An Investigation into Factors Enabling the Diffusion and Adoption Intention of Fintech Services for Bank Consumers.

A thesis submitted for the Degree of Doctor of Philosophy

By

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Declaration

I hereby declare that this thesis is my orginal work. Some of the material displaued herein has already been presented in the following publications:

Journal Papers

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Abstract

This research is about the central issue of challenges related to the adoption of fintech services in the context of Bahrain. Today, all financial service aspects seem to be affected by technology, fintech being one of them. Fintech development is in its early stages; many researchers and practitioners believe that it will shape up and define the future of the financial industry. Along with the development of fintech, scholars have focused on the application of information technology to financial services. Few scholars have studied the influence of fintech and the mechanism behind the consumer behavioral intention to adopt fintech services. This research, therefore, examines why consumers are willing or hesitant to adopt fintech services by integrating Technology Acceptance Model (TAM) with Diffusion of Innovation Theory (DOI). Further, the research investigates the critical factors that impact the behavioral intention to adopt fintech services. Also, this empirical study investigates whether the effect of perceived risk and trust on fintech adoption intention differs depending on the consumers' behavior using a conceptual model that was developed and validated for this purpose. An online questionnaire was designed and sent to the bank consumers to obtain responses from a sample population of 390 respondents targeted for this purpose.

Reliability measure was tested using Cronbach's alpha and Structural equation modeling (SEM) was used to analyze the validity, conduct confirmatory factor analysis, and path analysis. Results of the analysis showed that out of the 15 hypotheses, 10 were accepted and 5 rejected. The main findings showed that three factors namely relative advantage, compatibility, and perceived risk are the most influential predictor of the dependent variable (intention to adopt fintech services), followed by compatibility and perceived risk of using fintech services, with perceived risk showing negative influence. The results also showed that complexity and trialability exert negligible influence on the dependent variable while observability was not found to have any significant relationship with the dependent variable. All the mediating variables namely perceived usefulness, perceived ease of use, and trust of fintech services were found to have a significant mediating effect on the relationships hypothesized. Additionally, the association between the exogenous variables was found to affect the relationship between the predictors and the behavioral intention of the consumer of banks to adopt fintech services.

With regard to the main contribution of the research to knowledge, it can be seen that this research has combined four different concepts namely Diffusion of Innovation Theory (DOI), Technology Acceptance Model (TAM), perceived risk, and trust in one model that could be used to anticipate the influence of the predictors on the dependent variable with better predictive power. The research fills the gap in the literature

on how to improve the number of adoption and diffusion of innovation factors notably relative advantage, compatibility, and perceived risk. Theoretically, this research has been successful in integrating the DOI and TAM in the context of fintech services to anticipate the behavioral intention of the consumer of banks to adopt fintech services. The conceptual model provides a useful method for practitioners to control the diffusion factors and improve the adoption of fintech services amongst the consumers of banks. Finally, this research provides new branches of research that could be investigated to further enhance and explain the adoption behavior of consumers of banks in Bahrain and other parts of the world.

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Chapter 1: Introduction

1.1 Introduction

Technological innovation in the financial sector is not new, but the amount of investment in technology and the pace of innovation have increased significantly in recent years (Gomber et al., 2018; Ryu, 2018). Banking is continuously enhancing the quality of services offered to its consumers. To stay on top of the latest technology trends, banks have invested a significant amount of time and resources in fintech services to maintain their competitiveness and keep up with new technology trends (Hu, et al. 2019; Gomber et al., 2018; Ryu, 2018; Gimpel et al. 2018; Arner, et al. 2016). There has been rapid advancement in artificial intelligence, mobile applications, cloud computing, big data analytics, and distributed ledger technology (Stewart & Jujens, 2018; Ryu, 2018; Bhowmik, 2017; Chuang et al. 2016; Hanafizadeh et al. 2014). With rapidly changing technology, the finance sector seems to be uncertain on how to upgrade their current technology, introduce innovations, or new technology (Hu et al. 2019; Meyliana et al. 2019; Ryu, 2018). The problem is complicated further as the banks are not able to anticipate whether consumers will adopt those upgrades, innovations, or new technology (Yoon & Lim, 2020; Hu et al. 2019; Meyliana et al. 2019; Ryu, 2018). Failing in some technology investments that would not serve the purpose of the consumers and their business goals leading to potential losses (Hu et al. 2019).

Fintech services is an emerging phenomenon that is promising to change the way banking is conducted. However, literature shows that challenges exist that have led to either consumers not adopting fintech services at all or adopting fintech services partially (Senyoa and Osabuteyb 2020; Meyliana et al. 2019; Hu et al. 2019). Lack of knowledge on how to encourage consumers to adopt fintech services and assess future adoption behavior of those who have not adopted fintech yet is a major concern not only for the banking community but the researchers as well (Senyoa and Osabuteyb 2020; Meyliana et al. 2019; Hu et al. 2019; Mutahar et al. 2017). Furthermore, fintech is still an evolving technology meaning it is still diffusing through the market and users. As literature shows that not every diffusing technology leads to users adopting or accepting or using it (Yoon & Lim, 2020; Meyliana et al. 2019; Ryu, 2018). At this stage when fintech services are still diffusing it is difficult to anticipate whether the diffusing technology will end up with consumers adopting the technology or not.

In addition, research shows that one important factor that affects the diffusion of innovation like fintech service is the perceived risk of consumers who would like to adopt that innovation (Hu et al. 2019; Meyliana et al. 2019). According to Rogers (1983) at the early stage of diffusion perceived risk should be considered

as an important factor that affects the adoption rate so that later adopters could avoid it. However, not much research has been conducted to understand how perceived risk affects the adoption behavior of fintech services (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019).

Thus it can be seen from the foregoing introduction that fintech service is considered to be a technology that is promising to provide the consumers of banks with a service that is likely to change their complete experience of banking and enhance the quality of their banking operation as never seen before. However, such a claim is contradicted by the lack of the number of consumers adopting fintech services, reasons for which are still being investigated by researchers (Yoon & Lim, 2020; Senyoa & Osabuteyb, 2020; Hu et al. 2019; Meyliana et al. 2019; Chuang et al. 2016; Hanafizadeh et al. 2014). Furthermore, current knowledge available in the literature on predicting the fintech services adoption behavior of consumers of banks is found to be not complete, and more needs to be done to provide some support to banks to enhance the predictability of the consumer adoption behavior concerning fintech services. There are important gaps found in the literature that need to be researched in to enable a better understanding of the fintech services adoption behavior of consumers of banks. This research aims to thus investigate the diffusion of fintech services in today's world, the contradictions that exist in the literature, the gaps in the literature, and the central concept of adoption behavior of consumers of banks concerning fintech services. Hence, this chapter covers an overview of the research paper by highlighting the motivations for conducting this research, identifies the gap, research questions, and the aim and objectives of this research. Following the reasons for selecting the empirical work to conduct this research by using quantitative research methodology and adopting an online survey. Moreover, Structural Equation Modeling (SEM) was chosen as a multivariate technique to test the hypotheses, including Confirmatory factor analysis (CFA) and path analysis.

This Chapter is laid out as follows. Sections 1.2 provide a background of the research. Section 1.3 explain the choice of the Kingdom of Bahrain as a case for this research. Section 1.4 states the research problem and gap. Sections 1.5 and 1.6, highlight the research questions and the research focus. Followed by the aim, objectives and the significance of the study mentioned in sections 1.7 and 1.8. Finally, section 1.9, provides a brief description of the research method, and section 1.10, shows the overall structure of the thesis.

1.2 Research background

"Portmanteau" means "a large traveling bag opening into two equal parts," a word used by Gomber et al., (2018) describing "Fintech," a phrase used within the finance sector that describes financial services employing modern technology. To date, it appears that there is no universal definition of fintech in the

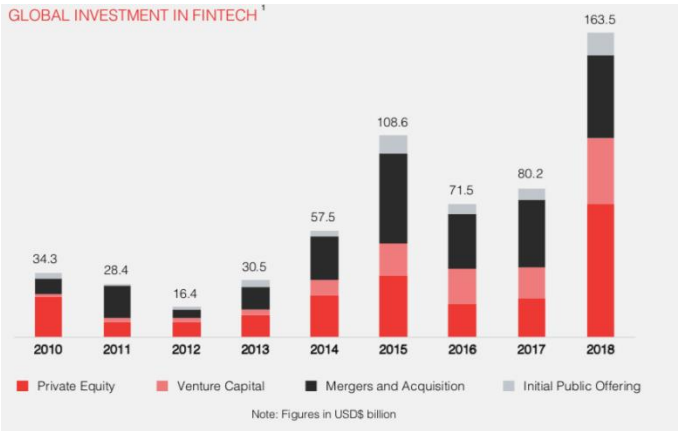
literature (Gimpel et al. 2018). Finding a widely used standard definition of Fintech in the literature is challenging (Gimpel et al. 2018; Hyun, 2018). Neumann (1955) says: "what seems to be exceedingly difficult in economics is the definition of categories, it is always in the conceptual area that the lack of exactness lies". Fintech as a term refers to the abbreviation of financial technology, which is a mixture of financial services and information technology (Gomber et al. 2018; Arner et al. 2016). Fintech as a financial innovation generated by technologies, this innovation leads to a new creation of business models, processes, applications, or products, that affect the financial market (KPMG, 2019). Fintech is not limited to a specific type of banking activates (such as financing), or business models (such as peer-to-peer lending applications) (Morgan et al. 2019; Arner et al. 2016). Literature shows that fintech covers different services that have been traditionally provided to the customer by banks (Gomber et al. 2018; Arner et al. 2016). The evolutionary changes are so rapid that even creating a relatively constant definition is challenging (Gomber et al. 2018; Arner et al. 2016). Moreover, the financial sector is still at the beginning of an exceptional phase where financial institutions are trying to keep up with the changes, and the regulators are trying to formulate a clear scope of the activity (Gozman et al., 2018; Gomber et al., 2018).

Furthermore, fintech has characteristics that are specific to the finance industry. Consumer usage patterns of new digital devices (such as smartphones, smartwatches, and tablets) and media (such as software, digital video, and digital images) are the main factors used for accessing financial information as well as executing financial transactions (Yoon et al., 2016). Fintech development has shifted the financial sector from being traditional intermediation originators "brick and mortar", to online intermediaries (Buchak et al., 2018). Today, customers demand intelligent and friendly use of financial services despite location and time, at a continuously more affordable cost. (Gomber et al., 2018; Guo et al., 2019). Fintech's ability to remove inconvenience experiences for financial services users is a significant advantage, although studies on fintech are still lacking (Guo et al., 2019; Varga, 2017). One of the primary purposes of using fintech services in banking is to improve the consumer experience and banking efficiency. However, the current research is mainly focused on the fintech strategy and the risk of banking viewed from the supply side (Kotarba, 2016; Gozman et al., 2018; Lee et al., 2011; Buchaket al., 2018) with not much attention paid to the demand side.

In addition, the global financial services industry has been going through a fundamental transformation during the last decade (Gomber et al. 2018; Arner et al. 2016). Industries in the finance sector have been at the forefront to adopt new solutions that offer cost-effective, competitive, and optimized digital channels and platforms (Gomber et al. 2018; Arner et al. 2016). An enormous amount of money is being spent worldwide on fintech development (Gimpel, Rau, and Röglinger, 2018; Varga, 2017). For example, the

world scale of investment in fintech increases each year sharply and has reached approximately 930 million US Dollars (USD) in 2008 even though fintech investments has grown by more than three times within five years to reach 2.97 billion USD in 2013 (Yoon et al., 2016). Moreover, according to International Data Corporation (IDC) (2020), countries including the UK, the US, China, and Japan, are focusing more on fintech projects at national level investment, which indicates the importance given to the concept of fintech. Almost 70% of their investments are concentrating in the payment field, while the investment rate on financial software and platform service has been relatively low. Also, the global Fintech industry investment has been witnessing a significant increase of 377% over the last many years for instance, from approximately 34.3 billion USD in 2010 to 163.5 billion in 2018 (Bahrain Fintech Bay Manifesto, 2020).

Figure 1. 1 Global investment in Fintech



Source: Bahrain Fintech Bay Manifesto (2020)

However, despite the tremendous spending on fintech investment, the literature shows that from the demand side, consumer adoption of new fintech services is still considered to be low (Gomber et al., 2018; Mutahar et al., 2017; Yoon et al., 2016). According to Moody's surveys 2016 (Moody, 2016), while the millennials meaning those born in this century, are making up the majority of fintech users but financially not well off, the parents, and the grandparents of those millennials happen to be the main bank customers (Wenyu, et al. 2019) all of who might not have adopted fintech. This is an anomalous situation as young people who are future consumers of banks have greater interest to adopt fintech services but do not form the bulk of the banking customers, while those who are the main bank customers do not show much interest in adopting fintech servcies. Thus, the current fintech services introduced by banks are not being fully utilized raising questions on whether fintech has fully diffused to reach the consumers or it is still in the process of diffusion or some factors could affect the consumers' behavioral intention to adopt fintech services. There is a need to understand to what extent fintech has diffused, what factors influence customer behavior to adopt fintech services, and which are the most influential factors, viewed from the demand side. New knowledge

discovered regarding the phenomenon of behavioral intention consumers of banks to adopt fintech services, which is the central issue of this research, is expected to enable service providers to enhance the adoption of fintech by those consumers. To investigate the central issue, the researcher chose the Kingdom of Bahrain as a case for this research.

The concept of fintech was introduced in Bahrain only in 2017 by the Central Bank of Bahrain (CBB, 2019). The current situation is that fintech services technology is still diffusing in the entire Arab world including Bahrain. According to a report by Consultative Group to Assist the Poor (CGAP, 2020) fintech services adoption amongst the people in the Arab world is not growing, due to challenges faced, including the cost of regulatory compliance, lack of growth investment capital, or unavailability of qualified talent. In addition, Ubaydli and Hussain (2020) raise a question on the future of fintech services in the context of Bahrain due to the growing use of artificial intelligence while keeping in mind the frightening aspect of when the performance of robots or machines exceeds that of the human. Thus, it can be seen that fintech has not been fully utilized in Bahrain.

1.3 Status of the financial technology in Bahrain

The choice of the Kingdom of Bahrain as a case for this research is explained in this section. Bahrain is the hub of banking in the Middle East (Corporate Finance Institute (CFI)), 2021). As a nation, Bahrain has provided support to the banking industry in several ways one of them being the technology infrastructure. Every latest innovation and new technology is quickly adopted in Bahrain including internet technologies, artificial intelligence, big data, data mining, and machine learning which are related to financial technology (Bahrain Fintech Bay Manifesto, 2020). The banking industry in Bahrain is one of the most vibrant with the latest technologies being implemented in commercial banking activities.

According to the United Nations e-government survey (2018), Bahrain stands number one in the GCC, ranked 5th in Asia and 26th globally (United Nations survey, 2018). Oxford Business Group (OBG) (2021), reports that in 2016 the Central Bank of Bahrain (CBB) had initiated action to transform the banking sector and introduced a fintech framework for the banks to operate using fintech services. OBG (2021) also reported that by the end of 2017, the number of account holders in the bank was estimated at 1.89 million, an increase of 37.9% from the 2011 number of 1.37 million. This figure indicates that for a population of around 1.5 million in 2017 the number of bank accounts per thousand was estimated to be 1257 (OBG, 2021). These figures indicate the extent of the use of banking facilities in Bahrain and how technology is becoming indispensable in operating bank accounts by consumers. This argument can also be linked to the

culture of the people of Bahrain to adopt latest technology in their everyday life. Literature shows that cultural aspects stimulate people to adopt new technology, for instance Sharmin et al. (2021) who argue that culture is a factor that is expected to influence individuals' attitudes and subsequent behaviour. In fact the theory proposed by Hofstede (1989) has been used by researchers (Sharmin et al., 2021) to argue that certain cultural factors proposed by Hofstede including collectivism, uncertainty avoidance, and long-term orientation) help in understanding digital technology adoption behaviour of people. Sharmin et al., (2021) have linked the three cultural factors to study their impact on perceived ease of use and perceived usefulness while investigating the effect of Hofstede cultural dimensions in the Digital Era. Kowalewski et al. (2021) confirmed these arguments in their study concerning determinants of cross-country differences in fintech and bigtech credit markets which included Bahrain. In their study Bahrain has been found to be a country whose culture stimulates the adoption of digital technology like fintech. While culture has been found to affect the adoption or non-adoption of new technology, however, the focus of this study is not the cultural dimension and hence not discussed in this research.

