ARTIFICIAL INTELLIGENCE IMPLICATIONS IN ISLAMIC BANKS: POTENTIAL AND CHALLENGES

Mohd Shukor Harun, PhD
Muhammad Ridhwan Ab Aziz, PhD
Muhammad Azrin Nazri,PhD
Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia (USIM), Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan Malaysia

Rana Fathinah Ananda
Sari Nuzullina Rahmadhani
Faculty of Economics and Business,Universitas Medan Area

Abstract: *As new digitalization strategies storm the banking industry, banks which are behind the technological curve may struggle to keep pace. This is a well-known challenge in the Islamic banking sector in particular; however, this research shows that little is being done to achieve unified digitalization in operations. Artificial Intelligence (AI) is a disruptive force in the financial sector, promising increased financial inclusion, economic development, and a excess of efficient, transparent, Shariah-compliant financial solutions due to its integration of technology with Islam's profound ethical principles. The objective of this paper is to study the potential and challenges of AI implications in Islamic Banks. This is a qualitative study using focus group interviews with five Islamic Banking experts consists of Shariah Committee Member, academic experts and Islamic banking executive from different banks in Malaysia. SC members from different Islamic banks. Following the interviews, a thematic analysis of the transcribed data was conducted using computer-assisted qualitative data analysis software. The participants were generally receptive towards the utilization of AI tools in the Islamic banks which give a significant impact of the Islamic banking landscape. The participants recognize the potential of AI for improving the efficiency and effectiveness of the Islamic banking operations. However, they raised some concerns about the challenges that need to be addressed such as replacing of manpower with AI in some area in Islamic banks. The novelty of this research provides a novel discussion of potential and challenges of AI implications in Islamic banks and at the same time add to the Islamic banking literature in this area. The size of the focus group was limited to five participants to optimize group size and composition to allow adequate participation by each group member. Further sampling from more SC members and experts may elicit additional findings. The first-hand views from the focus group interviews provides valuable input for potential and challenges of adopting AI in the Islamic banking operations.*

Keywords: Artificial Intelligence, Islamic Banking, Focus group

Introductions

Artificial intelligence (AI) is increasingly influencing various sectors, including the financial industry. In the context of Islamic banks, AI offers numerous potential benefits as well as challenges. The inevitable has happened as Financial Technology (Artificial Intelligence (AI)) has taken the center stage and disrupted the core of the financial services industry. The financial services industry is going through a massive transformation, and it has already embraced the most disruptive technology in the form of Artificial Intelligence (AI). Firms in the industry are faced with the challenges of developing new and innovative business models, enhanced customer experience and alternative approaches that result in the services transformation. Artificial Intelligence (AI) startups are looking for new pathways and new partners to grab the massive untapped market share. Artificial Intelligence (AI) has provided customers with what they have been asking for and more, with cross-country transfers being possible at the tip of their fingers.

Artificial intelligence (AI) is a technical science that expands and advances research by emulating human intelligence to develop theory, techniques, technology, and application systems. In layman's words, it is a computer system capable of converting human knowledge into productive work using technology. Users can greatly improve the traditional information transmission process by utilizing AI technologies to increase transmission speed, reduce transmission costs, and eliminate a variety of bottlenecks (AI Topics, 2016). The bulky data provided by many data sources, combined with cloud computing's practically endless computational capability, eliminates the bottleneck that limits AI development and enables the deployment of a deep learning algorithm. Furthermore, deep learning facilitates the development of a wide range of machines application for learning, broadening the field of AI research. Deep learning has already been used in several areas. As a result, the advancement of deep learning algorithms and approaches will expand this 'container' to levels that humans cannot predict (Demski, 2007; Greenman, 2017).

