

Bahaaeddin Alareeni  
Allam Hamdan *Editors*

# Sustainable Finance, Digitalization and the Role of Technology

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Conference on Business and  
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Editors

# Sustainable Finance, Digitalization and the Role of Technology

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on Business and Technology (ICBT 2021)

*Editors*

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# Online Banking of Islamic Banks: The Customer's Perceptions in Kelantan



Mohd Zulkifli Muhammad , Farah Hanan Muhamad ,  
Caturida Meiwanto Doktoralina, Dzulkifli Mukhtar,  
Mohd Fahmi Ghazali , Muhammad Khalilur Rahman,  
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**Abstract** This paper focuses on problems associated with the usage of internet banking and its privacy and security in the Islamic banks in area of Kota Bharu, a state capital of Kelantan which are attributed to the perspective, decision and suggestions from customers for possible actions that could be taken to overcome the problem. This study is conducted utilizing qualitative methods to ensure the data analyzed through a reliable software package of ATLAS.ti. The data employed were drawn from interviews and documents analysis. Interview's data collected from online banking users in Kota Bharu, Kelantan. The contents and textual analyses also used to achieve this purpose. Researchers concluded that everybody now ends up making online payment transactions by using the technology at their fingertips. Researchers find perception factor to be crucially significant and play a key role in determining whether e-banking adherents are confident and content with the privacy and security of online banking and whether perceptions affect their choice of e-banking. To avoid problems concerning privacy and security, awareness is an essential element. Trusts also influence decision-making and perception in online banking access. The implication of

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this study is that privacy and security are critical aspects in Islamic banking operation, and Islamic banking should take proactive measures to ensure that privacy and security in internet banking are at an optimal level.

**Keywords** Online banking · Privacy and security · Islamic banking · Kota Bharu

## 1 Introduction

After nearly four decades of existence, Islamic banks have found out how to place themselves as money related organizations which are not only critical in asset assembly, asset distribution, and usage, but are also effectively associated with the path toward actualizing government monetary policy (Narayan and Phan 2019). In addition to offering practical standard financial institutions, Islamic banks also promote domestic and international trade (Naushad 2021).

Malaysia's Islamic financial framework is based on a dual or parallel financial system, a structure that enables interest-free and interest-based funding to co-exist for credits and funding (Poon, Chow, Ewers and Ramli 2020). Furthermore, Poon et al. (2020) stated that the multi-religious and multi-social features of Malaysia lead to the Islamic financial system's ability to manage conditions in which the demand for and supply of surplus funds are no longer entirely based on confidence, but also on various factors such as return on accessibility, deposits, and the cost of financing (Syarif 2019). Furthermore, this religious and non-religious essential the showcase segment of Malaysian Islamic banking is accepted in a way that favors in the Malaysian Islamic banking investors' asset report the executive's organization influence execution (Naushad 2021; Poon et al. 2020).

Today, internet-based banking systems are one of the services offered by banks as a means for customers when making deposits or withdrawing funds. Computer-generated banks, also known as virtual banks or "branchless banks," are a new term used to describe banks that do not have a physical location, such as a branch, but instead provide services to customers through the internet and ATMs (Al-Shaer 2021; Sadeghi 2004).

Customers who use internet-based banking or online banking have direct access to a bank's information system from work, school, home, or any other location where a system association is available. The customer is now regarded as an end-client of the bank's information preparation structure in this contemporary paradigm. The customer's device plays an important role in end-client processing (Jiminez and Diaz 2019; Gerrard, Cunningham and Devlin 2006).

Al-Sharafi, Arshah, Herzallah and Abu-Shanab (2018) previously found that their findings affect the behavior of customers to accept online banking services with absolute trust. Furthermore, customer awareness, as well as perceived efficacy, security, and privacy, had a significant impact on their trust. Nevertheless, customers' perceived ease of use did not predict their intention to adopt mobile banking services.



Raza, Umer, Qureshi and Dahri (2020) and Normalini and Ramayah (2017) provide tools to assess the viability of biometric authentication technology in internet banking. While counting user perceptions of the effectiveness of biometrics authentication technologies in the framework's experimental testing, fundamental insights into the dynamics of the relationship between trust and its backgrounds were revealed. The findings of this study, in general, highlight the importance of using biometrics technology in internet banking. The relationships between perceived privacy and security and trust were clearly qualified by the perceived effectiveness of biometrics technology (Nassar and Battour 2020; Raza et al. 2020; Yussaivi et al. 2021).

