Secondary data	Bendig et al., (2023)
	Policy Cyber Security	Cyber Policy	one if the company has a policy on cyber security and zero otherwise.	Secondary data	Hasan et al., (2021); El Khoury, Nasrallah, and Harb, (2022)
CV	Free Float ownership	Free Float	Free Float as a percentage of traded shares.	Secondary data	Güngör and Şeker (2022); Di Vaio and Varriale (2020)
	Number of Analysts	Analysts	Number of sell-side analysts covering the security.	Secondary data	Sila (2010)

3.2 ECONOMETRIC MODEL

We construct the econometric model based on firm performance incorporating sustainability and policy on cyber security, and control variables in equation (1) to (5) below. These control variables were recommended by previous researchers because they might influence firm performance. The choice of control variables comprising free float ownership (Free Float) and number of analysts (Analysts) were guided by Di Vaio and Varriale (2022), Güngör and Şeker (2022) and Sila (2010). The econometric model is as shown:

- (1)
$$\text{TobinQ} = \beta_0 + \beta_1 \text{ESG} + \beta_2 \text{Cyber Policy} + \beta_3 \text{Free Float} + \beta_4 \text{Analysts} + \epsilon_j$$
- (2)
$$\text{TobinQ} = \beta_0 + \beta_1 \text{ENV} + \beta_2 \text{Cyber Policy} + \beta_3 \text{Free Float} + \beta_4 \text{Analysts} + \epsilon_j$$
- (3)
$$\text{TobinQ} = \beta_0 + \beta_1 \text{SOC} + \beta_2 \text{Cyber Policy} + \beta_3 \text{Free Float} + \beta_4 \text{Analysts} + \epsilon_j$$
- (4)
$$\text{TobinQ} = \beta_0 + \beta_1 \text{GOV} + \beta_2 \text{Cyber Policy} + \beta_3 \text{Free Float} + \beta_4 \text{Analysts} + \epsilon_j$$
- (5)
$$\text{TobinQ} = \beta_0 + \beta_1 \text{ESG Combined} + \beta_2 \text{Cyber Policy} + \beta_3 \text{Free Float} + \beta_4 \text{Analysts} + \epsilon_j$$

Models 1 to 4 examine how sustainability pillars and cyber security policies relate to firm performance (Tobin Q) in Malaysia, Thailand, and Singapore. Model 5 explores this using ESG Combined as an independent variable (IV). We refrain from predicting the direction of these relationships due to ongoing debate. Sustainability is defined by composite ESG scores and individual scores, including ESG Combined. Panel data's heterogeneity poses econometric challenges, managed using multiple ordinary least squares regression with robust standard errors (Yao et al., 2019; Baltagi, 2008).

4. ANALYSIS AND RESULTS

4.1 DESCRIPTIVE STATISTICS

Table 5 presents descriptive statistics for the variables. Tobin Q, a measure of firm performance, ranges from 18.32 to 28.68 (M = 23.34, SD = 1.85). The Environmental (ENV) score ranges from 0 to 100, averaging 44.20 (SD = 23.67).

The mean Environmental, Social, and Governance (ESG) score is 52.18 (SD = 17.61), with most firms scoring 51.60 (SD = 17.50) on the ESG Combined score. 76% of firms have a cyber security policy (Cyber Policy = 1). Social (SOC) and Governance (GOV) scores average 56.86 and 54.61, respectively. Firms have an average of 7.71 analysts (SD = 5.62) and 40% free float ownership (SD = 0.17). All variables show skewness (-1.21 to 0.75) and kurtosis (0.94 to 0.40).

TABLE 5
Descriptive Statistics

Variables	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
TobinQ	18.32	28.68	23.34	1.85	-0.02	-0.38
ESG	12.21	91.10	52.18	17.61	-0.16	-0.70
ENV	0.00	96.92	44.20	23.67	0.07	-0.79
SOC	8.05	94.97	56.86	20.42	-0.29	-0.72
GOV	9.94	95.58	54.61	20.56	-0.11	-0.94
ESG Combined	12.21	91.10	51.60	17.50	-0.09	-0.68
Cyber Policy	0.00	1.00	0.76	0.43	-1.21	-0.54
Free Float	0.01	0.97	0.40	0.17	0.75	0.40
Analysts	1.00	22.00	7.71	5.62	0.66	-0.76

Note: Refinitiv Eikon dataset. SD indicates standard deviation.

The Pearson correlation coefficients are reported in Table 6. Notably, a high correlation is observed between ESG and ESG Combined scores, with a coefficient of 0.98, followed by ESG and SOC, with a coefficient of 0.903. These high correlations are expected because of the inclusion of experimental variables such as ESG, ENV, SOC, GOV, and ESG Combined scores within the same sustainability category. Therefore, the associations between experimental variables do not significantly affect the overall preliminary analysis. Furthermore, it is observed that, apart from free float, other experimental and control variables exhibit close associations with firm performance, Tobin Q at 0.001 level. This finding underscores the viability of conducting further analysis in this study.

4.2 HYPOTHESIS TESTING

Table 7 presents the multiple regression analysis results. Sustainability metrics (ESG, ENV, GOV, SOC) were analyzed across four models. A relationship was observed between ESG and firm performance (Tobin Q) with a p-value of 0.06. However, no significant relationship was found between cyber security policies and Tobin Q (p-value = 0.13). Additional analyses examined ENV, SOC, and GOV with Cyber Policy and Tobin Q, showing mild relationships (p-values around 0.06). Models 3 and 4 indicated a positive relationship between Cyber Policy and Tobin Q (p-values of 0.09 and 0.03, respectively). Analysis demonstrated a strong positive correlation across all models. Further analysis replaced individual sustainability metrics with ESG Combined, reflecting overall performance based on ESG Score and ESG Controversies overlay.

TABLE 6
Pearson Correlation Matrix

No	Variables	1/VIF	1	2	3	4	5	6	7	8	9
1	TobinQ	0.031	1.000								
2	ESG	0.006	0.393**	1.000							
3	ENV	0.040	0.400**	0.881**	1.000						
4	SOC	0.033	0.349**	0.903**	0.795**	1.000					
5	GOV	0.067	0.158*	0.572**	0.243**	0.281**	1.000				
6	ESG Combined	0.037	0.367**	0.980**	0.864**	0.889**	0.550**	1.000			
7	Cyber Policy	0.747	0.310**	0.451**	0.442**	0.461**	0.140*	0.455**	1.000		
8	Free Float	0.947	0.070	0.090	0.090	0.120	-0.010	0.090	0.040	1.000	
9	Analysts	0.639	0.506**	0.518**	0.545**	0.488**	0.165*	0.480**	0.359**	0.1770*	1.000

TABLE 7
Multiple Regression Analysis

Items	Model 1		Model 2		Model 3		Model 4		Model 5					
	Coeff	p-value	Coeff	p-value	Coeff	p-value								
ESG	0.14	1.92*												
ENV			0.14	1.86*										
SOC					0.09	1.23								
GOV							0.06	1.05						
ESG Combined									0.12	1.69*	0.16	2.37***		
Cyber Policy	0.1	1.54	0.11	1.6	0.12	1.71*	0.14	2.19**	0.11	1.57			0.14	2.29**
Free Float	-0.01	-0.24	-0.01	-0.24	-0.02	-0.3	-0.01	-0.19	-0.02	-0.27	-0.02	0.33	-0.1	-0.23
Analysts	0.4	5.55***	0.39	5.40***	0.42	6.00***	0.45	6.78***	0.41	5.87***	0.43	6.24***	0.45	6.97***
Year	Included													
R2	0.28		0.28		0.28		0.27		0.28		0.28		0.28	
Adj R2	0.27		0.27		0.26		0.26		0.27		0.27		0.26	
Prob > F	20.32		20.23		19.56		19.42		20		25.7		25.2	
Number of observations	206													

Note: Coeff indicates coefficients for the models. ***, **, * Coefficients are significant at the 0.001, 0.01, 0.05 level respectively.

Similar to ESG, there appears to be a strong association between sustainability and firm performance, with a p-value of 0.09. No association is observed, however, between cyber security policy and firm performance. These findings indicate that sustainability does reflect Tobin Q. However, without considering ESG Combined, there appears to be an association between Cyber Policy and Tobin Q, with a p-value of 0.02 and an adjusted R-Square of 26%. To compare, the association between ESG Combined and Tobin Q also shows a positive and strong relationship, with a p-value of 0.01 and an adjusted R-Square of 26%. For all the tests, industry and time fixed effects were included. Clustering errors by the firm were accounted for by re-examining the analysis considering changes in sustainability from ESG to ESG Combined. Specifically, changes in ESG Combined between companies listed in Malaysia, Thailand, and Singapore were examined, resulting in the omission of ESG, ENV, SOC, and GOV as reported in Table 7 to minimize endogenous data collection.

5. DISCUSSION OF FINDINGS

5.1 DISCUSSION ON SUSTAINABILITY AND FIRM PERFORMANCE

This study addresses: How do sustainability and cyber security policies impact firm performance among ASEAN listed companies? It aims at offering insights into sustainability influence on firm performance, the synergy between sustainability and cyber security, and industry-specific variations. The study contributes industry-specific insights for ASEAN-listed firms, highlighting how robust sustainability practices attract investors and enhance corporate value.

Using Tobin's Q as a measure of firm performance aligns with recent literature emphasizing market value precision. Our analysis shows ESG and ENV factors impact firm performance significantly. Multiple regression analyses confirm a positive association between sustainability practices and firm performance in ASEAN-listed companies. From an Islamic perspective, organizational sustainability reflects a form of worship (ibadah), involving the entire organization in its pursuit.

5.2 DISCUSSION ON CYBER SECURITY POLICIES AND FIRM PERFORMANCE

The primary regression analysis, supported by prior research (Fatemi

et al., 2018; Galbreath, 2006), indicates that Malaysia, Thailand, and Singapore represent the ASEAN region well due to their robust stock exchanges and high prevalence of listed companies. The study also highlights the profound impact of sustainability on firm performance, aligned with the UN's 2030 SDGs. It discusses the Network and Information Security 2 Directive's global adoption since 2023 in the EU, prompting further exploration of cyber security policies to safeguard firm performance against data breaches and unauthorized access (Det Norske Veritas, 2023).

Additionally, our study reveals a significant relationship between cyber security policies and firm performance, particularly in data protection and information disclosure. Unlike Kang et al. (2022), which focused on specific attributes, our study examines the complex interaction between cyber security policies and Tobin's Q, considering both demand and supply dynamics.

Following Minkkinen et al. (2024), our study uses a dichotomous scale to support our hypothesis in models 3 and 4 regarding cyber policy. Global escalation of cyber security policies underscores their critical role in firm survival (Paulose and Sethi, 2023; Nakhli, 2022), echoing previous discussions on investor safeguarding. Amidst IR 4.0's digital transformation, enhancing cyber security policies is imperative to protect confidential information (Bissoondoyal-Bheenick et al., 2023), potentially influencing firm performance. Multiple regression analyses confirm a robust positive correlation between cyber security policies and firm performance, aligning with prior research.

6. CONCLUSION, LIMITATION AND FUTURE RESEARCH

This study suggests sustainability and cyber security policies significantly influence firm performance, measured by Tobin's Q, among ASEAN-listed companies, contributing to ASEAN studies and aligning with prior research. Limitations, however, include focusing only on Malaysia, Thailand, and Singapore, potentially missing industry diversity in ASEAN, and a narrow sample of companies with sustainability and cyber security policies. Theoretical frameworks of agency cost and stakeholder theories underpin the study's findings, consistent with global research. Practically, the findings underscore global sustainability debates and advocate for universal cyber security policies to protect investors. Regulatory bodies, such as Malaysia's

Securities Commission, can use the study to enhance data security. This research sets a foundation for future exploration in these crucial areas.

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EVOLUTION OF *SHARĪ'AH* GOVERNANCE PRACTICES IN *SHARĪ'AH* RISK MANAGEMENT FUNCTION FROM THE INSTITUTIONAL THEORY PERSPECTIVE

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ABSTRACT

This research aims at elucidating the evolution of *Sharī'ah* governance practices in a Malaysian *Islāmic* bank by examining the progression toward institutionalization through the lens of Institutional Theory. A qualitative research approach was employed, drawing on existing literature, case studies, and interviews with experts in *Sharī'ah* risk management function. An explanatory case study was done to deeply understand the institutionalization of *Sharī'ah* governance practices due to the evolution of framework and policy from Shariah Governance Framework (SGF) 2010 to the latest Shariah Governance Policy Document (SGPD) 2019. This research delves into the development of *Sharī'ah* governance from SGF 2010 to SGPD 2019, with a particular focus on the institutionalization of the *Sharī'ah* risk management function in an *Islāmic* bank. Analyzing the outcomes through the framework outlined by Burns and Scapens in 2000 within the context of Institutional Theory, the research highlights how this evolution has fortified *Sharī'ah* governance practices over time, indicating a shift toward greater alignment in an *Islāmic* bank with *Sharī'ah* governance. However, a notable limitation persists in ensuring the competency and expertise of *Sharī'ah* officers, particularly in their adaptation to institutional and actionable realms in routinizing the rules. This research paper enriches understanding of institutionalization, emphasizing its pivotal role in fostering trust, providing support, and enabling optimal performance among *Sharī'ah* officers. It highlights the importance of continuous learning and skill development for *Sharī'ah* officers, asserting that competency and expertise can evolve progressively. Consequently, the *Sharī'ah* governance practices in *Islāmic*

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banks have exhibited increased robustness, effectively mitigated *Sharī'ah* non-compliance risks, and demonstrated heightened adherence to *Sharī'ah* governance and compliance.

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1. INTRODUCTION

The evolution of regulated *Sharī'ah* compliance in Malaysia commenced 40 years ago with the enactment of the Islamic Banking Act 1983 (IBA). Malaysia, aspiring to become a global *Islāmic* finance hub, has indeed set a benchmark in the field, particularly in *Sharī'ah* governance. It is now ahead of the world in regulating its *Islāmic* finance industry. The regulatory bodies, notably Bank Negara Malaysia (BNM), have consistently enhanced the framework for *Islāmic* finance since the enforcement of the Islamic Banking Act. BNM's issuance of *Sharī'ah* governance-related guidelines, such as the Shariah Governance Framework (SGF) in 2010 (SGF 2010) and its subsequent revision in 2017, stands as a testament to this commitment. Scholars such as Shafii, Salleh, and Hj Shahwan (2010) emphasize that robust *Sharī'ah* governance is pivotal in establishing the procedures for *Islāmic* products and services offered by Islamic Financial Institutions (IFIs) as it contributes significantly to their financial and economic stability. Malaysia leads the global *Islāmic* finance market, evidenced by its substantial share in the sukuk market, which is approximately 67% globally. The BNM proactive measures through SGF and introduction of the Islamic Financial Services Act (IFSA) in 2013 have further fortified *Sharī'ah* governance practices within IFIs. This step catalyzed the growth of IFIs across the country.

Continuous efforts by BNM were reflected in the issuance of the Shariah Governance Policy Document (SGPD) in September 2019, aimed at enhancing the roles of the board, management, and the *Sharī'ah* committee (SC). Moreover, an increasing number of national and international conferences and programs focusing on *Sharī'ah* governance in IFIs have not only engaged academia but also experts, amplifying societal awareness and understanding in this domain (Mohd Hanefah and Kamaruddin, 2019). Amidst these advancements, however, unresolved concerns and challenges persist in *Sharī'ah*

governance within IFIs, primarily centered around the competence and availability of *Sharī'ah* scholars and practitioners, and the capabilities of IFIs in executing *Sharī'ah* functions (Kamaruddin and Mohd Hanefah, 2017; Shafii, Mohd Ali, and Kasim, 2014). Addressing these issues is crucial as failure to adhere to good *Sharī'ah* governance may jeopardize the *Islāmic* bank operational compliance.

This paper aims at elucidating the evolution of *Sharī'ah* governance practices in a Malaysian *Islāmic* bank within the framework of Institutional Theory, examining the evolution between SGF 2010 and SGPD 2019, with a specific focus on the *Sharī'ah* risk management function. Institutional Theory examines how organizations interact with their environments, respond to societal expectations, and integrate these influences into their practices including rules and routines (Dillard et al., 2004). This study focused on the institutionalization of rules, norms, and behaviors within *Islāmic* banks, recognizing their dynamic nature (Ahmed and Scapens, 2000; Burns and Scapens, 2000; Scapens, 1994). Institutional Theory in this study is aligned with the approach outlined by Karbhari, Alam and Rahman (2020). Their conceptual paper used Institutional Theory to explore institutional development and *Sharī'ah* governance practices in the *Islāmic* banking sector. Analyzing the outcomes through the framework outlined by Burns and Scapens (2000) focused on old institutional economics, this study identified *Sharī'ah* risk management as a key system of rules. Meanwhile, routines are tolerated in existing institutions and institutional norms and values (environment).

The comparative analysis accentuates the strengthening of *Sharī'ah* governance practices, which serves as an isomorphic mechanism for Malaysian *Islāmic* banks to align more rigorously with *Sharī'ah* governance, especially noting the greater institutionalization in SGPD 2019 compared to SGF 2010 in ensuring the legitimacy of Malaysian *Islāmic* banks.

Moving forward, this study will briefly explain the distinction of corporate governance with *Sharī'ah* governance and delve into an overview of *Sharī'ah* governance evolution in Malaysian *Islāmic* banks including the *Sharī'ah* governance practices and *Sharī'ah* risk management function in Section 3, followed by theoretical insights rooted in the Institutional Theory elucidated through Burns and Scapens' framework (2000) in Section 4. Section 5 will detail the research methodology. The analysis and result as well as findings and discussion from the interview with *Sharī'ah* officers in *Sharī'ah* risk

management function are illustrated in Section 6. Section 7 presents the concluding reflections and recommendations for future research.

2. CORPORATE GOVERNANCE AND *SHARĪ'AH* GOVERNANCE

Corporate governance encompasses a set of processes, policies, and laws that influence the governance, direction, management, and control of an organization (Sulaiman, Abd Majid, and Mohd Ariffin, 2015). This framework extends to the governance structure involving key actors in the institutional process. *Sharī'ah* governance, while sharing similarities with corporate governance, is distinct in its unique responsibility for ensuring compliance with *Sharī'ah* principles in all aspects of products, operations, practices, and management within *Islāmic* banks. Grassa and Matoussi (2014) highlight that *Sharī'ah* governance requires IFIs, especially *Islāmic* banks, to conduct their activities exclusively on the basis of *Sharī'ah*, setting it apart from conventional corporate governance. *Sharī'ah* governance, a term employed by researchers to signify the governance system of IFIs, is also known as *Islāmic* corporate governance (Mizushima, 2014; Wilson, 2009).

For the purpose of this research, however, the preferred terminology is *Sharī'ah* governance. Similar to corporate governance, *Sharī'ah* governance is concerned with the objectives of the corporation and its stakeholders. It extends the discourse to delineate how the governance system should operate to ensure *Sharī'ah* compliance within the corporation, addressing gaps in corporate governance theories related to entities offering *Islāmic* products and services. Moreover, *Sharī'ah* governance serves as a system that safeguards all activities and business transactions of *Islāmic* banks from non-permissible features such as *ribā'*, *gharar*, *maysir*, and other similar elements (Venardos, 2010). It acts as a guideline for ensuring the operational practices of *Sharī'ah* officers in *Islāmic* banks are aligned with the *Sharī'ah* compliance mission. Non-compliance with *Sharī'ah* is considered a reputational risk, impacting market and public confidence in credibility of *Islāmic* banking. The significance of *Sharī'ah* compliance in the growth of *Islāmic* banks is stressed by customer preference for *Sharī'ah*-compliant products and services. Ullah and Lee (2012) assert that to achieve better growth, *Islāmic* banks must offer competitive and *Sharī'ah*-compliant products. This aligns with research by Abdullah and Mohd Kassim (2015), which identified *Sharī'ah* compliance as a key factor contributing to *Islāmic* bank growth. Such growth is contingent on the degree of *Sharī'ah*

compliance in offered products and services, and this element as a whole influences customer demand and institutional growth (Khatun, 2013). The establishment of infrastructural institutions supporting the *Islāmic* banks led to the standardization of framework and regulation that enhanced *Islāmic* bank growth in the 2000s (Mat Ghani, 2020)

3. OVERVIEW OF *SHARĪ'AH* GOVERNANCE EVOLUTION IN MALAYSIAN *ISLĀMIC* BANKS

The evolution of *Sharī'ah* governance is seen as a positive development, introducing more stringent regulations, especially concerning *Sharī'ah* compliance in *Islāmic* banks. In the early stages of *Islāmic* banking in Malaysia, matters related to *Sharī'ah* governance were addressed by the BNM guidelines on *Sharī'ah* Committee (BNM/GPS 1), introduced in December 2004. During this period, the *Sharī'ah* Committee played a central role as the primary governance mechanism to ensure *Sharī'ah* compliance in *Islāmic* banks. Recognizing the need for comprehensive *Sharī'ah* compliance, BNM subsequently introduced the Shariah Governance Framework in 2010, effective from January 1, 2011. SGF 2010 significantly enhanced the roles and functions of *Sharī'ah* control, including *Sharī'ah* review, *Sharī'ah* audit, *Sharī'ah* risk management, and *Sharī'ah* research functions. It introduced a systematic approach for *Islāmic* banks to manage *Sharī'ah* non-compliance risks and ensure continuous operations and activities of *Islāmic* banks.

Introduction of the Islamic Financial Services Act 2013 (IFSA 2013) by BNM further solidified *Sharī'ah* governance practices by making them mandatory for *Islāmic* banks (Muneeza, 2014). IFSA 2013 upheld the SGF 2010 and other guidelines, giving them statutory force. The act emphasized the importance of compliance with internal policies and procedures to implement specified BNM standards, with severe statutory punishments for non-compliance.

A subsequent development in Malaysian *Sharī'ah* governance occurred in 2019 with the issuance of the Shariah Governance Policy Document (SGPD) to replace the 2010 version. SGPD 2019 introduced additional obligations and enforcement actions for non-compliance, emphasizing transparency and disclosure. It refined the *Sharī'ah* control functions to focus solely on *Sharī'ah* compliance, excluding *Sharī'ah* risk management and *Sharī'ah* research. Notably, both SGF 2010 and SGPD 2019 included a distinct section on transparency and disclosure to provide detailed guidelines for forming opinions in the *Sharī'ah* Committee.

The evolution of *Sharī'ah* governance between 2004 and 2019 reflects a continuous effort to strengthen *Islāmic* bank regulations and address *Islāmic* banking sector complexities. This evolution has been driven by recommendations from *Sharī'ah* scholars, responding to unresolved *Sharī'ah* governance issues. The emphasis on a *Sharī'ah* compliance culture and penalties for non-compliance has prompted *Islāmic* banks to adapt their activities, contributing to the ongoing evolution of *Sharī'ah* governance. Table 1 summarizes the key milestones in the evolution of *Sharī'ah* governance in Malaysian *Islāmic* banks.

3.1 SHARĪ'AH GOVERNANCE PRACTICES IN MALAYSIAN ISLĀMIC BANKS

The evolution of *Sharī'ah* governance practices has witnessed substantial enhancements following the enforcement of key regulatory frameworks such as SGF 2010, IFSA 2013, and SGPD 2019. These developments have been prompted by a combination of challenges and ongoing institutional structure refinement of reporting lines, disclosure mechanisms, as well as accountability and responsibility frameworks. Notably, these regulatory milestones have played a pivotal role in reshaping the *Sharī'ah* governance landscape within *Islāmic* banking institutions.

Shafii et al. (2014) asserted that expansion of *Sharī'ah* Committee roles and responsibilities, coupled with the integration of *Sharī'ah* control functions, has brought significant value to *Islāmic* bank operational dynamics. This positive impact on operations has been particularly pronounced in the decade since the issuance of SGF 2010. The comprehensive *Sharī'ah* control functions, as stipulated in SGPD 2019, include the *Sharī'ah* review (compliance) function, *Sharī'ah* risk management function, and *Sharī'ah* audit function, all of which continue to play integral roles in ensuring *Sharī'ah* compliance.

One noteworthy adjustment introduced by SGPD 2019 is the consolidation of the *Sharī'ah* research function under the umbrella of the *Sharī'ah* Division. This restructuring aims at streamlining and enhancing the efficiency of *Sharī'ah* governance practices. Consequently, the *Sharī'ah* Division has assumed the role of the secretariat for the *Sharī'ah* Committee, focusing on elevating the quality of decisions and advice provided by the committee. This strategic move underlines a deliberate effort to refine the governance structure and maximize effectiveness of *Sharī'ah* oversight.

TABLE 1
Summary of the *Sharī'ah* Governance Evolution

GPS 1/ 2004	SGF 2010	IFSA 2013	SGPD 2019
<ul style="list-style-type: none"> ▪ To set the rules, regulations, and procedures in forming a <i>Sharī'ah</i> Committee. ▪ To define the <i>Sharī'ah</i> Committee roles, scope of work, and responsibilities. 	<ul style="list-style-type: none"> ▪ To structure a framework that provides <i>Sharī'ah</i> governance structures, processes, and arrangements to ensure that all its operations and business activities align with <i>Sharī'ah</i> principles. ▪ To provide the board, <i>Sharī'ah</i> Committee, and the management with a comprehensive guideline to discharge its duties in <i>Sharī'ah</i> - related matters. 	<ul style="list-style-type: none"> ▪ Effective establishment of <i>Sharī'ah</i> Committee based on qualification, appointment, duties, cessation, and information. ▪ Appointment of a person by institution to conduct audit on <i>Sharī'ah</i> compliance. ▪ Appointment of a person by the bank to conduct an audit on <i>Sharī'ah</i> compliance. 	<ul style="list-style-type: none"> ▪ More active roles and guidelines are expected of the board, <i>Sharī'ah</i> Committee, the senior management, and key institutional members. ▪ The <i>Sharī'ah</i> Committee aims to reinforce robust decision-making processes and internal control functions for optimal <i>Sharī'ah</i> non-compliance risk management
<ul style="list-style-type: none"> ▪ To outline IFIs' duties and responsibilities. 	<ul style="list-style-type: none"> ▪ To outline the newly created functions entailing <i>Sharī'ah</i> review, <i>Sharī'ah</i> audit, <i>Sharī'ah</i> risk management, and <i>Sharī'ah</i> research. 	<ul style="list-style-type: none"> ▪ To enforce <i>Sharī'ah</i> compliance status on the market and drive the IFI toward more <i>Sharī'ah</i> compliance activities via close monitoring and penalties. ▪ To impose strict and severe penalties following the failure to comply with <i>Sharī'ah</i> principles. 	<ul style="list-style-type: none"> ▪ To outline the functions entailing <i>Sharī'ah</i> compliance, <i>Sharī'ah</i> audit and <i>Sharī'ah</i> risk management.

In the context of this research, the examination specifically delves into the evolution of *Sharī'ah* governance practices with a targeted focus on the *Sharī'ah* risk management control function. By scrutinizing the developments in this specific domain, we aim at contributing valuable insights into the ongoing evolution of *Sharī'ah* governance, shedding light on how institutions manage and mitigate *Sharī'ah* non-compliance risks. This focused exploration is expected to yield a nuanced understanding of the advancements and challenges associated with *Sharī'ah* risk management, thereby enriching the broader discourse on the continuous refinement of *Sharī'ah* governance practices within the *Islāmic* banking sector.