Also, It is important to recognize here that fintech services are being pushed as an important transforming agent by the CBB and hence studying the behavioral intention of consumers of the banks in Bahrain gains currency with diffusing still across the consumers.

1.4 Problem statement and Gap

Fintech revolution is beneficial to both banks and customers in terms of reducing transaction costs and increasing convenience to consumers by providing fast, seamless, anywhere, and anytime banking services (Gomber et al., 2018; Kotarba, 2016; Kaplan & Mikes, 2016). However, literature shows that existing research outcomes are mainly focused on the technical side of fintech strategy, service quality aspects, and the risk for banking from the supply side and not on the consumer side of fintech services utilization during diffusion. Further, there are concerns raised by researchers on the low rate of adoption of fintech by the consumers of the bank, which has serious implications for the banking performance (Hu et al. 2019; Meyliana et al. 2019). Additionally, massive investments in banks associated with fintech transformation projects have not been fully utilized by the users as fintech is still diffusing. Fintech adoption rate among its customers is still low (Hu et al. 2019; Meyliana et al. 2019) and reasons for that are not clearly identified in the literature keeping in view the diffusion aspect. Moreover, even though a number of projects have been implemented around the world, very few banks have achieved the real fintech transformations (i.e., fundamental changes to the way core functions of banks are performed to achieve efficiency and enhance end-user experience toward using banking services) (Wenyu, et al. 2019: Priem & Carr, 2012) leading to concerns on the investments made and the return on the investment. Furthermore, from a static point of

view, banks must understand that the factors that influence customer adoption behavior of fintech services is a major challenge during diffusion (Hu et al. 2019). Currently, in the literature, there is hardly any model, theory, or knowledge that could be used effectively by banks to tackle this problem (Gomber et al., 2018) keeing in view the diffusion of fintech services. This research investigates this critical issue which is a gap in the literature.

1.5 Research Questions

One of the most important targets of this research is centered on clarifying the research problem. Keeping the above aspects in view, it has been argued that questions have been raised about adoption of fintech services during diffusion of fintech in recent academic research. According to the literature review, there is a need to understand these challenges. Thus, the specific questions were posted in support of solving the research problem.

Research Question 1 (RQ1): What are the factors that affect the behavioral intention of consumers of banks to adopt fintech services when fintech is still diffusing?

Research Question 2 (RQ2): To what extent the predictor factors influence the predicted factor in an environment in which fintech is still diffusing?

Research Question 3 (RQ3): Which are the more influential factors that affect the customer behavioral intention to adopt fintech services when fintech is still diffusing?

Answers to these research questions are expected to enable the research to achieve the following aim and objectives.

1.6 The Focus

The global and the local financial services industry landscape continues to transform. There is an emerging agenda of understanding fintech readiness. In this study, we focus on the factors that influence consumers adopting of new fintech services introduced by the financial services industry in the Kingdom of Bahrain. This study focuses on Bahrain bank's consumers. As it has been found in other researches the importance of recognizing cultural differences and national limitation respect to how individual's behaviors toward reacting to potential risk and trust (Li-Jun and Megan, 2013; Tso et al., 1988).

Fintech will play a massive role in contributing to the global and the local economy. Thus understanding factors influencing customer adoption of fintech services during fintech's diffusion is essential at this stage. Moreover, changes in the financial sector are at the beginning. By taking into account the substantial investment banks are spending on new fintech services development, the time is right to ensure that banks

understand the factors that influencing customers to adopt those services. More importantly, steps must be taken for banks to create strategic plans to attract their customers to adopt these services.

1.7 Aim and objectives of the study

This study aims at investigating the factors that influence customer's behavior to adopt fintech services when fintech is still diffusing.

The above aim is expected to be achieved by pursuing the following objectives:

1. To identify the various factors including factors affecting diffusion and technology acceptance that determine the intention to adopt fintech services by consumers of banks during the process of diffusion of fintech and study those factors to find out possible linkages amongst them.

2. To examine the relationship amongst those factors concerning diffusion and technology acceptance using appropriate theories and conceptualize a theoretical framework that could be used to predict the fintech services adoption behavior of consumers of banks.

3. To test the relationships developed in the conceptual framework to understand the nature of the relationship amongst the variables using the primary data collected for the purpose.

4. To understand the empirical findings derived from analyzing the various relationships in the model and answer the research question set for this research.

5. To identify key findings concerning the research with regard to the published literature, outlining the main theoretical, practical, methodical implications of the study and offering suggestions for future research.

1.8 Conclusions derived through this research

Significance of study

Although this study was conducted in the Kingdom of Bahrain, it concentrates on academic knowledge beyond the boundaries of the Bahrain context. This research contributes to the body of knowledge as follows:

1. The new conceptual model developed is an important innovation and is new knowledge that could enable the practitioners and service providers to implement and increase the speed of diffusion of fintech services and its adoption.

2. An important contribution of this research to the body of knowledge concerning the predictability of the central issue of the behavioral intention of consumers of banks to adopt fintech services in innovative way, the researcher has integrated Diffusion of Innovation (DOI) and Technology Acceptance Model (TAM) factors in the presence of perceived risk and trust.

3. Although some have advocated the integration of DOI and TAM factors to improve the predictive power of TAM (e.g. Yoon & Lim, 2020; Al-Rahmi et al. 2019; Mutahar et al. 2017), those models have not fully treated all the five factors of DOI or include perceived risk and trust alongside the integrated model. This research has achieved this.

4. Applying Protection motivation theory (PMT) alongside an integrated model of DOI and TAM is not found in the literature. The combined effect of applying PMT and the integrated model of DOI shows that it is possible to explain the extent to which risk can be associated with the DOI factors and hence play a role in determining the intention to adopt the behavior of consumers of banks. This makes the current model more versatile.

5. The conceptual model can anticipate the intention to adopt behavior under three different phenomena namely diffusion of innovation, technology acceptance, and perceived risk in adopting an innovation. Combining the three theories in one research expands the application of PMT which is a new method of dealing with perceived risk in research concerning the diffusion of innovation and technology acceptance.

6. The relative advantage of fintech services has been identified as the most influential predictor amongst the exogenous variables while observability is an insignificant predictor. This is new knowledge.

7. Most existing research mainly studied the application side of fintech services from the supply side to enhance the consumers' experience of Banks. This research adds to the current research of fintech services from the consumers' side.

8. The research results may provide useful insight to practitioners and managers in better overseeing the new developments in fintech services. Outcomes of this research may be used by banks to adjust marketing strategies and strategic goals implementation by changing consumers' behavioral intentions through the adjustment of the influencing factors.

Recommendations

1. Future studies could investigate the validity of complexity, trialability, and observability of fintech services in other contexts including other territories as developed and developing countries. The results that emerge might be different from that of this research.

2. Extend the research to compare the findings against countries and the level of education of respondents. This could provide a wider knowledge on the operationalization of the integrated model under different contexts thereby enhancing the generalisability of the model.

3. More predictors could be added alongside DOI factors involved in this research leading to a more comprehensive understanding of the diffusion fintech service and consumer behavior concerning the behavioral intention to adopt fintech service.

4. Next, future research could add moderating variables such as age and novelty-seeking behaviors to study the effect on the integrated model and check its performance about predictive power.

5. Expand the findings of this research to include other predictors alongside DOI factors or other moderating variables that could add to the current body of knowledge.

6. This research opens up a new branch to investigate such concepts as actual usage of fintech services, continuous intention to use fintech services, and acceptable behavior. Thus expand the integrated model to cover more behavioral attributes that are found in the real-life behavior of consumers.

1.9 A brief overview of the research method

To answer the research questions and achieve the aim and objectives of the research, a quantitative research method has been chosen. Moreover, this study aims to investigate customer behavior concerning adopting fintech services, by testing the current theory, validating the developed conceptual model by testing the hypothetical relationships postulated in the model, and rigorously testing the model using statistical methods. Data was collected from a sample of bank consumers to capture general consumers' behavioral intention to adopt fintech services. Within the quantitative framework, this study analyzed the results of the online survey. The survey was distributed randomly using various channels, such as email and social media applications, to capture the views of a large sample size of consumers.

Furthermore, the relationship between the variables in the model was tested using statistical analysis and structural equation modeling which involved conducting a confirmatory factor analysis and path analysis of the various constructs involved in the model and the relationships established between them respectively. The results were thoroughly discussed to bring out the findings of this research and compared with the current research outcomes found in the literature to identify the contributions made by this research.

1.10 Thesis structure

As a brief, this thesis comprises Chapters:

Chapter 1: introduces the research by providing an overview of the study and identifies the research gap as highlighted in the literature, research questions, aim, and objectives, as well as the significance of the study. Moreover, this Chapter provides an overview of the direction of this study by shading the light into the motivations for conducting this research, research methodology, and finally, the research outline.

Chapter 2: reviews of the literature are covered in this Chapter, which concerning previous researcher studies and works in fintech. As well as identify the key factors that influence customer behavioral intention to adopt fintech services along with the discussing of different theories supporting the concepts covered in this research.

Chapter 3: this Chapter explains the developed conceptual model including factors identified during the literature phase. Also, the Chapter discusses theories that support the defined constructs and proposed hypotheses that are supporting the concepts covered.

Chapter 4: subsequently, this Chapter outlines the methodology selected for this research for addressing the research questions and testing the research model and hypotheses. The Chapter describes the rationale behind the demonstration of a survey distributed among banking consumers and the related research techniques adopted for this research. Then, it determines the research design developed, and the data analysis aspects of the quantitative methods.

Chapter 5: provides comprehensive data analysis and testing. Also, SEM multivariate technique is utilized to validate the fitness of the proposed conceptual model. A total of 407 responses are collected. The empirical data analysis begins with several tests conducted to clean the data, such as reliability, correlation, and normality test, and finding derived.

Chapter 6: provides a comprehensive discussion on the statistical analysis findings presented in Chapter 5 include answering research questions, addressing the identified gaps, interpreting the findings, and comparing the research outcomes with the research outcomes found in the literature. In addition, the proposed hypotheses are thoroughly discussed, justified, and explained by using the outcome from the path analysis.

Chapter 7: assesses whether the aim and objectives set for this research have been validated and achieved. In addition, this Chapter provides conclusive evidence on the contribution of this research to the body of knowledge, contribution to the theory, contribution to the practice, and contribution to the method concerning consumers' behavioral intention to adopt fintech services, the core concept that has been investigated in the context of banks in Bahrain. Moreover, the limitations and future research are highlighted as well.

Chapter 2: Literature Review

2.1 Introduction

Chapter 1 provides an overview of the research, through identifying the rationale of the research motivation, gaps in the literature along with the research questions, aim, and objectives. In brief, the combination of finance and technology (Fintech) has reshaped the use and delivery of financial services worldwide. Literature shows that fintech services are an innovation that will revolutionist the financial sector. Huge investments are made by the financial institution for introducing new technology that has the potential of bringing a paradigm shift in the lifestyle of the customers, in terms of providing a better user experience of achieving a fast seamless, anytime and anywhere banking (Yoon et al., 2016). While fintech services are purported to provide tremendous support and advantages to both the consumers and the financial institutions, there is a contradiction found in the literature regarding the adoption of fintech services despite the advantages it is expected to provide (Steenis, 2019; KPMG, 2019; Hu et al. 2019; Lee, 2018). This contradiction if not addressed at the early stage of diffusion of fintech services, there might evolve a situation wherein the new introduced fintech services could be used only to a limited extent by consumers without exploiting its full strength (Hu et al. 2019; Lee, 2018, Lee, 2009). In this Chapter, a comprehensive review of the normative literature on consumer adoption of fintech services and related factors is provided to identify the key issues as well as the gaps found in the literature concerning this study.

Literature shows that fintech services is still a diffusing technology and is in its infancy (Hu et al. 2019; Lee, 2018). For instance, cloud computing, as an example of fintech services, has been claimed to be failed to take off despite the promising start, and has not been adopted by the users to the extent expected (Bhowmik, 2017; Bogdan et al. 2015). Further, literature shows that there are serious limitations to the use of fintech services and those limitations have the potential to outweigh the advantages (Rodrigo et al., 2019; Lee and Shin, 2018; Bunjaku et al., 2017). Many researchers have argued that there are risks involved in the implementation of fintech services (Rodrigo et al., 2019; Lee and Shin, 2018; Bunjaku et al., 2017; Subramanian and Chino, 2016). Similarly, other researchers have argued that the adoption of fintech services is dependent on the extent to which the technology has diffused, and people can utilize the technology (Morgan et al. 2019; Gomber et al. 2018; Micu & Micu, 2016). Under these circumstances, it is not clear what factors affect fintech services that limit its adoption by users and to what extent those factors can be manipulated to ensure that the limitations affecting usage of fintech services are removed to a greater extent for the benefit of consumers and the financial institutions.

Moreover, even though literature shows some investigations have been carried out to understand the adoption of fintech services by the bank consumers, those investigations are not conclusive and suffer from limitations. Further, outcomes from the current research efforts are not generalizable (Yoon & Lim, 2020; Senyo, & Osabutey, 2020; Meyliana et al. 2019, Hu et al. 2019; Ryu, 2018; Stewart & Jujens, 2018; Lou & Li, 2017; Chuang et al. 2016). For instance, majority of the studies are highly focused on particular context or particular fintech services, such as cloud computing, mobile banking, internet banking or crypto-currencies (Lee, 2018; Raza et al. 2017; Kim et al. 2015; Hanafizadeh et al. 2014). Outcomes of highly contextualized studies may not provide room for application in other contexts. Moreover, some studies investigated certain components of consumers' adoption of fintech services in isolation, and do not take into account the possible influence of many potential relationships amongst factors that could contribute to the consumers' experience (Yoon & Lim, 2020; Hu et al.2019; Mutahar et al. 2017). Furthermore, there is a lack of agreement on a common set of factors that contribute to the consumers' behavioral intention to adopt fintech services (Yoon & Lim, 2020; Hu et al.2019). In fact, it can be seen that there is incomplete knowledge with regard to behavioral intention to adopt fintech by consumers and the factors affecting the behavioral intention to adopt of fintech services. Therefore, it is reasonable to conclude that there is a need to further investigate this phenomenon. Taking these arguments into consideration, the next section has presented a comprehensive review of the literature related to behavioural intention to adopt fintech by consumers.

This Chapter is structured as follows. Section 2.2 provides an overview of the fintech services in terms of definition, theories concerning fintech services, and previous research conducted in a similar context. Section 2.3 discuss the Technology Acceptance Model (TAM) as a supporting theory of TAM constructs and their relationship with the consumer behavioural intention to adopt fintech services. sections 2.4 discuss Diffusion of Innovation (DOI) as a supporting theory of DOI constructs and its expected relationship with perceived usefulness, perceived ease of use, and consumer behavioural intention to adopt fintech services. As for section 2.5, it discusses the theory supporting customers' trust, along with the expected influence on consumer behavioural intention to adopt fintech services. Similarly, sections 2.6 discuss the theory supporting consumer perceived risk, along with its expected relationship with trust and consumer behavioral intention to adopt fintech services. Section 2.7 presents the gaps found in the literature, while the Chapter key conclusions outline in section 2.8.

2.2 Research context

Literature shows that fintech is poised to revolutionize the way the financial sector operates in the contemporary world and publications concerning fintech has been recently increasing (Gomber et al. 2018; Alt et al., 2018). Research shows that the financial industry is being transformed by fintech (Alt et al., 2018; Arner et al. 2016). Fintech is new, is being adopted by banks and other financial institutions rapidly and currently a hot topic of discussion amongst researchers and practitioners, notably banks (Hu et al.2019; Alt et al., 2018). This research concerns with the consumers of banks and their behavioural intention to adopt fintech serices with regard to banks.

The History of the development of fintech in the banking sectors was noticed when it was initiated through the application of physical media technology at the beginning of the 15th century (Alt et al., 2018). Further the use of simulation technology in the 19th century accelerated its development (Alt et al., 2018). Although literature shows conflicting evidence on the origin of the term fintech (Bettinger 1972), the term itself can be originally traced to the early 1990s, where it was probably mentioned by John Reed who was the chairman of Citicorp, first. It was related to the project initiated by Citigroup back then to facilitate technological cooperation effort in the context of newly founded "Smart Card Forum" (Puschmann, 2017; Arner et al., 2015; Kutler, 1993) where the term "Financial Services Technology Consortium" was used. However, during 2014 the term attracted wider attention of regulators and market participants in the financial industry, primarily because of the sharp growth of the financial industry with the growth estimated to have reached to US $197 billion on investments (Alt et al., 2018).