Numerous researchers are already conducting research in this field, but the majority of these studies focus exclusively on conventional banking in Malaysia. Researchers rarely pay attention to research on the internet banking system provided by Islamic banking. As a matter of fact, the purpose of this research is to investigate adopters' perceptions of Islamic banks' e-banking in Kota Bharu in contexts of privacy and security. To determine whether adopters' decisions to use e-banking are adversely affected by the potential ramifications of e-banking, and ultimately to determine what measures can be taken to resolve e-banking privacy and security concerns. This article begins with an introduction and the purpose of the study, after which it discusses the literature review, research framework, methodology, findings and discussion, and finally it concludes with a conclusion and recommendations.

## 2 Literature Review

Islamic banking has become more recognized among market participants during the last decade. This is because technology has improved Islamic banking system performance for better services. In Saudi Arabia mobile services are easily accessible to users according to Alsheik and Bojei (2014). Alongside its expansion, a range of concerns in technology has been recognized. These problems include insufficient technological experience, inadequate use of technology and awareness of the risks involved (Wijayati and Gustyana 2021).

According to Eklof et al. (2016), the Islamic banking sector in Pakistan is dominated by shariah compliance understandings, which play a significant role in customer satisfaction. In the Muslim country, both the company's product and services must fulfill Islamic law since it is the most important preference among the customers. Customers will seek out Shariah-compliant institutions to use and purchase their goods and services, as this will provide them with satisfaction in selecting the best institution.

Customers' views are favorably linked to their quality preferences. Perception is a common thing that naturally occurs when it is related to humans dealing with something that will result in good or bad outcomes. Especially when the person is about to decide whether to use, apply, or adopt it. It is an active process that requires information processing and then interpreting it into a message to give humans an idea of how individuals perceive something.

Paul et al. (2016) viewed perception of a product's performance will emerge from the comparisons process, wherein the perceived performance of one company is compared to the other perceived performance of another company. Then, with one or more of the other company's standards compared, an expectation will be created. In brief, customers' perceptions of services in the internet banking industry would have a significant impact on the company.

Besides, Mohammadi (2015) found that awareness has an impact on users' perceptions in Iran. On the other hand, Dixit et al. (2010) analyzed the aspects that have an impact on the use of internet banking services that are surrounded by consumers and show the degree of consideration regarding privacy and security issues in India. Meanwhile, Safeena (2011) observed that awareness of internet banking services was high in their study. As a result, awareness has a significant impact on the adoption of internet banking services and customer satisfaction.

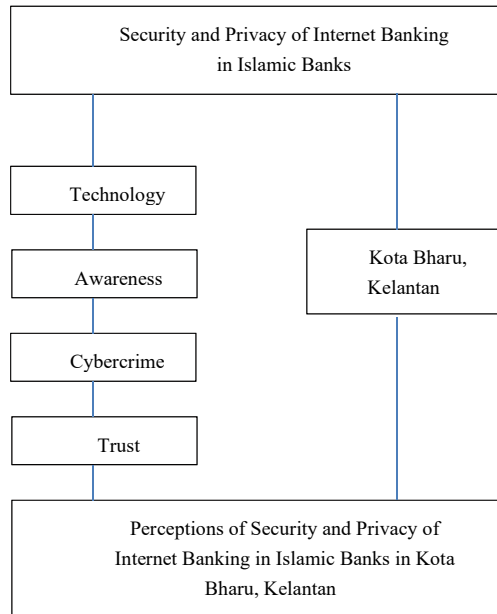
In a study of Aghdaie et al. (2011), trust can be classified into two types: interpersonal trust and institutional trust. The former is established between online customers and merchants, while the latter is established between the computer and the consumer. The client's assertion that she or he could have relied on electronic banking to ensure the welfare and security of the client's online transactions was referred to as trust (Al-Dmour, Al-Dmour, Brghuti and Al-Dmour 2021; Alazemi and Alazemi 2021; Holsapple and Sasidharan 2005).

Riek (2015) demarcated cybercrime as an unavoidable threat in today's Internet-dependent society. Though the true scale and economic impact are difficult to quantify, officials and scientists agree that cybercrime is a massive and growing issue. While according to Gaol, Budiansa, Weniko and Matsuo (2021) and Broadhust (2014), cybercrime is typically defined as a criminal activity involving technologies and computers committed on the internet. Contrary to More et al. (2016), cybercrime is an intentional attack from one computer to another computer by using network to modify, disrupt, repudiate, degrade, or damage or destroy the data accommodated in the attacked system or network.