3.2 SHARĪ'AH RISK MANAGEMENT FUNCTION

The concept of *Sharī'ah* risk management within the framework of Islamic Financial Institutions (IFIs) has evolved significantly between SGF 2010 and SGPD 2019, underscoring its critical role as a compliance and control function. According to BNM's definition, *Sharī'ah* risk management in SGF 2010 is characterized as a function that systematically identifies, measures, monitors, and controls *Sharī'ah* non-compliance risks to avert potential non-compliance events. *Sharī'ah* risk management is still an important *Sharī'ah* function in the SGPD 2019 to ensure effective risk management of *Sharī'ah* non-compliance (Mohd Ariffin, 2022).

SGPD 2019 further elaborates this function, emphasizing its role in systematically identifying, measuring, monitoring, and reporting *Sharī'ah* non-compliance risks across IFIs' operations, business affairs, and activities. The *Sharī'ah* risk management functions in accordance with the SGPD 2019 requirements to perform risk management processes so that *Islāmic* banks can mitigate any possible events that could create *Sharī'ah* non-compliance risk.

This evolution highlights the growing emphasis on *Sharī'ah* risk management as an independent function within IFIs, dedicated to managing and mitigating the associated non-compliance risks. Kasim et al. (2013) support this idea by emphasizing that a distinct *Sharī'ah* risk management function is pivotal in managing *Sharī'ah* non-compliance risks and preventing potential issues. The systematic approach adopted in addressing these risks ensures the seamless continuation of operations within *Islāmic* banks.

Sharī'ah risk management officers, equipped with expertise in *Sharī'ah* requirements and practices, play a crucial role in this function. They are tasked with reporting directly to the risk

management committee, Board of Directors, and management via the *Sharī'ah* Committee, ensuring effective oversight and control. The *Sharī'ah* risk management function under SGF (2010) requires a comprehensive approach involving identification, measurement, monitoring, and control of such risks. This includes understanding inherent risks in IFIs, evaluating the effectiveness of existing controls, assessing the potential impact of non-compliance on IFIs, and implementing controls to track and prevent non-compliant events. Additionally, developing policies and guidelines for *Sharī'ah* non-compliance risk management and fostering awareness of these risks among IFI staff are the key aspects of a robust risk management framework.

SGPD 2019 further emphasizes the monitoring of *Sharī'ah* non-compliance risk exposures and the effectiveness of mitigation measures. The function mandates reporting to the board, *Sharī'ah* Committee, and senior management regarding such exposures, and contesting decisions that elevate non-compliance risks. This becomes an integral part of IFIs' integrated risk management framework. The effective management of *Sharī'ah* non-compliance risks relies on robust processes within the *Sharī'ah* risk management function, including identification, measurement, monitoring, reporting, and control. By ensuring optimal governance practices within this function, IFIs can consistently align their activities and operations with *Sharī'ah* principles. Notably, *Sharī'ah* compliance is a fundamental aspect of operational risk for *Islāmic* banks. Hence, to mitigate this risk, banks must maintain unwavering adherence to *Sharī'ah* principles in all their operations and product offerings (Izhara, and Asutay, 2010).

4. INSTITUTIONAL THEORY

The Institutional Theory plays an important role in enhancing institutional structure and performance by balancing stakeholders' roles. The theory helps deliver a structure for recognizing how existing practices and standards among similar institutions influence how that regulation (i.e. in this case, *Sharī'ah* governance) is both interpreted and implemented in *Islāmic* banks. Thus, this research is motivated to consider Institutional Theory as the leading theory as it best illuminates the operational guidelines and procedures for IFIs. The few studies that attempt to show the importance of applying Institutional Theory in *Sharī'ah* governance of *Islāmic* banks include a study in terms of institutionalization of norms into *Sharī'ah* finance

(Hasanuddin and Hakim, 2017), institutionalization of *Islāmic* banking practices through specific work of key actors (Siti Nabiha and Adib, 2020) and the adaptation of new Institutional Theory in explaining the differences in *Sharī'ah* governance practices in a concept paper by Alam, Karbhari, and Rahman (2021).

This research, therefore, further adds a novel dimension to literature. First, the contribution to prior literature on *Sharī'ah* governance as it provides valuable insight on why Institutional Theory is more pronounced (as compared to the other theoretical frameworks) in the formation and discharge of the roles, powers, and functions by the different governance organs (such as regulators, the board of directors, management and *Sharī'ah* supervisory boards) operating in this unique corporate governance landscape. Second, by highlighting that the structures, procedures and rules of *Sharī'ah* governance are better represented by Institutional Theory and therefore, more relevant in ensuring accountability, independence, competence, confidentiality and transparency and disclosure especially in mitigating the *Sharī'ah* non-compliance risk, resulting in robust *Sharī'ah* governance and compliance.

Institutionalization involves movements from old to new possibilities (new structure, new policies, new behaviors, new actions, new patterns, new methodologies, new products or new market ideas) based on the reconceptualized patterns in the institution (Kanter, Stein and Jick, 1992). The architecture of institutionalization involves the design and construction of new patterns, or the reconceptualization of old ones, to make new, and hopefully more productive actions possible. Recent literature (Kanji and Moura, 2003; Lycke, 2003), state that changes can be various and could also include changes to procedures, structures, rules and regulations, technology, training and knowledge development within institutions. Therefore, it can be considered as the shift in behavior of the whole institution (Kanter et al., 1992), including the shift in people behavior, their activities, and the relationship of both elements in an institution.

An institution intending to institutionalize the new practices will need to be supported by intense pressure, various force factors, or broad influences to successfully implement the new practices (Norhayati and Siti Nabiha, 2009). Two types of factors influence institutionalization, namely internal and external environmental pressure (Cobb, Helliar, and Innes, 1995). The influence of intense pressure would move from the regulator to the institution level and next, to the internal level in the institution (Wanderley et al., 2011). This institutionalization will need more time to routinize the rules.

Institutionalization is also seen as an important part of evolution involving expansion and improving the systems, rules, and routines.

4.1 BURNS AND SCAPENS FRAMEWORK (2000)

The Burns and Scapens (2000) framework serves as a comprehensive guide in understanding the implementation of *Shari'ah* governance practices within the *Shari'ah* risk management control function. This framework delineates the stages of encoding, enacting, reproduction, and institutionalization, offering a thorough explanation of how these practices become embedded within *Islāmic* bank operations. Importantly, it views institutionalization as an ongoing process, recognizing that it evolves over time rather than being a singular event. This framework's flexibility extends beyond *Shari'ah* governance practices, encompassing various practice types, including the institutionalization of management accounting practices in specific establishments. Its adaptability and inclusivity make it an apt tool for explaining the institutionalization of *Shari'ah* governance practices in this research paper.

What sets Burns and Scapens' framework apart is its acknowledgment of the contribution of culture and values in the institutionalization process. Recognizing the significance of these elements in shaping institutional practices within *Islāmic* banks, the framework emphasizes the role of culture and values in facilitating the embedding of *Shari'ah* governance practices. While other frameworks exist, such as DiMaggio and Powell's (1983) framework of institutional isomorphism, Meyer et al.'s (1990) framework of institutionalized organizations, and Scott's (2008) framework of institutions and organizations, the Burns and Scapens framework stands out given its comprehensiveness, dynamism, and practical applicability. Its ability to encapsulate the complexities of institutionalization, coupled with its adaptability across various practice domains, makes it a fitting choice for elucidating the institutionalization of *Shari'ah* governance practices in *Islāmic* banks within this research context.

5. METHODOLOGY

This explanatory case study was conducted in a Malaysian *Islāmic* bank. This method adds valuable insight and allows for a comprehensive understanding on changes of rules and routines in the current practices in accordance with changes in the *Shari'ah*

governance practices guidelines and procedures from SGF 2010 to SGPD 2019. This research uses a qualitative research methodology. Table 2 lists the three *Sharī'ah* risk management officers, based on work experience (up to 2021 end of data collection period), qualification, and duration of interview for each interview session. The identified interviewees are knowledgeable and have experienced the evolution of *Sharī'ah* governance practices in the *Islāmic* bank. The Head of Shariah risk management function as well as the other two *Sharī'ah* risk management officers could address the questions and reflect the changes in the evolution that occurred from SGF 2010 to SGPD 2019 during the interview. In this single case study, three participants are sufficient since the data is rich, detailed, and saturated in achieving the objective of the study.

TABLE 2
Participants Profile

Position	Working experience with EMERALD (up to 2021)	Qualifications	Reporting to	Duration of interview
Head of <i>Sharī'ah</i> Risk Management Function	10 years	Master in Islamic Economy CIFPs	Chief Risk Management Officer	1 hour 20 minutes
<i>Sharī'ah</i> Risk Management Officer 1	7 years	Degree in Islamic Banking CIFPs	Head of <i>Sharī'ah</i> Risk Management Function	1 hour 25 minutes
<i>Sharī'ah</i> Risk Management Officer 2	3 years	Degree in <i>Fiqh</i> and <i>Usul</i> CIFPs	Head of <i>Sharī'ah</i> Risk Management Function	1 hour 16 minutes

The interview data collected through semi-structured interviews with three *Sharī'ah* risk management officers in an *Islāmic* bank later on named as EMERALD, were transcribed. The transcript data were further analyzed using thematic analysis, content analysis, and discussed based on the Burns and Scapens (2000) framework focused on old institutional economics (OIE) to explain the institutionalization of *Sharī'ah* governance practices in the *Sharī'ah* risk management process at EMERALD. The Burns and Scapens framework provides a valuable lens for better understanding this process (Karbhari et al., 2020). This research explained why and how

Islāmic banks institutionalize their *Shari'ah* governance practices. Thus, the main theme was developed based on the research question, “Why and how do the *Shari'ah* governance practices institutionalize in *Islāmic* banks?”. In answering the question, this study considers the current process under SGPD 2019 of *Shari'ah* risk management control function at EMERALD. The sub-theme was developed earlier from the document reviewed on SGPD 2019, which focused on the *Shari'ah* risk management process. The transcript data was then extracted and matched with the sub-theme, and at the same time, the codes were identified and developed. This process is called ‘coding’.

This interpretive case study established good rapport between the researcher and EMERALD members during their interactions to gauge “how things should be done” (rules) and “how things are actually done” (routines) in daily operations (Ahrens et al., 2007). As social phenomena are the key focus of interpretive case study and OIE (Burns and Scapens, 2000), this approach complemented the theoretical framework in this study. Four processes fall within the rules and routines, namely encoding, enacting, reproduction, and institutionalization that move in a reciprocal manner. The first process involves encoding the existing institution and taking for granted assumptions and meanings into the new rules, routines and procedures which embody institutional values. The new rules or procedures are usually interpreted in terms of the current norms and values of the group using the system. The second process is enacting routines and rules, which encode the institutional principles through the day-to-day activities performed by institutional members. The third process represents the ‘reproduction’ of the rules and routines over time, through their repeated use in practice (Scapens et al., 2003). The last step refers to ‘institutionalization’ of routines and rules which have been reproduced through the behavior of individual institutional members. The key attribute of the Burns and Scapens framework is that it describes the processes of change over time and remains relatively stable (Cameron and Quinn, 1999).

Table 3 summarizes explanations of the four processes in institutionalization by Burns and Scapens (2000). Institutionalization of the *Shari'ah* governance rules and routines may be applicable to *Islāmic* banks, in relation to this research, because the introduction of *Shari'ah* governance into *Islāmic* banks has resulted in great changes to the institution in doing business (Kasim et al., 2013). Accordingly, routinization of rules has coincided with the *Shari'ah* governance evolution.

TABLE 3
Four Processes of Institutionalization

Process	Transform rules and routines
Encoding	Process of encoding existing rules, routines and procedures which embodied institutional value such as existing accounting standards adopted.
Enacting	The new rules and routines performed by institutional members on daily activities become enactment within the institution. Resistance normally exists at this stage especially when new rules and routines challenge existing understanding.
Reproduction	Process of reproduction of new rules and routines continuously happens in a reciprocal manner through repeated use in practice over time.
Institutionalization	Large collective members within an institution agree to accept the new set of rules and routines.

Source: Burns and Scapens' Framework (2000)

6. ANALYSIS AND RESULTS

The interview data and reviewed documents (SGPD 2019) in this research were further analyzed and discussed according to the Burns and Scapens (2000) framework, with an emphasis on OIE to explain the institutionalization of *Sharī'ah* governance practices in *Sharī'ah* control functions at EMERALD. This framework, which provided a sound understanding of this process, underscored the significance of encoding, enacting, reproduction, and institutionalization in institutionalizing *Sharī'ah* governance practices. Table 4 summarizes the processes under *Sharī'ah* risk management function as stated in SGPD 2019. The first analysis was document-review to understand the routinization of rules or the institutionalization of *Sharī'ah* governance practices. Essentially, SGPD 2019 on the *Sharī'ah* control functions section was reviewed to identify the keywords or themes and further analyzed to address the main research question: "Why do *Islāmic* banks institutionalize their *Sharī'ah* governance practices and how does the institutionalization of *Sharī'ah* governance practices take place in the *Islāmic* bank?"

Parallel to the analysis results, the institutionalization of *Sharī'ah* governance practices was identified under the *Sharī'ah* risk management function, which involved encoding a *Sharī'ah* non-compliance risk management framework. The description in Table 4, which is "To integrate between *Sharī'ah* non-compliance risk with

conventional risk management”, exemplifies encoding. This activity involved integrating this framework with that of conventional risk management used by the Risk Management Division at EMERALD. This integration would ensure effective management of *Sharī'ah* non-compliance risk.

TABLE 4
Processes under *Sharī'ah* Risk Management Functions by
SGPD 2019

<i>Sharī'ah</i> control function	Process
<i>Sharī'ah</i> Risk Management	<ul style="list-style-type: none"> ● To integrate <i>Sharī'ah</i> non-compliance risk with conventional risk management. ● To identify potential <i>Sharī'ah</i> non-compliance risk exposures. ● To assess and measure the potential impact of <i>Sharī'ah</i> non-compliance risk exposures. ● To develop appropriate risk mitigation measures. ● To closely monitor both <i>Sharī'ah</i> non-compliance risk exposures and the effectiveness of risk mitigation measures. ● To report to the BOD, <i>Sharī'ah</i> Committee, and senior management on <i>Sharī'ah</i> non-compliance risk exposures. ● To develop constructive decisions that may prevent escalation to <i>Sharī'ah</i> non-compliance risks.

Source: Bank Negara Malaysia, SGPD 2019

The enacting process involved implementing the *Sharī'ah* non-compliance risk management framework in deterring *Sharī'ah* non-compliance events. The description in Table 4, which is “To identify potential *Sharī'ah* non-compliance risk exposures”, exemplifies enacting. This process involved identifying the potential *Sharī'ah* non-compliance risk exposures by reviewing the documents on new products to identify and assess the risk exposure. This identification would ensure that the management or business unit is aware of the risk exposure and undertakes risk mitigation measures. Reproduction involved the continuous monitoring of *Sharī'ah* non-compliance events. The description in Table 4, which is “Assess and measure the potential impact of *Sharī'ah* non-compliance risk exposures”, exemplifies reproduction. The process involved repetitive

actions in assessing and measuring the potential impact of the identified *Sharī'ah* non-compliance risk exposures. Implementing good assessment tools and mechanisms, such as RCSA, independent risk investigation, and risk notification proved useful in ensuring awareness about the potentiality of *Sharī'ah* non-compliance risks hence prompting risk mitigating actions.

Institutionalization involved embedding practices of deterring and mitigating *Sharī'ah* non-compliance risk as a routine. The description in Table 4, which is “To develop appropriate risk mitigation measures”, exemplifies institutionalization. This process involved developing appropriate risk mitigation measures to counter the identified *Sharī'ah* non-compliance risk exposures. Potential *Sharī'ah* non-compliance events could be mitigated with preventive, corrective, and rectification plans. The enacting process implies “To closely monitor both *Sharī'ah* non-compliance risk exposures and effectiveness of the risk mitigation measures” as described in Table 4. This process involved the close monitoring of *Sharī'ah* non-compliance risk exposures and the effectiveness of risk mitigation measures. At this stage, potential *Sharī'ah* non-compliance events were closely reviewed to ensure no resistance to the risk-mitigating measures and effective enactment of the *Sharī'ah* non-compliance risk management framework. This framework would be updated over time to validate the potential risk exposures identified. The description in Table 4, which is “To report to the BOD, the *Sharī'ah* Committee and senior management on the *Sharī'ah* non-compliance risk exposures”, exemplifies reproduction. This process involved reporting *Sharī'ah* non-compliance risk exposures to the BOD, *Sharī'ah* Committee, and senior management and ensuring that the management, other control functions, and business units are aware of the risks and actions taken to mitigate the risks involved. Initiatives on development of RCSA tools, independent investigation, and risk notification added value to the institutionalization of *Sharī'ah* governance practices in *Sharī'ah* risk management function at EMERALD.

Table 5 provides the sub-theme and codes for Theme 3, *Sharī'ah* risk management function. The cross-sectional content analysis for the interview transcripts was performed with NVivo 14, a computer-aided qualitative data analysis software as per Figure 1. The relevant information was extracted from the transcribed interview data and was deduced to match the sub-theme while simultaneously having the codes identified and developed through the coding process. The final (exploratory) stage of analysis summarized the results derived from the cross-sectional content analysis using NVivo 14 as shown in

Table 6. This final-stage analysis facilitated identification of coded activities under each sub-theme in line with the Burns and Scapens (2000) framework. The routinization of rules elaborated the encoding, enacting, reproduction, and institutionalization in *Sharī'ah* risk management function.

TABLE 5
Document Review and Coding for Theme - *Sharī'ah* Risk Management Function (SGPD 2019)

Sub-theme	Description
<i>Sharī'ah</i> non-compliance Integration	Integrate <i>Sharī'ah</i> non-compliance risk considerations with enterprise-wide risk management.
<i>Sharī'ah</i> non-compliance identification	Identify <i>Sharī'ah</i> non-compliance risk exposures in business operations and activities.
<i>Sharī'ah</i> non-compliance assessment and measurement	Assess <i>Sharī'ah</i> non-compliance risk and measure the potential impact of risk exposures.
Develop mitigation measures	Establish appropriate risk mitigation measures according to the identified risk types and levels.
Monitor <i>Sharī'ah</i> non-compliance	Closely monitor both <i>Sharī'ah</i> non-compliance risk exposures and the effectiveness of risk mitigation measures.
Reporting of <i>Sharī'ah</i> non-compliance	Report to the board, <i>Sharī'ah</i> committee and senior management on the <i>Sharī'ah</i> non-compliance risk exposures.
Developing constructive decisions	Constructively challenge decisions that may give rise to <i>Sharī'ah</i> non-compliance risks to identify and assess <i>Sharī'ah</i> non-compliance.

Source: Bank Negara Malaysia, SGPD 2019

Overall, the encoding stage was manifested in integrating *Sharī'ah* non-compliance risk management with conventional risk management within EMERALD. This integration aimed at ensuring a cohesive and effective approach toward managing *Sharī'ah* non-compliance risk. While implementing the enacting process, it is evident that EMERALD implemented the *Sharī'ah* non-compliance risk management framework to identify potential risk exposures, enabling proactive risk assessment and mitigation.

FIGURE 1
Summary of Content Analysis Performed using NVivo 14–
Theme *Sharī'ah* Risk Management Function

Item	Files	Re
THEME 3		
○ Name		
○ SNC assessment	0	0
○ assessment tools	1	2
○ investigation	3	6
○ RCSA tools	1	12
○ risk notification	1	1
○ risk control assessment	3	7
○ SNC challenge	0	0
○ challenges	3	15
○ validation of SNC	1	2
○ SNC identification	0	0
○ document review	2	9
○ risk exposure	2	3
○ SNC Integration	0	0
○ Risk management division	2	5
○ SNC mitigation measures	0	0
○ corrective action	2	4
○ preventive action	2	6
○ rectification plan	2	4
○ SNC monitoring	0	0
○ review SNC	3	5

Moving to the reproduction phase, as observed in the continuous monitoring of *Sharī'ah* non-compliance events, involved routine assessments and measurements of potential risks. This entailed employing robust assessment tools such as RCSA and independent risk investigation to maintain awareness and undertake prompt mitigating actions. Lastly, institutionalization involved embedding risk mitigation practices into routine operations. This stage focused on developing effective measures to counter the identified *Sharī'ah* non-compliance risks, aiming for preventive, corrective, and rectification plans to address potential non-compliance events. Additionally, the ongoing enacting process of closely monitoring non-compliance risk exposures and the effectiveness of mitigation measures emphasized the importance of consistent surveillance. This constant vigilance ensured no resistance to risk-mitigating measures and allowed for updates to the *Sharī'ah* non-compliance risk management framework, validating potential risk exposures over time. Furthermore, the reproduction aspect extended to reporting these risk exposures to the BOD, *Sharī'ah* Committee, and senior management, ensuring comprehensive awareness among management, control functions, and business units. Initiatives such as the development of RCSA tools,

independent investigations, and risk notifications significantly contributed to enhancing the institutionalization of *Sharī'ah* governance practices within the *Sharī'ah* risk management function at EMERALD. This detailed analysis provides a clear understanding of the stages and activities involved in institutionalizing *Sharī'ah* governance practices within the *Sharī'ah* risk management function, demonstrating how these practices are encoded, enacted, reproduced, and institutionalized within EMERALD's operations.

6.1 FINDINGS AND DISCUSSION

The inception of EMERALD in Malaysia signifies a pivotal moment in the development of a robust *Islāmic* financial system within the country (Al Nasser and Muhammed, 2013). Establishing a bank operating within the *Islāmic* framework, however, poses inherent challenges. The early stages of EMERALD's establishment emphasized the crucial role of practitioners, their backgrounds, and philosophies in shaping product and service development (Kitamura, 2020). The commitment of the Malaysian government and Bank Negara Malaysia (BNM) as the regulator, particularly with the introduction of the Islamic Banking Act of 1983 (IBA 1983), significantly influenced the growth of *Islāmic* banking. Despite the regulatory foundation provided by the Act mandating formation of a *Sharī'ah* advisory council, it proved insufficient for efficient management, where the guidelines issued by the regulator- on *Sharī'ah* governance lacked specificity. In response, EMERALD appointed a *Sharī'ah* officer from the outset to ensure institutional reputation and distinguish *Islāmic* banking from conventional practices.

Interview data from EMERALD illustrated the evolution from SGF 2010 to SGPD 2019 and the institutionalization of *Sharī'ah* governance practices within the institution. EMERALD navigated complexities during this evolutionary process, implicitly strengthening *Sharī'ah* governance practices. Initially adopting a self-regulated system aligned with its conditions, EMERALD found the government-issued *Sharī'ah* principles overly general. Intense pressure from various stakeholders, including the public, *Sharī'ah* Committee, renowned scholars, institutional members, and regulators, led EMERALD to ensure *Sharī'ah* compliance across transactions, products, activities, and programs, over time.

TABLE 6
Part of the Cross-sectional Content Analysis for Codes under Theme 3 *Sharī'ah* Risk Management Function

Main Theme - <i>Sharī'ah</i> Risk Management Function							
	Sub theme -SNC integration	Sub theme - SNC identification	Sub theme - SNC assessment	Sub theme - SNC mitigation	Sub theme - SNC monitoring	Sub theme - SNC reporting	Sub theme - SNC challenge
Coded activities under each sub theme identified from data by HO <i>Sharī'ah</i> Risk Management Function	<i>Sharī'ah</i> non-compliance risk is actually part of opportunity risk. Opportunity risk is under the Risk Management Division. So, we work together under the same division. The difference is that we are responsible for <i>Sharī'ah</i> non-compliance risk.	In the EMERALD Annual Report, we report excessive events related to <i>Sharī'ah</i> issues that we have identified, along with the factors that caused these excessive risks.	So, we use the same tool as opportunity risk management to assess SNC events. In fact, <i>Sharī'ah</i> non-compliance risk is a subset of opportunity risk.	The rectification plan is to rectify the SNC events occurring in the bank's current operations. The SNC risk is actually the important thing that we need to identify because we want to mitigate the SNC risk.	Perhaps among other things, we can hold a town hall. The town hall is a training session that we hold with all branch managers to provide exposure to SNC events and risks. This is important so that monitoring of SNC events can be improved.	Previously, under SGF 2010, our reporting line went directly to the <i>Sharī'ah</i> committee. Under SGPD 2019, however, our reporting line goes directly to the management risk committee.	It is difficult to differentiate between opportunity risk events and SNC events. Because there are some scenarios where we feel that "this thing is indeed <i>Sharī'ah</i> , and it is also Opportunity risk", or vice versa.

TABLE 6 (continued)

Main Theme - <i>Sharī'ah</i> Risk Management Function							
	Sub theme - SNC integration	Sub theme - SNC identification	Sub theme - SNC assessment	Sub theme - SNC mitigation	Sub theme - SNC monitoring	Sub theme - SNC reporting	Sub theme - SNC challenge
Coded activities under each sub theme identified from data by <i>Sharī'ah</i> Risk Management Officer 1	<p>Whether under SGF 2010 or SGPD 2019, SNC risk is a subset of opportunity risk.</p> <p>When the organizational structure was changed under SGPD 2019, we were placed under the risk management division.</p> <p>We align our daily tasks or processes with operational risk.</p>	<p>We have <i>Sharī'ah</i>-compliant guidelines that we use to identify SNC risk or to determine whether a case in EMERALD is related to a <i>Sharī'ah</i> non-compliance event.</p>	<p>After the SNC event is identified, the next step is to control the SNC event so that the risk from this event can be reduced or mitigated. Therefore, the SNC event will go through the risk control self-assessment (RCSA) process to identify and evaluate the associated risk.</p>	<p>If a loss event from SNC has been identified, corrective and preventive actions must be implemented to ensure that the SNC risk that occurred does not happen again.</p>	<p>We conduct monthly monitoring and reporting of rectification progress.</p> <p>We keep track of the rectification progress in the bank every month, and it can sometimes take up to a year to resolve SNC events. This means that we keep track of the progress every month and then present on the progress to the <i>Sharī'ah</i> committee and the operational committee.</p>	<p>Initially, under SGF 2010, we had two reporting lines: we reported to the Chief Risk Officer and the Chief <i>Sharī'ah</i> Officer.</p> <p>However, after BNM issued SGPD 2019, we only report directly to the Chief Risk Officer.</p>	<p>When we find a risk or <i>Sharī'ah</i> issue, we will argue whether or not it is a <i>Sharī'ah</i> issue, because the requirement in the <i>Sharī'ah</i> division does not mention the related issue, and there is no internal precedent.</p> <p>Therefore, before we confirm it as SNC, if the issue is in doubt, we call for a meeting with the Head of Shariah, Head of SRM, Head of Audit, and Head of Shariah Compliance. They can constructively challenge that decision.</p>

TABLE 6 (continued)

Main Theme - <i>Sharī'ah</i> Risk Management Function							
	Sub theme - SNC integration	Sub theme - SNC identification	Sub theme - SNC assessment	Sub theme - SNC mitigation	Sub theme - SNC monitoring	Sub theme - SNC reporting	Sub theme - SNC challenge
Coded activities under each sub theme identified from data by <i>Sharī'ah</i> Risk Management Officer 2	<p>The requirements that the SNC risk management team uses to identify SNC risk are <i>Sharī'ah</i> requirements.</p> <p>The tools, procedures, and processes that the team uses, however, are the same as those used by the risk management division.</p>	One of the tools that the team uses is document review. The team reviews internal and external documents to identify potential SNC events.	Once the team has identified a potential SNC event, they conduct a risk control self-assessment (RCSA) to assess the SNC risk from the perspective of gaps. For example, if there is a loss event, the team will include the loss event or findings in the RCSA to identify ways to mitigate the risk.	Corrective actions are important to fix what is wrong. For example, if a customer has not signed the <i>aqad</i> form, the corrective action would be to call the customer to the bank to sign the form. This is one way to mitigate SNC risk.	We need to review the existing products and highlight the related risks based on the applicable guidelines. For example, from the <i>tawarru'</i> perspective, we need to highlight the risks associated with <i>tawarru'</i> for <i>Ar-Rahnu</i> . For example, non-execution of <i>tawarru'</i> commodity trading. This is when we do <i>tawarru'</i> , but we do not actually execute the <i>tawarru'</i> trading. This is not <i>Sharī'ah</i> - compliant. This is one of the ways we monitor bank products.	Based on the RCSA results, we will highlight the five major risks to present to the <i>Sharī'ah</i> Committee, top management, and board committee.	Not executing or, in other words, not following the procedures given for one's work process is also one of the challenges that can lead to SNC events.