Continuing with its history and evolution, it can be seen that Bettinger (1972) defined fintech as a series of models to analyze and solve problems that were encountered by a bank through a combination of technology and banking expertise. Further, Arner et al. (2015) argue that development of fintech is an ongoing process of financial services and technology that are evolving together. The term while being used continuously since its origins mentioned above, was also used to refer to digitalized processes (Puschmann, 2017). However, in 2008, a new era of fintech emerged. During the new era, fintech was not only used to define the financial products and services but, also define the companies (typically start-ups) who delivered those financial products and services (Arner, et al., 2016).

Thus, literature shows that "fintech" as a term could encompass information technology based innovative financial solutions, traditional financial services providers such as, banks, insurance companies and new start-up players who emerged after the global financial crisis and took advantage of the advancements in regulations and technology and paved the way for new industries in the financial sector such as, PayPal, OnDeck and Billtrust (Alt et al., 2018; Gimpel et al. 2018; Arner, et al., 2016). Those start-up companies

entered into the financial industry to improve, disrupt or enhance the product and service types concerning the financial industry and their delivery using novel technologies (Gimpel et al. 2018). Taking the discussion above into account, it was felt that at this stage a general definition of fintech could be useful for this research. In addition, it was considered necessary to identify those factors that could critically affect fintech and its adoption, the theoretical base that is available in the literature to understand fintech and factors affecting it and the gaps exist in the literature with regard to the definition of fintech, factors affecting fintech, theoretical support available in the literature that needs to be addressed. To begin with the various definitions of fintech found in the literature were tabulated in Table 2.1.

Table 2. 1 Various definitions of fintech provided by researchers in the literature.

#	Definition of Fintech	Authors
1.	Financial technology or "FinTech" refers to technology-enabled financial solutions. The term FinTech is not confined to specific sectors (e.g. financing) or business models (e.g. peer-to-peer (P2P) lending), but instead covers the entire scope of services and products traditionally provided by the financial services industry	Arner et al. (2015)
2.	"FinTech", a contraction of "Financial technology", refers to technology-enabled financial solutions.	Arner et al. (2016)
3.	A new sector in the finance industry that incorporates the whole plethora of technology used in finance to facilitate trade, corporate business, or interaction and services provided in the retail industry.	Micu and Micu (2016)
4.	A portmanteau of financial technology that describes an emerging financial services sector in the 21st century	Gomber et al. (2018)
5.	Technologically enabled financial innovation that could result in new business models, processes, applications, or products with an associated material effect on financial markets and institutions and the provision of financial services.	KPMG (2019)
6.	Using the software, applications and digital platforms to deliver financial services to consumers and businesses through digital devices such as smartphones has become recognized as a promising tool to promote financial inclusion	Morgan et al. (2019)

The different definitions given in Table 2.1 are broadly implying that fintech is a technological innovation that aids in various aspects concerned with the financial sector. The definitions also indicate that fintech can contribute to improving the services offered by firms in the finance sector. For instance, fintech is already being employed by banks to make decisions regarding many aspects some examples of which include (Aziz & Dowling, 2019):

- The decision to which banks should lend money to a particular client.
- Alerting traders in the stock market about risky situations
- Detecting insider fraud, and
- Enhancing compliance.

Furthermore, researchers (Lynn et al. 2019; El-Masri et al. 2019) anticipate that fintech is likely to change the way financial operations including trading in stocks, lending in banks, compliance, managing risks, trading in shares, insurance activities and payments are currently being carried out. Moreover, fintech is

likely to significantly change the way financial transactions are being carried out by both organizations and consumers (Milian, et al. 2019; Hu et al. 2019; Gomber et al., 2018; Varga 2017).Yet, there is some caution against rushing into conclusions about fintech and its utility. For instance, serious concerns have been raised about the risks involved in adopting fintech services by different segments of the users, e.g. consumers, investors, and financial service firms (KPMG, 2019).

At this point, it is important to discuss some of the examples of fintech services that have been employed in the financial sector throughout the years, to gain knowledge on the extent to which those fintech services have contributed significantly to the disruption of financial services sector by increasing the competition and empowering customers (Mayliana et al. 2019; Lou & Li 2017). From the above, it can be seen that fintech is not a new concept. Since the 1950s the new technology has transformed the way financial services are operating and supporting the consumers. This was started from the time when the development of the Automated Teller Machine (ATM) and credit card processing, followed by electronic stock trading and e-commerce. From that time, each decade has witnessed new technologies emerging on the horizon and it can be seen that some were just taken for granted without being noticed, while those technologies were bringing a revolution (Milian, et al. 2019; Puschmann, 2017). For instance, a new generation of fintech services is being built on near-ubiquitous access to the internet through internet banking and other technologies like mobile phone banking, cloud computing, artificial intelligence (AI), machine learning, and blockchain are fast emerging (Lynn et al. 2019; Lou & Li, 2017). Table 2.2 shows some of the exemplars of fintech services that have been employed in the financial sector in recent times.

Table 2. 2 Provides an exemplars of fintech services that have been employed in the financial sector

#	**Fintech services and their brief description**	**Advantages**	**Limitations**	**Authors**
1	Crowdfunding: is a service that empowers networks of people to control the creation of new products, media, and ideas and are raising funds for charity or venture capital.	Used as a marketing tool for the start-up firm. Increases public awareness of the brand and product. Validate business ideas through receiving genuine feedback on the idea that's required funding. Provides financial support to local small businesses and startups.	Raising money with limited capacity. Losing confidentiality since the idea is shared online with others before the entrepreneur pioneers it. Risk of implementing the shared idea before the pioneer does. Promoting the idea required a lot of time and effort through campaigns. Fear of fraud	(Lee and Shin, 2018; Bohliqa, 2015; Honolulu, 2014)

2	Crypto-currencies: is a virtual digital currency that operates by using cryptography for security.	Open Code: all information about the transaction is shared in the network but without the data of the sender and recipient of the coins (anonymous). No Inflation. Unlimited possibility of a transaction, wallet holders can pay to anyone, anywhere, and any amount. No boundaries, payment made in the system cannot be cancel, fake, or duplicate. Low operational cost. Easy to use.	Strong volatility Can be used for money laundering or financing illegal activities. Large risk investing in crypto-currency that should be considered in the medium and long term In this regard, Tymoigne (2015) for example mentioned that the discounted cash value of a crypto-currency is zero. He further observes the currency lacks a central issuer, and that there is no financial or economic basis for its creation.	(Bunjaku et al., 2017; Subramanian and Chino, 2016)
3	Cloud computing Services: "cloud" refer to a larger group of interconnected computers or network that can be public or private	Cost savings for users. Business Continuity. Centralized data management. Unlimited storage capacity. Create an easier group collaboration. Universal access to Documents.	Complex data security challenges. loss of visibility to key security. Lack of standards and regulation. Vulnerable to cyber-attacks. Internet connection is required. Unable to work with the low-speed connection. The only access to limited features.	(Bhowmik, 2017; Bogdan et al., 2015)
4	Mobile Banking: refer to the interaction of the customer with the bank through a mobile device such as smartphone, digital assistant or cell phone	Real-time information to customers' accounts. Location free access to personal accounts. Save time.	System limitation, such as tiny screens and keypads, battery life, limited memory capacity, etc.) Inconvenience authorization due to PIN changing. Security threats and hacking.	(Rodrigo et al., 2019; Laukkanen and Kiviniemi, 2010)

Table 2.2 demonstrates that there are issues found in the literature concerning the use of fintech services which include risk of hacking the accounts, risk of error in processing, risks of financial losses that could occur due to disruptions in the services of ventures, lack of cybersecurity and internet frauds (e.g. Sumroy

et al. 2019; Arner et al. 2016). Also, there are additional challenges concerning the regulators and market participants alike, particularly in balancing the potential benefits of innovation with the possible risks of new approaches. This problem is highlighted by KPMG (2019), in which informs that regulators are worried about the risks of using fintech services. Risks include those that arise due to technology, cybersecurity, data privacy, protection of consumers, risk management, and problems concerning money laundering (Aziz & Dowling, 2019; Lou and Li 2017; Kaplan & Mikes, 2016). In fact, some researchers complain that there is less concern in evaluating the risks arising out of using fintech supported by AI when compared to contemplating its potential gains which usually happens with some new technologies (Sumroy et al. 2019).

Despite the pros and cons of using or adopting fintech services, the interest in employing fintech in the financial institution is growing. For instance, Steenis (2019) says in 2018 financial institutions lent 38% unsecured personal loans in the US which when compared to the ones lent in 2013 is up by 33%. In another instance, it is seen that in the UK fintech generates almost £7bn in revenues yearly (Steenis, 2019). These examples show that Fintech as technological innovation has come to stay. At this point while it may appear that fintech as a new technology is now being already accepted by users for automatic adoption, in reality it may be a questionable statement. If one considers, the examples of challenges mentioned above, it will be inappropriate to conclude that fintech adoption by consumers of banks or any other financial institution, either knowingly or unknowingly, is an automatic approval of its usefulness, ease of use and hence adoption by consumers. These contradictory arguments led the researcher to investigate the adoption behaviour of consumers of fintech and fintech as a concept. Thus, the next section deals with the theories concerning fintech as theories are expected to provide a comprehensive explanation about concepts and enabled the researcher to gain in-depth knowledge about the concept of fintech.

2.2.1 Fintech services in the context of Bahrain

The economy of Bahrain is fairly strong and its Gross Domestic Product (GDP) has been growing over the years except during the period when the pandemic COVID-19 attacked all nations. Currently, the GDP of Bahrain is USD13.47 billion (CBB, 2019). Such growth has led the Government of Bahrain to encourage the adoption of the latest technologies including fintech services so that the economic growth could be accelerated further (CBB, 2019). According to one report by the Bahrain Association of Banks (BAB) (2019; p. 254), the economic status of Bahrain in terms of financial activities is growing. The report says: "The banking system in Bahrain consists of traditional banks and Islamic banks, and constitutes the largest component of the financial system, where it constitutes more than 85% of the total financial assets of the sector. The value of banking assets at the end of June 2019 reached more than $ 211 billion, more than five

times the annual GDP of Bahrain." An economy of this order with a large banking operation needs the support of the latest technologies. Realizing the importance of the need for implementing such technologies, the Government of Bahrain initiated action to implement fintech in 2017 (CBB, 2019) and floated the concept of the sandbox. This fintech concept is diffusing slowly in Bahrain (Abdulkarim, 2020; Razzaque et al. 2020). When this research has undertaken the concept of fintech services was still new and there was a need to understand how the diffusion and acceptance of fintech services could be accelerated (Abdulkarim, 2020). Thus, through a process of critical review of the published papers in the relevant literature and those published specifically in the context of Bahrain, the researcher concluded that application of the DOI theory and TAM could enable the researchers and the practitioners to gain knowledge on addressing the weak diffusion and slow acceptance rate of fintech services in Bahrain.

While research on fintech services adoption in the Bahraini context is very sparse, this neglect of Bahrain by researchers has perhaps resulted in a lack of pace in the diffusion and adoption of fintech services. Some of the rare publications on fintech diffusion and fintech services adoption in the Bahraini context include the research conducted by Bureshaid et al. (2020), Abdulkarim (2020), and Razzaque et al. (2020). To date, only two publications are found that have addressed the concept of fintech using TAM in the context of Bahraini banks. However, no research has been conducted to understand the diffusion of fintech services using DOI. The current publications conducted on Bahrain do not, unfortunately, address the problem of diffusion of fintech services and the behavioral intention of consumers of banks to adopt fintech services using DOI and TAM by integrating the two models and predicting the behavioral intention of consumers to adopt fintech services before the actual adoption. In addition, those published papers in the context of Bahrain addressed the problem post-adoption of fintech and not early or pre-adoption of fintech services. This research fills this gap by addressing the early period of diffusion of fintech applying DOI which is expected to throw light on how the banking industry can use the latest technology to contribute to their growth as well the growth rate of the economy of Bahrain using the concepts of the behavioral intention of consumers of banks in Bahrain and DOI. Furthermore, banks in Bahrain have not paid much attention to the adoption intention of fintech of consumers of banks which is a major gap. Understanding the adoption of fintech servcies by the organizations in the finance sector alone excluding the customers was not expected to ensure complete and successful diffusion of fintech services as well as enhance the use of fintech services introduced in banks. Customers are the main stakeholders of banks and the economy of Bahrain. Thus, a study of the behavioral adoption of consumers in adopting fintech services and the diffusion of fintech servcies was expected to bring out knowledge on predicting the consumer adoption rate of fintech services of consumers of banks in Bahrain. Banks being an important part of the economy of Bahrain, any research conducted on banks regarding the diffusion of fintech and its adoption by its consumers, in a way is

expected to contribute to the knowledge on how to predict consumer behavior concerning the adoption of fintech services when it is still diffusing and hence be linked to the economy of Bahrain.

Moreover, the application of DOI theory to understand the rate of adoption of fintech services by the consumers of banks in Bahrain requires knowledge regarding the social system that is affected by innovativeness and the diffusion of that innovation including fintech (Rogers, 1983). According to Rogers (1983) in the life cycle of the diffusion of innovation, there are different members of the community in a social system, who use that innovation at different stages of the diffusion. Such members of the social system are categorized by Rogers (1983, p. 22) based on innovativeness as innovators, early adopters, early majority, late majority, and laggards. While the behavior of each one of the categories of the members of the social system varies with regard to the adoption of an innovation, this research focuses on the early adopters. According to Rogers (1983; p. 248), early adopters are more integrated into the local social system than innovators and are considered localities. This category of adopters according to Rogers (1983) is important as those adopters are the first ones to come into contact with innovation and have the greatest degree of opinion leadership in the most social system. The other adopter categories usually look up to early adopters. Thus any study of the early adopter through the diffusion process of fintech services is expected to provide fairly good knowledge about the early stage of diffusion of fintech servcies. Thus in this research, the focus is the early adopters and not the other categories.

2.2.2 Theories concerning fintech

According to the literature, there are a few competing theories that lend support to the concept of fintech and fintech services and its application in banks to a certain extent. For Instance, theory of P2P lending, (Pişkina & Kuşa, 2019; Santoso et al., 2019; Bertsch & Rosenvinge, 2019; Teigland et al., 2018), theories of financial intermediation (Thakor, 2019), theory of dynamic capability (Mihardjo et al., 2019; Schoemaker et al., 2018; Salunke et al., 2011), diffusion of innovation theory (DOI) (Lin et al. 2019; Lou and Li, 2017; Mutahar et al. 2017; Siddik et al. 2014), theory of perceived risk (Raza et al., 2017; Hanafizadeh, 2014), technology acceptance model (TAM) (Shin & Choi, 2019) and graph theory (Das, 2019; Burdick et al. 2011). Some of those theories are explained below although it appears that there is no specific theory that can fully explain the concept of fintech service in the literature.

Theory of Peer to peer (P2P) lending: Recently researchers have been showing interest in studying P2P lending (Pişkina & Kuşa, 2019; Bertsch & Rosenvinge, 2019; Teigland et al., 2018). P2P lending involves the mechanism used for the lending of money by people who have surplus funds to those who need funds using online methods without a need for intermediation (Bertsch & Rosenvinge, 2019; Teigland et al., 2018;

Pankaj et al., 2012; Campbell, 2011). Examples of P2P lending platforms include Lending Club, Funding Circle, Prosper, and other P2P services such as mobile pee to pee payment and Blockchain Platform (Pişkin & Kuş, 2019). According to Santoso et al. (2019), P2P lending theory explains the impact of borrower characteristics on the probability of obtaining a loan or whether the interest rate should be paid by the borrower. For instance, Pope and Sydnor (2011) argue that significant discrimination takes place in funding against borrowers' color skin. Similarly, Freedman and Jin (2017) point out that P2P lending is oriented favorably with borrowers with social networks and have chances to have their loan granted and obtain a lower interest rate. These aspects show that there is a necessity to describe the phenomenon of P2P lending theory in a broader sense taking into account the variations that occur in reality. Moreover, despite the fact P2P lending is considered to be a strong concept that could be applied to explain fintech, an important aspect that could impede such an application of this theory in the context of banks is the nature of banks i.e. while banks have several functions related to lending (e.g. liquidity and payment services, asset transformation, credit, liquidity and interest rate risk management, and credit risk analysis and monitoring of borrowers), P2P lending involves only two of those four functions namely asset transformation and credit risk analysis but without an intermediary (Bertsch & Rosenvinge, 2019). P2P lending theory does not explain the intermediation phenomenon that happens in banking. This it is necessary to carefully apply P2P lending theory when dealing with the phenomenon of fintech as the P2P theory does not fully explain the other application of fintech service.