Artificial intelligence has brought about a spur in the financial ecosystem and the incumbents are looking for innovative solutions to upgrade their established services. Nonetheless, proper review and research in this direction is the need of the hour to bring new legislation and to understand the market dynamics to seize this opportunity and to curtail the risk brought about by Artificial intelligence is significant to maintain financial stability. Since ChatGPT have been launch in November 2022, it has become a global phenomenon with millions of users and has since gained considerable traction – including from those in the Shariah field. ChatGPT was developed using generative Artificial Intelligence (AI) technology. Various use case demonstrations with ChatGPT that deal with complicated subject matter, has helped more people to realize the capacity of AI technology for solving complex problems. Although ChatGPT has no doubt intensified such interest, the vision of leveraging AI for the advancement of Islamic finance has been present for several years. Stakeholders in Islamic finance have openly expressed their optimism about the potential of AI for improving productivity and efficiency within the industry.

The financial sector has always been increasingly competitive and swift in adapting to the dynamic changes in its ecosystem for decades. Earlier digitalization seeped its way into the financial sector and resulted in easeful provision of financial services to the customers. However, it didn't pose a substitute threat to the financial firms; instead, they were accepted as an innovative improvement to the financial sector. Now, customers demand and accept those financial

institutions and banks that provide the most efficient, trustworthy, useful and quick services. With the innovation of Artificial intelligence, the dynamics of the financial services industry have completely rotated and moved to a more customer centric approach in contrast to the product centered approach earlier.

The objective of this paper is to study the potential and challenges of AI implications in Islamic Banks in Malaysia. Based on focus group interview conducted, the study will provide significant findings in achieving the research aims. This paper comprises of a literature review of AI in Islamic finance, followed by a methodology of the focus groups, and a discussion of the results, considering implications for the industry and future research.

1. Literature Review

2.1 Digital Transformation towards AI implications

An early definition of digital transformation is the use of digital technologies to facilitate institutions' day-to-day operations. Nowadays, the concept has become much broader, and it has a profound impact on financial institutions' entire business models .

Digital transformation is now more broadly defined as the use of advanced technology to improve and upgrade the performance and efficiency of enterprises. According to Tanguy Catlin et al (2019), if fully adopted, digital transformation provides organizations with the power to rethink and change all their operational aspects. Thus, digital transformation is a process where organizations identify strategic responses to adopt new paths for value creation while mitigating the challenges of such technologies.

The internet has fundamentally impacted society with the advent of its related innovative new technologies. Digital developments mold systematic change in internal processes, business models, and competencies to deliver intelligent and interactive values to customers. A holistic view of the definition of digital transformation consists of looking at both the operational aspect, by emphasizing on the use of technologies in the processes to upscale the operations, and the strategical aspect, in which transformative actions are applied on different levels, including the organization's culture, the business model, value creation, and the processes .

Various pieces of literature discuss the disruptive effect of the digitalization of finance, questioning the existence of banks in the fully digitalized future world. Classical banking business models and related value chains are no longer effective, and Artificial intelligence collaboration and the adoption of digital innovations have become crucial in order for banks to stay in the race. According to Cziesla(2021), the majority of traditional business models in the financial sector are challenged by digitalization, leading to the disintermediation of traditional financial institutions. A related KPMG(2020) survey showed that almost 90% of banks perceive Artificial intelligence as a threat to their businesses. Artificial intelligence increases the competition in digital banking services, open banking, and data analytics; it also provides a smoother customer experience.

Among the trending digital platform models, social-media-inspired platform designs appear to have the most significant attraction for customers, owing to their smooth and easyto- use structure for banking operations. However, when diving into the underlying systems of these digital platforms, Arner et al. argued that blockchain, together with Artificial intelligence, has a similar disruptive effect on the banking business. Similarly, Aysan et al(2020). discussed, in their study, the fact that among these technologies, blockchain-based solutions have a crucial role in achieving a resilient system. They focused on SDG achievement as a benchmark, and continued the paper by measuring the possibility of SDG achievement through blockchain-based methods. According to the authors, these methods are vital for achieving a greener and more inclusive banking system.

In terms of customer relationships, the use of technology has an impact on customer service performance, and leads to customer centricity. However, banks are adopting a cautious approach toward customer centricity. Abuhasan and Moreb(2020) analyzed the impact of digital transformation on customer experience. Their research focused on the relationship between the customers and Islamic banks of Palestine, and how this relationship is affected based on the digitalization processes of the banks. Widharto et al.(2021) performed a similar study on Indonesian banks. They argued that IT systems have the most rejuvenating effect on the digital transformation of the Indonesian banks, yet they are not enough for a bank to be defined as a "digital bank". Traditional financial institutions are confronted with strategic and operational barriers in their digital transformation journey, which indicates the absence of a comprehensive understanding of digitalization .