## ***2.1 Research Framework***

The research framework in Fig. 1 can be defined based on the themes and research gap that have already been identified. According to Fig. 1, the themes identified in the literature review regarding internet banking security and privacy in Islamic Banks are technology, awareness, cybercrime, and trust. Meanwhile, the study was conducted in Kota Bharu, Kelantan. As such, this study examines customer perceptions of internet banking security and privacy in Islamic banks in Kota Bharu, Kelantan.

**Fig. 1** Research framework of perceptions of security and privacy of internet banking in Islamic banks in Kota Bharu, Kelantan



### 3 Research Methodology

#### 3.1 Research Design

A research design is a plan that specifies when, where, and how information will be collected and analyzed (Hwang and Fu 2019; Parahoo 2014). The research design is referred to the framework within which a researcher chooses his or her research methods and techniques (Schoonenboom and Johnson 2017). The design enables researchers to focus on research methods that are appropriate for the subject matter and to establish a foundation for success in their studies (Novikov and Novikov 2019). Since this purpose of this study is to identify adopters’ perceptions, analyze customers’ decisions in choosing Islamic bank e-banking, and conclude possible actions to overcome privacy and security issues among e-banking users in Kota Bharu, Kelantan, qualitative research is appropriate for this research.

#### 3.2 Qualitative Research

The qualitative method is used to collect data in this study. Aspers and Corte (2019) stated that qualitative research is guided by intense and delayed contact with a “field” or life circumstance. These situations are frequently “cliché” or typical,

intelligent of individuals', groups', societies', and organizations' regular day-to-day lives.

Qualitative research is done in the same way as exploratory experiments are done (Crawford 2006). Likewise, Yilmaz (2013) has expressed a quality research approach to examine people, phenomena, social, cases and processes in their natural state in a natural, naturalistic, inductive and interpretative way to reveal in a descriptive aspect of the relevance of their experience in the globalized era.

The aim of using a qualitative approach in this study was to investigate and portray the perceptions of online banking users in Kota Bharu, Kelantan, on privacy and security in internet banking particularly in Islamic banks. It was an effective method for gathering their thoughts on the effects of internet banking in terms of its privacy and security. The methods used were as follows:

### **Exploratory Research**

Pantano and Vannucci (2019) states that when another area is researched or when little is known about the area of interest exploratory examinations are carried out. It is used to investigate the full concept of the phenomenon and the various factors associated with that too. An interview was used in this study to examine the perceptions of internet banking users in Kota Bahru, Kelantan, on the privacy and security of internet banking. Even though this paper has focused on the privacy and security of internet banking, little is known about the perceptions of online banking users toward Islamic banking in Kelantan.

### **Descriptive Research**

Gupta, Chauhan and Jaiswal (2019) defined descriptive research as a design for providing a picture of the natural environment. It explains the current practice and concludes with the development of theories. According to Creswell and Clark (2017), researchers need to select respondents and research sites purposely in order to conduct a thorough review of a phenomenon. This study aimed to obtain a picture of the perception of Internet banking users on privacy and internet banking security to improve the security of internet banking. In the context of this study, descriptive research is used.

### **Interview**

According to Willis (2019), a qualitative research interview seeks to cover both accuracy and significance levels, but it is typically increasingly difficult to interview on a meeting level. He explained that the interview on qualitative research looks at the implications of focus topics in the universe of existence of the subjects. The main task of the interview is to understand the importance of what the interviewees say. The purpose of this study is to examine further the privacy and security of internet banking among customers of electronic banking in Kota Bharu, Kelantan.

The respondents for this study consisting of twelve online banking users with a variety of backgrounds. These twelve respondents are taking into account the data saturation as the point when no new information or themes are observed in the data. They came from a variety of backgrounds such as professionals, government servants,

university students, managers, retailers and entrepreneurs. This survey inquires about their familiarity with online banking, how do they know about e-banking, do they know what privacy and security of online banking entails, do they believe online banking is secure and essential in the future, then how does the privacy and security e-banking level of Islamic banks in Kota Bharu affect customers' decision to adopt internet banking.

### **3.3 Data Collection Method**

In this qualitative analysis, data was collected using two methods. Primary data collected through a research survey, which is a personal interview, and secondary data gathered through document analysis of books, journals, conference papers and newspapers.