Financial intermediation theory: According to John & Nwekemezie (2019) financial intermediation theory posits that the development of financial markets or sector is dependent on the development of intermediaries (e.g. banks). Moreover, the development of an economy is dependent on the development of the financial markets or sectors. Allen and Santomero (1998) explain further that the financial intermediary theory is designed for financial organizations that accept deposits or issue insurance policies and channel funds to industries. The modern version of the financial intermediation theory states that imperfections in the market stop savers and investors from trading directly with one another in an optimal manner of market imperfection due to information asymmetry that exists between savers and investors. (Scholtens & van Wensveen, 2003). An intermediary, like banks, exists to fills the gap between the saver and investor. Furthermore, literature shows that financial intermediation theories argued that with the reduction in the information asymmetries and transaction costs, there should be a challenge to the existence of intermediaries. However, the same is not seen in real life. In fact, banks as intermediaries can create value for the economy (Scholtens & Wensveen, 2003). Thus, the application of intermediation theory to the intermediation activities of financial institutions in the modern world is unlikely to yield the expected results. This is a major limitation of financial intermediation theory. Applying this theory to explain the

adoption of fintech by consumers (savers) could lead to the conclusion that banks are not needed anymore by consumers because fintech reduces the information asymmetries and transaction costs greatly (Hübner et al., 2019). However, this is not expected to happen or seem to happen currently (Zveryakov et al., 2019; Li et al., 2017).

From the discussion above it can be seen that the concept of fintech is not explained fully by one theory. However, it can be explained with the support of other theories depend on its use and applications. Moreover, as we highlighted earlier, along with the development of the concept of fintech in the literature, most scholars have focused on studying the application of information technology to the financial services (Gomber et al., 2018; Gimpel et al., 2018; Buchak et al., 2018; Alt et al., 2018; Arner et al., 2015). The literature indicates that only a few studies investigated the influence of a mechanism, e.g. technology acceptance mechanisms (Hu et al., 2019; Gimpel et al., 2018), behind the adoption of fintech services. Thus, this paper investigated two theories that could explain the technology acceptance mechanism of fintech services by the consumers from amongst many theories available in the literature.

A review of the relevant theoretical literature concerning technology acceptance mechanism revealed that two theories are widely used by researchers namely the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) Theory. These are dominant theories found in the literature as those theories have been applied by researchers over the last two decades concerning adoption of any new innovation or technology (Al-Rahmi et al. 2019; Wang et al. 2019; Ozen et al. 2018; Taherdoost, 2018; Wu, 2009). However, there is a need to know whether those theories alone can also explain the behavioural intention of users of technology or not. For instance, the security and safety aspects concerning the adoption of new technologies are not covered by TAM and DOI (Thong and Yap, 1995; Zaltman et al., 1973). There is a need to understand the implications of factors that could deter consumers to adopt new technologies or innovations in regard to the safety and security of their information and privacy (Meyliana et al. 2019; Stewart & Jujens, 2018; Hanafizadeh et al. 2014) For instance, literature has clearly shown that influence of perceived risk and trust are important concepts that impinge upon the behavioural intention of consumers to adopt any innovation or new technology (Meyliana et al. 2019; Hu et al. 2019; Hanafizadeh et al. 2014). Researchers have consistently argued that these two factors need to be investigated with regard to consumers' behavioral intention to adopt fintech services (Hu et al. 2019; Stewart & Jujens, 2018; Hanafizadeh et al. 2014) Taking into consideration the above, the following section has provided an overview of the adoption of fintech services, and its relationship with other factors from the existing literature, which will form the basis of this research.

2.2.2 Consumer Adoption of fintech services

The adoption of an IT innovation is a phenomenon that has consistently raised concerns for both researchers and practitioners. Related literature defined IT innovation adoption as the process that results in the introduction and the use of a product, process, or practice that is new (Damanpour & Wischnevsky, 2006). Rogers (1983) stated that adoption is the decision to make full use of the innovation. Moreover, Rogers (1995) indicates that the adoption process culminates into a decision associated with the acceptance of the innovation and physical acquisition of technology. The diffusion of an innovation is the process in which the innovation is communicated through certain channels over time among members of a social system (Rogers, 1983). According to Rogers (1995, 1983), the process of adoption and diffusion of innovation would be only achieved by the decision to accept innovation and not if the innovation has been put to the use by the adopter. Yet, several scholars argue that this is merely a partial characterization of innovation adoption and diffusion (Thong and Yap, 1995; Zaltman et al., 1973).

Scholars also argue that the adoption process of innovation can only provide a meaningful representation if it assesses the decision to accept the innovation, as well as how technology is put into use by the potential adopter/consumers (Thong & Yap, 1995). Moreover, Straub (2009) stated that adoption models examine the decision of an individual to either accept or reject a particular innovation, while the models of diffusion examine how a group of the population adopts or rejects a particular innovation. Although studies of the process of diffusion are needed for a better understanding of the adoption of innovation phenomenon, literature shows that most studies on the adoption of IT innovation have only focused on the process of adoption (Premkumar et al., 1994). The same is also applies to the current studies related to the adoption of fintech services by the consumers that only focused on the process of adoption (Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart & Jujens, 2018; Ryu, 2018; Chuang et al. 2016; Kim et al. 2015). The below Table shows previous research conducted in the context of adopting fintech services.

Table 2. 3 Provides an exemplars of research on adoption of fintech services

Authors	**Type of the study**	**Focus**	**Factors**	**Key Findings**
Hanafizadeh et al. 2014	Structural Equation Modelling	Mobile Banking	Variables associated with the Technology Acceptance Model (TAM). need for interaction, perceived risk, perceived cost, compatibility with lifestyle, perceived credibility, and trust	It was found that these constructs successfully explain the adoption of mobile banking among Iranian clients .adoption of lifestyle and trust were found to be the most significant antecedents explaining the adoption of mobile banking

Kim et al. 2015	Elaboration Likelihood Model	Mobile Payment Services	Variables associated with the Technology Acceptance Model (TAM). CFIP (Concern for Information Privacy) and Self-efficacy	in invigorating payment-type Fintech services, convenience and usefulness are the most critical influential variables in terms of use, while from an institutional aspect, government deregulation and stronger security are called for.
Chuang et al. 2016	Structural Equation Modeling	Fintech Service	Variables associated with the Technology Acceptance Model (TAM). integrating brand and service trust	Brand and service trust has a significantly positive effect on attitudes toward using Fintech Service. Perceived usefulness has a significantly positive effect on attitudes toward using. Perceived ease of use has a significantly positive effect on attitudes toward using. Attitudes toward using have a significantly positive effect on behavioral intention to use.
Raza et al. 2017	Structural Equation Modelling	Mobile Banking	Variables associated with the Technology Acceptance Model (TAM). Awareness, compatibility, perceived risk and Resistance	Outcomes suggest that resistance is significantly and negatively associated with perceived ease of use while it is significantly and positively associated with perceived usefulness. Also, perceived risk and compatibility have positive significant relationships with both perceived ease of use and perceived usefulness. However, awareness is positively and significantly connected with perceived ease of use and an insignificant relationship with perceived usefulness.
Ryu, 2018	Structural Equation Modelling	Fintech Service	Based on the framework theoretically embedded in the theory of reasoned action, the paper suggested benefit-risk framework which integrates positive factors (Economic Benefit, Convenience, Transaction Process) and negative Factors (Financial Risk, Legal Risk, Security Risk, Operational Risk) associated with its adoption	Results show that legal risk has the biggest negative effect, while convenience has the strongest positive effect on Fintech adoption intention.
Stewart and Jujens, 2018	Structural Equation Modelling	Fintech Service (Mobile application)	Variables associated with the Technology Acceptance Model (TAM). customer trust, data security, value-added, user interface design and FinTech promotion	The number of mobile users in Germany is rapidly increasing, yet the adoption of Fintech is extremely slow. It is intriguing to reckon that 99 percent of respondents had mobile devices, but only 10 percent recognized Fintech. Further, only 10 of the 209 respondents had ever used Fintech services, representing under 1 percent of the

				surveyed respondents. The researcher concluded that Fintech incubators and banks offering Fintech services need to persuade their customers regarding the usefulness and value-added advantages of Fintech.
Lee, 2018	Structural Equation Modelling	Fintech Service (Bitcoin)	Variables associated with the Technology Acceptance Model (TAM). Perceived Security	Results indicated that the behavioral intention to use Bitcoin is affected mainly by perceived usefulness and perceived security. However, perceived ease of use is not significant and only indirectly gives influences the intention.
Hu et al. 2019	Structural Equation Modelling	Fintech Service	Variables associated with the Technology Acceptance Model (TAM). User innovativeness, government support, brand image, and trust	Results reveal that users' trust in Fintech services has a very significant influence on users' attitudes for adoption. also, perceived ease of use and perceived risk does not affect users' attitudes toward the adoption of Fintech services.
Meyliana et al. 2019	Structural Equation Model	Fintech Service	Variables associated with the Technology Acceptance Model (TAM). Perceived risk and Trust	The results indicate that the factor of users' trust influences perceived usefulness in the adoption to use Fintech services. However, the risk factor does not affect the use of Fintech services, which further does not influence the users' attitude.

Table 2.3 above shows that the adoption of fintech services have attracted the attention of related literature, due to its important role in understanding the consumer's behavior towards the adoption of fintech services. This also indicates that the adoption of fintech services is still an area of concern for researchers. Overtime related literature continue to investigate the factors that contribute to the adoption of fintech services. Yet, it is clear that there is no unique set of factors that affect the adoption of fintech services.

2.2.3 Factors affecting the adoption of fintech services

Table 2.4 shows some of the factors that have been identified in the literature along with the supporting theories.

Table 2. 4 Factors affecting adoption of fintech services

No.	Factors	Reference
1	Intention to Adopt Fintech Services	Senyoa and Osabuteyb (2020); Meyliana et al. (2019); Hu et al. (2019); Lee (2018); Stewart and Jujens (2018); Raza et al. (2017); Mutahar et al. (2017); Chuang et al. (2016); Kim et al. (2015); Hanafizadeh et al. (2014); Koenig-Lewis et al. (2010)
2	Perceived Usefulness	Yoon and Lim (2020); Meyliana et al. (2019); Hu et al. (2019); Lee (2018); Stewart and Jujens (2018); Raza et al. (2017); Mutahar et al. (2017); Chuang et al. (2016); Kim et al. (2015); Hanafizadeh et al. (2014); Koenig-Lewis et al. (2010)

3	Perceived Ease of Use	Meyliana et al. (2019); Hu et al. (2019); Lee (2018); Stewart and Jujens (2018); Raza et al. (2017); Mutahar et al. (2017); Chuang et al. (2016); Kim et al. (2015); Hanafizadeh et al. (2014); Koenig-Lewis et al. (2010)
4	Relative Advantage	Yoon and Lim (2020); Lou and Li (2017); Chitungo and Munongo (2013)
5	Complexity	Yoon and Lim (2020); Lou and Li (2017); Siddik et al. (2014)
6	Compatibility	Yoon and Lim (2020); Lou and Li (2017); Mutahar et al. (2017); Raza et al. (2017); Hanafizadeh et al. (2014); Koenig-Lewis et al. (2010)
7	Trialability	Yoon and Lim (2020); Mutahar et al. (2017); Chen (2013); Moghaddam and Salehi (2010)
8	Observability	Moghaddam and Salehi (2010)
9	Trust	Senyoa and Osabuteyb (2020); Meyliana et al. (2019); Hu et al. (2019); Muñoz-Leiva, et al. (2017); Stewart and Jujens (2018); Hanafizadeh et al. (2014)
10	Perceived Risk	Senyoa and Osabuteyb (2020); Meyliana et al. (2019); Raza et al. (2017); Muñoz-Leiva, et al. (2017); Hanafizadeh et al. (2014)

The above factors identified by the literature required more understanding of how they influence consumer's initiation to adopt fintech services. For instance, many research-supported TAM models have been developed to explain the adoption/ acceptance of Information Systems/Information Technology (IS/IT) in general as well as in the context of fintech services (Table 2.3 & Table 2.4) (Hu et al. 2019; Meyliana et al. 2019; Stewart and Jujens, 2018; Lee, 2018; Raza et al. 2017; Chuang et al. 2016; Kim et al. 2015). Despite the fact that many TAM variations have been found in the literature that have combined TAM with different theories, yet researchers have highlighted that more variations could be discovered by integrating TAM model with other theories to cope with the rapid changes in technology and to improve the explanatory power (Lee et al. 2011; Moghaddam and Salehi, 2010; Carter & Be´langer, 2005; Chen et al. 2002). One area that concerns rapid changes in technology is the innovation.

It is argued in the literature that the constructs employed in TAM model are a subset of perceived innovation characteristics (Taherdoost, 2018). This indicates that innovation theories could be combined with TAM. For instance, there is evidence in the literature of researchers combining TAM with the widely used DOI theory (Al-rahmi et al. 2019; Hubert et al. 2018). One of the points that strongly suggests a possible integration of TAM and DOI theories is that TAM and DOI constructs are similar and complementary to each another in term of explaining the adoption of Information Systems/Information Technology (IS/IT) (Taherdoost, 2018). Hence the integration of TAM and DOI theories could provide an even stronger model than either standing alone. Thus, this study employs two major theoretical paradigms, TAM and DOI as the

central theoretical base for investigating the concept of behvioural intention to adopt fintech. Moreover, the five constructs of DOI characteristics, namely relative advantage, complexity, compatibility, trialability and observability, and the three constructs of TAM characteristics, namely perceived usefulness, perceived ease of use, and intention to adopt fintech services were taken with appropriate modifications.

Furthermore, literature shows that the third important aspect that raised a concern regarding explaining the consumer intention to adopt technology was the concept of risk that is usually associated with any new technological innovation (Table 2.4) (Meyliana et al. 2019; Boz & Özen 2019; OECD 2019; Lee, 2018; Ryu, 2018; Muñoz-Leiva et al. 2017; Kim et al. 2015). Amongst the different theories that have been used in the literature that explains how risk factor is associated with new technological innovation, which protection motivation theory (PMT) was found to be useful in the context of fintech and supported in the literature (Jansen and Schaik, 2017; Boss et al. 2015; Vance et al. 2012). Finally, literature shows that any risk associated with new technological innovation is commonly linked to the trust of the user of the technology in the literature (Meyliana et al. 2019; Stewart and Jujens, 2018; Yang et al. 2015; Alessandro et al. 2012). Thus, based on the extant literature, the theory of reasoned action was found to be useful in explaining the phenomenon of trust that needs to be considered while adopting new technology (Lishomwa and Phiri, 2020; Yousafzai, 2010).

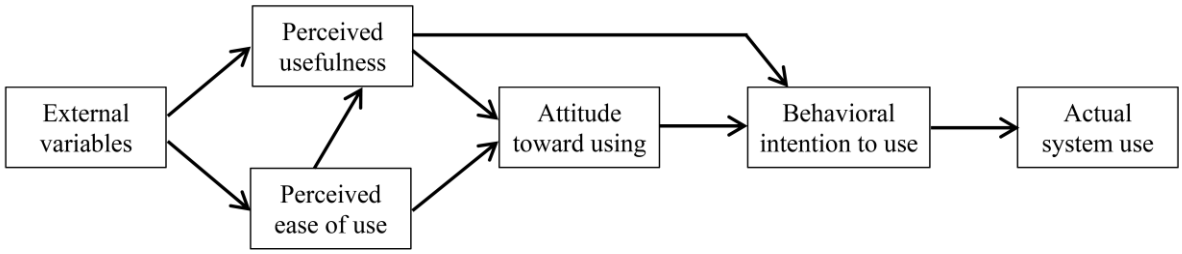
While there could be more theories and factors that may affect the user's intention to adopt fintech services (Table 2.3). This research has focused on ten factors, namely intention to adopt fintech services, perceived usefulness, perceived ease of use, relative advantage, complexity, compatibility, trialability, observability, trust and perceived risk and four theories, namely Technology Acceptance Model (TAM), Diffusion of Innovations (DOI), Theory of Reasoned Action (TRA) and Protection Motivation Theory (PMT), that are considered important at the diffusion stage of new technological innovation in the extant literature. With appropriate modification, the proposed model could successfully be generalized to acceptance within the fintech services concept. Bringing more factors and related theories into the discussion in one research can extend the scope of the current research to areas beyond fintech adoption, and thus lead to difficulties in completing the research within a specific period.