6.1.1 INSTITUTIONALIZATION OF *SHARĪ'AH* RISK MANAGEMENT FUNCTION

Sharī'ah risk management, as one of EMERALD's internal control functions, systematically identifies, measures, monitors, and reports *Sharī'ah* non-compliance risks to manage potential events. The Head of Shariah risk management function highlighted the practice's existence since the issuance of GPS 1 in 2004, predating SGF 2010. Introduction of SGF 2010, however, prompted adjustments in the reporting structure. While EMERALD initially reported solely to the Chief Shariah Division, post-SGF 2010, it also reported to the Chief Risk Officer, introducing a dual reporting system. Despite SGF 2010 not explicitly outlining *Sharī'ah* risk management under the Shariah Division, this structure was already in place at EMERALD. With the issuance of SGPD 2019, all control functions, including *Sharī'ah* risk management, became independent. Consequently, institutionalization in EMERALD underwent organizational restructuring, relocating *Sharī'ah* risk management under the Chief Risk Officer.

The Head of Shariah risk management function interviewed revealed that before SGPD 2019, *Sharī'ah* risk management guidelines were integrated with operational risk management, merging as 60% of the *Sharī'ah* risk management guidelines resembled those of organizational risk management. Post-SGPD 2019, the guidelines were merged into a single tool for both *Sharī'ah* and operational risk management functions. EMERALD is effective in their risk management practices. Risk monitoring was the most significant process that affected the bank's risk management practices.

According to the Head of Shariah risk management function, “*Sharī'ah* non-compliance risk is now a part of Operational Risk, which is the reality, so when we merged, we use the same one tool only, which is the merged guideline to perform our function, either *Sharī'ah* or operational risk management. This merger is considered another new measure undertaken following the issuance of SGPD 2019.”

Sharī'ah risk management officer 1 further added that, “...except in executing the function, we have our own *Sharī'ah* requirement compulsory with a penalty to be complied with as per IFSA 2013.

The internal requirement from EMERALD's management itself is another factor that could influence the harmonization of *Sharī'ah* governance practices. Good corporate governance practices must be seamlessly incorporated into EMERALD. Meanwhile,

EMERALD members must maintain optimal governance practices to elevate the institution's image and sustainability. The Head of Shariah risk management function perceived that, "Sometimes when there is an issue on *Sharī'ah* matters, it is quite impossible to maintain the best corporate governance practices in terms of reporting the findings. So, there will be no independence in this case when the gap is closed without any further investigation. So, to harmonize the culture, EMERALD should restructure its *Sharī'ah* control function and the reporting line."

As the key performance indicators of *Sharī'ah* risk management team members are determined by the Shariah Division, the members were considered Shariah Division officers even before the issuance of SGF 2010 and should report to the Head of *Sharī'ah* division. Nevertheless, the *Sharī'ah* risk management officers, other control function *Sharī'ah* officers, and Shariah Division officers were 'stuck', as mentioned by Head of Shariah risk management function, when each time BNM questioned the independence of the *Sharī'ah* control function while reviewing the *Sharī'ah* process and suggested that EMERALD change the single reporting line into a double reporting line. In other words, the officers could not transition from a single to double reporting line given the harmonized practice and culture already in place, which allowed the Head of Shariah Division to easily monitor the *Sharī'ah* development progress. As the internal control functions (including *Sharī'ah* risk management function) are overseen by the Head of Shariah division, they may share their *Sharī'ah* knowledge, experiences, and technical skills in managing *Sharī'ah*-related matters, specifically *Sharī'ah* non-compliance issues. Head of Shariah risk management function deemed it unnecessary to report to the Chief Risk Officer of the Risk management division, as their functions emphasize operational risk management over the *Sharī'ah* risk management function. As the *Sharī'ah* control function, which includes *Sharī'ah* risk management function, at the same time, still requires reporting to the Head of the *Sharī'ah* division, this independence issue raised by BNM during the review process remained unresolved. Nonetheless, the 'stuck' situation was harmonized following BNM's issuance of SGPD 2019, where all the *Sharī'ah* control functions must be independent of the Shariah Division with a single reporting line.

Ensuring the competency of *Sharī'ah* professionals is imperative for the effective passage and execution of *Sharī'ah* judgments and assessments during the evolution of *Sharī'ah* governance practices. The professional application of *Sharī'ah*

knowledge, skills, and experiences forms the cornerstone of successful *Sharī'ah* governance practices within EMERALD. Notably, individuals involved in the Shariah Division and control functions must embody knowledge, qualifications, and experience to adeptly address *Sharī'ah*-related issues. According to the General Manager in EMERALD, the head of any *Sharī'ah*-focused function should serve as the "river of knowledge." This emphasizes accountability in managing and deciding upon *Sharī'ah* matters based on one's *Sharī'ah* expertise. *Sharī'ah* competency is seen as reflective of EMERALD's image, and any deficiency in managing *Sharī'ah* matters could adversely impact the institutionalization of *Sharī'ah* governance practices.

Nevertheless, it is highlighted that having qualifications in *Sharī'ah* alone does not guarantee competency in the *Sharī'ah* risk management function. Previously, under SGF 2010, minimal qualifications for *Sharī'ah* risk management officers were unspecified, leading to challenges for newcomers in understanding their tasks. The current SGPD 2019 mandates that risk officers involved in *Sharī'ah* risk management must possess knowledge of *Sharī'ah* requirements applicable to *Islāmic* financial businesses. Initiative and independent learning are crucial for *Sharī'ah* competency. Emphasizing the importance of self-driven learning, the *Sharī'ah* risk management officer 1 and 2 mentioned that they underwent a one-year training program focusing on Professional Shariah Auditor certification, which included modules on *Sharī'ah* risk management. Training becomes a key avenue for gaining knowledge, exposure, and enhancing *Sharī'ah* competency, preventing deviations from *aqad* (contractual agreements). Both of the *Sharī'ah* risk management officers emphasized the importance of continuous learning and the sharing of knowledge among the Heads of Shariah control function and Branch management. Challenges and resistance are acknowledged, especially in instances where non-Muslim individuals are appointed as superiors. Adherence to BNM requirements, even when faced with challenges, however, is deemed necessary for the institution to maintain *Sharī'ah* governance practices.

Competency in *Sharī'ah*-related matters is not just limited to qualifications; it extends to the capability of the Head of Shariah risk management and the *Sharī'ah* risk management officers to perform the institutionalization of *Sharī'ah* governance practices in the control functions effectively. EMERALD's commitment to *Sharī'ah* competency has been sustained since its inception. However,

challenges arose during the implementation of double reporting for control functions after SGF 2010, especially when a non-Muslim Chief Risk Officer was appointed. The competency of this non-Muslim Chief Risk Officer was initially lacking, leading to divergence from managerial requirements. Subsequent Chief Risk Officer, also non-Muslim, sought guidance from *Sharī'ah* professionals, indicating a shift toward developing competence to handle *Sharī'ah* matters.

The *Sharī'ah* risk management officer 1 perceives EMERALD to be secure, citing the latest Chief Risk Officer's development of competence through guidance from *Sharī'ah* professionals. This emphasizes the importance of leadership competence in ensuring continuous improvement in *Sharī'ah* compliance culture and the mitigation of *Sharī'ah* non-compliance events. Despite religious differences, the Chief Risk Officer's commitment to learning and collaboration with *Sharī'ah* professionals highlights EMERALD's ability to navigate and enhance the evolution of *Sharī'ah* governance practices.

Sharī'ah risk management officer 2 mentioned a few examples of the translation of routines into rules or the transformation of existing rules or routines into new rules or routines in *Sharī'ah* risk management. The first example entails the Potential *Sharī'ah* Issue term.

As the *Sharī'ah* risk management officer 2 explained, "Potential *Sharī'ah* Issue is not stated or required under SGPD 2019. We only have Potential *Sharī'ah* non-compliance events and Actual *Sharī'ah* non-compliance event terms only. But, it is common for us in the *Sharī'ah* risk management function to determine the Potential *Sharī'ah* non-compliance event term since the issuance of the SGF 2010. And until now, after the issuance of the SGPD 2019, we try to embed this routine of determining Potential *Sharī'ah* non-compliance event terms into our *Sharī'ah* risk assessment work process in *Sharī'ah* risk management. The term is now being used as one of the guidelines in our *Sharī'ah* risk management policy". He added that, "The term is not used in SGPD 2019 and not in other *Islāmic* banks, but exclusively used in EMERALD, which is validated by us (*Sharī'ah* risk management)."

Changes in the process or procedure to execute certain tasks depends on either the internal requirement in EMERALD itself or external requirement, typically by the regulatory body of BNM. Other divisions or control functions could similarly influence the transformation of existing rules or routines into new ones. Based on an interview with *Sharī'ah* risk management officer 1, identifying a

new risk in the *Sharī'ah* division or other control functions necessitates a new procedure in *Sharī'ah* risk assessment. Occasionally, the documentation itself needs to be updated. This internal process only requires approval from either the Head of *Sharī'ah* risk management function or the Chief Risk Officer.

Another example addressed by *Sharī'ah* risk management officer 2, "...is when we make a plan for next year". This annual planning, which is not reflected in any *Sharī'ah* risk management guideline or EMERALD policy, served to review the *Sharī'ah* contract policy document. New risks were identified and included under the Risk and Control Self-Assessment (RCSA) result following this review. Despite not being a requirement by GPS 1 2004, SGF 2010, or SGPD 2019, the *Sharī'ah* risk management in EMERALD has executed this yearly planning.

How routines within *Sharī'ah* risk management are translated or transformed into new rules or procedures (institutionalization) was highlighted during the interview. One such instance is the incorporation of the term "Potential *Sharī'ah* non-compliance event," a step introduced by the *Sharī'ah* risk management function to assess whether a loss event or *Sharī'ah* risk may potentially lead to *Sharī'ah* non-compliance. Although not explicitly outlined in SGPD 2019 or other *Islāmic* financial standards, this term has been embedded into EMERALD's *Sharī'ah* risk assessment process since SGF 2010, now an integral part of their *Sharī'ah* risk management policy. The use of this term, exclusively within EMERALD, is validated and utilized by the *Sharī'ah* risk management team despite its absence in standard regulations. Transformations in procedures are influenced by both internal demands within EMERALD and external requirements, particularly stipulations from regulatory bodies such as BNM. *Sharī'ah* risk assessments are often adapted or updated in response to identification of new risks within the *Sharī'ah* division or other control functions, requiring revised procedures and documentation.

Annual planning, another uncodified practice, serves EMERALD in reviewing the *Sharī'ah* contract policy document and identifying new risks for inclusion in the Risk and Control Self-Assessment (RCSA) results. Despite lacking specific mandates from regulatory frameworks such as GPS 1 2004, SGF 2010, or SGPD 2019, EMERALD has consistently executed this yearly planning initiative as part of its *Sharī'ah* risk management practices. Regarding product introduction or enhancement, EMERALD maintains its workflow and standard operating procedures without changes. Each product, however, undergoes a rigorous assessment for potential risks,

especially related to *Sharī'ah* compliance. Strict control measures are enforced until the products meet *Sharī'ah* requirements and are deemed suitable for the market. This practice ensures a high level of control over products to prevent *Sharī'ah* non-compliance issues.

7. CONCLUSION

The journey of EMERALD, in a Malaysian *Islāmic* financial landscape, serves as a compelling case study in the evolution of *Sharī'ah* governance practices. From its inception, EMERALD faced the challenge of establishing an *Islāmic* bank operating within the *Sharī'ah* framework and navigating the nuances of compliance. The commitment of the Malaysian government and BNM as a regulator, evident in the IBA 1983, laid the foundation for *Islāmic* banking's growth, but the generic guidance provided by the Act underlined the need for more specific *Sharī'ah* governance practices. EMERALD's response to this challenge was marked by a self-regulated system, adapting *Sharī'ah* principles from government-issued guidelines. As the institution evolved, however, so did the complexities it encountered, leading to a more robust approach to *Sharī'ah* governance. Pressure from various stakeholders, including the public, *Sharī'ah* Committee, scholars, and regulators, played a pivotal role in driving EMERALD toward a more comprehensive *Sharī'ah* compliance approach. A crucial component of this evolution was the institutionalization of *Sharī'ah* risk management, a control function aimed at identifying, measuring, monitoring, and reporting *Sharī'ah* non-compliance risks.

In EMERALD, the *Sharī'ah* risk management function was not a mere response to regulatory requirements; it existed even before the issuance of SGF 2010. This early adoption positioned EMERALD uniquely but presented challenges during regulatory reviews. The subsequent issuance of SGPD 2019 triggered a restructuring, aligning the *Sharī'ah* risk management function with the Risk Management Division. The integration of *Sharī'ah* risk management with operational risk management, as guided by SGPD 2019, exemplifies EMERALD's commitment to effective risk mitigation. The use of ORION, a reporting system detailing regulation under SGF 2010, IFSA 2013, and SGPD 2019, emphasizes the meticulous approach to compliance. The institutionalization journey, however, faced challenges during leadership transitions. Nevertheless, proactive measures, including training, guidance-seeking, and ensuring the competence of control function heads, demonstrated EMERALD's

dedication to maintaining *Sharī'ah* governance standards.

The EMERALD case study offers valuable insights into the institutionalization of *Sharī'ah* governance practices. To further enhance *Sharī'ah* compliance and risk management, to comply with the dynamic nature of *Sharī'ah* governance practices, regular training programs for *Sharī'ah* officers and control function heads should be conducted. These programs should focus on emerging *Sharī'ah* requirements, risk management methodologies, and evolving regulatory frameworks. Establishing clear and standardized qualifications and competencies for *Sharī'ah* risk management officers besides aligning these qualifications with the specific requirements of the *Sharī'ah* risk management function are essential to ensure a consistent and competent approach to *Sharī'ah* compliance. Awareness of the pivotal role of leadership in the institutionalization process by providing specialized training and mentorship programs is also important to ensure a deep understanding of *Sharī'ah* requirements and effective *Sharī'ah* governance practices. Technological advancements also need to be utilized to streamline *Sharī'ah* risk management processes. Implementing advanced risk assessment tools, automated reporting systems, and digital platforms can enhance efficiency and accuracy in managing *Sharī'ah* non-compliance risks. And lastly, periodically reviewing *Sharī'ah* governance practices is desirable, and in line with regulatory changes and emerging industry standards. This is vital to ensure that EMERALD remains at the forefront of *Sharī'ah* compliance and adapts swiftly to evolving requirements.

Nevertheless, generalizability was identified as one of the single case study's limitations. The study outcomes may not be generalizable to other *Islāmic* banks with similar intricacies, size, and operational activities. Another limitation is on *Sharī'ah* officers' skills gap in routinization of rules. This is because routinization requires a strong understanding in *Sharī'ah*. This study might not be relevant to *Islāmic* banks in other countries because of different regulations and standards used. The last limitation to consider in this study is the lack of existing research that applies the Burns and Scapens (2000) framework to the context of *Islāmic* studies, where it shows the lack of references related to institutionalization in *Sharī'ah* governance practices.

In conclusion, EMERALD's journey provides a rich tapestry of experiences in institutionalizing *Sharī'ah* governance practices. By embracing these recommendations, EMERALD can continue to serve as a benchmark for IFIs, contributing to the broader evolution of

Sharī'ah governance in the dynamic *Islāmic* banking landscape. Future research based on the findings and insights gleaned from the analysis of EMERALD's *Sharī'ah* governance practices could be done by conducting a comparative study of *Sharī'ah* governance institutionalization in various IFIs as well as analyzing how different institutions approach the institutionalization of *Sharī'ah* governance practices, considering variations in size, geographical location, and regulatory frameworks. By addressing these research areas, scholars and practitioners can contribute to a deeper understanding of the dynamics, challenges, and innovations in *Sharī'ah* governance, fostering continuous improvement in IFIs. By pursuing research along these lines, scholars can contribute significantly to the ongoing evolution and enhancement of *Sharī'ah* governance practices in IFIs.

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MACHINE LEARNING IN ISLAMIC ECONOMICS AND FINANCE: A COMPARATIVE BIBLIOMETRIC ANALYSIS WITH THE CONVENTIONAL FIELD

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ABSTRACT

The aim of the study is to perform a bibliometric mapping analysis of machine learning research on *Islāmic* economics and finance in the Web of Science (WOS) database. In the study, a bibliometric analysis was performed on all studies written on the topic of “Machine Learning” with WOS data and in the fields of “Economics” and “Finance” as well as “Islamic Economics” and “Islamic Finance.” The tool VOSviewer (1.6.18) was used to classify the data within the research framework. As a result of the analysis, authoritative authors, journals, institutions, and the most frequently referenced sources in the field were identified. Besides that, information about the country that has done the most work in the field was also expressed as a result of the VOSViewer (1.6.18) program. When evaluating the literature, no study was identified that includes both economic and financial concerns on machine learning and presents a comparative bibliometric mapping analysis by studying *Islāmic* economics and *Islāmic* finance issues. It is believed that this study will contribute to literature in this regard.

JEL classification: G00, Z12, A10

Keywords: Bibliometric analysis, Economy, *Islāmic* finance, *Islāmic* economy, Machine learning

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1. INTRODUCTION

The study of economics and finance is a common subject in the field of economic and administrative sciences and is included in both microeconomics and macroeconomics. The functioning of both fields varies from country to country, and the most obvious difference is observed in the forms of adaptation, which differ according to religious beliefs. If we look at academic studies, we find that four different concepts are mentioned on two bases: *Islāmic* economy, *Islāmic* finance, economy, and finance. This observed distinction has been examined in *Islāmic* economics, and it has been observed that the density of studies in this field is less frequent than the generally published economic and financial studies. This situation explains the gap in the field.

If we evaluate *Islāmic* economics and *Islāmic* finance studies as a single group, it can be observed that religious sources form the basis and reference source of studies in this field. Among these religious sources, they mainly consist of the verses and sayings of the *Qur'ān*, *ḥadīth*, words, *Fiqh* books and the scientific books of religious scholars and pioneers. In addition, the basis for general economic and financial studies consists of legislation, including laws, regulations, statutes, and so forth, as well as sources published by economic schools, economic leaders and researchers conducting academic studies in this field.

In this case, it can be said that while the starting points to be used in general economic and financial studies may vary and new views may be spread in the field, basing the starting point of *Islāmic* studies on unchangeable verses negatively affects the changeability of studies in the field.

When evaluating the studies in the field, there are nine articles written in the field of machine learning and *Islāmic* economics and 11 articles written within machine learning and *Islāmic* finance indexed in the Web of Science database. In addition, it was found that there were 2,928 studies on general economics using machine learning and 1,683 studies on general finance using machine learning.

It can be stated that the studies on machine learning and the field of *Islāmic* economics (Yesilyaprak et al., 2023; Zakaria et al., 2023; Caraka et al., 2022; Hudaefi et al., 2022; Polyzos, Samitas, and Syriopoulos., 2022; Ghlamallah et al., 2021; Ghasiya and Okamura, 2021; Aslam et al., 2020) and *Islāmic* finance (Touri, Ahroum and Achchab, 2024; Caraka et al., 2022; Hudaefi et al., 2022; Polyzos et al., 2022; Ghlamallah et al., 2021; Khan and Rabbani, 2021; Mnif et

al., 2020; Tlemsani, Marir, and Majdalawieh, 2020; Cai et al., 2019; Kartiwi et al., 2018) covered a very small area in the literature.

It is incorrect to say that there are no studies in this field, but when the studies on machine learning in economics and finance are evaluated in general and when these studies in *Islāmic* economics are examined in return, not enough studies are indexed in the Web of Science and the field remains untouched. Although there is a developing understanding of *Islāmic* finance and *Islāmic* economics since the 1960s, when the *Islāmic* economics framework cannot catch up with the rapid rise in machine learning, it shows the lack of interested people and researchers in the field, hence the necessity of increasing studies in this direction.

Thus, this study determines keywords, studies, authors, journals, institutions, and countries regarding the studies in the field by using studies in the literature, in other words, qualitative data, and provides quantitative output by expressing the number of publications and citations. In this respect, the study will contribute to the literature and will serve as a guide for researchers in *Islāmic* economics and *Islāmic* finance in terms of areas to be researched in connection with machine learning.

2. REVIEW OF LITERATURE

Although multiple studies in the literature cover the concept of economy and finance, machine learning can be described as a relatively more current topic. In addition, machine learning has been examined in more than one field; it has been observed that the number of studies on economics and finance is constantly increasing. In addition, it has been observed that machine learning research on *Islāmic* economics and *Islāmic* finance remains very untouched. This study aims at carrying out bibliometric mapping analysis of 2,928 studies on “economy”, 1,683 studies on “finance”, 9 studies on “Islamic economics” and 11 studies on “Islamic finance” written with key words including “machine learning” indexed in the Web of Science. The aim here is to identify and eliminate the gap in the field.

The study is a comprehensive literature review. In this study, the analysis was carried out using the VOSviewer (1.6.18) program, and outputs such as the author who has done the most work in the field, the author with the most citations, the most effective study in the field, the most effective journal and so forth will be obtained. In line with these outputs, content analysis of the studies obtained will be carried

out and an evaluation will be made on why the studies are a reference source.

In addition to the studies, those written on machine learning will be analyzed separately on “economy” and “finance.” The existing literature shows that 103 studies meet all the constraints of “machine learning, economy and finance”. In addition to these studies, only four studies (Yesilyaprak et al., 2023; Caraka et al., 2022; Hudaefi et al., 2022; Polyzos et al., 2022) that combine the topics of “Islamic economics” and “Islamic finance” were identified. The fact that there is no study performing bibliometric mapping analysis among these studies underscores the contribution of this study to the *Islāmic* economics literature.

While examining machine learning, it is important to evaluate the subject scope of five studies examining both “Islamic economics” and “Islamic finance” to know the focus point in this framework. When the review was carried out, one study found was Caraka et al. (2022) who evaluated credit cards from an *Islāmic* perspective. In the study, Indonesia was chosen as a sample, and the borrowing system of credit cards was examined on its *Islāmic* compatibility and the moral burden and elements of debt repayment. The machine learning technique called data mining was used in the study. Here, it is aimed at finding *Islāmic* reference sources by identifying the factors that will create a driving force in debt payment, and the study contributed to the literature.

Hudaefi et al. (2022) focused on the concept of “*zakāt*”, which is of *Islāmic* importance and can be described as a religious duty and examined the compatibility of activities carried out on YouTube and Zoom with the concept of *zakāt* by using machine learning tools. As a result of the study, after determining the most frequently mentioned concepts and subject scopes in the relevant social media tools, contributing findings were obtained regarding *zakāt*.

Polyzos et al. (2022) examined in their study the understanding of *Islāmic* banking, which is frequently researched in terms of its differentiation from traditional banking from an *Islāmic* perspective and whose accuracy is questioned with religious outputs such as hadiths, verses, and so forth. In their study, the authors commented on the basis of the economy by evaluating the efficiency of the sector. In addition, the study was constructed using machine learning techniques, and the results show that the *Islāmic* banking approach negatively affects the economy on a numerical basis, and in addition has a positive effect on stability and happiness.

The last study to be examined was written by Yesilyaprak et al. (2023). This study also evaluated banking by combining economics and finance. This study also assessed banking by combining economics and finance. It evaluated profit rates by using machine learning and determined that the effectiveness of the banking approach in the field tends to increase.

In this direction, within the scope of the study, studies drawn from the Web of Science database will be analyzed and bibliometric mapping analysis of these studies will be carried out comparatively.

3. RESEARCH METHODOLOGY

The analysis method used in the study aims at qualitative output as a result of this data, taking into account the numerical data regarding the studies in literature. The database used to obtain the data in the study is called Web of Science (WOS). The data obtained will be analyzed using the VOSviewer (1.6.18) program, and this analysis is called bibliometric mapping analysis (Heberger, Christie, and Alkin, 2010). The analysis will include key idea analysis, author analysis, institution analysis, country analysis, and so on of academic studies received from the database, and the outputs will include information such as the trend and breadth of research in the area.

The acquired results will be presented in tables in the study's findings section. Each table in the findings section will present all works written on machine learning in the area of economics and finance in two different groups, both *Islāmic* studies and general studies, in a single table. This will enable data comparability.

When the studies in the literature were examined, it was observed that there were more than one study that applied bibliometric mapping analysis and was written within the scope of economics (Kumar et al., 2025; Bijos et al., 2022; Bircan, Akdağ Salah, and Haodong, 2023; Carrasco-Garrido, De-Pablos-Heredero, and Rodríguez-Sánchez, 2023; D'Amato et al., 2017; El Kattan et al., 2023; Espina-Romero and Guerrero Alcedo, 2022; Gundu et al., 2022; Jamwal et al., 2021; Li et al., 2023; Madzik et al., 2023; Walas Mateo and Redchuk, 2021; J. Wang et al., 2022; Xi et al., 2023).

In addition, it is observed that there are multiple bibliometric mapping analysis studies (Ahmed et al., 2022; Goodell et al., 2021; Maria, Ballini, and Souza, 2023; Muñoz and Castañeda, 2023; Nazareth and Ramana Reddy, 2023; Pattnaik et al., 2022; Zakaria et

al., 2023, et al.) written on finance and machine learning. Among the articles to be analyzed, no bibliometric mapping analysis research on machine learning and addressing *Islāmic* economics or *Islāmic* finance was found. Based on this, it is thought that the literature gap in the field of *Islāmic* economics and *Islāmic* finance will be identified, and the study will contribute by comparing the machine learning literature within the scope of economics and finance.

4. FINDINGS OF LITERATURE REVIEW

In this study, studies written on machine learning were evaluated in four separate groups. Relevant groups were obtained using data obtained from the Web of Science database. The first of the mentioned groups was determined as 2,928 studies covering the subject of “economy” and the second was determined as “1,683” studies covering the subject of “finance”. In addition to these studies, bibliometric mapping analysis of nine studies on machine learning and 11 studies on “Islamic economy” and “Islamic finance” will be carried out.

VOSViewer (1.6.18) program was used to analyze these studies taken from the database. The output obtained as a result of the analysis carried out with the program will be expressed under subheadings in this section of the study.

4.1 KEYWORD ANALYSIS OF PUBLISHED RESEARCH

In this part of the analysis, key concept evaluation will be carried out for 4 separate data groups examined in the study. In Figures 1, 2, 3 and 4, mapping analysis outputs are expressed within visuals. In the table, mapping analysis outputs are expressed within visuals, and in Table 1, the relevant data will be expressed quantitatively.