Furthermore, Abedifar et al.(2022) explained that a financial ecosystem in which Islamic banks are fully-fledged and technological opportunities are used more efficiently will perform better than an ecosystem with Islamic windows and more outdated infrastructures. The study proved that a dual banking system with fully-fledged Islamic banks will perform better in a systematic shock. Similarly, Dosso and Aysan(2020) demonstrated that a more technological financial system will perform better than a more outdated ecosystem, whether Islamic or conventional.

Zouari and Abdelhedi (2023) questioned the statistical impact of digitalization on customer satisfaction by focusing on Tunisian Islamic banks. They found out that there is a direct relationship between customer satisfaction and service quality and the digitalization process of the bank. Tiutiunyk et al.(2021) examined how banks' digital transformation improves their competitive positions in advanced economies, and the risks and benefits involved. The results show a direct relationship between the banks' performance and their digitalization level. Unlike most literature about financial digitalization, this paper is critical in showing, through a market study, that digital transformation is seen differently among Islamic banks, and that there may be discrepancies in the comprehensive understanding of the elements leading to a perfect implementation of digitalization. Additionally, Aysan and Unal(2018) discussed the fact that, especially, the global Islamic financial system evolves into Artificial intelligence and blockchain-

based user interface for a smoother customer experience and a more competitive position in the market.

Similarly, Tsindeliani et al.(1999)focused on financial digitalization from a legal perspective, and how deregulating the finance industry helps to improve flexibility mechanisms and stability amidst economic crises. The paper's results underlined the important impact of the internationalization and harmonization of legislation on financial performance in the industry. Sekhar and Gudimetla (2000) demonstrated with their study that the performance of a country at both the micro and macro levels increases with a higher level of digitalization activity. The results showed that a higher level of digitalization eases the production of high added-value products and increases the GDP. Besides this, the production, transmission, storage, and processing of information and knowledge help an economy make more concise and quick decisions, improving its ability to absorb significant shocks. A similar study by Apergis et al.(2018) focused on the effects of macro-prudential policies in systemic risks over a financial system. The authors proved that capital strength, managerial quality and other institutional qualities are the main basis for a positive policy effect on a financial ecosystem .As evidenced by the literature, the digitization of Islamic banking and its disruptive and restructuring effects on the banking industry is a hot topic among experts worldwide.

2.2   AI in Islamic Finance Industry

Artificial intelligence has disrupted the global finance industry by its ease of access, minimized costs and highly efficient products and services. Telecommunication services have started providing core banking services which has threatened the incumbents' market share. Artificial intelligence has also enabled financial inclusion of the tech savvy generation who are otherwise left off the hook due to the stringent requirements of incumbent banks and financial institutions. As such, financial institutions are forced to either incorporate Artificial intelligence services or partner with Artificial intelligence startups for reaping the maximum benefits of this innovation. Adopting Artificial intelligence isn't just a ladder to the top but a necessity to sustain in the current financial ecosystem. Traditional banks are faced with serious decisions to restructure their business models to incorporate Artificial intelligence.

One of the key reasons for the increased focus on AI in recent years is the fact that AI plays a significant role in overarching digitization and automation trends across numerous industries (Chan et al., 2019). For example, in Malaysia, Bank Negara Malaysia's (BNM) Policy Outlook reported that their budget for automation and digitization was raised from MYR700 million to MYR1 billion, on 17th March 2021 (Illias, 2021). Digitization and automation technologies also contribute to vast data sources (also known as big data). The growth effect in AI is further escalated by harnessing this big data, to augment human decision making.