2.3 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was developed by Davis (1989) (Figure 2.1). TAM model has been derived from the TRA model proposed by Ajzen and Fishbein (1967), to overcome the uncertainty of theoretical and psychometric status in the TRA model (Taherdoost, 2018; Muk and Chung 2015). Davis'

model has captured the attention of the related literature during the past decades, as it received substantial empirical support (Taherdoost, 2018; Wu, 2009; Mathieson et al. 2001). The model is widely used by researches in the field of technology acceptance due to its usefulness to anticipate the user intention or motivation to adopt the technology, using two constructs namely perceived ease of use (PEU) and perceived usefulness (PU) (Venkatesh et al., 2003; Venkatesh and Davis, 2000). According to Davis (1989), perceived ease of use and perceived usefulness determine the user intention behavior towards the use of particular technology. Also, according to Davis (1989), the main purpose of TAM was to explain the impact of external variables on internal beliefs, attitudes, and intentions. External variables could be user training, implementation process nature, and system characteristics are considered while applying TAM model (Taherdoost, 2018; Lin, et al., 2011).

Figure 2. 1 Technology Acceptance Model



Source: Davis et al. (1989, p. 985)

Davis (1989) argues that perceived usefulness and perceived ease of use are the most important factors in explaining technology use and any additional variables can only contribute little to the explanation of the variance on the internal beliefs of users toward technology acceptance. This statement is contradicted by recent changes taking place in the technological domain evidenced by numerous empirical studies (Malaquiasa & Hwang, 2019; Mu˜noz-Leiva et al. 2017; Hanafizadeh et al. 2014). However, new technologies are diffusing and getting integrated in the everyday lives of people so fast. This implies that the concepts of perceived ease of use and usefulness alone might be things of the past (Ajibade, 2018). In fact, there are situations wherein people adopting technology without hesitation. In such situations, there is a possibility people comply with the requirement and adopt the technology than depend on their perceptions (Ward, 2013).

Yet, for a phenomenon like fintech that are diffusing rapidly into many markets but require some time to be considered to have completely diffused, understanding the acceptance or adoption or usage behaviour of consumers connected to those technologies may still need to be linked to perceived ease of use (PEU), perceived usefulness (PU) and other external variables. TAM factors (e.g. perceived usefulness, perceived ease of use, and the intention to adopt) seem to be repeated by almost all researchers in determining

consumers' intention to adopt fintech services (Table 2.3 & 2.4). However, some studies confirm that external variables could provide a better understanding of what influences perceived usefulness and perceived ease of use, and their presence is essential to guides the actions required to influence greater use of technology (Olushola & Abiola 2017). There are two important elements that may need to be considered alongside perceived ease of use (PEU), perceived usefulness (PU) as those two have bearing on the consumers behavioural intention to adopt fintech. These two factors are risk and trust, which concern with security and safety of consumers using fintech that may have major implications for any consumer when adopting fintech. Moreover, according to Venkatesh and Davis, (2000) TAM does not include the demographic, economic and exogenous variables which have constrained the use of TAM model in determining the attitude and intention of consumer towards technology adoption. Hence, research carried out in innovational technology adoption usually modifies the TAM model by integrating other variables such as perceived risk (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Raza et al. 2017; Muñoz-Leiva, et al. 2017) and trust (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Hu et al. 2019; Muñoz-Leiva, et al. 2017).

Although external variables play an important role in the operationalization of TAM, it is not clear from TAM whether those external variables need to be the drivers of perceived usefulness and perceived ease of use or those variables can directly influence adoption intentions. In such a situation, taking into account the various outcomes of research publications on TAM, it can be seen that as external factors not only independent factors have been used to influence intention to adopt or attitude to adopt technology, but even theories have been combined to enhance the explanatory power of TAM. For instance, Hu et al. (2019) investigated the adoption intention of fintech services for bank users by directly linking external factors including brand image, perceived risk, trust, government support and user innovativeness as influencing attitude of users of banks while perceived usefulness and perceived ease of use were operationalized to influence attitude of users directly but separately. However, in their investigation on mobile banking acceptance in Yemen Mutahar et al. (2017) used external variables (DOI factors compatibility, observability and trialability) to influence perceived usefulness and perceived ease of use which is the original form of TAM. While the operationalization of external variables differed in the two research efforts highlighted above, an important feature that emerged was that in the research publication of Mutahar et al. (2017) the theories of DOI and TAM are integrated in a way that DOI factors drive TAM factors while in the case of Hu et al. (2019) TAM was used alongside Theory of Planned Behaviour (TPB).

It can be seen from the above section that although both TAM and DOI are extremely similar in some constructs and supplement on another, researchers have not taken advantage of the similarity and provided

a common way of representing a unified model. TAM constructs are a subset of the perceived innovation characteristics and integrated the constructs in both theories, could provide an even better explanatory model than either standing alone (Moghaddam and Salehi, 2010; Salehi and Rezaei-Moghaddam, 2009; Porter and Donthu, 2006; Wu and Wang, 2005). A unified model could have better explanatory power on the influence of the factors that affect the behavioural intention to adopt technology on the part of the consumers, including fintech. This leaves a gap in the literature which is the lack of understanding of the explanatory power of an integrated model that combines TAM and DOI theories. Thus, next section discusses the essential constructs TAM before reviewing the DOI theory and its components.

The examination of constructs constituting TAM and DOI at the basic level can reveal the possibility of integrating the two theories to explain the behavioural intention of consumers of banks to adopt fintech. The constructs of TAM that need to be reviewed were intention to adopt technology (fintech services), perceived ease of use and perceived usefulness. The external variable construct in TAM will be discussed separately as the construct needs to be reviewed for its variation in conceptualization in the literature and not as the way it is depicted in the original TAM. One variation has been identified above which is the integration of TAM and DOI constructs.

2.3.1 Intention to Adopt Fintech Services

Fintech services as the name indicates is a technology based service offered by financial institutions. It is new and still diffusing (Hu et al. 2019; Gomber et al., 2018; Yoon et al., 2016). It has advantages for consumers and can also pose challenges to users as well as the service providers (Senyoa & Osabuteyb, 2020; Hu et al. 2019; Gomber et al., 2018). An important aspect concerning the challenge is the security and privacy aspects concerning fintech which are considered major factors affecting any new technology and its adoption by consumers (Senyoa & Osabuteyb,2020; Meyliana et al. 2019). Behavioural intention to adopt technology is a well explained construct in TAM and literature is replete with research publications explaining the importance of this construct (Senyo & Osabutey, 2020; Alwi et al., 2019; Lee, 2018). In the context of fintech, intention to adopt fintech services is defined as the degree to which a consumer of the bank has consciously decided either adopt or not adopt fintech (Senyo & Osabutey, 2020; Alwi et al., 2019; Venkatesh et al., 2003). Additionally, it can be explained as the likelihood of an individual willing to use a certain type of technology (Hanafizadeh et al. 2014), thus indicating the intention to continue using a certain type of technology (Raza et al. 2017; Chang et al. 2016), for instance fintech. Davis (1989) argued that the intention to adopt behavior determines actual usage. Hence, the intention to adopt fintech services determines its usage (Yoon & Lim, 2020; Kim et al. 2015; Hanafizadeh et al. 2014). While some studies (e.g. Hsun-Kan & Wen-Hsiang, 2021; Senyo & Osabutey, 2020; Venkatesh & Davis, 2000) found that the

intention to adopt technology is merely a mediating factor. This study focuses on consumers' intention to adopt fintech services as the main dependent factor based on the TAM. Thus, the intention to adopt fintech services as a new technology, will be the core construct that will be investigated in this research with regard to the consumers of banks.

While TAM has depicted the intention to accept the technology as the original construct in the model developed by Davis (1989), over the years many other conceptualizations have emerged that have subsumed behavioural intention to intention to adopt technology (Alwi et al., 2019; Lee, 2018), actual usage of technology (Malaquias & Hwang, 2019; Muñoz-Leiva, et al., 2017; Hanafizadeh et al. 2014) and continuous intention to use technology (Ryu & Ko, 2020). There is no consensus on what conceptualization needs to be used in a specific context, although it appears researchers are using the concepts interchangeably. For instance, Rogers (1995) used the term continued adoption or later adoption the innovation-decision process model. Venkatesh and Davis (2000) used the terms intention to use and usage behaviour in their extended TAM. Venkatesh et al. (2014) used the terms behavioural intention and actual system use in the UTAUT model. In the TRA model Ajzen and Fishbein (1975) used the terms behavioural intention and attitude to indicate acceptance. Finally, in TPB Ajzen (1991) used the terms behavioural intention and attitude.

As far as the numerous empirical studies that have used TAM are concerned, it is seen that researchers have resorted to many different configurations of the model with most of them using the constructs perceived ease of use (PEU), perceived usefulness (PU) and intention to adopt in common in their models without employing the constructs the attitude to use or actual system use found in the original model (Alwi et al., 2019; Hubert et al., 2019; Al-Jabri & Sohail;2012) .Therefore, conceptualization of behaviour of consumers of banks to intend to adopt fintech could be argued to be explained in various ways. One such depiction is the behavioural intention to adopt fintech services, which is used in this research. This is supported by Senyo & Osabutey, 2020, Alwi et al. (2019) and Hu et al. (2019).

At this point it must be highlighted that the factors influencing the behavioural intention to adopt are found to be many. For instance, the model suggested by Mutahar et al. (2017) suggested that intention to use technology is determined by DOI constructs medicated by perceived ease of use (PEU) and perceived usefulness (PU) while the relationship between perceived ease of use (PEU), perceived usefulness (PU) and intention to adopt technology is moderated by income. Similarly, the model developed by Hanafizadeh et al. (2014) has eight constructs that directly determine intention to use technology which included perceived ease of use (PEU) and perceived usefulness (PU). These examples show that it is possible that the behaviour

of the consumers could be explained by using behavrioural intention to use fintech services as the determined variable with the antecedents varying as per the context in which the research is conducted. Lack of knowledge on how to anticipate behavioural intention of consumers to adopt fintech is a major gap in the literature. Any new knowledge that can address this issue could contribute to the body of knowledge concerning fintech adoption behaviour of consumers of banks. Thus for this research the examination of the behavioural intention of consumers of banks to adopt fintech becomes the final dependent variable and forms the nodal point of this research.

With regard to operationalization of the context of behavioural intention of consumers to adopt fintech services is concerned, literature shows that it has been operationalized varyingly. For instance, Hu et al. (2019) have used the intention to adopt fintech services as the determined construct with a number of antecedents as determinants including perceived ease of use (PEU) and perceived usefulness (PU). While Mutahar et al. (2017) have represented behavioural intention to use mobile as intention use and is the dependent variable with perceived ease of use (PEU) and perceived usefulness (PU) as the antecedents. It is seen that most researchers have used behavioural intention to use technology as the determined variable with different types of antecedents although some have used it as the antecedent to actual usage. For instance, Ozen et al. (2018) have used behavioural intention to accept e-government as the antecedent to use e-government. Similarly, Govender and Sihlali (2014) conceptualized intention to use as the antecedent of actual use in their study on mobile banking adoption among university students. These examples clearly demonstrate that behavioural intention to adopt fintech can be operationalised either as the final determined variable driven by different contextualized antecedents or as the antecedent of actual use of fintech services.

As far as evaluating this construct is concerned, it can be seen that many researchers have used different scales to measure objectively the behavioural intention to adopt technology. Widely used methods to evaluate this construct is the Likert format (Mutahar, 2017; Hanafizadeh et al. 2014; Venkatesh & Davis, 2000; Sun et al., 2014) with multi-choice options provided in the instrument to choose from. There are other studies that have evaluated the construct behavioural intention to adopt or use technology applying the qualitative methods including semi-structured interviews. For instance, Biljon and Renaud (2008) conducted a qualitative study on applicability of technology acceptance models to senior mobile phone users and suggested a more complex model than TAM called the Senior Technology Adoption and Acceptance Model (STAM). Similarly, Singh et al. (2020) investigated the drivers of fintech adoption using a multi-method evaluation while applying TAM and objectively measure behavior intention to use fintech services. These arguments clearly show that evaluation of the concept of behavioural intention to adopt fintech services are based on the specific research question being answered and largely depends on the

context in which the research is conducted. After understanding the various conceptualisations and ways to evaluate the concept of behavioural intention to adopt fintech services, the following sections review the literature regarding the concepts perceived usefulness and perceived ease of use and their relationship to the core issue of behavioural intention of consumers to adopt fintech services.

2.3.2 Perceived Usefulness and its Relationship with Consumer Intention to Adopt Fintech Service

Amongst the three important factors of TAM is the perceived usefulness (PU) of a technology. perceived usefulness of technology measures a consumer's subjective assessment of the utility offered by certain technology (Gefen et al., 2003). Rogers (1983) also refers to usefulness as the level to which a technological innovation payload benefits the person adopting the technology in regard to such things as satisfaction, economic benefits, and increased facilities. Usefulness is the feeling that somebody thinks using specific technology could help him to better the accomplishments of his works (Davis et al, 1989). Raza et al. (2017) argued that perceived usefulness pinpoints the variables which affect the actual use and the intention to continue using a certain technology. Also, according to TAM, perceived usefulness is a key factor of technology followed by perceived ease of use (Igbaria & Iivari, 1995). Both perceived ease of use (PEU) and perceived usefulness (PU) influence the intention to utilize a certain type of technology including fintech services (Arias-Oliva, 2019; Belanche et al., 2019; Hu et al., 2019; Joo, 2016; Kim et al., 2015; Raza et al. 2017; Hanafizadeh et al. 2014). Hence, perceived usefulness is considered to be associated with the consumers or a person who intends to adopt and use a technology. Examples of perceived usefulness of fintech services are provided in Table 2.5

Table 2. 5 Examples of perceived usefulness of fintech services

	Usefulness Theme	**Operational definition**	**Author/s**
Perceived Usefulness (PU)	Convenience of the Channel	Using the services more quickly and efficiently	Wu et al. (2015)
	Accuracy of the Information	Service description and price matching between virtual and physical channels	Choshin and Ghaffari (2017
	Integration of the Information	Consistency between the service descriptions on the physical and virtual channels	Choshin and Ghaffari (2017)
	Professionalism of the Services	Presence of interactive online features online features on the virtual channel, and sales information is consistent with that of the physical channel	Du and Tang (2014)
	Familiarity of the services	Interface and content of the virtual channel are comparable with those of the physical store	Brandt et al. (2011) Dayan and Kromidas (2011)

Source: Cho and Lai (2021, p. 7)

As far as fintech services is concerned, the study of Hu et al. (2019) shows that perceived usefulness of fintech services has been found to have small but statistically significant correlation with the attitude of a person, which in turn is highly statistically significantly correlated to the intention to adopt fintech services. That is to say that perceived usefulness (PU) is indirectly contributing to the intention to adopt fintech services. Similarly, Meyliana et al. (2019) in their study on consumers' adoption of fintech services related to banks in Indonesia found similar results. In the studies conducted by both Hu et al. (2019) and Meyliana et al. (2019) the TAM was not the only theory used but other constructs including trust and perceived risk were used as well. It is significant to note that in both the studies the researchers have not considered the diffusion aspect of fintech services. While fintech is new and is already being adopted in many parts of the world, yet researchers still argue that it is a diffusing technology, an aspect which cannot be ignored in investigations dealing with adoption of fintech services. The reason for this is that unless diffusion is complete it is not easy to know whether the technology has been fully accepted (Yoon & Lim, 2020; Mutahar et al. 2017; Lou & Li 2017; Al-Jabri & Sohail;2012). Thus it is possible to argue that the studies of Hu et al. (2019) and Meyliana et al. (2019) can be considered to be suffering from limitations with regard to the validity of their research outcomes. Similar research outcomes can be seen in the literature which is a major gap in the body of knowledge concerning behavioural intention of consumer of banks to adopt fintech services. Further studies are needed to understand during the diffusion process how perceived usefulness influences behavioural intention of consumers of banks to adopt fintech services.