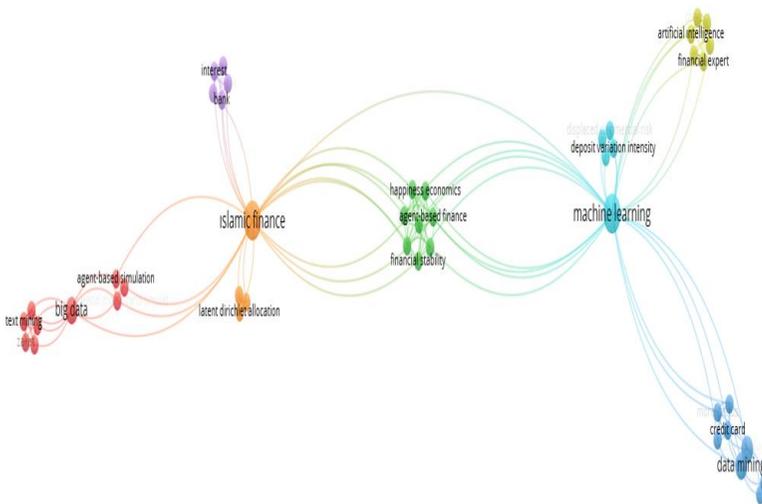
When Figures 1 and 2 are examined, the key concept densities and concept connections of the studies written in the field of economics and covering the subject of machine learning can be observed on an *Islāmic* basis (1) and on a general basis (2). The higher number of studies explains why Figure 2 has a denser network map.

Analyzing both Figure 1 and Figure 2, as well as the data in Table 1, it was found that 'machine learning' was the keyword with the highest usage rate in machine learning and economics - both *Islāmic* economics and general economics. The fact that the word is the main subject of the studies explains this situation. When the term is examined within the figure, it can be seen that it is used more

When the corresponding evaluation was carried out for the general economy, it was determined that there were a total of 2,928 studies and it is stated in Table 1 that the keyword machine learning was included 1,151 times in these studies. Other terms include “Islamic finance”, which is used a total of three times, and “text mining”, which is used two times in *Islāmic* economics studies. In general economics, 'deep learning' is used 195 times and 'artificial intelligence' 171 times. Table 1 gives information about the literature in terms of the ten most effective words.

When Figures 3 and 4 were examined, it was determined that there were 11 *Islāmic* finance studies in total for Figure 3 on machine learning and the most frequently used keywords were “machine learning” and “Islamic finance” and had a total of four uses. Other keywords were identified as “big data”, “data mining” and “feature selection” with two uses.

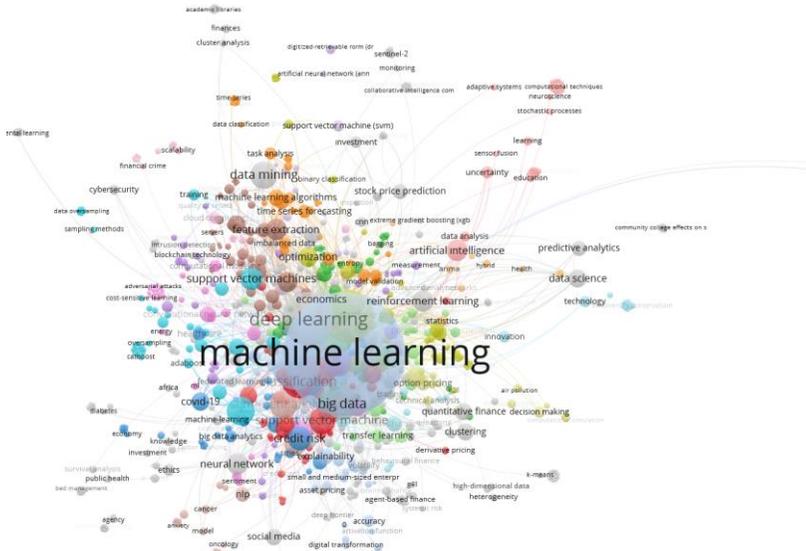
FIGURE 3
Co-occurrence Keyword Mapping Analysis (*Islāmic* -Finance)



Source: Author’s elaboration using VOS viewer

When evaluated for Figure 4, “machine learning” ranks first with 697 uses, followed by “deep learning” with 130 uses, “finance” with 128 uses and “artificial intelligence” with 108 uses. Other concepts can be observed in detail in the table.

FIGURE 4
Co-occurrence Keyword Mapping Analysis (Finance)



Source: Author's elaboration using VOS viewer

4.2 PUBLICATIONS WITH THE MOST CITATIONS

Another analysis output shows the study with the highest citation among the studies examined. The publication information expressed in Table 2 has an important place in terms of expressing the scope of the subject of the studies in the field and knowing the subject guided by the literature.

Table 2 shows that the most cited study among the studies written on machine learning and structured within the framework of *Islāmic* economics was written by Hudaefi et al. (2022). The study is stated in the literature review section and is descriptive of *Islāmic* practices by including the concept of “*zakāt*” within the subject scope. In this respect, it has been made a reference source in literature. The second most cited study (Ghlamallah et al., 2021) included both economics and finance concepts and examined academic studies between 1979 and 2018. In this respect, the study serves as a guide for other fields of studies.

TABLE 1
Co-occurrence Keyword Analysis

<i>Islāmic</i>					
Economy			Finance		
Keywords	Occ.	TLS	Keywords	Occ.	TLS
Machine Learning	3	20	Machine Learning	4	25
<i>Islāmic</i> Finance	3	17	<i>Islāmic</i> Finance	4	21
Text Mining	2	9	Big Data	2	9
Agent-Based Finance	1	9	Data Mining	2	9
Happiness Economics	1	9	Feature Selection	2	9
Financial Stability	1	9	Agent-Based Finance	1	9
Credit Card	1	6	Financial Stability	1	9
Data Mining	1	6	Happiness Economics	1	9
Feature Selection	1	6	Accounting Research	1	7
Moral Status	1	6	Asia-Pacific	1	7
Economics					
Economy			Finance		
Keywords	Occ.	TLS	Keywords	Occ.	TLS
Machine Learning	1151	2527	Machine Learning	697	2032
Deep Learning	195	625	Deep Learning	130	517
Artificial Intelligence	171	534	Finance	128	588
Covid-19	125	362	Artificial Intelligence	108	442
Classification	75	187	Big Data	47	208
Circular Economy	71	204	Classification	45	124
Random Forest	66	216	Neural Networks	41	123
Support Vector Machine	55	111	Forecasting	39	131
Big Data	53	287	Sentiment Analysis	38	135
Forecasting	51	154	Prediction	37	146

Note: Total Link Strength (TLS), Occurrences (Occ.)

Source: Author's elaboration using VOS viewer

TABLE 2
Citation Analysis in Academic Articles

Islamic					
Economy			Finance		
Title	Article	Citation	Title	Article	Citation
Knowledge discovery of <i>zakāt</i> administration worldwide from YouTube and Zoom via text mining	(Hudaefi et al., 2022)	13	Machine Learning and Expert Judgement: Analyzing Emerging Topics in Accounting and Finance Research in the Asia–Pacific	(Cai et al., 2019)	21
The topics of <i>Islāmic</i> economics and finance research.	(Ghlamallah et al., 2021)	10	The topics of <i>Islāmic</i> economics and finance research.	(Ghlamallah et al., 2021)	10
Machine learning in the financial industry: A bibliometric approach to evidencing applications	(Zakaria et al., 2023)	6	Artificial Intelligence and NLP - Based Chatbot for <i>Islāmic</i> Banking and Finance	(Khan and Rabbani, 2021)	10
Indonesian <i>Islāmic</i> moral incentives in credit card debt repayment: A feature selection using various data mining	(Caraka et al., 2022)	4	Big data tools for <i>Islāmic</i> financial analysis	(Mnif et al., 2020)	8

TABLE 2 (continued)

<i>Islāmic</i>					
Economy			Finance		
Title	Article	Citation	Title	Article	Citation
Understanding the Middle East through the eyes of Japan's Newspapers: A topic modelling and sentiment analysis approach.	(Ghasiya and Okamura, 2021)	3	Screening of Murabaha business process through Quran and hadith: A text mining analysis.	(Tlemsani et al., 2020)	6
Knowledge discovery of <i>zakāt</i> administration worldwide from YouTube and Zoom via text mining	(Hudaefi et al., 2022)	2	Indonesian <i>Islāmic</i> moral incentives in credit card debt repayment: A feature selection using various data mining	(Caraka et al., 2022)	4
Forecasting <i>Islāmic</i> securities index using artificial neural networks: Performance evaluation of technical indicators.	(Aslam et al., 2020)	2	Management and monitoring of the displaced commercial risk: A prescriptive approach	(Touri et al., 2024)	2
<i>Islāmic</i> banking, efficiency and societal welfare: A machine-learning, agent-based study	(Polyzos et al., 2022)	0	Knowledge discovery of <i>zakāt</i> administration worldwide from YouTube and Zoom via text mining	(Hudaefi et al., 2022)	13
The Profit Rate-Interest Rate Nexus Evidence from Machine Learning Algorithms	(Yesilyaprak et al., 2023)	0	<i>Islāmic</i> banking, efficiency and societal welfare: A machine-learning, agent-based study	(Polyzos et al., 2022)	0

TABLE 2 (continued)

Economics					
Economy			Finance		
Title	Article	Citation	Title	Article	Citation
Accelerating the discovery of materials for clean energy in the era of smart automation	(Tabor et al., 2018)	397	Power of multifactor dimensionality reduction and penalized logistic regression for detecting gene-gene interaction in a case-control study	(He et al., 2009)	4151
CovidGAN: Data Augmentation using Auxiliary Classifier GAN for Improved Covid-19 Detection	(Waheed et al., 2020)	340	From local explanations to global understanding with explainable AI for trees	(Lundberg et al., 2020)	1846
Circular Economy and Sustainable Manufacturing: A Bibliometric Based Review	(Jain et al., 2022)	205	Discovering governing equations from data by sparse identification of nonlinear dynamical systems	(Brunton, Proctor, and Kutz, 2016)	1625
A machine learning approach on the relationship among solar and wind energy production, coal consumption, GDP, and CO2 emissions	(Magazzino, Alola, and N. Schneider, 2021)	183	Deep learning with long short-term memory networks for financial market predictions	(Fischer and Krauss, 2018)	794

TABLE 2 (continued)

Economics					
Economy			Finance		
Title	Article	Citation	Title	Article	Citation
Economic complexity theory and applications	(Hidalgo, 2021)	178	Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy	(Dwivedi et al., 2021)	645
CoroDet: A deep learning-based classification for COVID-19 detection using chest X-ray images	(Hussain et al., 2021)	171	Recent advances in robust optimization: An overview	(Gabrel, Murat, and Thiele, 2014)	520
An ensemble machine learning approach through effective feature extraction to classify fake news	(Gadekallu et al., 2021)	169	An Introduction to Deep Reinforcement Learning	(François-Lavet et al., 2018)	510

Source: Author's elaboration using VOS viewer

Among the studies written on machine learning and within the scope of general economics, the study with the highest number of citations was Tabor et al. (2018) with 397 citations. The author makes evaluations on the basis of economy, emphasizing the benefits of integrated research systems developed based on new smart technologies within the scope of machine learning, with the influence of technology. The fact that the smart technology applications included in the study save time and support cost minimization increases the importance of the study in literature.

Another study (Waheed et al., 2020) ranks second with 340 citations. The study was built based on the global pandemic crisis and is a machine learning study that concerns the field of health and economy together. In the study, smart technologies are integrated with the detection of disease symptoms and application-oriented outputs are presented to speed up disease detection. The study contributes to the field and offers a new method that explains its effectiveness in literature.

When evaluated within the scope of finance, it is observed that the most cited study (Cai et al., 2019) on *Islāmic* finance is evaluated for the Asia-Pacific region. This study aims at using machine learning for literature review. In line with this purpose, the development of the qualitative analysis method of the study increases its contribution to the literature. The study is categorized under finance because of the inclusion of accounting and finance research in the literature review.

In the analysis outputs of general economic studies analyzed on finance, the most cited study (He et al., 2009) also uses machine learning elements. The study is a case-control study in which 200 cases were examined. The study evaluates gene interaction. The study provides outputs that contribute to the finance literature.

4.3 JOURNALS WITH THE MOST PUBLICATIONS

Another analysis shows the journals that publish studies in the field. Identification of these journals enables the identification of sources that contribute to the field and the identification of leading studies in the field.

When the table is examined, among the studies written on machine learning on the basis of Islam, the journal that has contributed the most publications to the literature for those within the scope of economics is the "International Journal of Islamic and Middle Eastern Finance and Management". While a total of 9 studies exist in the field,

3 of them are published in this journal. When the evaluation is made for 11 studies contributing to the literature in the field of finance within the same group, it is observed that two journals rank first with 2 publications. These journals were identified as “International Journal of Islamic and Middle Eastern Finance and Management” and “Journal of Islamic Accounting and Business Research.”

The relevant evaluation was also carried out for studies within the framework of general economy. Among these studies, it was determined that there were 2928 studies within the scope of “economy” and it was determined that the journal in which 67 studies were published most was “Sustainability” and the studies published in the journal received a total of 429 citations in this journal. Following this journal is “IEEE Access” with 57 publications and 1147 citations, and “Energies” journal with 42 publications and 485 citations.

When the 1683 studies indexed in the Web of Science database within the scope of “finance” were examined, the journal that contributed the most publications to the literature was stated as “IEEE Access” with 58 publications and 626 citations. Following the relevant journal, there is the journal “Expert Systems with Applications” with 36 publications and 1138 citations, and the journal “Computational Economics” with 19 publications and 155 citations. The excess publication and citation numbers of the mentioned journals can be found in Table 3.

4.4 THE MOST ACTIVE WRITER IN THE FIELD

In this part of the study, it is also necessary to examine the author who is most active in the field under examination. The analysis output, based on the data obtained in the section, is expressed below in both tables and figures.

Figure 5 illustrates the collaboration between authors within the scope of *Islāmic* Economics studies. Figure 5 shows that clusters have formed among authors and that studies intensified in 2022, while the existence of new studies published in 2023 indicates that the subject is still being investigated.

Figure 6 shows author collaboration for studies in the economics category.

TABLE 3
Top Publications by Sources and Number of Citations

Islamic					
Economy			Finance		
Journal	Article	Citation	Journal	Article	Citation
International Journal of Islamic and Middle Eastern Finance and Management	3	17	International Journal of Islamic and Middle Eastern Finance and Management	2	4
Journal of Islamic Accounting and Business Research	1	2	Journal of Islamic Accounting and Business Research	2	8
International Review of Economics and Finance	1	10	International Journal of Emerging Markets	1	2
Turkish Journal of Islamic Economics-TUJISE	1	0	International Review of Economics and Finance	1	10
Digital Scholarship in the Humanities	1	3	Turkish Journal of Islamic Economics-TUJISE	1	0
Journal of Economic and Administrative Sciences	1	2	Abacus- A Journal of Accounting Finance and Business Studies	1	21
Intellectual Discourse	1	6	Intelligent Systems in Accounting Finance and Management	1	8

TABLE 3 (continued)

Economics					
Economy			Finance		
Journal	Article	Citation	Journal	Article	Citation
Sustainability	67	429	IEEE Access	58	626
IEEE Access	57	1147	Expert Systems with Applications	36	1138
Energies	42	485	Computational Economics	19	155
Journal of Cleaner Production	28	1093	Mathematics	18	120
Plos One	24	168	Neural Computing and Applications	17	258
Sensors	22	158	Frontiers in Artificial Intelligence	17	25
Remote Sensing	19	238	Applied Sciences-Basel	16	287
Expert Systems with Applications	19	375	European Journal of Operational Research	15	1774

Source: Author's elaboration using VOS viewer

FIGURE 5
Author Elaborating (*Islāmic* Economy)

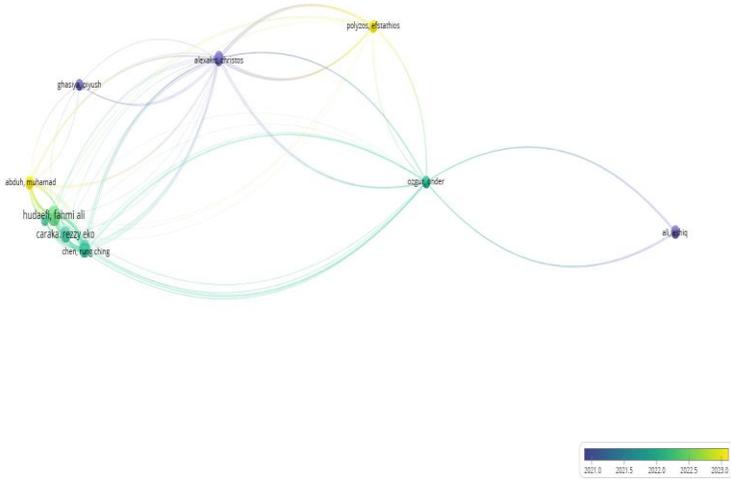


FIGURE 6
Author Elaborating (Economy)



Source: Author's elaboration using VOS viewer.

When the data obtained was examined, the author who published the most on studies in *Islāmic* economics within the scope of machine learning and economics was determined to be “Hudaefi, Fahmi A” with three publications. Following the author is “Caraka, Rezzy E” with two works.

When the authors who brought general economics studies to the literature were evaluated, it was determined that “Mele Marco” ranked first with nine studies, and “Magazzino, Cosimo” followed the author with eight studies. The identified authors remain leaders in the field.

Figure 7 evaluates author collaboration analysis for academic studies in the *Islāmic* finance category. The scaling shows that literature remains up-to-date in finance studies with high author network connectivity.

Figure 8 shows the finance category, and both tables must be considered when making an assessment.

When both tables are evaluated together, it can be seen that the number of authors working in the field of finance is higher than those working in the field of *Islāmic* finance. Although fewer authors are visible on the map in the field of *Islāmic* finance, it can be stated that the network connection between authors is higher.

In addition, the table shows that there is a weak network connection among authors working in the field of finance. This can be evaluated in the context of intensive work in both *Islāmic* finance and general finance.

When the table is examined, when the 11 studies examining the subject of *Islāmic* finance are evaluated, “Hudaefi, Fahmi A” has the highest number of publications, just like in *Islāmic* economics studies. The author contributed a total of 2 studies to the literature in this field and received 6 citations with these studies. The author is followed by “Hasan, M Kabir” with 2 publications and 10 citations. It is also observed within the mapping analysis that the works of “Hasan, M Kabir” are more up to date than the works of “Hudaefi, Fahmi A”. Other studies are shown in detail in the table.

When other studies written in the field of finance and not *Islāmic* finance were examined, it was determined that 5 of the 1683 studies analyzed were written by “Creamer, German G”, “Kumar, Satish”, “Papadimitriou, Theophilos”, “Garcia-Mendez, Silvia”, “Hansen, Kristian B” and “Boyd, Stephen”. In this regard, it can be stated that the authors ranked first in terms of the number of publications.

TABLE 4
 Authors, Article(s), Citation, and Total Link Strength

Islamic					
Economy			Finance		
Author	Art.	Cite.	Author	Art.	Cite.
Hudaefi, Fahmi A.	3	19	Hudaefi, Fahmi A.	2	6
Caraka, Rezzy E.	2	17	Hasan, M. Kabir	2	10
Alexakis, Christos	1	10	Alexakis, Christos	1	10
Dowling, Michael	1	10	Dowling, Michael	1	10
Ghلامallah, Ezzedine	1	10	Ghلامallah, Ezzedine	1	10
Piepenbrink, Anke	1	10	Piepenbrink, Anke	1	10
Chen, Rung C.	1	4	Caraka, Rezzy E.	1	4
Goldameir, Norr E.	1	4	Chen, Rung C.	1	4
Toharudin, Toni	1	4	Goldameir, Norr E.	1	4
Tyasti, Avia E.	1	4	Toharudin, Toni	1	4
Ugiana, Prana	1	4	Tyasti, Avia E.	1	4
Economics					
Economy			Finance		
Author	Art.	Cite.	Author	Art.	Cite.
Mele, Marco	9	450	Creamer, German G.	5	188
Magazzino, Cosimo	8	447	Kumar, Satish	5	245
Li, Jie	7	83	Papadimitriou, Theophilos	5	65
Ramakrishna, Seeram	6	120	Garcia- Mendez, Silvia	5	21
Schneider, Nicolas	6	402	Hansen, Kristian B.	5	57
Kumar, Anil	6	199	Boyd, Stephen	5	441

TABLE 4 (continued)

Economics					
Economy			Finance		
Author	Art.	Cite.	Author	Art.	Cite.
Khan, Muhammad A.	6	46	Krauss, Christopher	4	1076
Zhang, Lei	6	8	Eachempati, Prajwal	4	42
Liu, Wei	5	60	Srivastava, Praveen R.	4	42
Xiao, Dong	5	68	Lim, Weng M	4	237
Fan, Shuangshuang	5	21	Samitas, Aristeidis	4	27

Note: Article (Art.), Citation (Cite)

Source: Author's elaboration using VOS viewer

4.5 INSTITUTIONS WITH MOST PUBLICATIONS

When the journals that published studies written on machine learning and based on *Islāmic* principles were examined, the institution contributing the highest number of publications to the literature in *Islāmic* economics was determined to be “University of Indonesia” with two publications and 17 citations. Following this institution, “BAZNAS Center of Strategic Studies”, “Seoul National University”, “University Kebangsaan Malaysia” and “University Brunei Darussalam” are observed with 13 citations and one publication each.

After studies in the field of *Islāmic* finance were examined, the institution that published two of the 11 studies analyzed were identified as “University of Indonesia”, “University of New Orleans” and “Zayed University”.

When studies within the framework of general economics were evaluated, 2928 studies in “machine learning” on the subject of “economy” were analyzed. The most effective institution in the field was determined to be the “Chinese Academy of Sciences” with 40 publications and 630 citations. The journal is followed by “Tsinghua University” with 23 publications and “University of the Chinese Academy of Sciences” with 21 publications.

TABLE 5
Top Publishing Institutions

<i>Islāmic</i>					
Economy			Finance		
Institution	Art.	Cite.	Institution	Art.	Cite.
University of Indonesia	2	17	University of Indonesia	2	4
BAZNAS Center of Strategic Studies	1	13	University of New Orleans	2	10
Seoul National University	1	13	Zayed University	2	6
Universiti Kebangsaan Malaysia	1	13	Chaoyang University of Technology	1	4
University of Brunei Darussalam	1	13	Darussalam Institute of Islamic Studies	1	4
Chaoyang University of Technology	1	4	Padjadjaran State University	1	4
Padjadjaran State University	1	4	Polytechnic Application University	1	4
Polytechnic Application University	1	4	Riau University	1	4
Riau University	1	4	Universitas Sumatera Utara	1	4
Universitas Sumatera Utara	1	4	University of Brunei Darussalam	1	2
Darussalam Institute of Islamic Studies	1	4	IPB University	1	2

TABLE 5 (continued)

Economics					
Economy			Finance		
Institution	Art.	Cite.	Institution	Art.	Cite.
Chinese Academy of Sciences	40	630	Stanford University	21	1608
Tsinghua University	23	373	New York University	18	71
University of the Chinese Academy of Sciences	21	165	University of Illinois Urbana	15	196
University of Johannesburg	19	202	Massachusetts Institute of Technology	15	792
Zhejiang University	19	164	Chinese Academy of Sciences	14	404
King Abdulaziz University	19	389	Tsinghua University	14	153
Beijing Institute of Technology	18	319	Stevens Institute of Technology	14	4385
University College London	17	129	Nanyang Technological University	13	257
Tongji University	17	128	University of Boston	12	295
University of California, Berkeley	16	654	University of Washington	12	3873

Note: Article (Art.), Citation (Cite)

Source: Author's elaboration using VOS viewer

When studies in finance are evaluated, “Stanford University” ranks first with 21 publications and 1608 citations. Following the identified institutions are “New York University” with 18 publications, “University of Illinois Urbana” and “Massachusetts Institute of Technology” with 15 publications. Detailed information can be found on the table.

4.6 COUNTRIES WITH THE MOST PUBLICATIONS

The last restriction, in which the data obtained in the study will be analyzed using the VOS Viewer (1.6.18) program, is country analysis. The data obtained in this section provides a quantitative output based on the country where the journal publishing studies were brought to literature and the country where the authors are affiliated with the institutions.

When Table 6 is examined, it reveals a total of 9 studies in *Islāmic* economics, but it was determined that 3 of these studies were published in Indonesia and 2 of them were published in Malaysia. In this regard, it can be stated that these two countries are active in the field.

When economic studies on a general basis are evaluated in the study a total of 2,928 articles were examined. The People's Republic of China ranks first with 700 publications, followed by the USA with 492 publications, and India with 403 publications.

For studies in *Islāmic* finance, the two countries that came first were identified with 2 publications for “Indonesia” and “USA”. When the evaluation is made for general finance studies, USA ranks first with 392 publications. The country has received a total of 16150 citations with its published studies and is by far the most effective country in the field. Following USA are the Peoples Republic of China (352, 3850) and India (170, 1920) in terms of publication and citation numbers, respectively. Table 6 gives detailed information about the countries and their publication and citation numbers.

Figures 9 and 10 provide information about the countries that have contributed the most publications to literature. The countries listed in Figure 9 show the countries that are active in studies within the scope of *Islāmic* economics, and it can be seen that the most recent publications are from Brunei and the USA.

TABLE 6
Publications by Countries

Islamic					
Economy			Finance		
Country	Art.	Cite.	Country	Art.	Cite.
Indonesia	3	19	Indonesia	3	6
Malaysia	2	19	USA	2	10
South Korea	1	13	France	2	18
Brunei	1	2	United Arab Emirates	2	6
USA	1	2	Brunei	1	2
Taiwan	1	4	Tunisia	1	8
France	1	10	Taiwan	1	4
United Arab Emirates	1	0	Spain	1	6
Turkey	1	0	Malaysia	1	0
Japan	1	0	Morocco	1	2
Pakistan	1	2	Turkey	1	0

Economic					
Economy			Finance		
Country	Art.	Cite.	Country	Art.	Cite.
Peoples r China	700	6035	USA	392	16150
USA	492	8302	Peoples r China	352	3850
India	403	3920	India	170	1920
England	188	3987	England	130	3394
Spain	121	1655	Germany	88	2387
Germany	114	1736	Italy	78	1974
Saudi Arabia	107	1091	France	73	1720
Australia	103	1816	Canada	63	1630
Italy	103	1656	Spain	54	868
Canada	100	1825	Australia	52	579

Note: Article (Art.), Citation (Cite)

Source: Author's elaboration using VOS viewer

The countries shown in Figure 10 represent countries where research has been conducted in the field of general economics. This indicates that publication intensity is high and that 2021 is ahead in terms of publications. In addition to the high number of countries and publications, network connectivity is also high.

The countries operating in the *Islāmic* finance sector within the financial industry are Brunei, Indonesia, Malaysia, Taiwan, Morocco, Turkey, the United Arab Emirates, Spain, France and Tunisia. The countries contributing to the literature with the most recent publications are Brunei, Taiwan and Turkey. The highest number of publications has been identified in Indonesia.