The Financial services industry (FSI) is identified as one industry that has benefited greatly from AI innovations. 'Artificial Intelligence is a powerful tool that is already widely deployed in financial services' (Chan et al., 2019). Traditional FSI players have no choice but to remodel their processes and offerings, to adapt to continuous changes in consumer behaviors and needs (Deloitte,

2019). AI has helped to accelerate the speed at which this responsiveness is possible and has consequently built a new degree of trust in the financial industry. AI plays a very important role in the FSI as 'it is revolutionizing a centuries-old industry innovation flow from the ground' (Corea, 2019). The President and CEO of International Centre for Education in Islamic Finance (INCEIF) Malaysia, in his presentation at the 6th Doha Islamic Finance Conference entitled Artificial Intelligence in Islamic Banks: A Looking forward Vision, stated that "Islamic Banks must innovate by adopting AI', and that 'the future will look brighter with AI".

Khan (2019) summarizes the applications of AI in Islamic finance into functional groupings, which cut across front, middle, and back-office operations, as well as compliance. Unique to Islamic financial services are AI applications for Shariah compliance. Sa'ad et al. (2020) opines that AI digital assistants (Robo Shariah advisors) could help to reduce the effort involved in the iterative Shariah review process, and therefore facilitate timelier, and more robust, Shariah rulings for Islamic banking products and services. Example of AI in Islamic Finance Industry are:

1) **Robo-Advisory services**. Examples of firms that offer such are Wahed, Aghaz Investments, Sarwa , Wealthface, FinaMaze, and others.
2) **Asset Management**. Examples include Al Rajhi Capital, Albilad Capital, SNB Capital and pretty much every Islamic bank.
3) **Financing services**. Examples are Tamara, Tabby, XPay, Tarmeez Capital, Alinma Bank Pay, FlexxPay, and Tamam.
4) **Virtual assistant**. Mashreq Al Islami Bank collaborated with the AI software company Kore.ai to offer the Bank Assist virtual assistant. This product ensures personalized self-service and quicker resolution of customer queries in Arabic and English.
5) **Crowdfunding**. Nayifat Finance Company, manafa | Tameed, Lendo |Sahlah, and Funding Souq are included in this category.
6) **Savings association**. Mit-Ghamr Islamic Saving Associations (MGISA) is an example of such.
7) **Blockchain-based firms**, like Finterra Technologies.

In addition, the following are the two tangible initiatives of AI applications within the Shariah dimension of Islamic financial services:

1) **IRSHAD**, an intelligent Robo Shariah Advisor, replicates human advisory functions and will serve as Zakat, inheritance, and investment advisor. Currently in development, it will employ various AI technologies in its creation.
2) **SKIL-RSA**, the SKIL Robo Shariah Advisor for Islamic finance, utilizes cutting-edge AI techniques, enabling users to pose intelligent queries, perform comparative analyses, and consult an automated legal advisor for complex scenarios. Positioned as a "Mufti-Companion" or "Mujtahid-Assistant," SKIL-RSA assists human scholars in Shariah opinions, offering essential resources. However, the last word and decision will remain with human Islamic scholars.

Methodology

This study adopts a focus group interview approach. Focus group interviews are 'a particular type of group interview, where the topic is clearly defined and there is a focus on facilitating discussion between participants' (Sekaran & Bougie, 2016). Focus group interviews are interviews you conduct with a group of participants to collect a variety of information. These interviews can be as small as four participants and sometimes as large as ten, but I would recommend keeping a focus group interview between four and eight participants (Abdullah,2018). The focus group interview method was deemed suitable for this study in achieving its research objective. 'Focus groups work particularly well to explore perceptions, feelings, and thinking about issues, ideas, products, services, or opportunities' (Krueger, 2015). For the purpose of this study, 5 experts from several background being chosen be involved in the focus group interview.

To keep the focus group discussion within the relevant context of this study, the focus group interview was guided by the Unified Theory of Acceptance and Use of Technology (UTAUT), which is well established for studying human intentions to accept and use software applications. The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh et al (2003) in "User acceptance of information technology: toward a unified view". The UTAUT aims to explain user intentions to use an information system and subsequent usage behaviour.

3.1   Focus Group Participants

The focus group comprise of five (5) experts from different Islamic banks in Malaysia. A summary of the profiles of the participants is given in Table 1.