Another important consideration of employing perceived usefulness is its operationalization. For instance, Yoon and Lim (2020) in their study on factors affecting customers' acceptance of internet-only banks in Korea, perceived usefulness of fintech services has been operationalized as a mediating variable that has a direct and large but statistically significant correlation on the actual use of fintech services. Also, Yoon and Lim (2020) in their study used four DOI constructs as independent variables. This is one of those few studies that has integrated part of TAM and DOI in the context of fintech serivces. However, Hanafizadeh et al. (2014) in their investigation on mobile banking adoption by Iranian bank clients, tested their model using TAM constructs and directly linking to intention to use mobile banking an example of fintech services. The correlation between perceived usefulness and the intention to use mobile banking was found to be is large and statistically significant. These examples clearly show that behavioural intention to adopt fintech can be directly driven by perceived usefulness of fintech services which is a TAM construct.

Furthermore, as far as variables that form antecedents of perceived usefulness, it can be seen that researchers have used a number of them including DOI constructs (Yoon & Lim, 2020; Mutahar et al. 2017) and perceived risk and trust (Meyliana et al. 2019). However, Hu et al. (2019) have used perceived usefulness

as an independent variable driving intention adopt technology indirectly through attitude of the users. In addition, it can be seen that both Yoon & Lim (2020) and Mutahar et al. (2017) did not use all the constructs of DOI. While Mutahar et al. (2017) have used on compatibility, trialability and observability to study their influence on perceived usefulness and intention to use mobile banking. Yoon & Lim (2020) have used relative advantage, complexity, compatibility and trialability are conceptualized as influencing perceived usefulness. These examples could be interpreted in a way that the researchers did not find all the five constructs as essential to build a conceptual model or their study is incomplete in the absence of all the five constructs of DOI as the complete knowledge about the influence of DOI could not be ascertained.

As far as evaluation of perceived usefulness is concerned, it can be seen that perceived usefulness has been widely used as a variable in conceptual models that have used quantitative research methodology and measured using Likert scale (e.g. Chen, 2007; Davis, 1989). In addition, it can be seen that TAM suggests perceived usefulness be operationalized in association with perceived ease of use of technology. Thus the next sections discuss the construct perceived ease of use.

2.3.3 Perceived Ease of Use and its Relationship with Consumer Intention to Adopt Fintech Service

Perceived ease of use (PEU) is a widely used construct in studies that are concerned with behavioural intention to adopt technology including fintech services (e.g. Cho & Lai, 2021; Alwi et al. 2019; Arias-Oliva, 2019; Belanche et al., 2019; Hu et al., 2019; Joo, 2016; Kim et al., 2015). The most widely used definition of perceived ease of use of a technology in the literature is the one given by Davis (1989). Perceived ease of use (PEU) of technology is referred to as the degree to which you expect technology to be free of effort (Davis et al., 1989). Venkatesh and Davis (2000) also refer to perceived ease of use as the level of a person who believes that using a specific technology does not require too much effort and time. Although, literature provides empirical proof on the statistically significant influence of perceived ease of use (PEU) and perceived usefulness (PU) on the behavioral intention of people adopting technology (Meyliana et al. 2019; Stewart and Jujens, 2018; Raza et al. 2017; Mutahar et al. 2017; Chuang et al. 2016; Kim et al. 2015; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010). Yet Hu et al. (2019) and Lee (2018) indicated in their studies that perceived ease of use does not significantly affect the consumers' behavioral intention to adopt fintech services. Despite this contradiction, it is commonly expected that fintech services need to be easy to use and easy to learn to avoid being either not used or underused.

Furthermore, it could be meaningful to say that consumers of bank will be more willing to adopt fintech services if they perceive it to be useful and meet their banking needs. Perceived ease of use is expected to develop positive attitudes of consumers to adopt fintech services (Sek et al. 2010). Thus, when fintech services are easy to use, consumers will be less likely to be reluctant to use fintech services (Koenig-Lewis et al. 2010). Therefore, while commonly it can be thought that the perceived ease of use of fintech services should be an essential component that must characterize fintech services, it is also possible that through the different stages of diffusion of the technology it may be perceived to be complex prior to its acceptance. This could be the reason why in some studies perceived ease of use has not been found to be related to intention to adopt. Thus considering the fact that fintech services is still diffusing, it would be worthwhile to understand its nature and examine its influence on behavioural intention to adopt. Such a study could reveal the actual effect of perceived ease of use on behavioural intention to adopt. Hence this study will investigate the perceived ease of use of fintech on consumer intention to adopt fintech services. Examples of perceived ease of use of fintech services are provided in Table 2.6

Table 2. 6 Examples of perceived ease of use of fintech services

	Ease of use Theme	**Operational definition**	**Author/s**
Perceived ease of use (PEU)	Appearance of the interface	Virtual channel interface meets industry standards	Hernand et al. (2009)
	Interface User-Friendliness	Interface is streaming and easy to use	Davis (1989)
	Stability of the Transfer	The sever response from the virtual channel interface is stable (responses are sent within 10 milliseconds of receiving the signal)	Dayan and Kromidas (2011)
	Security of the Information	Passes ISO 'international standards on quality management' reliability certifications	Choshin and Ghaffari (2017)

Source: Cho and Lai (2021, p. 7)

In addition, in TAM, it has been shown that perceived ease of use is influencing perceived usefulness also. Davis (1989) argued that technology, if it has to be useful, it needs to be driven by perceived ease of use of that technology. However, after critically reviews the literature it can be seen that this is not always the case. Some researchers have used perceived usefulness as an independent variable (e.g. Cho & Lai, 2021; Hanafizabeh et al. 2014) influencing intention to use technology. Thus operationalization of perceived ease of use of fintech services needs to take into account the need for it to influence perceived usefulness of fintech services. by taking the example of Hanafizabeh et al. (2014) into account, there is a possibility to delink perceived ease of use and perceived usefulness. Either way it can be seen that models arguing for the establishing a relationship between perceived ease of use and perceived usefulness, and those that do not link perceived ease of use and perceived usefulness have produced acceptable results. This implies that modifying the original TAM or using TAM as it is, could be an option not something mandatory.

Operationalisation of perceived ease of use of fintech services is very similar to that of perceived usefulness of fintech services. Some researchers have used perceived ease of use as an independent variable that influences intention to use a technology directly (e.g. Alwi et al. 2019; Lee, 2018; Hanafizabeh et al. 2014) or through attitude of the users to adopt fintech services (e.g. Meyliana et al. 2019; Hu et al. 2019). While, other researchers have used perceived ease of use of fintech services as a mediating variable (e.g. Matahar et al. 2017; Munoz-Leiva et al. 2017) indicating antecedents of perceived ease of use can improve the behavioral intention to adopt fintech services. Thus, operationalization of perceived ease of use in the literature varies with regard to the original TAM. This could be interpreted in a way that perception of ease of use of fintech services can influence intention to use in three different ways and it could be a challenge to decide on its operationalization. However, it is possible to choose the operationalization based on the research question under investigation and the way it has been operationalized in similar situations by other researchers.

2.3.4 Integration of Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI)

From the foregoing discussions it can be seen that TAM has been widely used over the last few decades and is still popular amongst researchers. While the operationalization of the constructs of TAM are not uniform amongst researchers, such a situation provides freedom to other research efforts to consider the operationalization of those constructs differently based on the research question being addressed. Since this research is concerned with behavioural intention of consumers of banks to adopt fintech at a stage when fintech is still diffusing, use of the constructs of DOI theory as the antecedents of the two main TAM constructs namely perceived usefulness and perceived ease of use is plausible. This calls for an integration of the TAM and DOI theories and there is evidence found in the extant literature integrating the two theories. Prior to critically reviewing DOI as a theory it is necessary to critically review the integration aspect concerning DOI and TAM models which is expected to provide the justification while a linkage between the constructs of DOI and TAM is discussed later in this research.

Moreover, one of the TAM limitations as identified from the literature is that TAM ignored the social influence on technology adoption. Also, external variables need to be added to the TAM model to provide a more consistent prediction of systems use (Taherdoost and Masrom, 2009; Taherdoost, et al. 2009). While the DOI theory is more focused on the system characteristics, organizational attributes, and environmental aspects (Taherdoost, 2018). Incorporated DOI constructs to the TAM model could overcome this limitation and increase the explanatory power. Another limitation as argued in some papers is that TAM model is more appropriate for individual acceptance of technology rather than in institutional or corporate

application that requires an integration of information technology (Ajibade, 2018). Despite to TAM limitation literature have shown that TAM model is being used in recent research concerning fintech adoption (Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018; Raza et al. 2017; Chuang et al. 2016; Kim et al. 2015).

While DOI aims to explain how technology like fintech can be viewed as an innovation that diffuses amongst a community of people, then applying the TAM model could explain whether consumers of banking services will intend to adopt fintech as a new technological innovation. This is also supported in the literature by Yoon and Lim (2020), Lou and Li (2017), Mutahar et al. (2017), Carter and Be´langer (2005), and Legris et al. (2003), who argued that the parsimonious nature of TAM enables researchers to integrate TAM and DOI. Furthermore, application of DOI and TAM in an integrated manner has been found to attract the attention of researchers and has been recommended in recent literature (e.g. Al-Rahmi et al. 2019; Wang et al. 2019; Min et al. 2018; Ozen et al. 2018) although the outcome of such integration is not free of flaws. For instance, Al-Rahmi et al. (2019) while integrating DOI and TAM to understand the adoption intention of students of e-learning systems studying in the undergraduate and postgraduate programs in Malaysia, argued that additional factors need to be used alongside DOI factors to complete the integration of DOI and TAM. For instance, one of the factors suggested by Al-Rahmi et al. (2019) to be added to DOI factors is the perceived enjoyment that could be used to determine the perceived ease of use and usefulness of e-learning systems alongside the five factors (relative advantage, complexity, compatibility, trialability, and observability) suggested by DOI. This indicates that diffusion of a new technology needs to be explained along with other factors like perceived enjoyment alongside DOI factors. As such other factors could be useful in explaining why people adopt new technology when integrating with TAM. However, this claim may not apply universally as different authors have used different methods to integrate DOI and TAM. For instance, Ozen et al. (2018) have suggested the use of DOI, TPB, TAM, and trust as an independent factor to determine intention to use and actual use of technology. Similarly, Gera and Chen (2003) have relied entirely on DOI and TAM model to propose a new wireless technology diffusion (WITD) model without taking into account any additional factors. Furthermore, Sepasgozar et al. (2019) have integrated TAM and DOI but using social cognitive theory (SCT) to understand the concept of citizen-centric technology in developing smart cities. The result was that Sepasgozar et al. (2019) came up with a new model called Urban Services Technology Acceptance Model (USTAM).

These examples clearly show that integration of TAM and DOI is an established concept that can be used to explain behavioural intention to adopt a new technology or a new invention or innovation. Such integration needs to be carefully based on arguments that are grounded on a solid theoretical basis. Yet,

both DOI and TAM are not free of criticism, it is necessary to note that either of the theories or an integrated version of a theory could still be considered for application in a research that is intending to adopt fintech services as a technology. In the absence of a single theory that could be generalized, any application of an integrated theory of TAM and DOI can have the potential to bring out useful outcomes in this research. After reviewing critically, the concept of integration of DOI and TAM theories, the following sections critically review DOI and factors derived from DOI to understand whether the integration with TAM is theoretically sustainable.

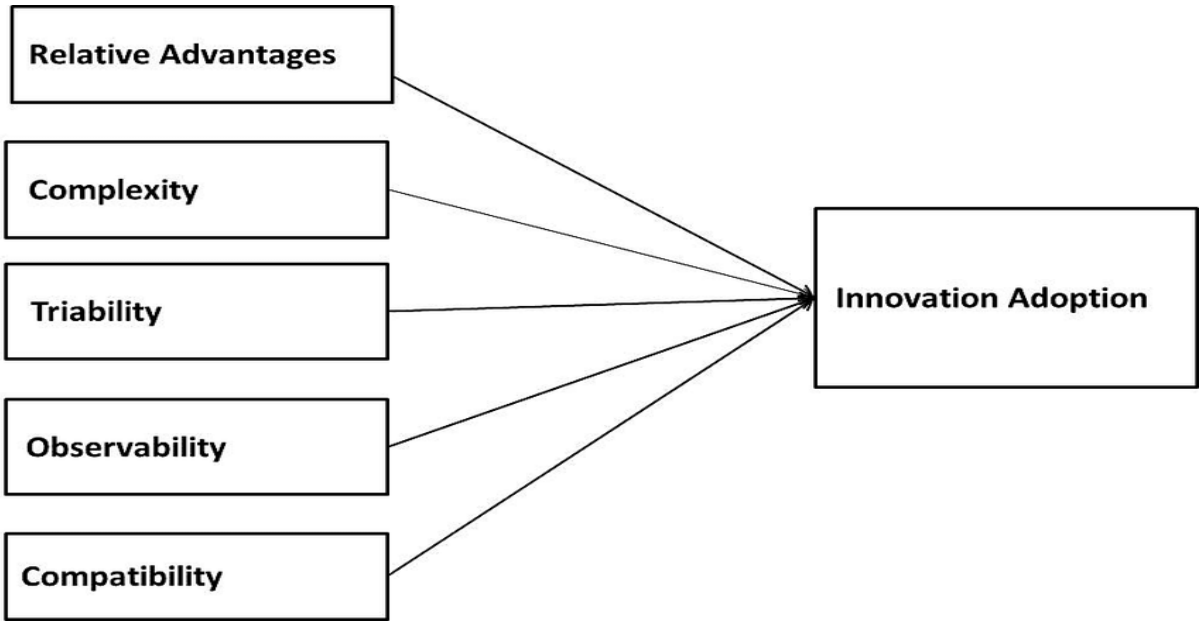
2.4 Diffusion of Innovation (DOI)

The theories related to understanding diffusion of innovation can be traced back to the period between the 1920s and 1930s. The most recognized work in this field was postulated by Everett Rogers of the Diffusion of Innovations (DOI) theory in 1962. Since then this theory has been widely applied in researches related to technology diffusion over the years. Diffusion of Innovation argued that four factors influence the spread of new technology; innovation, communication channel, time, and social system (Sharma & Mishra, 2014). The theory was developed to explain the process of diffusion through which, over a specific time, an innovation; idea, service, or product gains momentum and spreads through a specific social system using certain channels of communication (Sharma & Mishra, 2014). The diffusion of innovation needs to be considered if new technology is invented and introduced (Rogers, 2003). Moreover, innovation itself is considered as an idea, practice, or object that is perceived as new for adoption by a member or unit of the social system (Rogers, 2002). Thus, during the process of diffusion, it is expected that people or consumers (as part of the social system), adopt the new idea, behavior, or product. According to the literature, people who are most likely to adopt an innovation earlier gave different characteristics than people who tend to adopt an innovation later (Seeger & Wilson, 2019; Im et al. 2003). For that reason, it is crucial to understand the characteristics of the target population while promoting innovation.

By applying the definition of innovation as explained by Rogers (1995) to new technology (e.g. fintech), it is possible to identify it as an idea, practice, or object that is perceived as new by a person that would like to adopt fintech services. Similarly, by applying the definition of diffusion as explained by Rogers (1995) to innovation (e.g. fintech services), then it would be presented as the process to which an innovation is communicated via a certain channel or channels over a certain period amongst the members of a social system (e.g. banking sector and the customers both of whom are likely to adopt fintech services through the communication channel that may be created between them). Thus, taking into account the theory of DOI postulated by Rogers (1995) and the definitions of innovation and diffusion, it can be seen that it is possible to apply the theory of DOI to fintech services (Morgan et al. 2019; Micu and Micu, 2016).

Furthermore, fintech services has already be seen to be adopted in practice by organization e.g. banks who have adopted fintech services as a community for conducting their business. At this stage it is interesting to note that the phenomenon of fintech as an innovation appears to be diffusing fast and has been steadily communicated to the banking community as a social system for its adoption. This leads to the conclusion that DOI as a theory is able to explain fintech services and the process of its diffusion as it can be seen that it focuses more on the system characteristics, organization attributes and environmental aspect (Taherdoost, 2018). In addition, Rogers in 1983 defined perceived attributes of users have bearing on the diffusion of the technology and lead to adoption of that technology which is discussed next as it is the basis on which diffusion could be explained.