When the figure is examined, it is determined that among the countries that have published studies on “*Islāmic* economy”, the countries that have contributed the most up-to-date studies to the literature are Brunei and the USA. When the analysis is carried out for economic studies on a general basis, it is observed that the publications of “People's Republic of China”, which brought the most studies in the field to the literature, were published on average in 2021, and the studies in “USA”, which ranked second, were published mainly between 2019-2020.

The countries contributing the most up-to-date publications to the literature on studies in *Islāmic* finance were identified as Brunei, Taiwan and Turkey. Following the relevant countries, it is observed that the publication year of the USA, which has the highest publication for general finance studies, is mostly between 2019-2020, and for the Peoples' Republic of China and India, it is mostly between 2020-2021. It is observed that Lebanon, Guinea, Turkey, and Nigeria, are among the countries contributing the most up-to-date studies to the literature.

5. DISCUSSION AND CONCLUSION

This study was created to present quantitative outputs by processing the qualitative data obtained in the Web of Science database through the VOS Viewer (1.6.18) program. The data used in the study were obtained from the Web of Science database and were created as a result of examining four separate concepts on two separate bases. When the data groups used in the study were examined, nine studies on “Islamic economics and machine learning”, 11 studies on “Islamic finance and machine learning”, 2928 studies on “economy and machine learning” and 1683 studies on “finance and machine learning” were extracted from the database for analysis. A detailed literature review was conducted by examining the obtained studies.

When the analysis outputs were evaluated, it was determined that Indonesia carried out the most studies on *Islāmic* economics and *Islāmic* finance. In addition, on a general basis, the most effective countries in economic studies were the Peoples' Republic of China (PRC) and USA, respectively, and for studies in the field of finance, USA and PRC.

Another finding is that the most frequently used key concept was found to be 'machine learning' for all four review topics. When examining the most cited studies, it was found that Hudaefi et al. (2022), studies in the field of *Islāmic* economics, and Cai et al. (2019), studies in *Islāmic* finance, came first with 13 and 10 citations respectively. When evaluated on a general basis for economics and finance studies, the work of He et al. (2009) ranked first for finance studies and Tabor et al. (2018) ranked first for economics studies.

When the authoritative journal in the field is identified for studies on *Islāmic* basis, it can be stated that the International Journal of Islamic and Middle Eastern Finance and Management, Journal of Islamic Accounting and Business Research and International Review of Economics and Finance are important in both *Islāmic* economy and *Islāmic* finance, respectively. Sustainability ranked first in general economics studies and IEEE Access ranked first in general finance studies.

On an institutional basis, the leading institution for *Islāmic* studies is the University of Indonesia. For general economics, this institution includes the Chinese Academy of Sciences and Tsinghua University, and for general finance, Stanford University and New York University.

This study contributes to the literature by examining studies on machine learning and economics and *Islāmic* economics, as well as studies in finance and *Islāmic* finance. In addition, it is effective as it is the first study to carry out such a comprehensive literature review through “bibliometric mapping analysis”.

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IN-VITRO FERTILIZATION AND THE *ISLĀMIC* LAW OF INHERITANCE

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ABSTRACT

The advent of In-Vitro Fertilization (IVF) and the great strides made by the medical profession in Assisted Reproductive Technology (ART) raises serious concerns. These concerns include the legality of the procedure, the lineage of the children produced through IVF, and their inheritance, if at all they have inheritance rights. One uniqueness of the *Sharī'ah* is that it provides solutions to every problem or situation. The Islamic law of inheritance is so comprehensive to the extent that it does not neglect any possible case that might arise till the last day, including the issue of how IVF children inherit. This article discusses the different scenarios that might arise concerning the inheritance of a fetus from IVF. Several assumptions need to be addressed depending on the circumstances based on whether the child was born dead or alive, the gender of a single child and more than one child with similar or different genders in multiparity cases, whether identical or fraternal from a single pregnancy. The article addresses each one of these and gives examples of how the distribution would be conducted. A brief literature review is also included on how other authors have addressed the issue and the research gap thus identified. The is non-empirical qualitative research reliant on secondary data for its analysis.

JEL Classification: J13, K36

Keywords: IVF, Inheritance, *Sharī'ah*, *al-Nisab al-Arba'ah*

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1. INTRODUCTION

Islāmic Sharī'ah puts much weight on the preservation of progeny. Anything that contributes to ruining honor, dignity, integrity, lineage and family life is prohibited and rejected by *Islām*. The *Qur'ān* commanded both males and females to lower their gaze (*Qur'ān*, 24,

Āyah: 30-31). Other *Sharī'ah* guidelines included: observing hijab in one's dress and behavior, no free mixing between genders, prohibition of women travelling without their *mahrams*, seeking permission before entering people's territories and the prohibition of *al-khalwah*.

The advent of In-Vitro Fertilization (IVF) and the great advances in terms of Assisted Reproductive Technology (ART), however, raises serious concerns. Besides the legality issue, whether or not the *Sharī'ah* recognizes it, another pressing matter is the inheritance of those involved in 'successful' IVF procedures: the question is, who inherits who in the different scenarios of IVF as practiced in the medical profession?

One uniqueness of the *Sharī'ah* is that it provides solutions to every problem. This is manifested in the saying of Allāh *'azza wa jalla*: "And We have explained everything (in detail) with full explanation" (*Qur'ān*, 17, *Āyah*: 12). Thus, IVF like any other issues arising in the community, is included in the details mentioned by this verse. The *Islāmic* law of inheritance is so comprehensive to the extent that it did not neglect any possible case that might arise till the Last Day. However, this issue is one of the most sensitive matters and the *Qur'ān* has paid great attention to it. Negligence in this matter leads to instability in the family system. In this contemporary era the breaking of family ties due to enmity and hatred, which in some instances led to lost lives and wealth, are rampant. All these negative consequences are the result of wrong *fatwas* that are given by unqualified people because of absence of *taqwā* in their lives. For this reason, the *Qur'ān* is very strict on this matter and has laid down laws to govern it. It says, after discussing some of the matters of inheritance: "These are the limits (set by) Allāh *'azza wa jalla*, and whosoever obeys Allāh *'azza wa jalla* and His Messenger, will be admitted to Gardens under which rivers flow, to abide therein, and that will be the great success. And whosoever disobeys Allāh *'azza wa jalla* and His Messenger, and transgresses His (set) limits, He will cast him into the Fire, to abide therein; and he shall have a disgraceful torment (*Qur'ān*, 4, *Āyah*: 13-14). In the last *āyah* of the same *Sūrah* the *Qur'ān* concluded the *Sūrah* with: "(Thus) does Allāh *'azza wa jalla* make clear to you (His Law) lest you go astray. And Allāh *'azza wa jalla* is the All-Knower of everything" (*Qur'ān*, 4, *Āyah*: 176).

IVF is a phenomenon from the West that was introduced to *Muslim* communities. An explanation has been given in another work by this author on how it is carried out and the *Sharī'ah* legal ruling concerning the matter (Tahir, 2023) In this article the researcher will focus on how to deal with children conceived through IVF. What will

be the best mechanism in detecting the status of their life? What will be the nature of their inheritance and which child among them inherits since not all types of IVF are legal?

2. IN-VITRO FERTILIZATION: BACKGROUND

In-vitro fertilization (IVF) is a type of Assisted Reproductive Technology (ART). It involves retrieving eggs from a woman's ovaries and fertilizing them with sperm in the lab. This fertilized egg is known as an embryo. The embryo can then be frozen for storage or transferred to a woman's uterus (Martel, 2016)

2.1 A BRIEF BACKGROUND ON IN-VITRO FERTILIZATION

The medical profession achieved a significant milestone in 1978 when Louise Joy Brown, the first IVF or "test-tube baby" was born. This was a culmination of efforts in different areas related to fertility and the human reproductive system. Some major events include: the discovery that the combination of sperm and egg was the cause of pregnancy in the 1800s, the first attempt of intrauterine insemination from the husband's sperm and when doctors learnt how oocyte fertilization occurs in the 1960s and 1970s. The use of IVF to treat infertility has made it a popular option for individuals unable to conceive with around 1-3% of children born across the globe being a result of IVF (RMA, 2022; Eskew and Jungheim, 2017). Other spin-off developments include: use of donor gametes, surrogacy and the testing of embryos for morbidity causes/factors (Eskew and Jungheim, 2017) Although the field was heavily influenced by moral and ethical opinion in the beginning, science has generally taken the lead in deciding what is acceptable and what is not as voices of dissent have significantly reduced.

2.2 ARTIFICIAL INSEMINATION AND THE RULINGS

This section describes the seven methods of Artificial Insemination (Al-Salus, 2008). They are as follows:

- a. Where the seed/sperm of the man is taken in a syringe and placed within the correct position in the vagina of his wife or her womb, as internal insemination. This is in order for the sperm to meet with the egg that is naturally produced by his wife's ovary. Fertilization will then take place between them and then its product blastocyst attaches to the uterine wall by the will of Allāh *'azza wa jalla*, almost similar to that which

happens through normal sexual intercourse (Al-Salus, 2008). This is the usual insemination which does not happen as “in-vitro” as the sperm are only inseminated into the uterus. Fertilization then occurs naturally.

- b. Where the sperm and an egg are taken from a couple, inseminated externally in the medical Test-Tube and then later (the fertilized egg is) planted in the womb of the wife (who is the owner of the egg), where it will attach itself to uterus. It will be implanted there and continue to develop until the end of the pregnancy duration, where she will give birth to a child by the will of Allāh *'azza wa jalla* (Al-Salus, 2008).
- c. Where the insemination takes place externally in the medical test-tube between the seeds of a couple, then later (the fertilized egg) will be planted in the womb of the husband's other wife (who volunteers to carry it) (Al-Salus, 2008).
- d. Where the insemination takes place between the seeds of a couple, then the fertilized egg is planted in the womb of a strange woman who volunteers to carry it (Al-Salus, 2008).
- e. Where the insemination takes place externally between the seeds of two alien (not married) persons and then later (the fertilized egg) is planted in the womb of a wife of another man (Al-Salus, 2008).
- f. Where the sperm is taken from a man, which will be injected in the appropriate place of the wife of another person, so that fertilization between the sperm of a man and an egg of the other person's wife will take place internally and then attaches to the wall of the uterus by the will of Allāh *'azza wa jalla*. This is almost similar to what happens as a result of normal sexual intercourse (Al-Salus, 2008).
- g. Where the insemination is done externally in the medical lab between the sperm of a husband and an egg taken from the ovary of a woman other than his wife (who is known as a volunteer), and then later the fertilized egg is planted in the womb of his wife (Al-Salus, 2008).

IVF is one of the contemporary issues causing great concern among scholars. Some scholars say that IVF should be considered impermissible to be on the safe side. This is also reported to be the view of the Standing Committee of Saudi Arabia (Al-Munajjid, 2007).

Ibn Uthaimin was reported to have said concerning IVF: (... This is a very serious issue. Who can be certain that the doctor will not put the sperm of one man in the uterus of someone else's wife?!

Hence, we think that precautions must be taken and we should not issue *fatwas* except in specific cases where we know the man, the woman and the doctor. The matter is not to be taken lightly, because if any deceit takes place, it means that lineages will be mixed, and there will be chaos, which is something that *Shari'ah* has forbidden. Hence the Prophet (*ṣal-Allāhu 'alayhi wa sallam*) said: "One should not have intercourse with a pregnant woman until she gives birth." (Al-Sijistānī, 1969). Thus, I will not issue *fatwas* to this effect, unless a specific case is referred to me and I know the man, the woman and the doctor) (Al-Sulaimani, 1413).

Al-Bar (2021) quotes the position taken by the Islamic Fiqh Council of the Organization of the Islamic Conference: "There is nothing wrong with resorting to this in the case of need, but it is absolutely essential to take all necessary precautions." Al-Munajjid (2001) responded to a question on IVF with the following: "If a third party, other than the spouses, is introduced into the process of fertilization, such as eggs coming from another woman or another woman acting as a surrogate mother, or sperm coming from another man, then fertilization in such cases is *haram*, because it is counted as *zinā* (adultery). When a woman uses the sperm of a man, this comes under the same rulings as intercourse in terms of what is *halal* and what is *haram*. Regarding the child who is born as the result of such a process, he is to be attributed to the mother who bore him, and not to the man who produced the sperm, as is the ruling in the case of *zinā* (fornication or adultery). If that man claims to be the father and no one disputes that, then the child may be attributed to him, because the Lawgiver is keen that people should be named after their fathers. With regard to the *ḥadīth*, "The child belongs to the (marriage-)bed and for the adulterer is the stone" (Al-Bukhārī, 1987) it is to be interpreted as referring to cases where there is a dispute, as is clear from the incident which gave rise to this *ḥadīth* (Al-Munajjid, 2001). These are some of the different views expressed by contemporary scholars pertaining to IVF and its practice.

According to the researcher's findings, only two potentially permissible methods of IVF exist. The first method is where the seed of the husband is taken in a syringe and injected within the correct position in the vagina of his wife or her womb (internal insemination). The second method is where the gametes of the couple are taken from them and then inseminated externally in the medical lab and then later (the fertilized egg is) planted in the wife's uterus (she is the owner of the egg). Henceforth, it will be attached to the uterus wall where it will continue to develop until the end of gestation. If Allāh *'azza wa jalla*

wills, she will give birth to a child (Al-Salus, 2008). The second method of IVF is Islamically permitted, according to some scholars, if the stipulated conditions are met and the need of the couple to carry out IVF is established. They deem it permissible given that the gametes are from the married couple and planted in the wife's womb without a third party which resembles the process and results of natural reproduction. The general conditions laid down by the scholars who permitted the practice of IVF for a husband and his wife are mentioned by Tahir (2023).

The second method was initially tolerated but was later proven to have serious ethical and trust issues. These issues of ethics and trust stem from the fact that the process is conducted outside the wife's womb before it is placed in it which makes it exposed to manipulation or a mix up, even if unintentional. A *Muslim* should avoid this method unless it is absolutely necessary.

The third method is similar to the second method except in this case the fertilized egg is placed in the womb of a third party, another wife of the husband and not the wife who the egg is extracted from. The Committee of the Islamic Conference had initially considered this to be permissible in its third sitting but revoked this ruling in a subsequent meeting. They gave the following reasons for their revocation:

- a. It is risky as it might be difficult to determine the true mother as the surrogate wife might conceive due to a sexual relationship with their husband close to the implantation period before the womb seals itself. It is highly possible for her to then carry twins and not be able to determine which child is hers and which one is her co-wife's upon delivery of both.
- b. Similarly, the clot of blood or embryo of one of the pregnancies mentioned in the above point might die and remain in the womb till the time of the delivery where it comes out together with the baby when it is delivered (Al-Salus, 2008).

Thus, given the different aspects or components of the third method, it is possible to mix lineages due to uncertainty about actual parents of the child (Al-Salus, 2008). Furthermore, the removal of eggs from a woman's ovaries to her uterus is unethical. The rest of the other methods (from 4-7) are impermissible as they include or require the participation of a third party either by the use of their gametes or a strange woman's womb (Al-Salus, 2008).

3. THE *ISLĀMIC* LEGAL RULING

Ibn ‘Uthaymin (may Allāh ‘azza wa jalla have mercy on him) asserted that if there is no need for IVF then it is not permissible as it involves uncovering the ‘awrah unnecessarily. He stated that if it is deemed necessary then strict measures have to be in place to ensure that the husband’s sperms are taken in a permissible manner and only the gametes of the husband and his wife are fertilized and placed in the wife’s uterus with no storage of gametes for later use. The husband or someone he trusts should be present to ensure these measures are implemented (Al-Sulaimani, 1413).

4. ETHICAL CONSIDERATIONS AND POSSIBLE ALTERNATIVES

When tested, *Muslims* should be patient and seek reward from The Giver of everything. Similarly, they should intensify their *du‘ās* to Allāh ‘azza wa jalla and ask for His forgiveness. They should understand that there is wisdom behind Allāh ‘azza wa jalla’s decree. In addition, it is also permissible for those with access to Islamically acceptable means of getting children to pursue them. IVF is one of the practices that violates some of the restrictions that *Islām* placed in preserving the ‘awrah and guarding modesty. In *Islām* having children is not obligatory upon everyone, thus, on what basis does a *Muslim* expose his/her private parts since IVF is not a medicine? It is not a medical treatment, rather, it is just an attempt to do the reproduction process manually. And if this is the case, there is no proper justification for the *awrah* to be shown to other than the spouse.

In *Islām* it is not necessary that whenever something is prohibited an alternative has to be provided. However, a possible alternative for IVF is to enhance the belief in the *Qadā’* and *Qadar* and to intensify dua’s to Allāh ‘azza wa jalla. History has confirmed the effectiveness of this method of returning to Allāh ‘azza wa jalla via du’a. Prophet Ibrahim and Zakariyyah are the best examples to support this fact. (*Qur’ān*, 51:28-30 and *Qur’ān*, 21: 89-90). Similarly, the use of natural and divinely given medicine such as authentic honey or black seed and many other tested and effective herbs could act as the best solution by the Grace of Allāh ‘azza wa jalla. Finally, one of the most effective ways to gain children is to fix the relationship between a *Muslim* and The Creator. This could be done through a collective and sincere repentance, being dedicated and committed to practicing the religion as Prophet Nuh said when he was

inviting his people to worshipping Allāh ‘azza wa jalla alone (*Qur’ān*, 71: 10-13).

5. IVF AND INHERITANCE

The literature available generally discusses the question of whether a child from one of the methods of IVF is considered legitimate or not. Sudirman et al. (2022) are among the few writers who delve into the challenges presented by IVF in terms of determining lineage and inheritance. They also stated that the child born through a surrogate mother can only inherit the mother who gave birth to him. This is a different opinion from Pasaribu et al. (2019) who state that the child inherits from the biological parents and not the surrogate mother. Sudirman et al. (2022) assert that in the instance of a sperm donor being other than the birth mother’s husband, then he as a biological father does not have legal ties with the child and thus, they do not inherit each other. Abdulrasheed (2020) in his work has a chapter dedicated to discussing the consequences of IVF in terms of inheritance. He also raises the same concerns by Sudirman et al. (2022) concerning the lineage and thus inheritance of a child born through a surrogate mother. Regardless of the important issues raised by the different authors, none of them go into detail about how the inheritance of an IVF child would be distributed in the different circumstances where it is attributed to one or both of the parents. The only attempt made to go into a few details about the inheritance of the IVF child is Pasaribu et al. (2019). It seems that the authors, however, are insufficiently equipped with the knowledge of inheritance and their work can do more harm than good if the layman tries to distribute the inheritance by following their works.

6. DISCUSSION

In inheritance, certain conditions must be fulfilled before an estate is distributed to the rightful heirs. Among these conditions are conditions related to the heirs. An heir cannot inherit the deceased unless the following conditions and causes are met: It must be confirmed that he is related to the deceased either through the lineage, marriage or guardianship over a slave, it must also be confirmed that the child survived the deceased, he must be alive after the death of the deceased or in the case of pregnancy, he must be in existence in the womb after his death and he has to be born alive (Tahir, 2015).

Finally, all the factors that deprive a person from inheritance (such as murder, disbelief, and slavery) must be absent (Tahir, 2015).

These are the areas of concern and attention before any distribution of an estate takes place. These are applicable in normal circumstances where the normal process in reproduction is followed. In the case at hand, the focus on detecting the life of a child will mainly depend on the information provided by the medical experts involved in that particular case. It is evident that there are many children, leading normal lives, who were born through IVF. This is a clear indicator that those sperms and eggs inseminated in the lab contain lives in them. But when does conception take place in the process of IVF? Based on the experts' experience, pregnancy occurs when the embryo implants in the lining of the uterus, and this may take about 7 to 10 days after the embryo is implanted in the uterus (al-Rays, 2022; Mayo Clinic, 2022) and the doctor constantly monitors its occurrence through ultrasound to ensure stability of the pregnancy. Then the pregnancy stages are completed naturally and with periodic follow-ups from the medical doctor. (al-Rays, 2022; Mayo Clinic, 2022) Thus, for us to know whether pregnancy exists during the death of the deceased in question, the focus should be on the time the injection of the inseminated eggs took place in the uterus. If the death happened 7-10 days after the injection, then the fetus fulfilled the first condition of inheritance which is to exist during the demise of the deceased; after that we wait for the second condition to take place which is to be born alive. If these two conditions are fulfilled, a baby born through this process can inherit. Regarding the issue of 7-10 days that are used to measure the existence of pregnancy, to be more certain on whatever action we are taking, it is necessary to conduct a pregnancy test to confirm whether or not pregnancy exists.

Based on the previous discussion, not all types of IVF practices are permissible. Thus, it is imperative to know when a child from IVF can inherit with consideration given to which type of practice or process was utilized. To answer this question, it could be said that the child in the first two types of IVF inherits from both parents (the father and the mother). This is because sperm and egg came from both of them without any intervention from others. Where the sperm is taken from a husband who has two wives, and the egg is taken from one of the wives and is later mixed and treated with the husband's sperm, and then eventually the inseminated egg is implanted in the other wife's uterus, in this case, the child will belong to the owner of the eggs together with the husband, the owner of the sperm. This is the safest opinion *in shaa Allah*, and more attached to the *musūṣ*, that a child is a result of a combination of sperm and eggs even though there are other opinions that say otherwise (Al-Najjar,

2022). To avoid any possible doubt, it would be better if a DNA examination could be conducted to determine the relation between both women and the new-born baby. In all the above-mentioned situations, the child can be attributed to the husband and the child can be referred to as his child. In situations where the insemination takes place between the seeds of a couple, then later the fertilized egg is planted in the womb of a woman who volunteers to carry it (a surrogate), in this case the new-born baby belongs to the couple after confirmation through a DNA test.

When the insemination takes place externally between the seeds of two alien (not married) persons and then later the fertilized egg is planted in the womb of a wife of another man, in this case, the newborn baby can only be attributed to the woman who is the owner of the egg. As for the man who is the owner of the sperm, the child cannot be attributed to him since there is no marriage relationship between him and the owner of the egg. Thus, the case is similar to that of *zinā*, where the child born out of wedlock can only be attributed to his mother. With regard to the alien donors whose fertilized egg was planted in the uterus of the wife, the child will not be attributed to the man since there is no legal marriage between him and the egg donor. Thus, the child will only be attributed to the egg donor. One opinion says that the *hadith* “The child belongs to the (marriage-) bed and for the adulterer is the stone,” (Al-Bukhārī, 1987) is also applicable here, where the child belongs to the one who bore him and her husband. (al-Haqq, 2022) However, this *hadith* clearly shows that it is applicable in cases of conflict between the husband and somebody else. Thus, the researcher does not see any justification for attributing the child in this case to the husband of the woman since we know with certainty the child is a result of sperm that was taken from somebody else. Allāh *‘azza wa jalla* knows best.

In a situation where the sperm is taken from a man and then injected in the appropriate place of the wife of another person, for internal fertilization to occur between the sperm of that man and an egg of the other person’s wife, and then attaches to the wall of the uterus by the will of Allāh *‘azza wa jalla* according to some scholars, the child can only be attributed to the wife, and the husband as well, except in situations where he denied the lineage of the child. This is based on the saying of the Prophet: “The child belongs to the (marriage-) bed and for the adulterer is the stone.” (Al-Bukhārī, 1987). Another existing opinion is almost similar to the first one with the exception of the last part of it. The opinion said: ‘the child who is born as the result of such a process, shall be attributed to the mother who

bore him, and not to the man who produced and donated the sperm, as the ruling will be similar to that of *zinā* (fornication or adultery). But if that man, the owner of the sperm, claims to be the father and no one disputes that, then the child may be attributed to him, because the Lawgiver is keen that people should be named after their fathers. With regard to the *hadeeth*, “The child belongs to the (marriage-) bed and for the adulterer is the stone” (Al-Bukhārī, 1987) it is to be interpreted as referring to cases where there is a dispute, as is clear from the incident which gave rise to this *hadith* (Al-Munajjid, 2007).

The first opinion is safer, however, since the case is judged to be similar to *zinā* since there is no legal marriage between the man and the owner of the egg. Thus, attributing the child to the mother is safer and he inherits only from her; Allāh ‘azza wa jalla knows best.

When the fertilization is done externally in the medical lab and between the sperm of a husband and an egg taken from the ovary of a woman other than his wife, (who is known as a volunteer), and then later the fertilized egg is planted in the womb of his wife, in this case the child can only be attributed to the strange woman, the owner of the egg. The husband will not get anything in terms of inheritance or attribution because there is no legal marriage between him and the owner of the egg. The same goes to the wife since the egg is not from her. However, the relationship between her and the child she gave birth to is exactly as the relationship between a foster mother and the child she breastfed. Having said that, it could be confirmed that inheritance is only applicable where the lineage (Nasab) is Islamically attributed. Whoever the child is *Islamically* attributed to, the inheritance can exist between them. (Al-Salus, 2008) As previously mentioned, the inheritance of a child born through IVF is similar to the inheritance of al-Ḥaml.

7. INHERITANCE OF AL-ḤAML

Al-Ḥaml literally means the fetus in the womb of the female. Technically, al-Ḥaml means the fetus in the womb of humans. (Al-Kātib, 2001) A fetus can only inherit when two conditions are met:

- a. Confirmation of its existence during the death of the deceased even in the form of *Nutfah* (zygote).
- b. Confirmation of him being born alive after the death of the deceased.

The first condition could be confirmed when the mother gave birth to the child within six months from the demise of the deceased.

This is because the minimum duration for pregnancy is six months. (Ibn Sālim, 2012) In the case of IVF, it must be confirmed by the experts that the conception took place before the demise of the deceased. If she gave birth to him after six months from the death of the deceased, in this case, the existence of the pregnancy cannot be confirmed except in two ways:

- a. If the pregnancy is very clear during the demise of the deceased.
- b. When it is confirmed that the sperm of another man did not reach the womb of the mother after the demise of the deceased. (Al-Kātib, 2001)

As for the second condition, it could be confirmed when the child gets out of the womb with what clearly shows signs of life in him, e.g. crying, breathing or movement that happens more than once. This is necessary because the child might come out dead, but at the same time, the body will stretch because it passed through a very narrow exit where some might think that the baby is alive. Thus, to avoid making mistakes in this regard, the movement of the newly born baby must be more than once. It is very important in this regard to contact experts in the field for confirmation to avoid mistakes. The possible scenarios in the case of pregnancy in relation to the inheritance of the rest of the heirs:

- a. Those who do not get affected by the fetus. In this case, they should be given their portion completely.
- b. Those whose inheritance is affected by the existence of the fetus, where the inheritance increases or decreases. In this case, they should be given the minimum.
- c. Those whose inheritance is affected by the existence of the fetus, where they inherit sometimes and sometimes do not. In this case, they will not be given anything until the time where the status (gender) of the pregnancy is clear (Ibn Sālim, 2012).

7.1 THE PROCESS

When we withhold for the fetus, the maximum portion inherited by two males or two females, the following six assumptions must be addressed:

- a. To be delivered dead
- b. To be delivered alive and a male
- c. To be delivered alive and a female

- d. To be delivered alive but two males
- e. To be delivered alive but two females
- f. To be delivered alive but a male and a female.

Based on these assumptions, it is imperative to have six cases at once, each in its own column, and after resolving all of the cases the bases will all be placed and analyzed through what is known as *Al-Nisab al-Arba'ah*. The result will be the final merger of all the cases. The *Juz' al-Sahm* (*Juz' al-Sahm*: this is the smallest amount used to be placed on top of a base which will eventually be multiplied by the base in order to know the portion of an heir without a fraction.) of every case will be the result generated from dividing the final merger by the base of every case. And for us to know the lowest portion an heir can inherit, we have to multiply the portion of every heir by the *juz' al-Sahm* of his, or her, or their case. The result will be placed in front of the heir. After all of these calculations there shall be a balance which will be kept until the status of the fetus is clear. The detained portion shall be distributed once again based on the status of the fetus after the delivery (Al-Kātib, 2001).