#### **Primary Data**

This study was based on primary data collected through a series of qualitative interviews with twelve informants consisting of customers who consistently using internet banking in Islamic banks available in Kota Bharu.

The ordained gave researchers and respondents an insightful discussion to communicate and understand one another. This allowed the researcher to extract relevant data that would have been impossible to obtain through a standardized questionnaire. The personal interviews also allowed the researcher to meet the respondents face-to-face, thus allowing them to evaluate their expression during the talks.

The first source of data is primary data. The original data were collected to answer questions from the research. The researchers themselves are collecting information to test the hypothesis in their study. This file is not available. Then, the data sources are generally collected via experiments or field research. Interviews and observations are an example. It can be compiled of people, focus groups or expert panels. In principle, the collection of passive and active data is based on two primary methods of data collection (Nguyen 2019).

The rationale for the interview is to explore the perspectives, meetings, beliefs, or inspiration of individuals on specific issues. Until an interview, informants should be informed about the test points of interest and provide confirmation of moral standards (Devlin and Gray 2007).

The researcher only chose internet banking customers in Kelantan in this study. The rationale is that the researcher has decided to collect the best and the most numerous replies to complete this research. The researchers have carried out a semi-structural interview as respondents answer the researchers' questions spontaneously. On top of that, researchers also use communication face-to-face to ensure the information is pure.

## **Secondary Data**

Secondary data is information derived from previous studies. These data differ from primary data, in which the investigator collects the data himself or herself from an interview. Secondary data too are reliable in support of every researcher's research. Secondary data also support large-group research, since data from various sources can be collected (Ritchie 2013).

The information or derivative material gathered by the individual or other researchers. Reviewing a book, journal, conference paper, or newspaper, for example, is an example of secondary data. Journals from databases and academic textbooks such as Emerald, ProQuest, Science Direct, Google Scholar, My Athens, Research Gateway, and Yahoo were used as secondary data in this study.

Secondary data is gathered by the researcher from journals, newspapers, and books. Secondary data is used by researchers to take a data or reference that is related to Islamic banking knowledge. This is due to research indicating that privacy and security are very important in modern digital age.

## **3.4 Data Analysis Method**

To ensure the validity of the information examined in an effective manner, the data collected in the study are analyzed using document analysis and supported by the ATLAS.ti software program. The data for this study gathered using existing resources such as books, articles, and journals. Therefore, ATLAS.ti also was adopted to retrieve data from interviews.

### **Interview**

Interviews are a method that requires subjects and researchers to participate to acquire and collect information. Researchers obtained the information studied directly from direct sources. Any information gathered during the interview must be documented because any responses mentioned by respondents are important data to observe and analyses. According to Willis (2019), the interview method was preferable to the questionnaire method for gathering in-depth data. Interviews can be part of the overall research data collection strategy or one of the techniques used in the study.

### **Documentation Analysis**

Documentation analysis is a type of qualitative research in which the analyst examines documents to identify an appraisal theme. Document analysis is a social research method and an important research tool as it is used in most triangular schemes, which are a combination of methodologies used to study the same phenomenon (Bowen 2009). Documentation review is a form of secondary data analysis.

Document analysis is used by researchers for a variety of reasons. This is because documentation analysis is one of the most efficient and effective methods of data collection because documents can be handled and obtained from practical sources.

When conducting research or experiment, obtaining and analyzing documents is frequently more efficient (Bowen 2009).

ATLAS.ti version 8 is a powerful workbench for analyzing large amounts of textual, graphical, audio, and video data. Sophisticated tools assist researchers in creatively arranging, reassembling, and managing researcher material. This version 8 maintains the researcher's focus on the material itself. Hence, it meets the needs of researchers for qualitative analysis.

### **3.5 Validity and Reliability**

The concepts of validity and reliability were also used in this study. It is to understand how to minimize the possibility of errors and tendencies by increasing the data's reliability and validity. According to Mohajan (2017), reliability is one of two factors that qualitative researchers must consider when conducting the study, analysing the results, and evaluating the study's quality. Furthermore, Koohang, Nord, Sandoval and Paliszkiwicz (2020) suggested that creating a good quality study through credibility and validity in qualitative research, as further claimed, "belief of a research report lies in the middle of issues commonly discussed as validity and reliability."

Conferring to FitzPatrick (2019), validity evolved into a complicated concept. It is more closely related to the conclusion based on the assessment results. That is more focused on the outcome of the speculation that makes it implied. This evaluating consideration must be accurate and declare the truth. The assessment or evaluation should not be valid; only the assumption about this evaluation should be valid.