Figure 2. 2 Diffusion of Innovation Theory



Source: Roger (1983)

A sub-category of the diffusion of innovation theory is the attributes of innovation namely relative advantage, compatibility, complexity, trialability, and observability (Seeger & Wilson, 2019; Stieninger et al. 2017). Rogers (1983) argued that if an innovation has these five constructs it is more likely to succeed and be adopted by users. Therefore, all five attributes of innovation are considered useful in this research and are argued to contribute to the rate of adoption of a technology (Rogers, 1983). However, literature shows that most often researchers do not use all the five attributes in research to explain the adoption intention of fintech services by consumers and outcomes produced by those researchers are not comprehensive or generalizable (e.g. Lin et al. 2019; Lou and Li, 2017; Stieninger et al. 2017; Mutahar et al. 2017). For instance, Lin et al. (2019) apply DOI to the application of fintech services namely mobile payments, did not use all the five constructs (relative advantage, compatibility, complexity, trialability, and observability) to determine the diffusion of innovation of fintech. Only one construct namely compatibility

was used. Similarly, Lou and Li (2017) used only three factors namely relative advantage, compatibility, and complexity to explain the adoption of fintech services. Thus there is a need to understand the proper application of DOI as a theory to fintech as an innovation that can diffuse in multiple contexts and in the presence of different factors that affect fintech. For instance, in the context of banks, fintech services is already adopted by the banks but users are still struggling to come to terms with the technology. A good example would be the mobile applications available for use that may not be safe as there is a possibility of phishing attacks (these attacks are malicious cyber-attacks) that endanger the credentials of users and breach their privacy through the mobile applications which is found to be high (Jain et al. 2020; Goel & Jain, 2018). This could be a serious problem for users of fintech service and could affect the rate of adoption of fintech by consumers of banks.

While DOI found to be useful in research concerning the innovation of technology and its diffusion, literature shows that is suffering from shortcoming. For instance, Rogers (2003), indicates that DOI suffers from pro-innovation bias. Thus, it does not explain the adoption of technology that falls into the category of re-innovation. Also, DOI has been criticized for its limited usefulness in explaining the adoption of innovations that cannot be leaned by using simple modeling, as it is argued that DOI is a behaviorist perspective in which learning through modeling and imitating others happens through a social process and not a critical assessment of practical innovation (Siddiqui and Adams 2013; Greenhalgh, et al. 2005). Further, DOI has been argued to be reducing uncertainty while adopting innovation although one of the constructs namely complexity indicates the adoption of new ideas with a limited of uncertainty (Greenhalgh, et al. 2005). Despite limitations of DOI, researchers have continued to apply DOI in areas related to investigation of the adoption of innovation of technology including fintech services, indicating its wide popularity and utility. Also, the application of DOI to understand the values and general attitudes that influence adoption decisions has not received much attention from researchers (Wang et al., 2008). This left a vacuum in the literature concerning understanding the diffusion of new technological innovations like Fintech (Wang et al., 2008).

Use of DOI in research concerning adoption of fintech service is well documented and a number of articles have been appearing recently in journals (e.g. Yoon & Lim, 2020; Mutahar et al. 2017; Lou & Li, 2017). However as mentioned earlier, the perceived behavioural attributes of an innovation that affect rate of adoption of that innovation is not well understood in the literature with regard to the five attributes of DOI. There appears to be lack of agreement within researchers on why the five attributes of DOI identified by Rogers (1983) may not be influencing the rate of adoption or behavioural intention to adopt an innovation or explaining the different facets of diffusion (Ardis & Marcolin, 2017). This could be the case especially

with fintech services. Some examples of causes of disagreement include (Ardis & Marcolin, 2017) complexity of the technology (e.g. complexity in understanding the working of the technology), need to attach the importance of technological solutions as socially constructed phenomena (e.g. ease of use of the technology), need for learning intensely artefacts (e.g. learning how to use smart phones) and volatility in the arena of diffusion that determine adoption (e.g. changing technologies within short durations). Under these situations it is important that researchers using DOI are careful and consider other aspects than those explained by the DOI theory.

Furthermore, literature shows that there is a need to develop DOl theories at the site that take into account multiple points of analysis. For example, researchers may need to use multi-layered theories (e.g. use of risk and trust theories when dealing with fintech services along with DOI) to explain factors that affect diffusion between various levels of an organization and geographies (Ardis & Marcolin, 2017; Lyytinen & Damsgaard, 2001; Markus & Robey, 1988; Downs & Mohr, 1976). Similarly, the complex, networked, and learning intensive features of technology are aspects that cannot be consistently explained by DOI and need to be recognized when using DOI in research. Table 2.7 shows how different authors have viewed the diffusion of a technology. This shows the diversity in the opinions of available in the literature regarding reasons for adoption intention.

Table 2. 7 Various views of diffusion of a technology

No.	Conjecture of adoption	Author/s
1	Technologies are discrete packages developed by independent and neutral innovators.	(Rogers 1995; Premkumar et al. 1994; Tornatzky & Klei 1982)
2	Technologies diffuse in a homogenous fixed social ether called diffusion arena, which is separate from the innovation locale.	(Mahajan et al. 1990)
3	Diffusion rate is function of push and pull forces	(Thirtle & Ruttan 1987)
4	Push factors include features of technology, and channels of communication.	(Rogres 1995; Mahajan et al. 1990)
5	Pull is determined by adopter's rational choices.	(Rogres 1995)
6	Adoption decisions are dependent on available information, preference functions and adopter's properties.	(Rogres 1995)
7	Diffusion traverses through distinct stages, which exibit little or no feedback.	(Nolan 1979; Nolan 1973; Rogres 1995)
8	Time scales are relatively short and the diffusion history is not important.	(Rogres 1995)

Source: Ardis and Marcolin (2017, p 43)

As far as the factors that define the process of diffusion of a technology is concerned, it can be seen that various authors have derived multiple factors that could be applied to understand diffusion of a technology. Table 2.8 gives an idea about the factors identified by different authors.

Table 2. 8 Factors that affect diffusion of a technology

No.	Factors	Authors
1	1) compatibility; 2) relative advantage; 3) complexity; 4) cost; 5) communicability; 6) divisibility; 7) profitability; 8) social approval; 9) trialability; and 10) observability.	Tomatzky and Klein (I982)
2	1) compatibility, 2) relative advantage, 3) costs, and 4) communicability	Premkumar et al. (I994)
3	1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, 5) observability; and 6) risk.	Hai (1998)

The differences amongst researchers in regard to the number of factors that can contribute to diffusion provided in Table 2.8 shows that the factors identified by Rogers (1995) are not the only set of factors that could affect diffusion of a technology but there could be more. However, one unique feature that is applicable to the various set of factors identified as affecting diffusion of technology by different researchers is that there is a common set of factors that could be derived as affecting diffusion. For instance, the factors relative advantage, compatibility, complexity, trialability and observability are common to the findings of Tomatzky and Klein (I982), Rogers (1995) and Hai (1998). As far as the findings of Premkumar et al. (I994) are concerned only compatibility and relative advantage were found to be common with the findings of other researchers. It must be noted here that Rogers' (1995) model is one of the most widely used models in the literature concerning the diffusion of technology and adoption intention (Yoon & Lim, 2020; Al-Rahmi et al. 2019; Zhang et al. 2015) Additionally it can be seen that the factors identified by Rogers (1995) (relative advantage, compatibility, complexity, trialability and observability) are part of the findings of other researchers (Tomatzky and Klein, I982; Hai,1998), it is reasonable to conclude that the factors identified by Rogers (1995) could be used in an efficient way to address the issues of diffusion of fintech services and the behavioural intention of consumers of banks to adopt fintech services. Thus converging on the factors identified by Rogers (1995) the following sections review critically the concepts of relative advantage, compatibility, complexity, trialability and observability identified in the DOI model.

2.4.1 Relative Advantage and its Relationship with perceived usefulness, perceived ease of use and the Consumer Intention to Adopt Fintech Service

Relative advantage is defined as "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 1983; p. 15). In this study, the relative advantage refers to using fintech services as an innovation and its perception amongst users as being better than traditional banking methods. Relative Advantage signifies the differences in regard to economic benefits, increased efficiency, and enhanced status offered by a new technology or innovation in comparison to the existing one (Rogers, 1995). Thus, when a researcher uses relative advantage as a factor to assess the extent to which fintech services has diffused then the diffusion needs to be related to the extent to which the user and the service provider derive

economic benefits, improved efficiency and enhanced status in using fintech services (Ashurov & Othman, 2019). It can be interpreted that if the new innovation does not offer any economic benefit or increased efficiency and enhanced status, then the new innovation could not be adopted by people. Researchers have indicated that in determining the adoption of new technology innovations, relative advantage is seen to be an important factor (Hutahaean et al. 2019; Tornatzky & Katherine, 1982). Several studies also consistently found that the relative advantage positively affected the consumers' behavioral intention to adopt a certain type of technology across different participants (Shatta et al. 2020; Lou & Li, 2017; Lawson-Body et al. 2014; Carter & Campbell, 2011).

Lou and Li (2017) argue in his research that in TAM and DOI, the relationships among relative advantage, perceived usefulness (PU), and perceived ease of use (PEU) has seldom been studied. Furthermore, in the literature there are arguments that point out that relative advantage is similar to perceived usefulness (Hubert et al. 2019; Mutahar et al. 2017; Wang et al. 2008; Venkatesh et al. 2003) which implies that in a research concerning integration of TAM and DOI, using both relative advantage and perceived usefulness in one model could be duplicating the constructs without any purpose. In fact, Lee et al. (2011) and Zhou (2008) argue that relative advantage and perceived usefulness have shown high correlation indicating that the two constructs are same. This argument is countered by Wang et al. (2008). According to Wang et al. (2008) considering relative advantage of a technology as identical to perceived usefulness of that technology. For instance, fintech services, could be a concern when explaining and predicting the adoption in situations where alternative is available, such as traditional banking. The reason is that the fintech services could be perceived to be useful but in the presence of a traditional banking. Wang et al. (2008) vehemently argue that relative advantage and perceived usefulness need to be therefore separately dealt with and distinguished.

Another important aspect of relative advantage is its operationalization which is varied. Researchers have used relative advantage as an independent variable (Yoon & Lim, 2020; Jin et al. 2019) and mediating variable (Wang et al. 2008). In addition, relative advantage has been conceptualized to influence perceived usefulness by some researchers (e.g. Yoon & Lim, 2020), perceived usefulness and perceived ease of use by some others (e.g. Min et al. 2018), attitude of the users (e.g. Shatta et al. 2020; Shiau et al. 2018) by some others and intention to adopt (e.g. Shatta et al. 2020; Carter & Campbell, 2011; Wang et al. 2008) directly by a few others. Under these circumstances operationalizing relative advantage in a model that is using both DOI constructs as determinants of intention to adopt represented in TAM becomes a matter concerning the context. Considering the fact that fintech services are still diffusing and, it is reasonable to assume that relative advantage, perceived usefulness and perceived ease of use can be linked to understand its effects on behavioural intention to adopt fintech services. This is an important gap in the literature which makes the knowledge related to linking relative advantage of fintech services to TAM constructs

incomplete. As far as evaluation of relative advantage as a construct is concerned, it can be seen that almost all the researchers have used it as a quantity that could be measured empirically by a set of items on a Likert scale (e.g. Yoon & Lim, 2020; Mutuku, 2019; Min et al. 2018; Siddik et al. 2014; Moore & Benbasat, 1991).

The discussions show that relative advantage as a factor that contributes to the diffusion of fintech services, can be manipulated to alter the rate of adoption of fintech services by making the advantage of using fintech services relatively higher than traditional banking. For instance, fintech services could improve the efficiency and productivity of consumers of banks to be higher when compared to traditional banking methods. Thus, in this research, the application of relative advantage as a factor driving the diffusion of fintech services gains currency. However, it must be mentioned that relative advantage is only one of the five factors that have been identified by DOI theory as driving diffusion of a technology. Thus after reviewing the various aspects concerning the application of relative advantage of fintech services critically the following discussions focus on the next DOI construct namely complexity of fintech services and its role in the diffusion of fintech and behavioural adoption to fintech or rate of adoption of fintech.

2.4.2 Complexity and its Relationship with perceived usefulness, perceived ease of use and the Consumer Intention to Adopt Fintech Service

Complexity is the degree to which an innovation is perceived as difficult to understand and use (Rogers, 2002; p. 990). Complexity in using fintech services is described as the perceived difficulty of learning to use and understand technology (Sonnenwald et al. 2001). Previous empirical studies indicated that complexity had a significant effect on the intention of the user to adopt a certain technology (Lou & Li, 2017). If an innovation is complex then it would require substantial technical skills and greater implementation and operational effort to increase its chances of adoption (Cooper and Zmud, 1990; Dickerson and Gentry, 1983). For example, fintech services could be felt to be complex by many users as those users may perceive face to face interaction to be more convenient then transacting money online. (Cao et al. 2020). Such complexities could have a negative impact on the consumers of banking services.

As far as diffusion of innovation (fintech) is concerned, from the definition of complexity it could be argued that it can either accelerate some projects or decelerate those projects depending on the complexity perceived by the consumers. Especially in research concerning the integration of TAM and DOI theories, complexity of fintech services could impact the TAM constructs perceived ease of use and perceived usefulness. For example, Min et al. (2018) in their study on Uber mobile applications that involve transfer of money, found that complexity inversely affects perceived use of use and perceived usefulness of those mobile applications. Thus, it can be seen that complexity as a construct can either enable a faster diffusion or a slower diffusion of fintech services, depending on how complex fintech services is perceived to be by

the users. However, there is only a limited number of studies that have considered investigating the influence of complexity on the consumers' behavior intention to adopt fintech services (Yoon and Lim, 2020; Lou & Li, 2017; Siddik et al. 2014). Lack of adequate studies on complexity of fintech services has produced limited knowledge on how complexity of fintech services can affect behavioural intention to adopt fintech and the consequent difficulty in predicting how complexity influences the behavioural intention to adopt (Yoon and Lim, 2020; Lou & Li, 2017).

Furthermore, in research concerning the investigation of behavioural intention of users to adopt fintech, where combination of TAM and DOI is contemplated, it can be seen that complexity has been identified as a construct with multiple representations. For instance, while Mutahar et al. (2017) argued that complexity is understood to be complexity is an inverse factor of the perceived ease of use construct hence in one model use of complexity alongside perceived ease of use could be a redundant exercise. This argument is supported Hubert et al. (2018) Moore and Benbasat (1991). However, Min et al. (2018) have used complexity as an antecedent of perceived ease of use and usefulness in one model and have argued that complexity distinguishes itself from both perceived ease of use and perceived usefulness of a technology. This argument is supported by Wang et al. (2008). These arguments are contradictory in nature and no clear conclusion could be drawn from the outcomes of the research conducted so far with regard to the conceptualization of complexity. However, what is clearly known is that Rogers (2002) argues that complexity is a factor that drives diffusion of an innovation and the subsequent adoption of the innovation. This is confirmed by some researchers who have used Rogers' (2002) argument to establish an empirical relationship between complexity and intention to adopt an innovation (e.g. Al-rahimi, 2019; Min et al. 2018) in conjunction with TAM constructs perceived ease of use and perceived usefulness.

In practical terms it can be seen that fintech services could be complex due to built-in technologies like artificial intelligence. Hence, consumers could find it difficult to adapt the facilities offered by fintech services. While, transacting through fintech services for such aspects as transfer of money or updating individual information, artificial intelligence could provide prompts not familiar to users on the screens. Such unfamiliar prompts could unintentionally make the consumers to commit mistakes that may not sometime be retractable. This could create a complex situation that could make the consumer abandon fintech services. In another it can be seen that hacking mobile applications can make the users lose money from their account. These complex situations can make the consumers perceive of fintech services to be less easy to use or useful. However, despite such exceptional situations, it is possible that consumers are rely upon the relative advantage of fintech and continue to use fintech services, a phenomenon that can practically be witnessed in everyday life. This contradiction makes it difficult to understand the adoption behaviour of users of fintech services and predictability of intention to adopt fintech services extremely difficult. Thus, this study will investigate the expectation that is expected to work with perceived ease of

use and perceived usefulness towards the adoption of fintech services.

As far as operationalization of complexity of fintech services is concerned, it can be seen that this construct has been varyingly conceptualized. Some researchers have used complexity as independent variables influencing the TAM constructs perceived ease of use and usefulness negatively (Min et al. 2018), while some others have totally avoided using it in favour of perceived ease of use (Hubert et al. 2018; Matahar et al. 2017). Furthermore, in the knowledge of the researcher there is a lack of understanding on how complexity operates and influences TAM constructs, during the process of diffusion of fintech services. new knowledge created concerning this issue can enable a way to maneuver complexity of fintech services to enhance perceived ease of use and perceived usefulness of fintech services and the behavioural intention to use fintech services. This is a gap in the literature.