Table 1: Focus Group Participants' Profiles

Participants	Shariah Committee Roles
Respondent 1	A prominent member of Shariah Advisory Councils in Malaysia,
Respondent 2	SC member of an Islamic bank and Takaful
Respondent 3	SC member of a digital Islamic bank in Malaysia, and SC member of a government owned Islamic financial institution
Respondent 4	An academic scholar in Islamic Finance industry and a member of SC of an Islamic banks.

Respondent 5	A senior executive of Islamic banks with 10 year of experience in that field

3.2 Interview Questions

The open-ended questions for this focus group were developed based on the three constructs from the UTAUT. The questions are as given in Table 2.

Table 2: List of Questions for Focus Group Interview

Construct	Questions
What is AI?	(1) What do you understand about artificial intelligence(AI)?? (2) In what ways do you think that AI can be implement in Islamic Finance? (3) What are your concerns in utilizing AI in Islamic Finance industry? (4) What are your expectations for utilizing AI in Islamic Finance?
Potential of AI in Islamic Finance?	(5) What is the potential of using AI in Islamic Finance industry? (6) Can you share with us your thought regarding to the benefit of using AI in Islamic Finance? (7) What are your expectations of AI implications in Islamic Finance?
Challenges of AI in Islamic Finance?	(8) Are you willing to use AI in making shariah decision such as Robo Shariah Advisor? (9) What are the main challenges to adopt AI in Islamic finance? (10) In your opinion, how to overcome all the challenges as stated above?

3.3 Data Analysis Method

Following the focus group interviews, a thematic analysis of the transcribed data was conducted. Thematic Analysis is one of the most common approaches to qualitative data analysis (Bryman, 2011). The process involves systematically coding data, in order to identify patterns (themes) from the dataset, often with the help of Computer-assisted qualitative data analysis software (CAQDAS) like QSR NVivo.

Results and Discussion

4.1   What is AI?

In general, all respondents provide a generic information about AI which is Artificial Intelligence (AI) holds significant potential for transforming the operations of Islamic banks, which adhere to the principles of Shariah law. Most of the respondents understands and aware that AI will be used widely in Islamic Finance industry. The implications of AI in Islamic banking can be broadly categorized into potential benefits and challenges.

Potential of AI in Islamic Finance

The findings with regards to potential of AI in Islamic Finance we found that the key point of Potential of AI in Islamic finance as below:

1. **Enhanced Customer Experience:**
    o **Chatbots and Virtual Assistants:** AI-driven chatbots can handle customer inquiries 24/7, providing quick and accurate responses. They can assist with routine transactions, offer product recommendations, and help resolve issues.
    o **Personalized Services:** AI can analyze customer data to offer personalized financial products and services that align with individual needs and preferences, improving customer satisfaction.
2. **Operational Efficiency:**
    o **Automation of Routine Tasks:** AI can automate repetitive tasks such as data entry, document verification, and transaction processing, reducing operational costs and minimizing human errors.
    o **Process Optimization:** AI algorithms can optimize various banking processes, such as loan approval and risk assessment, enhancing efficiency and reducing turnaround times.
3. **Risk Management:**
    o **Fraud Detection:** AI can analyze transaction patterns and detect anomalies, helping to identify and prevent fraudulent activities.
    o **Credit Scoring:** AI models can evaluate credit risk more accurately by analyzing a wide range of data points, including non-traditional data sources, which is particularly useful for customers with limited credit histories.
4. **Compliance and Regulatory Adherence:**
    o **RegTech Solutions:** AI can assist in automating compliance with Shariah law and other regulatory requirements, ensuring that all banking activities are conducted in accordance with Islamic principles.
    o **AML and KYC Processes:** AI can enhance Anti-Money Laundering (AML) and Know Your Customer (KYC) procedures by efficiently analyzing large datasets to identify suspicious activities.
5. **Product Innovation:**
    o **Development of New Financial Products:** AI can aid in the creation of innovative Islamic financial products tailored to meet the evolving needs of customers while adhering to Shariah principles.