## **4 Findings and Discussion**

Based on the findings attained, this study concluded five factors that may stimulate the issue of privacy and security in e-banking are Technology (1), Perception (2), Awareness (3), Trust (4), Cybercrime (5). The findings can be illustrated from network view of ATLAS.ti and the explanation of the findings are as follows (Fig. 2):

### **4.1 Technology**

Every respondent believed that technology played a significant role in their decision to work in Islamic banking. They acknowledge that Islamic banking, in the absence of technology, will struggle to compete with conventional banking. Additionally, with the advancement of technology in banking, it simplifies banking-related transactions for them.

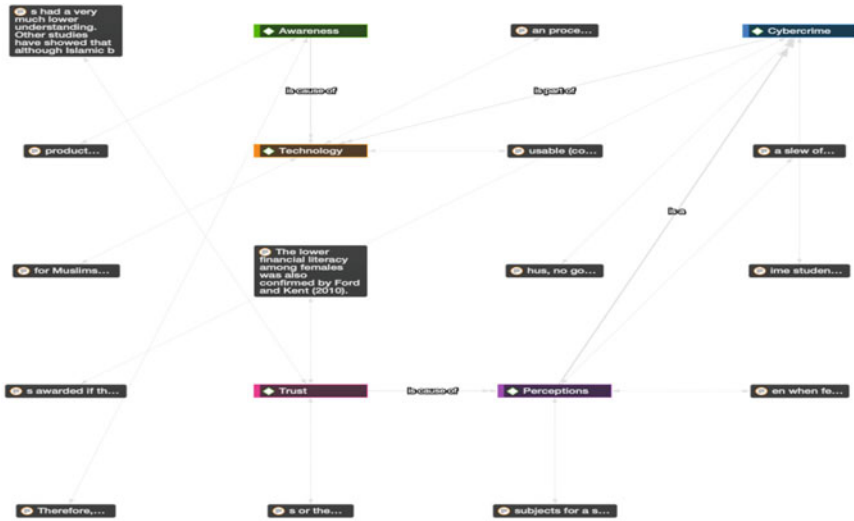


Fig. 2 Network view of perceptions of security and privacy of internet banking in Islamic banks in Kota Bharu, Kelantan

This view is found to be parallel to Utami and De Guzman (2020). They said that the business process in financial services is incredibly challenging. Banks must introduce alternative delivery channels to attract online users and enhance consumer perception. Most banks have already implemented online banking by providing their customers with a variety of online services that provide greater access to information and transactions. Customers’ satisfaction is becoming imperative as a success factor in e-banking. In a service organization, technologies are rapidly being developed. It aims to improve the quality of customer service and delivery while also reducing costs and standardizing core service offerings (Bilal Khan, Ahmad Ghafoorzai, Patel, Mohammed Shehbaz 2021).

However, respondents 1, 3, 4, 6, 7, 9 and 12 expressed some concern about whether the technology would also result in concerns about the security and privacy of their banking data. They are concerned about the ease with which irresponsible parties can obtain their personal information. Additionally, the growing problem of scammers heightens their concerns about the security and privacy of online banking. Additionally, banking data hacking incidents have occurred in Malaysia, compounding their concerns.



## 4.2 Awareness

The majority of respondents stated that they were extremely conscientious about safeguarding personal banking information such as their username, pin number and password. For example, according to respondent 4 stated that:

*“Along with my credit card and debit card, I did not preserve the password number and pin number in my wallet. This is due to the fact that it is extremely hazardous. In this regard, I will use extreme caution.*

*I will not respond to mails from scammers because I am aware that they are really harmful. They can deceive you in a number of ways.”*

Additionally, they are familiar with banking fraud, such as the Macau scammer. This awareness is in line with Tan and Teo (2000) that identify three aspects of consumer behavior that demonstrate consumer awareness of e-banking, as well as subjective norms. Which exemplifies the social impact that can influence the customer's motivations for using Internet banking and, ultimately, recognizing in control of behavior, which explains the anticipation of adapting mobile banking. Awareness is a critical component in preventing problems with privacy and security issues. Both customers and banks must play their roles to stay alert and spreading awareness to the public (Mathiyarasan and Chitra 2019). Everyone has a role of socially responsible in preventing themselves from becoming a victim of cybercrime.