Example no. 1

A person died, leaving behind his wife, his daughter, his consanguine brother, and the pregnancy of the wife.

TABLE 1

Juz' al-Sahm	180	60	60	36	20	45	Final merger (1440)	Distribution of the detained portion						
Heir/ Case	8	24	24	40	72	32								
W	1	3	3	5	9	4	180	-	-	-	-	-	-	-
D	4	7	8	7	16	7	252	468	168	228	-	68	63	
CB	3	×	5	×	15	×	×	540	-	300	-	300	×	
Wife's pregnancy	-	14	8	28	32	21	-		840	480	1008	640	945	
	Dead	M	F	MM	FF	FM	1008	Dead	M	F	MM	FF	FM	
	Detained													

The base of the case of the death of the fetus is (8), and the base of the case where the fetus is assumed to be male or female is (24). The base of the case where the fetus is assumed to be two males is (40). The base of the case where the fetus is assumed to be two females is (72). The base of the case where the fetus is assumed to be a male and a female is (32). The final merger which is (1440) is the result of looking into the bases of the cases through the *Nisab al-Arba'ah*. The final merger will then be divided by the base of every case among the six cases, the result will be the *juz' al-Sahm* of that particular case.

The portion of every heir will be multiplied by its juz' al-Sahm so that we will be able to know the worst-case scenario in his case, where he takes that one. Every heir will receive their portion according to the worst-case scenario, and the balance will be kept until the status of the fetus is clear.

Example no. 2

A person died leaving behind his father, his mother, and the pregnancy of the mother.

TABLE 2

Juz' al-Sahm	2			1			Final merger	Distribution of the	
Heir/Case	3	3	3	6	6	6	6	detained portion	
F	2	2	2	5	5	5	4	×	1
M	1	1	1	1	1	1	1	1	
Mother's pregnancy	×	×	×	×	×	×	×	×	MM
	Dead	M	F	M	F	M	1	Dead	FF
				M	F	F	Detained	M	F/M
								F	

The base of the case of the death of the fetus is three and the base of the case where the fetus is assumed to be male or female is three. The base of the case where the fetus is assumed to be two males is six. The base of the case where the fetus is assumed to be two females is six. The base of the case where the fetus is assumed to be a male and a female is six. The final merger which is six is the result of looking into the bases of the cases through the Nisab al-Arba'ah. The final merger will then be divided by the base of every case among the six cases, the result will be the juz' al-Sahm of that particular case. The juz' al-Sahm of the first three cases is two, and the juz' al-Sahm of the rest of the cases is one. The portion of every heir will be multiplied by its juz' al-Sahm so that we will be able to know the worst-case scenario in his case, where he takes it. Every heir will receive their portion according to the worst-case scenario, and the balance will be kept until the status of the fetus is clear.

7.2 THE CONCEPT OF AL-NISAB AL-ARBA'AH

In the above discussion about the inheritance of the fetus, the term *al-Nisab al-Arba'ah* is mentioned, it is then imperative to shed light on how this term works. This principle of *al-Nisab al-Arba'ah* has four components:

Al-Mumāthalah is when you have numbers that are identical, for instance, you have two and two, or six and six. The ruling in this situation is to be sufficed with one of these numbers, (to take two in the first case and six in the second case) to use it as the denominator.

Al-Mudākhalah (also known as *al-Munāsabah*) is when you have two or more numbers, where the larger can be divided by the smaller without a remainder (where the smaller number is a factor of the larger number). For instance, you have six, two, and three. The ruling in this situation is to be sufficed with the biggest one among all the numbers (the highest factor). Thus, in our example we take six.

Al-Muwāfaqah is when you have two or more numbers and none of them is a factor for the other, but at the same time they have a common factor. For instance, six and four. The ruling in this situation is to look for their highest common factor and use it to divide each of them. The quotients are called *wafq* which will be cross-multiplied by the two numbers, which in this case are six and four.

Their highest common factor is two. When dividing six by two the answer is three and when dividing four by two we get two. We then multiply six with the quotient of $4 \div 2$ and multiply four with the quotient of $6 \div 2$. The answer is 12 for both, which confirms the accuracy of the calculation.

Al-Mubāyanah (also known as *al-Mukhālafah*). This is when you have two or more numbers, e.g., five and three, that cannot be divided by each other, and they do not have a common factor. The ruling in this situation is to multiply the first with the second, i.e. 5×3 . (Al-Kātib, 2001).

8. CONCLUSION AND RECOMMENDATION

It is evidently clear from the above discussion that IVF is now a widely practiced option to resolve fertility issues by many *Muslims*. Enough has been done by contemporary scholars in their efforts to reach a conclusion on how to deal with it and what could possibly be its ruling Islamically. The least that can be said about IVF is that it is doubtful. The ease of manipulation makes it even more sensitive when issues of lineage and inheritance arise. Unless stern precaution is taken, the sperms and eggs can be easily mixed up whether intentionally or by mistake. Furthermore, the violation of the *maqṣad* of preservation of lineage is a major point to note and it cannot be flouted under the guise of *Darūrah*. Besides the potential mixing of lineages, a woman undergoing IVF usually has to open up her *'awrah* to a *non-mahram*.

Although IVF did not exist for most of humankind's residence on earth, the comprehensiveness of the Islamic law of inheritance addresses any and all issues that may arise until the Last Day. Thus, the inheritance of a child born out of IVF is also part of that covered

by the *Shari'ah*. Since IVF deals with pregnancy upon the success of the process, the law governing it is the same as that governing the inheritance of the fetus in the wombs of the mothers which had been discussed earlier. The researcher advises the community to refrain from using IVF to resolve their fertility issues. It is also important for the authorities to discourage people from using it. They should provide an intensive program aimed at raising awareness and educating the community on the article of faith 'belief in *Qaḍā'* and *Qadar'*. The community should be educated to accept that everything has been decreed by Allāh '*azza wa jalla* and He is in control of everything. Thus, the family should always go back to Him in resolving their problem naturally. Natural and permissible alternatives include consuming black seeds or their oil as Rasoolullah said in a hadith reported by Abu Hurairah: There is no disease for which Nigella seed does not provide remedy (Sahih Muslim).

They should always remember that Allāh '*azza wa jalla* has the power over everything. This will increase the family's faith in Allāh '*azza wa jalla*'s ability to solve their problems. Allāh '*azza wa jalla* knows best.

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AN ANALYSIS OF THE PERSISTENCE OF WAGE DIFFERENTIALS IN MALAYSIA

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ABSTRACT

Studies on the labor market wage gap have been published across nations with different variables of interest because inequality in labor compensation is a severe socioeconomic problem. Income inequality is studied through the wage gap Blinder-Oaxaca Decomposition method to investigate the contributing factors to the wage differential. As per previous studies, the factors were classified into endowments, coefficients, and interaction parts. Endowments capture the disparity in productivity or observable characteristics that may define the wage gap, the coefficient part is the wage structure built from discrimination or unobservable characteristics, and interaction is the component of how the other two interact with each other. Our study uses data from the Household Income Survey (HIS) conducted by the Department of Statistics Malaysia (DOSM) in 2022, 2019, and 2016. The total sample size is 35,884 observations (of which 12,735 are for the year 2022; 11,698 for 2019; and 11,451 for 2016). Findings show that the wage difference between Bumiputera and non-Bumiputera was reduced from 2016 to 2019. It increased again in 2022, however, higher than in 2016. The three-year mean for endowment effects is

39.55% of the wage difference and 60.45% for coefficient and interaction parts combined. Therefore, it is statistically evident that Bumiputera labor is compensated lower than non-Bumiputera. This study gives recent insights on the ethnic wage differentials with more updated datasets and identifies the determinants of wage differential which would help policymakers to tackle the root causes.

JEL Classification: C02, J24, J31, J710

Keywords: Wage gap, Oaxaca-Blinder, Bumiputera, Labor, Discrimination

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1. INTRODUCTION

Malaysia is a multiracial country and home to many races, with citizens categorized into two groups: Bumiputera, the term for Malays and other aborigines, and non-Bumiputera, the Chinese, Indian, and other ethnicities. The division of population as of 2022 shows that 64.7% of the population is Bumiputera, 27.2% are non-Bumiputera, and the rest are from different ethnicities or expats (Department of Statistics Malaysia, 2023). The Bumiputera comprise 57.5% of the labor force, while the Chinese and Indian portions are around 21.5% and 6.26%, respectively, as of 2022 (Economic Planning Unit, Prime Minister's Department, 2022). Bumiputera is the group of interest in this paper because, as the majority, they have a significant weightage in deriving findings and conclusions in the wage gap study.

The history of earning discrimination in Malaysia can be traced back to British colonialism, when the divide-and-rule policy was implemented. Malays became the most disadvantaged race, affected by the prohibition of being involved in lucrative businesses. The Chinese earned more as merchants, and Malays earned the least as poor farmers and fishermen (Yaakub et al., 2022). We hypothesized that Bumiputera was the discriminated group in this study due to its economic disadvantage in the past, which is still persistent in time following the effect of human capital accumulation, evidently supported by the government's incessant effort to improve productivity skills of Bumiputera. One of the Malaysian government's policies to tackle the issue was implementing the New Economic Policy (NEP) in 1971 to attract Bumiputera participation in the critical economic sectors. In the 1990s, the National Development Policy (NDP) targeted Bumiputera to participate in skill, training, and

education while giving them financial aid. Several government agencies were set up to specialize in helping this disadvantaged group, such as the National Entrepreneurial Group Economic Fund (TEKUN), to provide monetary assistance to Small and Medium Enterprises (SMEs) to help alleviate the Bumiputera from economic hardship by funding micro businesses and fostering employment. This paper examines wage discrimination as a critical issue for two reasons. First, wages significantly determine labor pricing and its supply-demand equilibrium. Second, economic development should be improved with better wages. As of 2022, Bumiputera is still the majority poor group in Malaysia because of household economic activities and geolocation (Hussain, 2020). This paper investigates whether the wage gap between these two groups is still persistent from the previous similar study, and what predictors explain the differences. This paper hypothesizes that Bumiputera workers earned less than non-Bumiputera, and coefficient and interaction significantly impact the wage.

This paper is organized as follows: Section 1 gives the background and motivation of the study. Section 2 outlines a literature review that covers the economic models and theories, and research published in other countries' labor markets. Section 3 explains the methodology and the variable list. Section 4 discusses the results and empirical results, and Section 5 concludes with policy recommendations and suggestions for future research.

2. LITERATURE REVIEW

2.1 ECONOMIC MODELS AND UNDERLYING THEORIES

Taste for Discrimination theory explained employers' aversion toward a group characterized by non-productive differences from a similarly capable group regarding skills and productivity. The employer would then have the impression that hiring a discriminated group involves more cost, which is unreasonable because the cost is built upon their perception, unrelated to the business's profit, such as skin colour, gender, and race.

Then, the emergence of Theory of Human Capital in the 1960s, stated that investment in human capital, such as education and on-the-job training, would improve productivity, reflecting economic growth and development (Schultz, 1961). From then on, formal education has been the starting point for explaining the differences in income earning. The importance of education is reflected in government policy; for example, the Malaysian government spent

16.4% of its total expenditure on education in 2021 (World Bank Open Data). A separate study in the United States showed that the state-level wage gaps and actual gross domestic product per worker resulted in a significant inverse relationship, which means the higher the GDP per worker produced, the lower the wage gap. Nevertheless, they are not attributable to the government spending on education and capital investment (Gramozi, Theodore, and Marios, 2023). Because education and capital investment could not explain the wage difference, other factors may cause taste-based discrimination (Gramozi, et al., 2023). This means the Human Capital model cannot fully explain the macroeconomic implications of wage differential when education and human capital investment cannot explain the underlying reasons. An important takeaway from this study is that authors interlinked the discrimination with macroeconomic variables to show the monetary cost to the nation, making this research topic relevant because not only does discrimination affect the labor force and their well-being, but employers and the national income are affected as well.

Next, Mincer's Earning Equation explained the positive correlation between the three and could empirically be proved with the Mincer Earning Function (Mincer, 1974). However, these two variables are inconclusive enough to explain income differences between labor with identical productivity portfolios. Income inequality is an economic problem happening worldwide, with different countries having a different nature of labor market discrimination. A study with Brazilian labor market data showed that employers favor their workers based on their skin color, which is closely defined by their race and gender. The non-white population's discriminatory wage is below that of white laborers (Faustino et al., 2023). Another critical point in this study was a government initiative to boost employment called transfer policies, which aimed at more inclusivity toward the lower class by increasing their employment (Faustino et al., 2023). Economically Active Population (EAP) is the term used for people who are working or actively looking for employment. The EAP group surprisingly fell from 2004 to 2014 despite the transfer policies being adopted especially in the wealthier regions where the population was more educated (Faustino et al., 2023). Labor market discrimination acted as a disincentive for them to be part of EAP because of unfair competition, even with peers of similar productive characteristics. Without proactive countermeasures to fight employment bias, the expenditure would yield either less or the opposite result than intended.

2.2 WAGE GAP STUDIES IN OTHER COUNTRIES

The study of discrimination in the labor market was initiated in 1957, which led to several subsequent economic analyses of wage differential, adapted to different geographical and demographical settings up to recent years. Based on the wage gap studies conducted in other countries, understanding the labor market's legal, historical, and demographical nature is essential to understand the underlying discrimination. For example, in Indonesia, while it is true that educational attainment improved the wage gap at a diminishing rate, the legality concerning the wage system and health, safety, and environmental (HSE) regulations widened the gap more than it was narrowed (Santoso et al., 2022). In China, a study was conducted on the mean wage of workers in the extractive and production energy industry, proving that the public sector was getting paid higher than the private sector. The wage gap persisted from 2003 to 2014, with a decreasing statistical discrimination rate from 30% to 18%. This study used gender, educational attainment, and working experience as controlled factors. Only a small proportion of the gap could be explained by them, however, which means other non-productive characteristics contribute to the unexplained discrimination (Li, Tu, and Zhang, 2022).

In Malaysia, the Chinese earn more than the Malays and the Indians, and the ratio is approximately 0.57 for Malay/Chinese and 0.81 for Indian/Chinese (Borjas, 2016). Sector-specific wage differential research revealed that in the Malaysia manufacturing sector, Chinese workers were significantly earning higher wages than Malay workers, but not significant when comparing between Indian and Malay (Ismail and Noor, 2013). A variable that contributed the highest to the unexplained portion of the wage gap is demographic characteristic which signified the underlying discrimination practice in 1991 (Ismail and Noor, 2013).

Government intervention in improving productivity was reviewed, since the counterfactual to the labor discrimination is the discrepancy in the labor productivity between two groups. In Malaysia, despite making up 65.8% of the labor market, Bumiputera was the 'minority' or discriminated against in terms of wage differential (Department of Statistics Malaysia, 2022). The New Economic Policy (NEP) managed to close the gap by increasing Malay wages. Data from 1976 to 1991, however, showed that the gap grew and persisted after 1986, from RM 298 to RM 643.10 (Shahiri, 2012). Five decades ago, workers with a Lower Certificate of Education

(PMR) were more likely to be recruited for white-collar jobs than workers who did not attend school or finished schooling at a lower secondary level (Hirschman, 1983). In a separate study that investigated the discrimination in the Malaysia labor market between men and women workers in 1988, when only human capital variables were included in the decomposition, 87% of the wage differential stemmed from the gap of productive characteristics (Mohd Nor, 2013). Inclusion of family institution variables, however, increased the discrimination component to 89%, with men benefitted about 11% on productive advantage over women (Mohd Nor, 2013). To overcome the advantage enjoyed by men, women needed to attain better human capital quality, such as a higher level of education. These findings are aligned with an earlier research by Mohd Nor (2013), showing that in 1988, the women's wages were reported lower than men at 59%; improving the productivity traits will fix only small portions as 50% rooted in omitted variables.

At the macro level, the labor productivity does depend on the human capital variables such as education and health. Among all education levels, only secondary and tertiary were statistically significant and their impacts are positive on the labor productivity because Malaysia is a middle-income economy with mostly secondary education levels (Arshad and Malik, 2015). Increasing life expectancy contributed to an increment of labor productivity by 14 percent, *ceteris paribus* (Arshad and Malik, 2015). Meanwhile in another study between the Organization of Islamic Cooperation (OIC) countries, investment from the high-income countries would greatly boost the GDP growth in low-income countries with better infrastructure and creation of business and employment (Yusuf and Zainuddin, 2011). This is because in developing economies, jobs were mostly informal and exposed to discrimination in terms of legal and social protection (Yusuf and Zainuddin, 2011). Arshad and Malik (2015) as well as Yusuf and Zainuddin (2011) emphasized the importance of human capital factors as determinants for labor productivity improvement.

Malaysian citizens were also discriminated against with regard to wage differential when taking immigrant workers into account. A study by Abdullah, Theodossiou, and Zangelidis (2020) found that the wage gap between natives and immigrants in Malaysia could be explained mainly through productivity skills. The unexplained portion of the wage gap by other unobservable variables accounted for a 15.4% increment in the native's wage and a 13.3% decrement in the

immigrant's salary. Low-skilled foreign workers in the plantation sector are favored by employers with a striking difference of 33 percentage points higher than native workers (Shahiri, Cheng, and Al-Hadi, 2021a). Realizing the existence of wage differential, native workers entered the employment without the intention to stay on the job long term. Among Indonesian, Indian, and Malaysian (others), Indians earned the least, and Indonesians earned the most. Employers disguised their payment practices for productivity reasons; but employers assign more jobs to them because employers favor Indonesian workers (Shahiri et al., 2021a). This gave foreigners more experience, practice, and skill and they appeared more productive than Malaysian workers.

This paper will use more recent data to investigate if the wage gap between non-Bumiputera and Bumiputera is a current issue or if it has been resolved. Bumiputera comprises a majority of the total labor market hence their economic hardships substantially affect Malaysia's economic growth and development, making continual research and policy proposals crucial.

3. METHODOLOGY AND DATA

3.1 DATA

The Department of Statistics Malaysia supplied the data through the Household Income Survey (HIS) conducted in 2016, 2019, and 2022. The samples are from private workers in Malaysia, excluding government workers, because public employers are already subjected to a fixed wage structure. This data would then be analyzed using the Blinder-Oaxaca Decomposition method with Stata software. This method breaks down the wage difference to observable and unobservable attributes. Table 1 below lists all variables used in this study with descriptions. As per previous research on a similar topic Li et al. (2022) and Faustino et al. (2023), educational attainment, marital status, gender, demographic, and geographic characteristics variables are chosen. Meanwhile, other income variables were chosen based on the labor supply and income effect theory that says non-employment income would make labor supply less working hours and accept lower wages to have more leisure for utility maximization (Borjas, 2016).

TABLE 1
List of Variables and Explanation

Variables	Explanation
ethnic_dummy	Dummy variable for ethnic (1 for non-Bumiputera and 0 for otherwise)
lnINCS01_hh	Log of annual household employment income (in MYR). Proxy for wage of HOH and the dependent variable of this study.
strata_dummy	Dummy variable for strata (1 for Urban, and 0 for otherwise)
region_dummy	Dummy variable for the region (1 for Peninsular Malaysia, 0 for otherwise)
hh_size	Household size
hoh_gen	Dummy variable for gender of head of household (HOH) (1 for male; 0 for otherwise)
hoh_age	Age of the HOH
hoh_agesq	Age square. Proxy variable for working tenure.
hoh_marital_dummy	Dummy variable for the marital status of HOH (1 for Not Married, 0 for otherwise)
hoh_no_cert	Dummy variable for no certification as the highest educational attained by HOH (1 for no certificate, 0 for otherwise)
hoh_pmr	Dummy variable for PMR as the highest educational attained by HOH (1 for PMR, 0 for otherwise). PMR is equivalent to Lower Secondary Assessment.
hoh_spm	Dummy variable for SPM (or equivalent) as the highest educational attained by the HOH (1 for SPM, 0 for otherwise). SPM is the O-level equivalent.
hoh_dip	Dummy variable for diploma (or equivalent) as the highest educational attained by the HOH (1 for diploma, 0 otherwise)
hoh_bachelor	Dummy variable for a bachelor's degree and above (or equivalent) as the highest education attained by the HOH (1 for Bachelor's degree and above, 0 for otherwise)
hoh_prof	Dummy variable for the professional occupation of the HOH (1 for professional worker, 0 for otherwise)
lnINCS02_hh	Log of other earned income annually (in MYR)

*The STPM-holder or A-level equivalent is the reference group for educational attainment dummy variables.

3.2 WAGE EQUATIONS FOR TWO GROUPS

Samples are divided into two groups; Group nb comprises workers of non-Bumiputera (Chinese, Indian, and Others), Group b includes Bumiputera workers, the outcome variable Y , the log of HOH's wage proxy variable, and a set of predictors. This method aims at decomposing the mean wage between n and nb . The wage model here is assumed to be in a linear functional form (Cahuc, Carcillo, and Zylberberg, 2014).

$$(1) \quad \ln Y_{nb,i} = \mathbf{x}_{nb,i} \boldsymbol{\beta}_{nb} + \varepsilon_{nb,i}$$

The equation above is for the non-Bumiputera workers group. $Y_{nb,i}$ is the log of HOH's wage proxy of individual i from nb group. $x_{nb,i}$ is the vector of observable predictors of individual i from nb group. β_{nb} are the vector coefficients to be estimated. $\varepsilon_{nb,i}$ is the error term, assumed to be normally distributed with zero means.

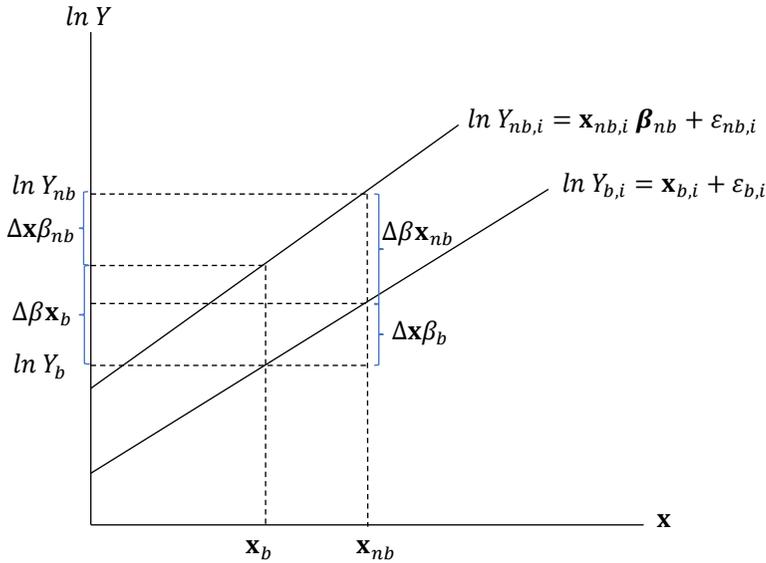
The equation for Bumiputera workers is constructed similarly:

$$(2) \quad \ln Y_{b,i} = \mathbf{x}_{bi} \boldsymbol{\beta}_b + \varepsilon_{b,i}$$

The hypothesized discriminated group would have a better regression line than the other group (O'Donnell, Doorslaer, Wagstaff, and Lindelow, 2008). This means that for every value in the vector x , the outcome $\ln Y_i$ will be relatively better for Group nb than Group b .

Based on Figure 1, the wage equation for Bumiputera workers lies below that for non-Bumiputera workers. The x_{nb} leads to a higher value of $\ln Y_{nb}$ than x_b does for $\ln Y_b$. The difference of Δx is the explained wage gap weighted by their respective coefficients, $\Delta x \beta_{nb}$ and $\Delta x \beta_b$ determined by the observed productivity features of the two groups. In comparison, $\Delta \beta$ is the coefficient difference weighted by the observed predictors, $\Delta \beta x_{nb}$ and $\Delta \beta x_b$. This part shows the difference in $\ln Y_i$ given the same x_i .

FIGURE 1
Wage Decomposition



3.3 THE BLINDER-OAXACA METHOD: THE BASIC TWO-FOLD DECOMPOSITION

Now, we must calculate the difference between the log of HOH’s wage proxy between two groups, using $\Delta = E(Y_{nb}) - E(Y_b)$, resulting in:

$$(3) \quad \Delta = \mathbb{E}(x_{nb}) \beta_{nb} + \mathbb{E}(\epsilon_{nb}) - \mathbb{E}(x_b) \beta_b - \mathbb{E}(\epsilon_b)$$

From assumption $E(\epsilon_{nb}) = E(\epsilon_b) = 0$, we obtained:

$$(4) \quad \Delta = \mathbb{E}(x_{nb}) \beta_{nb} - \mathbb{E}(x_b) \beta_b$$

Replace equation 4 with the expected values of covariates of the respective group mean; the estimated equation for the model is:

$$(5) \quad \hat{\Delta} = \bar{x}_{nb} \hat{\beta}_{nb} - \bar{x}_b \hat{\beta}_b$$

Lastly, we add and subtract the average counterfactual wage that Bumiputera workers would earn if they have the non-Bumiputera workers' wage structure into the equation 5, we get:

$$(6) \quad \overline{\ln Y_{nb}} - \overline{\ln Y_b} = (\bar{x}_{nb} - \bar{x}_b) \hat{\beta}_{nb} + \bar{x}_b (\hat{\beta}_{nb} - \hat{\beta}_b)$$

There are two components in equation 6, first, $(\bar{x}_{nb} - \bar{x}_b) \hat{\beta}_{nb}$ is the composition effect, or the "explained" portion of the decomposition. It comprises the wage differences due to observed characteristics such as education attainment and age. Second, the "unexplained" portion, $\bar{x}_b (\hat{\beta}_{nb} - \hat{\beta}_b)$, is the wage structure effect, and it measures the change of the wage paid to Bumiputera workers' if they have the same characteristics of non-Bumiputera workers have. The basic decomposition is also known as the two-fold decomposition. Next, we will look at the three-fold decomposition.

3.4 THE BLINDER-OAXACA METHOD: THE THREEFOLD DECOMPOSITION

We used the threefold Blinder-Oaxaca decomposition technique to decompose the difference in the log average wage into three parts: the Endowment Effect (E), the Coefficient Effect (C), and the Interaction Effect (I) (Jann, 2008). We are interested to know the mean difference of Y of those two groups,

$$(7) \quad R = \mathbb{E}(\ln Y_{nb}) - \mathbb{E}(\ln Y_b)$$

Take the linear model,

$$(8) \quad \ln Y_i = \mathbf{x}'_i \beta_i + \epsilon_i, \mathbb{E}(\epsilon_i) = 0, i \in \{nb, b\}$$

x is the vector with observed predictors, β has the slope parameters and the intercept, and ϵ_i is the error that includes all unobserved and excluded variables.

Adapting the equation 8 into 7, we have,

$$(9) \quad R = \mathbb{E}(Y_{nb}) - \mathbb{E}(Y_b) = \mathbb{E}(\mathbf{x}_{nb})' \beta_{nb} - \mathbb{E}(\mathbf{x}_b)' \beta_b$$

Since

$$(10) \quad \mathbb{E}(Y_i) = \mathbb{E}(\mathbf{x}'_i \beta_i + \epsilon_i) = \mathbb{E}(\mathbf{x}'_i \beta_i) + \mathbb{E}(\epsilon_i) = \mathbb{E}(\mathbf{x}_i)' \beta_i$$

We assume, $E(\beta_i) = \beta_i$ and $E(\epsilon_i) = 0$.