4.2 Challenges of AI in Islamic Finance

Based on the interview conducted the responses reveal a broad understanding, key point that we can summarize regarding to challenges of AI in Islamic Finance as below:

1. **Shariah Compliance:**
   - **Algorithm Bias:** Ensuring that AI algorithms do not inadvertently violate Shariah principles requires careful design and oversight by Shariah scholars and experts.
   - **Ethical Concerns:** The use of AI must align with Islamic ethical standards, which emphasize fairness, transparency, and the prohibition of unjust gains.
2. **Data Privacy and Security:**
   - **Data Protection:** Islamic banks must ensure that customer data is protected against breaches and misuse, adhering to both legal and ethical standards.
   - **Cybersecurity Risks:** The increased use of AI can expose banks to new cybersecurity threats, necessitating robust security measures.
3. **Technology Integration:**
   - **Legacy Systems:** Integrating AI with existing legacy systems can be challenging and may require significant investment in technology upgrades.
   - **Skill Gap:** There is a need for skilled personnel who understand both AI technology and Islamic banking principles.
4. **Regulatory Challenges:**
   - **Evolving Regulations:** Islamic banks must navigate a complex regulatory landscape that is continuously evolving to keep pace with technological advancements.
   - **Global Standardization:** There is a lack of global standardization in Islamic finance, which can complicate the implementation of AI solutions across different jurisdictions.
5. **Cost and Investment:**
   - **High Initial Investment:** Implementing AI technology requires substantial initial investment, which can be a barrier for smaller Islamic banks.
   - **Ongoing Maintenance:** Continuous monitoring, updating, and maintenance of AI systems are necessary to ensure their effectiveness and compliance.

Conclusion

AI has the potential to transform Islamic banks by enhancing customer experience, improving operational efficiency, and supporting Shariah compliance. However, it also presents challenges related to regulation, ethics, data security, integration, and costs. Islamic banks must navigate these challenges carefully to harness the benefits of AI while adhering to Islamic principles and maintaining trust with their customers. This study indicates that focus group participants are receptive towards the issues of utilizing AI impications for Islamic banking products and services. They believe that collective adoption AI among Islamic banks will not only help make the process more efficient, but may also result in better quality decisions. There are still numerous concerns on the challenges of adoption of AI in Islamic banking idustry as well. To extend this research, the researcher suggests a study targeting key influential stakeholders who have the potential to be involved in the adoption of AI in Islamic banks may help the industry to be more competitive with

conventional banks who agressively adopted AI in their oprations.There are golden opportunity and potenital of adoption AI in the industry,when there is opprtunity,there is challenges need tobe face dand overcome to enusure the oprational activities are not effected. We do beleive that Islamic banks will perform better with adoption of AI in their daily operations.

References

Abuhasan, F.; Moreb, M. The Impact of the Digital Transformation on Customer Experience in Palestine Banks. In Proceedings of the 2021 International Conference on Information Technology (ICIT), Amman, Jordan, 14–15 July 2021; IEEE: New York, NY, USA, 2021; pp. 43–48.

Adeyemi, A., & Nakhooda, M. (2018). Fintech in Islamic Finance: Digitalization of Islamic Financial Services. In I. Hasan, M. K. Hassan, & M. O. Oseni (Eds.), Handbook of Empirical Research on Islam and Economic Life (pp. 752-771). Edward Elgar Publishing.

Ahmed, H. (2011). Product development in Islamic banks. Edinburgh University Press.

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). The evolution of Fintech: A new post-crisis paradigm?. Georgetown Journal of International Law, 47(4), 1271-1319.

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). The Evolution of Fintech: A New Post-Crisis Paradigm? SSRN Electronic Journal. https://doi. org/10.2139/ssrn.2676553.

Benlaharche, K., & Nouaouria, N. (2018), 'Ontology Based Similarity for Case Based Reasoning in Islamic Banking', *International Journal on Islamic Applications in Computer Science and Technology*, Vol 6 No. 2, pp. 9–20.

Bryman, A. (2011), *Social Research Methods*. Oxford University Press, New York, USA.