## 4.3 Trust

According to Yuusaivi et al. (2021) and Bhattacharya et al. (1998), researchers from various disciplines have hypothesized trust along various dimensions. Identity analysts usually describe trust as an individual trademark, whereas social therapists generally view trust from the perspective of behavioral desires for others involved in transactions. Economists and sociologists generally focus on how institutions are set up and impetuses are used to reduce vulnerability associated with transactions involving relative outsiders. It has been demonstrated that trust is a critical middle person in all business relationships and should be a central focus of any organization associated with administrations (Al-Dmour et al. 2021; Morgan and Hunt 1994). This is parallel to

*“Trust plays a significant part in maintaining clients trusting the bank.”*

Whereas respondent 6 stated that:

*“We have no trouble doing business with banks and remaining loyal to them if they can maintain an element of confidence throughout their operations.”*

#### 4.4 Cybercrime

Cybercrime is commonly defined as a criminal activity involving technology and computers that takes place on the internet. Mogos and Jamail (2021) and Riek et al. (2015) also demonstrated that cybercrime has a significant impact on operational systems in banks. Cybercrime has a wide range of consequences including financial costs and intangible losses. Some cybercrime involves criminals assuming specialized roles and deceiving people. Respondent 2, 6, 9 and 10 stressed that:

*“We are particularly worried about recent cybercrime issues, and we propose that the Malaysian government take decisive measures to combat this critical problem. We, as customers, are quite concerned about the current rise in cybercrime.”*

Whereas respondent 3, 4, 7 and 10 stated that:

*“We always take the best precautions to avoid being tricked by cybercriminals; we also propose that the bank take stricter efforts to ensure that customer information is safe and secure; the bank is also required not to sell our information to irresponsible third parties.”*

In addition, these cybercrime attacks are designed to steal relevant information, money, and other valuable information while leaving no trace of the intrusion (Acharya and Joshi 2020; Gaol et al. 2021).

## 5 Conclusion

The primary goal of this research is to investigate and investigate adopters' perceptions of Islamic bank e-banking in Kota Bharu in terms of privacy and security. From the findings, it is suggested that there are several factors to take into consideration, and it is the responsibility of banks to ensure that customers are provided with secure systems to use e-banking services, as well as to spread awareness to the customers. Not only that, e-banking users must take personal responsibility to avoid becoming a victim by being aware of and always cautious of any issues or problems related to the privacy and security of the e-banking system.

Users of online banking are acknowledged of the tremendous benefits gained such as convenience, twenty-four-hour availability, time savings, and the ease of conducting transactions anywhere. These are some of the most important advantages of internet banking that users have mentioned. Based on the result attained, privacy and security issues have become a concern to the adopters, not just those who have experienced cybercrime but also those who are not.

According to the study's findings, users are concerned about privacy and security issues, not just those who have experienced cybercrime but also those who have not. As a result, the researchers discovered that perception is very valuable and plays a key role for users who are determined to adopt internet banking. Consequently, their trust and awareness of internet banking, as well as their perception of online banking privacy and security may influence their decision to act. Finally, users of e-banking

must be responsible for securing their personal information, and organizations must strengthen their proxy from hackers breaking into operational systems.

Due to the nature of the research questions and the limited location of research, this research was based on qualitative research methods. The data collection and analysis conducted in this study did not, for the most part, yield statistically significant result. Rather, the data led the researchers to a sample of primary (interview method) and secondary data analysis from which to draw conclusions. While the data analysis was vigorously conducted using ATLAS.ti tools and validated, the results are limited by the sample size. As a result, the customer's perceptions identified by the study are based on perceptions from customers that reside in Kota Bharu, Kelantan. The limitations of this study point towards topics to be addressed in the future. Internet banking of Islamic banks in Malaysia will continue to evolve. Online banking should strive to lead this change. The following are a few areas for future research; a) Malaysian customer's perception on privacy and security of online banking in Islamic banks, b) Study on privacy and security issues of internet banking in Islamic banks from quantitative or mix method perspective, c) The impact of Fintech in Islamic banking industry.