Now, we need to find how the predictors contribute to the wage gap, and we rearrange equation 9 as such:

$$(11) \quad R = [\mathbb{E}(x_{nb}) - \mathbb{E}(x_b)]' \beta_b + \mathbb{E}(x_b)' (\beta_{nb} - \beta_b) + [\mathbb{E}(x_{nb}) - \mathbb{E}(x_b)]' (\beta_{nb} - \beta_b)$$

The equation 11 is the three-fold decomposition, summarised as:

$$R = E + C + I$$

First summand, Endowment Effect (E): $[E(x_{nb}) - E(x_b)]' \beta_b$

This part showed how much the observed characteristics contribute to the wage gap. It tells us the expected change in Bumiputera workers' wages if they have non-Bumiputera predictor levels. For example, the value informs us that if Bumiputera has the same educational attainment as the non-Bumiputera, what would be Bumiputera's wage change?

Second summand, Coefficient Effect, (C): $E(x_b)' (\beta_{nb} - \beta_b)$

This shows the differences in the coefficients weighted by non-Bumiputera predictor levels. This part tells us the change in Bumiputera's wage if they have the coefficients belonging to the non-Bumiputera group.

Third summand, Interaction Effect, (I): $[E(x_{nb}) - E(x_b)]' (\beta_{nb} - \beta_b)$

The last summand contains the part when C and E happens simultaneously between Bumiputera and non-Bumiputera.

4. EMPIRICAL RESULT

4.1 DESCRIPTIVE DATA AND SAMPLE CHARACTERISTICS

The study uses the 2016, 2019, and 2022 Household Income Survey (HIS) data collected by the Department of Statistics Malaysia (DOSM). The data utilized for this study are categorized into household information, personal individual characteristics, and productivity characteristics of the heads of households (HOH).

Household information collected includes the size, ethnic membership, demographic and geographic characteristics, whether they are located in urban or otherwise and Peninsular Malaysia or otherwise, other household income than the employment source, and the dependent variable, the household paid income. The household-paid income is a proxy of the wage earned by the HOH, assuming the wage earned by the HOH is the household's primary income and the HOH is the primary wage contributor for the households, as is the case for conventional households.

The personal individual characteristics of the HOH are gender, marital status, and economic activities; they must be in the private sector and whether they are working as a professional.

The productivity characteristics of the HOH are their age, age squared as the proxy of working experience tenure, and the highest level of educational attainment since their working tenure information is unavailable from this dataset. Age squared as the proxy was acknowledged in David Card's writing in the Handbook of Labour Economics (1999).

Heckman's two-step method to remove selection bias is unnecessary in this research because there is no variation in the paid employment income because other employment statuses were excluded. Other activity statuses that were excluded: those HOHs who are employers themselves, government employees, registered and unregistered self-employed, unpaid family workers, unemployed, housewives, students, pensioners, elderly, children and infants, and others. This study is particularly interested in the private wage earners only because, in Malaysia, private employers can offer any salary as long as it is above the minimum.

Table 2 shows the sample characteristics and the percentage of the proportion. After excluding other activity statuses, the sample size in 2022 was reduced from 26,225 to 12,735; for 2019, from 24,872 to 11,698; and for 2016, from 23,536 to 11,451. On average, most households are Bumiputera, which is 64.72% of the total sample. With more than 70% of these households residing in urban areas and Peninsular Malaysia, geographically and demographically, they are concentrated in certain regions. Over 84% of the HOHs are male; per the Department of Statistics Malaysia (DOSM) 2022 report, the national male labour participation rate was 80.9%. The proportion of HOH working as a professional increased from 10.44% (2016) to 11.38% (2019) and 15.26% (2022). HOHs were also getting higher qualifications, degrees and above. Diploma and SPM showed an

increasing trend, while STPM, PMR and no certification showed a declining trend across the three years.

TABLE 2
Sample Characteristics

	2022		2019		2016	
	Sample size	%	Sample size	%	Sample Size	%
Total	12,735		11,698		11,451	
Bumiputera	8,319	65.32	7,698	65.81	7,220	63.05
Non-Bumiputera	4,416	34.68	4,000	34.19	4,231	36.95
Urban	10,021	78.69	8,523	72.86	8,705	76.02
Rural	2,714	21.31	3,175	27.14	2,746	23.98
Peninsular	9,534	74.86	8,608	73.59	8,372	73.11
East Malaysia	3,201	25.14	3,090	26.41	3,079	26.89
Male	10,802	84.82	9,979	85.31	9,837	85.91
Female	1,933	15.18	1,719	14.69	1,614	14.09
Professional	1,943	15.26	1,331	11.38	1,195	10.44
Non-professional	10,792	84.74	10,367	88.62	10,256	89.56
Degrees and above	2,269	17.82	1,532	13.10	1,280	11.18
Diploma	2,090	16.41	1,776	15.18	1,655	14.45
STPM	269	2.11	287	2.45	320	2.80
SPM	5,509	43.26	5,027	42.97	4,739	41.39
PMR	1,250	9.82	1,407	12.03	1,607	14.03
No certification	1,348	10.59	1,669	14.27	1,850	16.16

Table 3 shows the data descriptive of continuous variables. The HIS data shows the average log employment income *lnINCS01_hh* increased every three years: 10.71 (2016), 10.84 (2019), and 10.96 (2022). The mean log of other sources of income, *lnINCS02_hh* declined in 2019 before it increased in 2022, 8.80 (2016), 8.65 (2019), and 9.07 (2022). This shows that more HOHs are having other sources of income that could support their leisure time or potentially lower the accepted wages. The household size, *hh_size*, has reduced from 4.26 (2016) to 4.12 (2019) to 4.01 (2022). The

average HOH age, *hoh_age*, remained around 42 for all three observation years. The working experience proxy variable, the age squared, *hoh_agesq*, has also decreased over time.

TABLE 3
Data Descriptive

	2022		2019		2016	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
lnINCS01_hh	10.96	0.77	10.84	0.77	10.71	0.80
lnINCS02_hh	9.07	1.10	8.65	1.35	8.80	1.10
hh_size	4.01	1.86	4.12	1.93	4.26	1.96
hoh_age	42.07	11.18	42.60	11.38	42.64	11.34
hoh_agesq	1,923.30	996.40	1,944.16	1,019.26	1,946.40	1,011.03

4.2 BLINDER-OAXACA TWOFOLD DECOMPOSITION

It is observed from Table 4 that the log wage for Bumiputera is less than the log wage for non-Bumiputera. This means wage differential existed between Bumiputera and non-Bumiputera, evidently shown by the wage gap -0.41 (2016), -0.37 (2019), and -0.45 (2022). Note that the negative sign indicates that Bumiputera was earning less than non-Bumiputera; 2022 is the only year when predictors could explain more of the wage differential, at 52.17%, but the coefficient is the highest in 2022, at -0.45. Meanwhile, 2019 is the year with the lowest wage gap coefficient, at -0.37, but it has the highest percentage of unexplained portion, 58.33%.

TABLE 4
Twofold Decomposition Result

	2022		2019		2016	
	Coeff.	%	Coeff.	%	Coeff.	%
Bumiputera Wage	10.77***		10.71***		10.54***	
Non-Bumiputera Wage	11.23***		11.07***		10.96***	
Wage gap	-0.45***	100	-0.37***	100	-0.41***	100
Explained	-0.22***	52.2	-0.15***	41.7	-0.19***	46.3
Unexplained	-0.22***	47.8	-0.21***	58.3	-0.22***	53.7

Note: Coefficient (Coeff), *** significant at 1%.

4.3 BLINDER-OAXACA THREEFOLD DECOMPOSITION

Endowment showed the uneven distribution of the predictors between the two groups, which means, in this case, the non-Bumiputera group tends to have more preferable characteristics than the Bumiputera group. The coefficient component showed the wage disparity from not having the predictor or from variables omitted in this study.

As per Table 5, in 2016 and 2019, the coefficient and interaction were more than the endowment components by the difference of 29.27% and 32.43%. For 2022, the reversal happened; the endowment is larger than the coefficient and interaction but only by a slight percentage difference of 2.22%. The interaction part showed how the other two components interact with each other. Even though 2022 has the biggest coefficient of the wage differential, it also has the most explained and endowment portion compared to the other two observation years. On the other hand, 2019 recorded the lowest coefficient of the wage gap. However, most cannot be attributable to the endowment since 67.57% went to coefficient and interaction components. Therefore, looking at the wage gap performance alone might be misleading if we do not conduct the threefold decomposition. Decreasing the wage gap does not necessarily mean these workers are compensated fairly. Three components will be broken down to each variable used in this study to understand which predictors contribute to the wage gap.

TABLE 5
Threefold Decomposition Result

	2022		2019		2016	
	Coeff.	%	Coeff.	%	Coeff.	%
Wage gap	-0.45***	100	-0.37***	100	-0.41***	100
Endowment	-0.22***	48.89	-0.13***	35.14	-0.15***	36.59
Coefficients	-0.22***	48.89	-0.22***	59.46	-0.22***	53.66
Interaction	-0.01	2.22	-0.03**	8.11	-0.05***	12.20

Note: Coefficient (Coeff), *** significant at 1%, ** significant at 5%

Table 6 and Appendix 1 show the breakdown of the three components of each predictor for all three years. Starting with the endowment component, among all predictors, other annual household income is one of the top three predictors contributing the biggest percentage, 40.02% (2022), 30.12% (2019), and 31.65% (2016). In

other words, reducing the other source of income disparity between Bumiputera and non-Bumiputera will lead to a wage gap reduction of approximately 40% in 2022. Among all levels of qualification used for this study, having a bachelor's degree would help Bumiputera the most to narrow down the wage differential, 37.04% (2022), 39.65% (2019), and 23.82% (2016). Next, it shows that more Bumiputera resided in rural areas compared to the non-Bumiputera who stayed in urban areas, causing Bumiputera to receive lower employment income. The percentage of contribution that the disparity in urban residents' income, *strata* caused to the endowment component is 33.58% (2022), 47.48% (2019), and 20.31% (2016). Not all predictors in endowment would widen the wage gap; a positive coefficient in the endowment signifies that the respective predictors would reduce the differential.

The top three predictors that showed the largest reduction are household size, gender of HOH, and marital status. The larger the household size, the more employment income contributed, meaning that Bumiputera households with more members have a higher paid employment income. The percentage for three years is 32.66% (2022), 45.52 (2019), 24.36 (2016). However, the log of annual employment income is a proxy to the HOH salary, other working family members and adding up to paid employment income may have amplified the coefficient. Nevertheless, having more working members would help narrow the wage gap by a significant percentage for Bumiputera households. Next, there are more male HOH for Bumiputera than non-Bumiputera, and they are married compared to the counterpart group. HOH being male and married would help reduce the wage gap by 9.6% (2022), 18.20% (2019), and 9.18% (2016). All these variables, however, are personal characteristics of HOH and do not reflect the outcomes of productivity traits. Other significant predictors with disparity and caused widening of the wage gap in all three years are: professional occupations, age squared, no certificate, SPM qualified, and Peninsular Malaysia residents' income. Even though they are not the top three predictors that cause the wage gap, improving the educational level to produce more Bumiputera professionals would reduce the wage gap.

TABLE 6
Endowment, Coefficient and Interaction Components' Coefficients

	Endowment			Coefficient			Interaction		
	2022	2019	2016	2022	2019	2016	2022	2019	2016
dstrata	-0.07***	-0.06***	-0.04***		0.08***	0.18***		-0.02***	-0.06***
dregion	-0.02***	-0.02***	-0.01***		-0.07***	-0.08***		0.01***	0.01***
hh_size	0.07***	0.06***	0.05***	-0.08***	-0.08***		-0.02***	-0.01**	
dhoh_gen	0.01***	0.01***	0.01***						
hoh_agesq	-0.02***	-0.01***	-0.01***	0.08***	0.10***	0.08***	-0.01***	-0.01***	
lnINCS02_hh	-0.09***	-0.04***	-0.07***	-1.22***	-0.73***	-0.96***	0.06***	0.04***	0.05***
dmarital	0.02***	0.01***	0.01***	0.03***			-0.01***		
dcert_degree	-0.08***	-0.05***	-0.05***						
dcert_dip									
dcert_spm		-0.02***							
dcert_pmr				-0.02**					
dcert_nil	-0.02***		-0.01***						
docc	-0.02***	-0.01***	-0.01***	-0.11***	0.02***		-0.02***	-0.01***	

Note: *** significant at 1%, ** significant at 5%, insignificant coefficients are removed for visibility and simplicity

Next, we examine the predictors for coefficient and interaction components. Predictor *lnINCS02_hh* has the highest coefficient and percentage under the coefficient. Taking away the disparity in having other sources of income, the wage gap would widen by 562.22% (2022), 339.69% (2019), and 432.62% (2016). In other words, even if two HOHs from different groups of ethnicities are identical in that both have or do not have other sources of income, the Bumiputera HOH would still be earning less than the non-Bumiputera counterpart. Recall that the exact predictor also occurred under the endowment effect as the top contributor. Still, the magnitude of the coefficient component effect for this predictor is far larger than for the endowment part. Other significant predictors under the coefficient include professional occupations, squared of age, lower secondary school certification (PMR), Peninsular Malaysia, urban and rural disparity, and marital status. Since the interaction portion is how the other two components interfere with one another, all predictors that are significant under interaction are the same as under the coefficient part.

5. CONCLUSION

5.1 POLICY RECOMMENDATION

In the awakening of discrimination toward marginal groups, developed countries have implemented labor economic policies to tackle issues regarding labor market discrimination. For example, employers in developed countries such as the United States, European Union country members, and the United Kingdom advertise their vacancies with the premise that they are practising inclusive recruitment to protect individuals who are discriminated against based on characteristics unrelated to their skills or productivity such as race and ability status. These corrective measures have finally taken place thanks to the extensive studies of wage differential analysis. For example, in 1995, a survey of the black-white wage ratio showed that whites earned 21% more than blacks significantly (Borjas, 2016). The relative economic status of blacks has improved ever since, and the wage ratio has improved from 0.40 in 1940 to 0.76 in 2012 for black males and 0.75 in 1967 to 0.87 in 2012 for black females (Borjas, 2016). The Equal Employment Opportunity Commission (EEOC) was established by the enactment of the 1964 Civil Rights Act; affirmative action by the government resulted in the bettering economic status of the black race, judged by the improved disparity of school quality,

higher return-to-school rate, and increased black human capital (Borjas, 2016). Apart from combating discrimination due to skin color, the United States Congress showed its commitment to reducing gender wage inequality in the workplace when they passed the Equal Pay Act and the Civil Rights Act in the 1960s, which demands equal wages for employees regardless of their gender as long as they do similar work (Calcagno and Montgomery, 2020). This act was imposed on private firms, however, and left out female public sector employees because the Republican members received a more significant gender wage gap compared to Democrats or Independents (Calcagno and Montgomery, 2020).

From these examples of race and the gender wage gap, we learned that even though awareness concerning the wage gap is spread through both academia and industries, the statistical persistence continued to exist to date, and the work is still ongoing for governments, researchers, and employees to push through an equal pay to protect the discriminated groups. The push for equal pay is based on principles of fairness, social justice, and economic efficiency. Wage disparities limit the marginalized group's economic mobility and their overall well-being. In Malaysia, the Shared Prosperity Vision 2030 and Madani framework emphasize inclusive and sustainable growth, focusing social equity and equitable opportunities. This calls for policies that address wage gaps and fair compensation based on labor productivity traits. By the time this study was conducted, no similar policy existed in Malaysia. The government may publish a blueprint to guide employers on how to price labor based on their productivity traits.

5.2 MAJOR FINDINGS AND FUTURE RESEARCH

The wage gap decreased in 2019 but increased again in 2022. However, in 2022, explained and endowments parts are higher than unexplained and coefficient portions. Even though 2019 recorded the lowest coefficient of the wage gap, the unexplained and coefficient portions are the highest. Hence, across the years 2022, 2019, and 2016, the predictors could capture and explain more of the wage differential. The productivity-related predictor that is the most significant and has the highest magnitudes on the endowment part of wage differential is a bachelor degree; for personal characteristics, it is professional occupations, and for household characteristics are log of other household annual income, Peninsular Malaysia and household size. As for coefficient and interaction portions, the most important predictors

are the same as endowment effects, with additions of age squared, lower secondary certificate (PMR), and marital status.

Bumiputera group has a less educated workforce and fewer professional workers, indicating that this group is lagging in human capital investment. Relying solely on employment income to invest in human capital, however, would be hard because they are compensated less than the non-Bumiputera group. Hence, government intervention, such as education and training subsidies, would reduce costs and narrow the productivity disparity. Despite the government's continuous effort to improve the Bumiputera group's livelihood, the wage gap is still persistent and prevalent. Hence, legislative fair employment measures should be considered. A recommended future research is to investigate the combined effect of gender and racial discrimination towards the wage gap in Malaysia.

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APPENDIX 1**The Ranking of Significant Predictors in Endowment, Coefficient, and Interaction Component****TABLE 7**
Endowment Component Variable Ranking Year 2022

Rank	Predictor	Coefficient	%	P>z
1	lnINCS02_hh	-0.09	40.02	0.00
2	dcert_degree	-0.08	37.04	0.00
3	dstrata	-0.07	33.58	0.00
4	hoh_agesq	-0.02	9.03	0.00
5	docc	-0.02	7.33	0.00
6	dcert_nil	-0.02	6.83	0.00
7	dregion	-0.02	6.80	0.00
8	dhoh_gen	0.01	-2.44	0.00
9	dmarital	0.02	-7.16	0.00
10	hh_size	0.07	-32.66	0.00

TABLE 8
Coefficient Component Variable Ranking Year 2022

Rank	Predictor	Coefficient	%	P>z
1	lnINCS02_hh	-1.22	562.92	0.00
2	hh_size	-0.08	36.16	0.00
3	dcert_pmr	-0.02	8.84	0.04
4	dmarital	0.03	-13.13	0.01
5	docc	-0.11	-14.17	0.00
6	hoh_agesq	0.08	-38.95	0.00

TABLE 9
Interaction Component Variable Ranking Year 2022

Rank	Predictor	Coefficient	%	P>z
1	hh_size	-0.02	115.67	0.00
2	docc	-0.02	105.29	0.00
3	hoh_agesq	-0.01	74.27	0.00
4	dmarital	-0.01	38.42	0.01

TABLE 10
Endowment Component Variable Ranking Year 2019

Rank	Predictor	Coefficient	%	P>z
1	dstrata	-0.06	47.48	0.00
2	dcert_degree	-0.05	39.65	0.00
3	lnINCS02_hh	-0.04	30.12	0.00
4	dregion	-0.02	16.02	0.00
5	dcert_spm	-0.02	12.01	0.01
6	hoh_agesq	-0.01	11.66	0.00
7	docc	-0.01	6.56	0.00
8	dhoh_gen	0.01	-8.59	0.00
9	dmarital	0.01	-9.61	0.00
10	hh_size	0.06	-45.52	0.00

TABLE 11
Coefficient Component Variable Ranking Year 2019

Rank	Predictor	Coefficient	%	P>z
1	lnINCS02_hh	-0.73	339.69	0.00
2	hh_size	-0.08	34.76	0.00
3	dregion	-0.07	31.96	0.00
4	hoh_agesq	0.10	-46.08	0.00
5	dstrata	0.08	-36.47	0.01
6	docc	0.02	-8.23	0.01

TABLE 12
Interaction Component Variable Ranking Year 2019

Rank	Predictor	Coefficient	%	P>z
1	dstrata	-0.02	88.00	0.01
2	hh_size	-0.01	58.26	0.00
3	hoh_agesq	-0.01	54.33	0.00
4	docc	-0.01	30.41	0.01
5	dregion	0.01	-34.86	0.00
6	lnINCS02_hh	0.04	-139.27	0.00

TABLE 13
Endowment Component Variable Ranking Year 2016

Rank	Predictor	Coefficient	%	P>z
1	lnINCS02_hh	-0.07	31.65	0.00
2	dcert_degree	-0.05	23.82	0.00
3	dstrata	-0.04	20.31	0.00
4	hoh_agesq	-0.01	6.12	0.00
5	dregion	-0.01	5.35	0.00
6	dcert_nil	-0.01	5.05	0.01
7	docc	-0.01	4.37	0.00
8	dhoh_gen	0.01	-3.68	0.00
9	dmarital	0.01	-5.50	0.00
10	hh_size	0.05	-24.36	0.00

TABLE 14
Coefficient Component Variable Ranking Year 2016

Rank	Predictor	Coefficient	%	P>z
1	lnINCS02_hh	-0.96	432.62	0.00
2	dregion	-0.08	34.32	0.00
3	hoh_agesq	0.08	-37.94	0.01
4	dstrata	0.18	-83.61	0.00
5	lnINCS02_hh	-0.96	432.62	0.00

TABLE 15
Interaction Component Variable Ranking Year 2016

Rank	Predictor	Coefficient	%	P>z
1	dstrata	-0.06	127.81	0.00
2	hoh_agesq	-0.01	17.39	0.01
3	dregion	0.01	-18.37	0.00
4	lnINCS02_hh	0.05	-100.24	0.00



IBRĀH ACQUISITION: A NEW CONCEPT OF ABSORPTIVE CAPABILITY BASED ON ISLĀMIC VALUE

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ABSTRACT

This study aims at introducing a new concept; the integration of absorptive capacity theory and *ibrāh* value—this value derived from Islamic values, namely *ibrāh* acquisition (IA). Absorptive emphasizes the company's ability to recognize the importance of new information, assimilate it, and apply it for commercial purposes. Meanwhile, *ibrāh* is an effort to take lessons from the experiences of other parties or events that occurred in the past through deep thinking. Thus, *ibrāh* acquisition is defined as the company's ability to absorb external knowledge from various events, history, and experiences based on values and measures that are more rationally applied in the company to realize optimal company performance. The concept of *ibrāh* acquisition includes seven newly developed dimensions presented in this article's contribution, framed in the main competency categories. They are prior investments, prior knowledge, motivation for collecting knowledge, and direction of knowledge with dimensions for scale development, namely *aqidah*, morals, and belief.

JEL Classification: M54; O15

Keywords: Absorptive capacity theory, Acquisition, *Ibrāh*, Organizational performance

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1. INTRODUCTION

Absorptive capability in an organization requires the ability to assimilate and create new knowledge based on previous knowledge (Labas and Courvisanos, 2021). Three core dimensions of Absorptive

Capability theory (ACAP) are: knowledge search, knowledge accumulation, and process transformation (Asiedu and Doe, 2022). Those are for identifying, assimilating, and exploiting knowledge from the environment to the company (Levint, 1990). It needs various skills to manage the needs related to the Tacit component of technology transferred to the company's internal needs (Mowery et al., 1996). It also requires the ability to learn and develop problem-solving learning skills. Learning ability includes assimilating knowledge for imitating skills and problem-solving to create new knowledge for innovation.

Since absorptive capability is considered an essential factor in corporate innovation and competitive advantage (Tho, 2017), the absorptive capability perspective should include the role of knowledge absorbed by organizations and provide a better understanding of the nature of boundaries within and around organizations (Easterby-Smith et al., 2008). Jansen et al. (2005) proposed a definition of absorptive capability based on three crucial components: the capability to recognize external knowledge value and the capability to assimilate and apply it. Ko et al. (2005) found that absorption has a positive effect and determines knowledge transfer from consultant to client. In comparison, other studies show that absorptive capability has a negative effect on knowledge transfer. This finding is reinforced by Pacharapha and Vathanophas (2012) that absorption does not increase knowledge transfer.

Ibrāh can be interpreted as an event object either in the form of natural phenomena, history, or stories that contain wisdom, which can be used as lessons, examples, measures, or warnings from Allāh *'azza wa jalla*. The wisdom and lessons can be obtained through observation, consideration, investigation, research, and measurement based on values and rationality. Through the *Qur'ān*, Allāh *'azza wa jalla* teaches the concept of *ibrāh* learning to humans to explore and analyze every event. It aims for humans to find knowledge, wisdom, or lessons behind events or incidents (Ulfah, 2021).

This *ibrāh* method aims at fostering faith (*aqidah*) in monotheism (*tauhid*), provide satisfaction in *aqidah* understanding, arouse a sense of *rabbaniyyah*' (divinity), and foster obedience and a sense of awe toward Allāh *'azza wa jalla*'s creatures (Aziz et al., 2022).

Spiritual values can improve performance, job satisfaction, innovation, and leadership potential and provide insight into how organizations can create an environment that supports employee spiritual growth (Biberman, 2008). Knowledge management

performance that focuses on human capital, as well as practices and policies based on religious values, will be more effective in driving organizational performance achievement (Widianti et al., 2024). Five main disciplines—systems thinking, personal mastery, mental models, shared vision, and team learning—are the basis for organizations to create a culture of continuous learning (Peter, 1990). By integrating spiritual values into organizational policies and practices, companies not only create space for employee spiritual growth but also strengthen commitment and motivation, resulting in a more harmonious and innovative environment and enabling organizations to face challenges more effectively. The formation of *Ibrāh* Acquisition (IA) dimensions in the organization will help understand the development of *ibrāh* values in knowledge acquisition, which refers to the company's ability to identify and acquire important external knowledge. The application of *ibrāh* involves learning from past experiences, where members are encouraged to reflect and analyze the phenomena that occur so that they can draw relevant lessons (*hikmah*). In addition, it is important to integrate spiritual values into organizational policies and decisions, create an open culture for discussion, and conduct training targeted at character development and spirituality. In this way, organizations can not only improve performance but also build harmonious and meaningful communities.

2. LITERATURE REVIEW

2.1 ABSORPTIVE CAPABILITY THEORY

A company's ability to recognize new information value, assimilate it, and apply it for commercial purposes and absorption is highly dependent on knowledge (Cohen and Levinthal, 1990). The new definition of absorptive capability is organizational activities and processes by which companies acquire, assimilate, transform and exploit knowledge to generate dynamic organizational capabilities (Zahra and George, 2002).

Potential absorptive capability and absorption potential are made of two elements. First, is knowledge acquisition which refers to the company's ability to identify and acquire externally generated knowledge important for its operations. Second is the assimilation ability or the company's routines and processes that enable it to analyze, process, interpret and understand information obtained from external sources. The potential absorptive capability allows companies to accept and assimilate external knowledge. Its manifestation consists

of transformation capability, which can be defined as the company's ability to develop and refine routines that facilitate incorporation of existing knowledge, newly acquired and assimilated knowledge.

On the other hand, realized absorptive power is also made of the exploitability of the company. The company can apply the newly acquired knowledge in a product or service that can benefit it financially. Furthermore, realized absorptive capability is a function of transformability and exploitation.

Zou et al. (2018) conducted an absorptive capability meta-analysis and found that: (1) absorptive capability is a strong predictor of innovation and knowledge transfer. Its effect on financial performance is fully mediated by innovation and knowledge transfer; (2) The firm size absorptive capability relationship is positive for small companies but negative for large companies. The relationship between company age absorptive capability is negative for mature companies and is significant for young companies; (3) Social integration mechanisms, knowledge infrastructure, management support, and relational capabilities have a positive and significant impact on the absorptive innovation-capability relationship. Nevertheless, they did not find the extent of external search or the intensity of competition to influence the relationship. Environmental dynamism has a slightly significant negative impact on the absorptive capability innovation relationship; (4) They also found that the absorptive capability-innovation relationship is more potent when measured by surveys rather than by archival proxies.