Chan, C., Chow, C., Wong, J., Dimakis, N., Nayler, D., Bermudes, J., Raman, J., Lam, R., & Baker, M. (2019), 'Artificial Intelligence Applications in Financial Services - Asset Management, Banking and Insurance' (Technical Paper). Marsh & McLennan Companies. New York, USA

Corea, F. (2019), *Applied Artificial Intelligence: Where AI Can Be Used in Business*. Springer International, New York, USA.

Deloitte Research (2019), 'Global Artificial Intelligence Industry Whitepaper', Deloitte Research, China.

Fazi, F. (2019), 'Role of Robo-advisors in Islamic Financial Institutions', *Wahed: Personal Finance*, available at: https://journal.wahedinvest.com/role-of-robo-advisors-in-islamic-financial-institutions (accessed 5 May 5 2023).

Hasan, R., Hassan, M. K., & Aliyu, S. (2020). Fintech and Islamic Finance: Literature Review and Research Agenda. International Journal of Islamic Economics and Finance (IJIEF), 3(1). https://doi.org/10.18196/ijief.2122

Illias, S. (2021), 'Economic Outlook & Lookout - Silver Linings amid Pandemic Clouds…?' (Slide), Maybank Kim Eng, Kuala Lumpur, Malaysia

Khan, N. (2019), 'Artificial Intelligence Application in Islamic Finance Industry'. *Global Islamic Finance Report 2019*, pp. 122–133.

Krueger, R.A. (2015), *Focus Groups: A Practical Guide for Applied Research*, Sage Publications, California, USA.

Mat Rahim, S.R., Mohamad, Z.Z., Abu Bakar, J., Mohsin, F.H., & Md, N. (2018), 'Artificial Intelligence, Smart Contract and Islamic Finance', *Asian Social Science*, Vol 14 No. 2, pp. 145–154.

Obaidullah, M. (2021), 'Promise of IRSHAD: The Intelligent Robo Shariah Advisor', *IBFNet*, available at: https://conference.ibfnet.group/2021/03/03/promise-of-irshad-the-intelligent-robo-shariah-advisor/ (accessed 5 May 2023).

Omar, A. (2021), 'Artificial Intelligence in Islamic Banks: A Looking forward Vision', *YouTube*, available at: https://www.youtube.com/watch?v=4Hj8lE6715s (accessed 5 May 2023).

Paynet (2023), 'Who We Are', *PayNet: Payment Network Malaysia*, available at: https://paynet.my/about-paynet.html (accessed 5 May 2023).

Sa'ad, A.A., Alhabshi, S.M., Mohd Noor, A., & Hasan, R (2020), 'Robo-Advisory for Islamic Financial Institutions: Shariah and Regulatory Issues', *European Journal of Islamic Finance*, First Special Issue, ISSN 2421–2172.

Salim, K., Abojeib, M., & Abdul Hamid, B. (2020), 'Islamic Fintech in Malaysia: Reality & Outlook', The International Centre for Education in Islamic Finance (INCEIF), Kuala Lumpur, Malaysia.

Sekaran, U., & Bougie, R. (2016), *Research Methods for Business: A Skill-Building Approach*. John Wiley & Sons, West Sussex, United Kingdom.

Sultan, Y. (2017), 'Will shariah robot-advisors replace the human shariah advisors?', *LinkedIn*, available at: https://www.linkedin.com/pulse/shariah-robo-advisors-replace-human-advisors-yousuf-sultan (accessed 5 May 2023).

Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003), 'User Acceptance of Information Technology: Toward a Unified View', *MIS Quarterly,* Vol 27 No. 3, pp. 425–478.

Yunita, P. The Digital Banking Profitability Challenges: Are They Different Between Conventional And Islamic Banks? J. Akunt.Dan Keuang. Indones. 2021, 18, 4.

Zhang, D., Mishra, S., Brynjolfsson, E., Etchemendy, J., Ganguli, D., Grosz, B., Lyons, T., Manyika, J., Niebles, J.C., Sellitto, M., Shoham, Y., Clark, J., & Perrault, R. (2021), 'The AI Index 2021 Annual Report', Human-Centered AI Institute, Stanford University, California, USA.