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## References

- Acharya, S., Joshi, S.: Impact of cyber-attacks on banking institutions in India: A study of safety mechanisms and preventive measures. *PalArch's J. Archaeol. Egypt/egyptology* **17**(6), 4656–4670 (2020)
- Al-Dmour, A., Al-Dmour, H.H., Brghuthi, R., Al-Dmour, R.: Technology acceptance dynamics and adoption of e-payment systems: Empirical evidence from Jordan. *Int. J. E-Bus. Res. (IJEER)* **17**(2), 61–80 (2021)
- Al-Shaer, B.Y.: The jurisprudential rules related to the revolving credit card issued by Safwa Islamic Bank/The Hashemite Kingdom of Jordan. *Jordan J. Islamic Stud.* **16**(3), 157–178 (2021)
- Al-Sharafi, A., Arshah, R.A., Herzallah, A., Abu-Shanab, E.A.: The impact of customer trust and perception of security and privacy on the acceptance of online banking services: structural equation modeling approach. *J. Ind. Manage.* **4**, 1–14 (2018)
- Alazemi, M., Alazemi, L.: Transparency standards implementation in light of governance in the Islamic banks in Kuwait. *Int. J. Bus. Ethics Gov.* **4**(1), 106–123 (2021)
- Aspers, P., Corte, U.: What is qualitative in qualitative research. *Qual. Sociol.* **42**(2), 139–160 (2019)
- Bhattacharya, R., Devinney, T.M., Pillutla, M.M.: A formal model of trust based on outcomes. *Acad. Manage. Rev.* **23**(3), 459–472 (1998)
- Khan, M.B., Ghafoorzai, S.A., Patel, I., Shehbaz, D.M.: Waqf based Islamic fintech model for agriculture sector of Indonesia. *Int. J. Bus. Ethics Gov.* **4**(1), 73–85 (2021)
- Bowen, G.A.: Document analysis as a qualitative research method. *Qual. Res. J.* **9**(2), 27–40 (2009)

- Broadhurst, R., Grabosky, P., Alazab, M., Bouhours, B., Chon, S.: An analysis of the nature of groups engaged in cybercrime. *Int. J. Cyber Criminol.* **8**(1), 1–20 (2014)
- Creswell, J.W., Clark, V.L.P.: *Designing and Conducting Mixed Methods Research*. Sage Publications, Washington DC, USA (2017)
- Crawford, J.: The use of electronic information services and information literacy: a Glasgow Caledonian University study. *J. Librariansh. Inf. Sci.* **38**(1), 33–44 (2006)
- Devlin, M., Gray, K.: In their own words: a qualitative study of the reasons Australian university students plagiarize. *High Educ. Res. Dev.* **26**(2), 181–198 (2007)
- Dixit, N., Saroj, K.: Acceptance of e-banking among adult customers: An empirical investigation in India. *J. Internet Bank. Commer.* **15**(2), 1–17 (2010)
- Eklof, J., Hellstrom, K., Malova, A., Parmler, J., Podkorytova, O.: Customer perception measures driving financial performance: theoretical and empirical work for a large decentralized banking group. *Meas. Bus. Excell.* **21**(3), 239–249 (2017)
- FitzPatrick, B.: Validity in qualitative health education research. *Curr. Pharm. Teach. Learn.* **11**(2), 211–217 (2019)
- Gaol, F.L., Budiansa, A.D., Weniko, Y.P., Matsuo, T.: Cyber crime risk control in non-banking organizations. *J. Theor. Appl. Inf. Technol.* **99**(5), 1219–1231 (2021)
- Gerrard, P., Barton Cunningham, J., Devlin, J.F.: Why consumers are not using internet banking: a qualitative study. *J. Serv. Mark.* **20**(3), 160–168 (2006)
- Gupta, P., Chauhan, S., Jaiswal, M.P.: Classification of smart city research—a descriptive literature review and future research agenda. *Inf. Syst. Front.* **21**(3), 661–685 (2019)
- Hwang, G.J., Fu, Q.K.: Trends in the research design and application of mobile language learning: a review of 2007–2016 publications in selected SSCI journals. *Interact. Learn. Environ.* **27**(4), 567–581 (2019)
- Koohang, A., Nord, J.H., Sandoval, Z.V., Paliszkievicz, J.: Reliability, validity, and strength of a unified model for information security policy compliance. *J. Comput. Inf. Syst.* 1–9 (2020)
- Mathiyarasan, M., Chitra, V.: A study on customer awareness towards internet banking—with reference to tumkur district. *SAARJ J. Bank. Insur. Res.* **8**(3), 17–27 (2019)
- Mogos, G., Jamail, N.S.M.: Study on security risks of e-banking system. *Indonesian J. Electr. Eng. Comput. Sci.* **21**(2), 1065–1072 (2021)
- Mohajan, H.K.: Two criteria for good measurements in research: validity and reliability. *Econ. Ser.* **17**(4), 59–82 (2017)
- Mohammadi, H.: Investigating users’ perspectives on e-learning: an integration of TAM and IS success model. *Comput. Hum. Behav.* **45**, 359–374 (2015)
- Narayan, P.K., Phan, D.H.B.: A survey of Islamic banking and finance literature: Issues, challenges and future directions. *Pac. Basin Financ. J.* **53**, 484–496 (2019)
- Nassar, R.M., Battour, M.: The impact of marketing ethics on customer loyalty: a conceptual framework. *Int. J. Bus. Ethics Gov.* **3**(2), 1–12 (2020)
- Naushad, M.: Comparative analysis of Saudi sharia compliant banks: a CAMEL framework. *Accounting* **7**(5), 1119–1130 (2021)
- Nguyen, M.: *Data Collection Methods in L2 Pragmatics Research*. The Routledge, London (2019)
- Normalini, M., Ramayah, T.: Trust in internet banking in Malaysia and the moderating influence of perceived effectiveness of biometrics technology on perceived privacy and security. *J. Manage. Sci.* **4**(1), 3–26 (2017)
- Novikov, A.M., Novikov, D.A.: *Research Methodology: From Philosophy of Science to Research Design*. CRC Press, Florida (2019)
- Pantano, E., Vannucci, V.: Who is innovating? an exploratory research of digital technologies diffusion in retail industry. *J. Retail. Consum. Serv.* **49**, 297–304 (2019)
- Parahoo, K.: *Nursing Research: Principles, Process and Issues*. Macmillan International Higher Education, New York (2014)
- Paul, J., Modi, A., Patel, J.: Predicting green product consumption using theory of planned behavior and reasoned action. *J. Retail. Consum. Serv.* **29**, 123–134 (2016)