The definition of absorptive capability is based on three essential components: the capacity to recognize external knowledge value, assimilate it, and apply it. Acquisition capability is the company's ability to find, identify, assess and acquire essential external knowledge to its operations, which will be analyzed, processed, interpreted, comprehended, and internalized (Van den Bosch et al., 2005).

Thus, companies with a high absorptive capability will be able to recognize new external knowledge value, acquire, assimilate or transform, and exploit new external knowledge.

2.2 ACQUISITION

Acquisition is one of companies' most popular growth and internationalization strategies (Buckley et al., 2016). Knowledge assimilation refers to a company's capability to process, examine, interpret, and understand newly acquired knowledge and may include

incorporation into routines (Lewin et al., 2011). Knowledge assimilation occurs when an employee comes up with a new idea and must 'adapt' to a person's knowledge (Silva et al., 2014).

When people discover new things and interpret these experiences, they make small and large adjustments to existing ideas about the world around them (Gosal and Kamase, 2021). Despite its prevalence, however, acquisitions often exceed expectations (King et al., 2004). Previous acquisition research has mainly focused on examining the influence of financial and strategic factors in the pre-acquisition stage, such as company relatedness, payment methods, and previous acquisition experience. These factors, however, only partially explain acquisition outcomes, suggesting the need for additional theory development (Tarba et al., 2020; Oh and Johnston, 2020).

2.3 IBRĀH

According to al-Wahidi, *ibrāh* can be interpreted as thinking about various issues so that something other than its kind is known. This word is commonly used in the sentence “*al-i'tibar bi ma madha,*” or taking lessons from the past. The value of *ibrāh* can be taken from stories and experiences so that it will change behavior, encouraging one to be humble and think that everything other than Allāh ‘azza wa jalla is small because Allāh ‘azza wa jalla is the Greatest. The reflection on education in *ibrāh* includes education in *aqidah* and morals (Ansari, 2011).

Ibrāh is an Arabic word meaning crossing from one river bank to another. Imam Ghazali defined *i'tibar* as; “Crossing from what is mentioned to what is not mentioned. Therefore, it is not limited to those mentioned”. It means *i'tibar* is taking a lesson from an event by a person, even though the lesson is invisible or not explicitly stated. *Ibrāh* is a word found in the *Qur'ān* in *Sūrah* Yusuf Verse 111. The definition of *ibrāh* in the *Qur'ān* refers to an effort to learn lessons from other people's experiences or events that occurred in the past through a deep thought process. This aims at raising awareness within individuals, so that they can learn and take lessons from history and the experiences they have undergone (Aziz et al., 2022).

The meaning of *ibrāh* comes from the Arabic word *عِبْرَة* which means lesson, or there is a lesson in every story for people who have sense. *Qur'ān* is not a fabricated book but justifies the previous books, explains everything, and acts as guidance and mercy for those who believe. Types of *ibrāh* in the *Qur'ān* are *ibrāh* through stories, taking lessons from favors and Allāh ‘azza wa jalla’s gifts, and taking lessons from various events and history.

The story of Prophet Moses and Pharaoh is one example often told by Prophet (*ṣal-Allāhu ‘alayhi wa sallam*) to provide moral and ethical lessons. Allāh ‘azza wa jalla sent Prophet Moses to free the Children of Israel from the oppression of Pharaoh, who was known as a cruel and tyrannical ruler. This story contains many lessons, especially regarding just leadership, courage in facing oppression, and the importance of trust in Allāh ‘azza wa jalla. Prophet Moses showed strong leadership by adhering to the principles of justice and truth, even though he had to face great challenges from Pharaoh. Pharaoh, on the other hand, illustrates the nature of arrogance and rejection of the truth, which ultimately led to his destruction. The lesson that from this story is that good leadership must be based on justice and that Allāh ‘azza wa jalla always supports those who fight for the truth. This story can be found in the *Qur’ān*, in *Ṣūrah Al-A’raf* (7:103-137) and *Ṣūrah Ta-Ha* (20:9-79), which describe the journey of Prophet Moses and his interactions with Pharaoh.

By implementing the lessons from this story in the *Qur’ān*, organizations can develop more effective leadership, improve fairness in decision-making, and encourage innovation through learning from experiences, both positive and negative. This will not only strengthen the organization's foundation but also improve overall employee performance and satisfaction.

2.4 *IBRĀH* ACQUISITION

Ibrāh acquisition knowledge transfer integrates *ibrāh* and acquisition values developed from absorptive capability theory. The integration process is shown in Figure 1.

The acquisition is the capability to recognize, understand, and acquire the importance of external knowledge for organizational operation (Zahra and George, 2002). Acquisition is a generator of knowledge for an organization; thus, it can result from investment in management or through prior knowledge (Welsh et al., 2001). The concept of absorptive capability has been widely studied from a theoretical perspective. The dimension of absorption, from a literature review, consists of (1) Acquisition with indicators, namely risk tolerance, senior management support, training, and investment in research and development (R&D), (2) Prior knowledge with Knowledge repertory indicators, the intensity of knowledge, experience within the R&D department, highest academic degree held by employees, (3) Motivation for collecting knowledge with indicators of motivation, observation, learning speed and (4) The

direction of knowledge with indicators of circulation of knowledge (Noblet et al., 2011).

Components that create IA are given in the following Figure 2: The newly developed measures presented in this contribution have been framed within these main competency categories, which generate seven dimensions for scale development.

FIGURE 1
Integration of Absorptive Capability Theory with the Concept of *Islāmic* Value

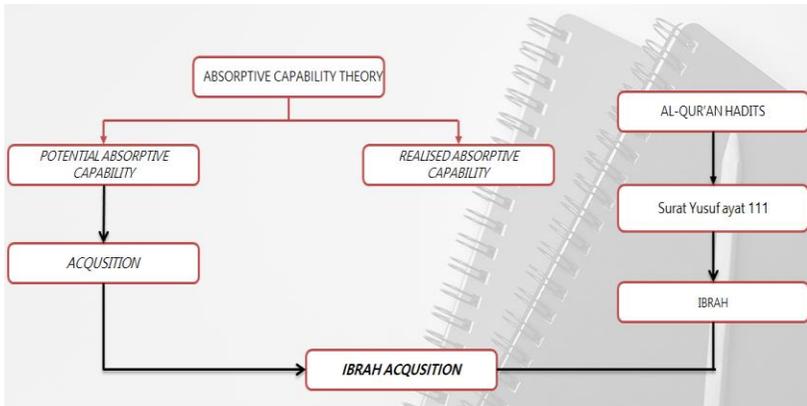


FIGURE 2
Competency Categories



- **Prior investments**

It is all initial investments that meet the requirements for reuse. In this study, the investment is initial employee knowledge obtained from formal and non-formal education and experience. The company manages it, so it supports absorption of knowledge. It aims at assisting in completing tasks and routines and supporting decision-making. The indicators are Senior management support, training, and investment in R&D (Noblet et al., 2011).

- **Prior knowledge**

The ability of an individual to evaluate and make better use of knowledge that comes from outside is a level function of interconnected prior knowledge. This interconnected prior knowledge provides an ability to recognize the new knowledge value, to assimilate and apply it in new settings. Specifically, prior knowledge may include basic skills, language division, or knowledge of the most recent technological or scientific developments in related fields.

Prior knowledge as a concept can be interpreted as a set of experiences, attitudes, knowledge, and even beliefs already owned by individuals who obtain it from experiences throughout their lives that will be used to construct new knowledge and experiences. The better the initial knowledge possessed by employees, the easier the capability to absorb knowledge for organizational progress. Several studies on prior knowledge show a relationship between prior knowledge and the ability to complete tasks and investigate concepts. The higher a person's initial knowledge level, the higher the relationship (Idris Hasanuddin, 2020).

Hence prior knowledge has strong implications in interactions with tasks and learning (Ningsih and Khoiriyah, 2016). Interrelated prior knowledge provides the ability to recognize new knowledge value and absorb and apply new attitudes. The indicators are knowledge repertory, the intensity of knowledge, experience within the R&D department, and the highest academic degree held by employees (Noblet et al., 2011).

- **Motivation for collecting knowledge**

Process: It is the process carried out by employees in gathering knowledge from formal and non-formal education, training, self-experience, and other people, which can be utilized to support organizational performance achievement.

To have the required knowledge absorption capability, a person needs to know various types of knowledge or topics (knowledge aspect) and have deep mastery of a particular type of knowledge (knowledge depth aspect). Likewise, as a recipient of

knowledge, a person needs to know various types of knowledge, even if it is only the big picture, to relate it to the current knowledge. In this case, the process of seeking and acquiring knowledge becomes crucial.

The indicators include levels of motivation, observation, and speed of learning (Noblet et al., 2011).

- Direction of knowledge

There will be different levels of absorptive capability between one individual and another because of differences in conditions such as professional experience or educational background. The level of human education influences perception of rationality and thinking with a moral awareness full of responsibility and independence. Thus, human self-maturity becomes the basis for developing knowledge and awareness in mind. In other words, the direction of knowledge will be better based on the awareness of recognizing and understanding external knowledge that will be applied and contribute to the organization. The indicator is the circulation of knowledge (Noblet et al., 2011).

- *Aqidah*

The concept of *aqidah* is essential for the legality of a person, whether he is worthy of being a Muslim or not. Allāh *‘azza wa jalla* conveys the principles of *aqidah*, one of them is through *ibrāh*. Therefore, *aqidah* education has an urgency that must be conveyed to every Muslim generation. The aim is to grow and familiarize the process of fostering and strengthening self-confidence that is firmly and correctly based on the values of the creed. *Aqidah* contains an element of invitation to humans as well as arousing awareness and stimulating reason to capture the true values of *aqidah* so that everyone's rationality will encourage reason to make further observations and research.

Several verses of *aqidah* containing *ibrāh* have lessons to be used as contemplation and observation for people who use their minds. Observations made through rational power will transform into an awareness of faith embedded in the heart and science. One of the most important things in every lesson from *ibrāh* is strengthening the value of *aqidah*. The first way *Islām* filters science and technology development in human life is that the *Islāmic* faith must be the basis for all science and technology concepts and applications. It is the *Islāmic* paradigm as brought by Prophet (*ṣal-Allāhu ‘alayhi wa sallam*).

- *Akhlaq*

Akhlaq or morals are the traits humans carry from birth embedded in their souls. This trait can be in the form of good deeds, called noble character, or bad deeds, called despicable morals. The science of *akhlaq* determines the boundaries between good and bad, between what is commendable and what is reprehensible, about the words or actions of human beings physically and mentally (Asmaran-As, 2002). It also explains good and bad, teaches human relations, and states the goal of all their endeavors and work. Standards of good or bad *akhlaq* are derived from *Qur'ān* and *as-Sunnah*, while good and bad ethical and moral standards are society's common sense and customs. Thus, the standards of morals and ethical values are local and temporal, while *akhlaq* standards are universal and eternal.

- Belief in Allāh *'azza wa jalla*

It is described in the *Qur'ān* as regarding individual beliefs in achieving the expected goals. A person's faith creates commendable attitudes, namely belief in Allāh *'azza wa jalla* in all his or her efforts, being patient (consistent) in facing difficulties or even failure, and always being grateful for the successes (Widianti, 2024).

This model is expected to provide an overview of a new concept, namely a measure of absorptive capability with IA. which can help achieve organizational performance. The discussion in this article refers to the formation of a new concept, namely, *Ibrāh* Acquisition (IA). It is especially about the company's ability to absorb external knowledge from various events, history, and experiences based on values and measures that are more rationally applied in companies to realize optimal company performance. This research implies that better IA has the potential to improve organizational performance. The seven dimensions of IA encompass prior investments, prior knowledge, motivation for collecting knowledge, the direction of knowledge, *aqidah*, *akhlaq*, and beliefs.

3. CONCLUSION

Knowledge assimilation requires understanding how new information fits into what is already contained in the knowledge base and how the current information should be modified. Hence it can reflect the views of experts on the domain through assimilation and take new information or experience and incorporate it into existing ideas. The process is more subjective because it changes experience or information to match pre-existing beliefs. Accordingly, a deep understanding is needed to create wisdom in new information or

knowledge that can be used as lessons, examples, measures, or warnings so that considerations, investigations, research, and measurements are based on values and measures that are more rational. This assimilation plays an important role in learning about the world around people.

The new concept of IA is defined as the company's ability to absorb external knowledge from various events, history, and experiences based on values and measures that are more rational and applied to realize optimal company performance. This paper shows that the IA has the potential to improve organizational performance while upholding noble values and hoping for the blessing of Allāh *'azza wa jalla*.

The implementation of IA within an organization is a strategic step that not only improves organizational operational effectiveness but also builds a culture of continuous learning. By creating an environment where employees are encouraged to share experiences and learn from mistakes, organizations can turn challenges into opportunities for innovation. Through structured training and clear communication, each individual can feel involved and have a sense of ownership of the change process. Thus, IA is not only a theoretical concept but also a real practice that strengthens the foundation of the organization in facing the dynamics of the ever-changing market.

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BOOK REVIEW

ISLĀMIC FINANCE AND CIRCULAR ECONOMY: CONNECTING IMPACT AND VALUE

by Syed Nazim Ali and Zul Hakim Jumat, Springer Singapore, First Edition, 2021, 335 pp., EUR 169.99 (paperback), ISBN: 978-981-16-6060-3

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The book “Islamic Finance and Circular Economy: Connecting Impact and Value Creation” delves into the intricate relationship between multidisciplinary ecological, social, economic, and *Islāmic* finance issues, which are central to the global economic agenda. This book provides a comprehensive discussion of the circular economy (CE) from the perspective of the *Islāmic* economy. It is organized into three parts, comprising 16 chapters, and totaling 335 pages. Each part contains a varying number of chapters. The chapters in this book originated as papers presented at the International Conference on Islamic Finance (ICIF) by the Center for Islamic Economics and Finance of the College of Islamic Studies in 2020.

Structurally, each chapter is formatted like a journal article, including an abstract, introduction, recommendations, and conclusion. This clear structure enables readers to quickly grasp the purpose, scope, and outcomes of the authors' arguments and analyses. Furthermore, the book is comprehensive in its approach, offering definitions and conceptual explanations, positive analysis validation, and case study examples from several countries.

The initial pages of the book include a preface and a table of contents, and a list of contributing authors, their professional status, and their affiliations. Following this, the first chapter, which is separate from any of the three main parts, is presented. This introductory chapter is authored by the book's editors, Syed Nazim Ali and Zul Hakim Jumaat. It serves as an introduction, offering a brief outline of the book, future directions, and recommendations.

Part one of the book, titled “*Islāmic* Perspective on Circular Economy and Sustainability,” consists of two chapters that discuss the

fundamental concepts of the circular economy (CE) and sustainability in general, and examine the role of *Islāmic* thought in these concepts. Both chapters utilize *Maqāsid* as the foundational values to analyze their alignment with the CE. Chapter 2, titled “Islamic Perspective on Circular Economy,” is authored by Saqib Hafiz Khateeb, Zul Hakim Jumaat, and Munir Sound Khamis. This chapter focuses on the history, urgency, and advantages of CE relative to a static economy, as well as on business models aligned with CE principles. Chapter 3, “Environmental Protection and Sustainable Development: An Islamic Perspective,” authored by Mohammed El-Gammal and Abdulazeem Abozaid, focuses on the inductive legal aspects, addressing both positive and negative provisions.

Part two, titled “Convergence of Islamic Finance and Circular Economy,” elucidates the evidence of the relationship between *Islāmic* finance and the circular economy (CE). This section consists of nine chapters, which can be broadly categorized into three main areas of discussion. Chapters 4, 5, and 6 discuss the conceptual urgency of *Islāmic* finance in relation to CE from perspectives other than *Maqāsid al-Sharī‘ah*. Chapters 7 and 8 present empirical evidence on the relationship between *Islāmic* investments and markets and the CE and Sustainable Development Goals (SDGs). The remaining chapters focus on *Islāmic* financial technology (Chapter 9), relationship between the *Islāmic* finance industry and environmental issues (Chapter 10), *Islāmic* marketing in the context of CE (Chapter 11), and analysis of axioms learning support in addressing the climate crisis (Chapter 12).

Although chapters 4, 5, and 6 are centered on the same overarching topic, Chapter 4 specifically discusses *Islāmic* financial products that comply with the CE concept. Chapter 5 focuses on the compatibility of transaction instruments within *Islāmic* finance. Meanwhile, chapter 6 examines the conceptual relationship between CE, *Islāmic* banking, and social finance. Furthermore, chapter 4 on “Circular Economy Financing: An *Islāmic* Finance Perspective” by Nafis Alam, discusses the urgency of financing within the circular economy (CE) by examining its strategic importance, historical context, and the challenges associated with inter-institutional cooperation. The author also conducts a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of commercial *Islāmic* finance products suitable as financing instruments for environmental initiatives. This analysis highlights how *Islāmic* finance can play a pivotal role in advancing circular economy principles and practices.

Chapter 5 is titled “Circular Economy, Green Economy, and Sustainable Development: Establishing the Interconnections and Discouring the Role of Islamic Finance” by Abdul Rashid and M. Abubakar Siddique. The authors go into greater detail on the extent and differences between circular economy, green economy, and sustainable economy, as well as the role of *Islāmic* financing in implementing these three concepts. They also demonstrate how these three concepts can be implemented practically in *Islāmic* finance by integrating the *Mushārakah cum Ijārah* Model, which is divided into three modeling levels. This modeling integration can reduce uncertainty in the financial system, improving stability, resilience, inclusivity, and economic growth.

Chapter 6 is “The Circular Economy and Its Possible Collaboration with Islamic Economics and Finance” by Mohamed Aslam Haneef and Husna Jamaludin. The conversation focuses on “rethinking”, criticism, and involvement with CE from various perspectives. The authors discuss the economic limits of using CE, namely inefficient hidden costs and incorrect utility assumptions in economic behavior involving recyclable commodities (p. 78). The authors also explore the state of CE in Malaysia (p. 81-82), which consists of (1) altruistic value practices and (2) value-based intermediation at *Islāmic* Bank Malaysia, both of which have the potential to improve welfare and environmental conditions.

Chapter 7, titled “ESG Analysis and Shariah Screening: Mutual Learnings for a Better Investment Climate” by Valeed Ahmad Ansari and Shariq Nisar, focuses on the performance analysis of the National Stock Exchange (NSE) of India. The study covers the Nifty 100 ESG, Nifty 50 *Sharī‘ah*, and board-based Nifty 50 indices over the period 2011 to 2019. The authors employ various models including CAPM, Fama and French, Carhart, as well as Sharpe and Treynor ratios to evaluate these indices. The analysis reveals that investment portfolios linked to ESG and *Sharī‘ah* indices exhibit superior performance compared to other indexing strategies when considering risk levels. This finding underscores the potential benefits for investors and the *Islāmic* finance industry alike, highlighting the attractiveness of sustainable, *Sharī‘ah*-compliant investment options for enhancing long-term sustainability and financial performance.

Chapter 8, titled “Sustainable Investment and Transparency Recommendations in Segmented Markets: An Application to Islamic Investment Accounts” by Ahmed M. Badreldin and Bernhard Nietert, focuses on the challenges and opportunities of integrating sustainable investment principles and transparency practices within *Islāmic*

investment accounts. The authors highlight the importance of aligning *Islāmic* finance with sustainability principles to address environmental, social, and governance (ESG) concerns by enhancing transparency and disclosure practices.

Chapter 9, on “Sustainability, Trust, and Blockchain Applications in Islamic Finance and Circular Economy: Best Practices and Fintech Prospects” by Ahmet Faruk Aysan and Fouad Bergigui, specifically highlights the importance of trust in *Islāmic* finance and explores how blockchain technology can enhance transparency, accountability, and trust within the financial system. The authors discuss opportunities and challenges associated with integrating blockchain technology into *Islāmic* finance and how it can promote circular economy practices.

Chapter 10, titled “Financial Development and Ecological Footprint in OIC Countries: Islamic Perspectives and Empirical Evidence” by Muhammad Tariq Majeed, examines the relationship between financial development and ecological footprint using panel data from OIC (Organization of Islamic Cooperation) countries spanning the period from 1971 to 2017. The analysis employs regression techniques to substantiate its findings. The author explains that financial development can have both positive and negative impacts on environmental degradation. Empirical results indicate that financial development can enhance environmental quality by reducing the ecological footprint in OIC countries, particularly in more prosperous nations. This chapter provides valuable insights for decision-makers in formulating policies, highlighting the potential of financial development to mitigate environmental impacts in the context of *Islāmic* perspectives.

Chapter 11, titled “A Consumer Perspective of the Circular Economy: An Empirical Investigation Through Structural Equation Modeling” by Muhammad Tahir Jan, presents an exploratory study on the Circular Economy (CE) from a marketing perspective. The study utilizes the Theory of Planned Behavior and includes additional factors such as convenience and environmental impact. The primary data for this study were collected from 377 questionnaires in the Klang Valley area of Malaysia. The findings indicate that subjective norm, attitude, and environmental impact are factors influencing consumer intention to purchase circular products or products aligned with CE principles.

The book also examines the importance of knowledge in the Circular Economy (CE) in Chapter 12, titled “A Multi-Layer Analysis and Solution for Climate Crisis: From the Restructuring of Production

to Restructuring of Knowledge” by Omar Javaid. This chapter delves deeply into the fundamental causes of economic system failures in addressing environmental crises, utilizing a multi-layered approach based on the Hollingsworth framework. Within this analysis, Javaid identifies six layers of approach encompassing two distinct paradigms: modern and *Islāmic* ontological and epistemological perspectives. The author emphasizes that reconstructing society in accordance with *Islāmic* principles and paradigms is crucial to preventing further environmental degradation.

Part three of the book, consisting of four chapters, discusses various case studies and innovations in the Circular Economy (CE). Chapter 13, titled “Zero Waste Cities in the Developing World: A Comparative Study” by M. Evren Tok, Cristina D’Alessandro, Adenike Akinsemolu, and Bayan Khaled, underscores the critical importance of waste management arising from consumption and waste production. The chapter conducts a comparative analysis focusing on Middle Eastern countries and several nations in Sub-Saharan Africa. It explores the implementation of zero-waste cities through discussions of challenges, opportunities, practical examples of CE practices, case studies from regions beyond the Middle East and Sub-Saharan Africa, future trends, and recommendations to enhance governance of zero-waste cities in terms of infrastructure and investment.

Chapter 14, titled “Solving the Problem of Water, Sanitation, and Hygiene in Nigeria Using Blended Finance” by Mubarak Mohammed Kabir Musa, Jainaba Kolley, and Dalal Aassouli, discusses an integrated financing structure utilizing *Islāmic* financial instruments for water and sanitation projects in Nigeria. Given the inadequate WASH infrastructure in Nigeria, the chapter highlights significant challenges in providing access to clean water, sanitation, and hygiene facilities. Blended finance, which combines public and private funds, is proposed to improve the sustainability and scale of WASH projects and accelerate the achievement of sustainable development goals.

Chapter 15, on “The Role of Islamic Finance in Fostering Circular Business Investments in the Case of Qatar’s Tire Industry” by Abdul-Jalil Ibrahim, Khalid Al-Ansari, and Nasim Shah Shirazi, explores how *Islāmic* finance can facilitate circular business investments, particularly focusing on Qatar's tire industry. The authors examine the potential of *Islāmic* financial instruments such as *Islāmic* bonds (*sukuk*) and *Islāmic* venture capital in promoting sustainable and environmentally friendly practices within the CE framework.

They discuss how these financial tools can support initiatives aimed at reducing waste and promoting recycling in the tire industry, aligning with Qatar's goals for sustainable development.

In the last chapter on “Electronic and Electrical Waste Management: Malaysia and Sweden Experiences,” Eiman I. Hassan and Nasim Shah Shirazi compare the waste management practices of electronic and electrical or e-waste in Malaysia and Sweden. The authors delve into the challenges and strategies employed by each country to achieve effective e-waste management. Malaysia's approach focuses on regulations and policies to control e-waste generation and disposal, while Sweden emphasizes extended producer responsibility and recycling infrastructure development. The paper highlights the importance of collaboration between stakeholders, including governments, industries, and consumers, to address the growing e-waste problem. It underscores the need for international cooperation and knowledge sharing to develop sustainable solutions for global e-waste management.

Generally, each chapter in the book aligns with the overarching topics outlined in its respective parts. Specific observations regarding clarity and depth of discussion, however, arise in certain sections. Chapter 2, for instance, includes a conclusion mentioning *Muḍārabah* and *Mushārah* (p. 22), yet the substantive discussion of these concepts is absent from the main text. This omission may confuse readers who expect further elaboration on these concepts within the context discussed. Chapter 3 subsequently provides a more detailed and systematic exploration of the themes introduced in Chapter 2, enhancing clarity for general readers.

In Part Two, while most chapters are well-explained, attention is drawn to Chapters 4 and 10. In Chapter 4, the introduction to the *Mushārah* Cum *Ijārah* Model (p. 67) remains introductory in nature. To delve deeper into this integrated modeling approach, it may be beneficial to consider a more extensive discussion in a separate chapter to broaden the readers' understanding. Regarding Chapter 10, there is consideration as to whether the article on ecological footprint is personal or a case study. Additionally, there is a lack of detailed discussion regarding the relationship between financial development and ecological footprint from an *Islāmic* perspective. While the author conceptually mentions *Islāmic* economic paradigms within the context of the Circular Economy (CE), these are not included as variables in the regression equation, resulting in outcomes reflecting only a general relationship between finance and the environment in Muslim

countries, rather than specific implications for *Islāmic* finance and economics.

In Part Three, Chapters 14 and 15 propose models within their respective case studies. Rough calculation simulations are needed to illustrate the potential of these models for practical application according to their specific case studies. These points indicate that while each chapter adheres to relevant topics within the designated sections of the book, there is room to enhance clarity, depth, and integration of theory and application in specific sections. An advantage of this book is its systematic and comprehensive exploration from *Islāmic* perspectives on the environment, basic understanding of CE, to real-world examples of its application in various countries, particularly within the Organization of Islamic Cooperation (OIC) nations. The book also provides clear limitations, outlining its specific audience and which chapters can serve as references for policymakers.

The book's format is a collection of chapters involving different articles, and there is a lack of continuity between chapters. However, it may pose difficulties for novice readers due to the absence of bridging explanations between chapters. Therefore, it may be unsuitable as a handbook or reference for beginner-level teaching, such as the undergraduate level in universities. Additionally, there is a lack of perspectives from other economic schools, particularly mainstream economics, including neoclassical economics. As observed in Chapters 1, 2, 3, and 6, the authors briefly mention criticisms of neoclassical economics as foundational to environmental degradation and CE. Nevertheless, these mentions are brief and lack further discussion, which may lead to confusion among readers seeking a comprehensive discussion on mainstream economics' impact on CE.

Overall, this book is highly recommended for scholars, students, and policymakers seeking comprehensive resources on the potential and contributions of *Islāmic* finance to ecological issues. With its well-structured organization, the book provides a clear and systematic understanding of the circular economy, the role of *Islāmic* finance, and its implications in CE. Furthermore, this book serves as an essential reference for addressing the UN SDGs agenda.



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