- Poon, J., Chow, Y.W., Ewers, M., Ramli, R.: The role of skills in Islamic financial innovation: evidence from Bahrain and Malaysia. *J Open Innov. Technol Market Complex.* **6**(3), 47 (2020)
- Raza, S.A., Umer, A., Qureshi, M.A., Dahri, A.S.: Internet banking service quality, e-customer satisfaction and loyalty: the modified e-SERVQUAL model. *TQM J.* **32**(6), 1443–1466 (2020)
- Riek, M., Bohme, R., Moore, T.: Measuring the influence of perceived cybercrime risk on online service avoidance. *IEEE Trans. Dependable Secure Comput.* **13**(2), 261–273 (2015)
- Ritchie, J., Lewis, J., Nicholls, C.M., Ormston, R.: *Qualitative Research Practice: A Guide for Social Science Students and Researchers.* Sage Publications, London (2013)
- Safeena, R., Hundewale, N., Kamani, A.: Customer's adoption of mobile-commerce a study on emerging economy. *Int. J. e-Educ. e-Bus. e-Manage. e-Learn.* **1**(3), 228 (2011)
- Sadeghi, T.: Examining the obstacles of formatting electronic banking in Iran. (Unpublished master's thesis). Alíame Tabatabay University, Farsi, Iran (2004)
- Schoonenboom, J., Johnson, R.B.: How to construct a mixed methods research design. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie* **69**(2), 107–131 (2017)
- Syarif, F.: Regulatory framework for Islamic financial institutions: lesson learnt between Malaysia and Indonesia. *J. Halal Prod. Res.* **2**(2), 79–85 (2019)
- Utami, P., De Guzman, M.J.J.: Innovation of technology-based strategies based on environmental examination organizations in Islamic banking and finance. *Asian J. Multi. Stud.* **3**(1), 117–126 (2020)
- Wijayati, C.D., Gustyana, T.T.: The impact of mobile banking on ROA of Islamic banking which was listed on the IDX in 2015–2019. *Int. J. Adv. Res. Econ. Finan.* **3**(1), 63–69 (2021)
- Willis, R.: The use of composite narratives to present interview findings. *Qual. Res.* **19**(4), 471–480 (2019)
- Yilmaz, K.: Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *Eur. J. Educ.* **48**(2), 311–325 (2013)
- Yussaivi, A.M., Lu, C.Y., Syarief, M.E., Suhartanto, D.: Millennial experience with mobile banking and artificial intelligence (AI)-enabled mobile banking: evidence from Islamic banks. *Int. J. Appl. Bus. Res.* 39–53 (2021)