As far as evaluation of complexity of an innovation like fintech services is concerned, different scales are found in the extant literature including the widely used scale developed by Rogers (2003). There are other scales are also available like the one developed by Sonnenwald et al. (2001). Notwithstanding these examples, it can be seen that complexity of an innovation has been measured largely objectively only using Likert scale measurement. Although hardly any specific example of measuring complexity of fintech services does not appear in the fintech literature, the examples available in the literature related to complexity used in other domains of research are promising for adoption in fintech research. After discussing the second DOI construct affecting the diffusion of fintech services, the following section critically reviews the literature concerning the third DOI construct namely compatibility of fintech.

2.4.3 Compatibility and its Relationship with perceived usefulness, perceived ease of use and the Consumer Intention to Adopt Fintech Service

Rogers (2002; p.990) defines compatibility as “the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters” during diffusion. Extant literature related to diffusion of innovation shows that compatibility indicates the level of consumers' belief that the specific technology is compatible with their opinions, ways of living, and action (Raza et al. 2017; Hernandez & Mazzon, 2006). In practical terms it is possible to explain compatibility through an example. In which, a consumer of a bank could feel that fintech services are compatible if that consumer is able to derive the same set of values derived from traditional banking, can match the past experience of that consumer concerning banking transactions and meet the consumer’s needs like efficiency in operation and safe to operate. Examples of lack of compatibility between information technology artefacts have been identified in the relevant literature in regard to fintech services (Thota et al. 2019) which could delay the diffusion of fintech and eventual adoption.

Various researchers have noted that compatibility is one of the factors that significantly affects the adoption of fintech services (Raza et al. 2017; Hanafizadeh et al. 2014; Chen, 2013; Koenig-Lewis et al. 2010). Moreover, literature reveals that more than two-thirds of financial transaction services fail due to non-ubiquity in the traditional channels which is overcome by the wireless of fintech service (Hourahine & Howard, 2004). Wu and Wang (2005) reported that customers need a high compatibility while transacting through online banking indicating that chances of a certain technology to be adopted could increase if it is compatible with the users' requirements. Thus, when the channel of communication between the bank and its consumers is not compatible with the consumers' needs, then the bank is more likely to fail in offering services that could lead to consumer's avoidance. Agarwal and Prasad (1999) asserted that a positive relationship exists between consumer's previous compatible experiences and the adoption of new technology. Moreover, Agarwal and Prasad (1999) found that the extent of the experience with similar technologies was positively associated with an ease of use belief about the innovation or new technology.

As a DOI factor compatibility appears to be a major challenge to users. Usually witnessed incompatibility in technology artefacts in use amongst consumers include variation in the function of end user devices that are used to access fintech services (e.g. use of android vs I-phone) and incompatibility with changing technology (e.g. changing versions of operating systems incompatible to a particular type of end user device like mobile phones and laptops). These challenges could force consumers to delay adopting fintech services which would affect the diffusion of fintech services. In addition, in fintech services research concerned with the combination of DOI and TAM, compatibility is usually argued to be linked to TAM constructs perceived usefulness and perceived ease of use and intention to use (e.g. Hardgrave et al. 2003). This implies that fintech services should be perceived to be useful and easy to use before consumers intend to adopt for it to diffuse fully and be adopted by the consumers. Incompatibilities could be seen in certain section of consumers who are not well versed with technical aspects like using mobile applications or new technologies like artificial intelligence, which will make the consumers to perceive fintech services to be less useful and not easy to use. Lack of understanding of compatibility as a construct that can influence TAM constructs as antecedents with regard to fintech services with a view from multiple customer perspective has the potential to seriously affect consumers and their intention to adopt. This is an important gap that needs to be addressed to improve adoption of fintech services.

Furthermore, operationalization of compatibility of fintech services in the literature is seen to be inconsistent with different researchers choosing their own ways of splitting the DOI and TAM theories arbitrarily and using in empirical models. This has given rise to confusion on how to understand the operation of compatibility of fintech services and manipulate it to ensure improved intention to use and adopt fintech services. For instance, Lou and Li (2018) have suggested that compatibility of fintech services must be linked to perceived ease of use and perceived usefulness directly and intention to adopt fintech

services indirectly. Also, Matahar (2017) depicted compatibility of fintech services as indirectly affecting the intention to adopt fintech services but directly perceived ease of use and perceived usefulness in the literature. While, Hanafizadeh et al. (2014) have linked compatibility of fintech services directly to intention to use mobile banking. Moreover, Yoon and Lim (2020) in their study have directly linked compatibility of fintech services to perceived usefulness only and not perceived ease of use before predicting intention to use fintech services indirectly.

Furthermore, literature shows that compatibility has been investigated previously from different perspectives and results show that compatibility impacts perceived ease of use and perceived usefulness, and the intention to adopt (Hardgrave et al. 2003). For instance, Marcus (2016) and Koenig-Lewis et al. (2010) in their studies, found that perceived ease of use and perceived usefulness were influenced by compatibility significantly. Thus, consumers who could feel that fintech services are compatible with their needs are in a better position to evaluate its usefulness and are expected to find it easier to use. As far as the use of compatibility in empirical studies it can be seen that it is almost always used as part of a conceptual model in quantitative studies. Thus measuring it using survey questionnaires and Likert scales (Mutahar et al. 2017; Zolkepli & Kamarulzaman, 2015; Hanafizadeh et al. 2014; Moore & Benbasat, 1991). There is hardly any study has been found in the literature that has studied compatibility through qualitative studies. Further to critically reviewing compatibility of fintech services the following sections review the next DOI construct trialability of fintech services.

2.4.4 Trialability and its Relationship with perceived usefulness, perceived ease of use and the Consumer Intention to Adopt Fintech Service

Rogers (2002; p. 990) defined trialability as "the degree to which an innovation may be experimented with on a limited basis". Products and services which can be tested before their full implementation are normally accepted and used faster than those that cannot be tested (Rogers, 2003). Thus, it can be interpreted that consumers need to try and test a new service or product to fully understand its usefulness and ease of use and whether new service or product meets their needs or not. Furthermore, from Rogers' (2002) definition of trialability, it can be argued that consumers are more likely to accept and adopt an innovational technology if they can test it to perceive its benefits and see how easy it is to use and therefore develop a positive intention to adopt it. Moreover, Chen (2013), indicated in his research that trialability is positively associated with the intention adoption rate. There is some evidence in the literature that shows that studies that have investigated the relationship between trialability and intention to adopt new technology have been empirically tested and found that trialability had a positive effect on the intention to adopt new technology (Brown et al. 2003; Moore & Benbasat, 1991). Yet, only limited research has been conducted to investigate the relationship between trialability and behavioral intentions to adopt fintech services (Mutahar et al. 2017) which is a lacuna in the literature. An important aspect of trialability is that, when technology is new and

diffusing, this technology may not be trialable by the consumers, as that technology may not be accessible to those consumers. In the absence of a method to try out the new technology, either the consumer needs to wait patiently until it is accessible for trying it out or need to take the help of others who have access to it. In both situations, the new technology may not be fully diffused, hence adopted by those consumers.

Furthermore, when one considers the integration of TAM and DOI during the process of diffusion of a technology, it can be seen in the literature that less attention has been paid by researchers to trialability of a technology (Min et al. 2018; Lou & Li, 2017). In the literature it is argued that trialability is likely to affect intention to adopt a technology if only a person did not have any experience of prior adoption of a technology in the past (Min et al. 2018). This implies that fintech services being a technology that has been built over information and communication technology (ICT), if a person has adopted internet, then in every likelihood that person could adopt fintech services without trying it out. In addition, Moore and Benbasat (1991) did not find a statistically significant relationship between testing of an innovation and its adoption with regard to trialability in the context of the corporate sector. Similar arguments have been espoused by Akturan and Tezcan (2012) who found that there is no statistically significant relationship between trialability and adoption of an innovation.

The contradiction arises from the fact that literature shows that trialability as an independent variable affecting diffusion of technology is not having a statistically significant relationship with behavioral intention to adopt fintech service(Akturan & Tezcan, 2012; Moore & Benbasat, 1991). While people in practical life are shown to be concerned with trialability. In the everyday banking business, it can be seen that the customer service support unit at banks is being swarmed by consumers asking for a walk-through session and an actual hands-on trial of the fintech services applications before they adopt the fintech application. The reasons for this contradictory phenomenon are not explained in the literature. Which is a gap in the literature.

There is no clarity on the concept of trialability although Hubert et al. (2018) argue that users of technology in their private use are greatly concerned about trialability of an innovation. These contradictory arguments clearly cause confusion as results of prior research neither confirm whether it is necessary to use trialability in any research concerning diffusion of an innovation or this construct could be left out. This is a gap in the literature.

Assuming that trialability is essential in research concerning diffusion of an innovation, literature is again not showing consistent operationalization of trialability. For instance, Mutahar (2017) has combined DOI and TAM theories and has used trialability as a predictor of intention to use mobile banking mediated by perceived ease of use and perceived usefulness of mobile banking, a conceptualization that can be seen in the research outcomes of Hubert et al. (2018). However, Yoon and Lim (2020) have conceptualized

trialability as influencing only perceived usefulness and enjoyment and not perceived ease of use while predicting intention to use in their investigation on internet banking in Korea. Similarly, Shiau et al. (2018) who conceptualized trialability as affecting perceived attitude of users in their investigation on innovation diffusion of the open street map in STEM education. Thus, while it can be seen that trialability is varyingly conceptualized and operationalized in the literature it is difficult to anticipate which of the configurations found in the literature is most suitable to be considered for use in empirical research investigating diffusion of an innovation like fintech.

As far as evaluation of trialability is concerned it can be seen that it is widely used by researchers involved in diffusion of innovation research, in conceptual models that have been tested using quantitative research methodology using Likert scale based instruments. Measuring using a Likert scale appears to have become the norm. Thus, in the absence of a contrary view, it is perhaps worthwhile to follow the researchers who have measured it using survey questionnaire and multi-point Likert scale in research that is concerned with DOI and TAM. Widely used scales for measuring trialability can be found in the research efforts of Brown et al. (2003) and Moore and Benbasat (1991). After discussing the concept trialability as part of this review the next section dwells on the final concept of observability of fintech.

2.4.5 Observability and its Relationship with perceived usefulness, perceived ease of use and the Consumer Intention to Adopt Fintech Service

Rogers (2002; p. 990) defined observability as "the degree to which the results of an innovation are visible to others". Consumers need knowledge about fintech services and its benefits to facilitate its adoption. Therefore, when a consumer's friend (e.g. one of whom is a user of fintech services) talks about the use of particular fintech services, a potential consumer may have a positive intention towards adopting this service. Consequently, their perception of this critical factor would likely lead to a more positive intention to adopt fintech services. In line with previous studies that have combined TAM and DOI and used observability as a factor, it can be argued that when a consumer observes a technology or innovation by seeing at the working of that technology e.g. through visual or audio-visual medium, it is possible that consumers perceive that the technology is more useful and easier to use (Zolkepli and Kamarulzaman, 2015; Park and Chen, 2007). As far as fintech services is concerned, an example of observability can be explained by the fact that consumers start an application of fintech services provided by a bank when they see others, such as their friends, relatives, or someone known to them using those services. Literature says that consumers are more likely to adopt innovations or new technology when their effects or benefits could be seen by others (Min et al. 2018). In addition, literature shows that there is only a limited number of studies that have been considered investigating the influence of observability on the consumers' behavior intention to adopt fintech services (Lou and Li, 2017; Mutahar et al. 2017) which clearly points out to the existence of a problem. Observability has not been used widely in research when an innovation or invention or new

technology is diffusing due to the fact that the degree to which an innovation is visible to a consumer could be difficult to determine. Actually, Moore & Benbasat (1991) in their research divided the original construct of observability into result demonstrability and visibility, which indicates the complexity associated with the concept of observability. Unfortunately, not much of research has been conducted to remove the complexity surrounding observability which is echoed in the literature (Siddik et al. 2014). Thus it is possible to conclude that more research is needed to understand observability as a construct that affects diffusion of an innovation or new technology including fintech services. This is a gap in the literature, as lack of complete knowledge about observability of an innovation could be an obstacle to understand the complete diffusion of fintech services and its influence on adoption of fintech services mediated by perceived ease of use and perceived usefulness.

As far as actual examples of the use of observability it can be seen that it has become common now to witness banks requesting the consumers to download their new mobile applications. This has enabled easy access to their account and saved time usually spent on lengthy procedures to be followed using online applications of those banks that require computers. This example provides an opportunity to see or observe fintech services in actual operation by the consumers who have not started to use fintech. However, by just observing fintech services in operation, consumers of banks may not be satisfied. Those customers may need to physically observe the operation either though visual media or audio-visual media which could improve their intention to adopt fintech services by perceiving the ease of use and usefulness. This is usually absent and there is a lack of such facilities through which consumers could be made to observe the entire application through a visual medium. Fintech services being a technology based application linked to financial operations, it is usually not possible to observe how others use fintech services or learn by operating the applications with the help of others as factors like password, username, authentication, accessibility and transacting actual business are strictly individualistic in nature. In such a situation predicting the consumer intention to adopt fintech services through observability becomes a challenging issue. This area is not a well-researched area and is a gap in the literature.

As far as operationalization of the construct, it can be seen from the extant literature that observability is used widely as an independent variable influencing different factors. For instance, Al-Jabri and Sohail (2012) have used observability as an independent variable affecting intention adopt mobile banking in Saudi Arabia. Matahar et al. (2017) and Min et al. (2018) have used observability as an independent variable that affects the intention to use indirectly but through different mediating variables. While Matahar et al. (2017) have used TAM constructs perceived ease of use and perceived usefulness, Min et al. (2018) have used three constructs from TAM namely perceived ease of use, perceived usefulness and attitude to use. Moreover, It can be seen that there is hardly any research that has conceptualized observability differently other than using it as an independent variable in diffusion of innovation research. Thus, considering the fact

that almost all the researchers have used observability as an independent variable, it is perhaps worthwhile use observability as an independent variable while investigating the phenomenon of diffusion of fintech services that is aiming to integrate DOI and TAM in understanding diffusion of innovation and intention to adopt fintech services.

As far as evaluation of observability is concerned it can be seen that observability as a DOI factor is widely measured using a Likert scale. For instance, Zolkepli and Kamarulzaman (2015) and others (Huang et al. 2020; Mutahar et al. 2017; Rogers, 2010; Park & Chen, 2007) have measured observability using the Likert scale in their surveys. There are others (e.g. Huang et al. 2020; Mutahar et al. 2017; Rogers, 2010) who have measured observability using Likert scale in their surveys. Those scales have been validated by those researchers which is pointing towards the possibility of adapting those survey research instruments measuring observability in other research. Further to critically reviewing the five constructs that could explain the phenomenon of diffusion of fintech services and the relationship between the DOI and TAM constructs, this review proceeds to review the concepts of trust and risk that need to be critically reviewed as those constructs have been argued to be important to be considered in research concerning the adoption of innovations concerning banking.

2.5 Concept of Trust

The concept of trust is complicated (e.g. depends on the moral beliefs of the trustor and trustee which cannot be easily understood), multidimensional (e.g. trustor's confidence and trustee's ability to complete a given task) and is a unidimensional (e.g. trustor trusts the trustee) concept (Malle & Ullman, 2021; Moody et al. 2017). Trust, distrust and ambivalence are conceptualizations of trust that are coexisting but explanations on how it exists, particularly with regard to online relationships is absent in the literature, an argument echoed by Malle and Ullman (2021). Furthermore, Liébana-Cabanillas et al., (2014) explain trust as the willingness of a consumer that follows a specific behavioural pattern and such trust could determine the success rate of acceptance of a certain type of technology. Muñoz-Leiva, et al., (2017) explain trust in the context of innovational distribution as the expectation that other individuals or companies whom on interactions with or someone having a dependence will not take undue advantage of that dependence upon them. Thus, it can be seen that trust is defined in various ways by researchers and how to conceive trust, it depends on many aspects including the trustor, trustee, context, acceptance of technology, expectation, ambivalence, absence of exploitation of dependence of the trustor on trustee and moral beliefs. Trust as a definition that applied to a specific research depends entirely on the researcher and the context of the research. In this research concerning fintech services, it can be seen that online relationships are the central issues and trust, distrust, ambivalence, morality and expectations are all important. Although, literature is silent on how it coexists.

Further, trust has been identified in the literature as an interdisciplinary concept that has been studied by

scholars in many fields including management, organizational and sociology. Trust has been considered as an important concept concerning consumer adoption of technology (Hu et al. 2019; Mcknight and Chervany, 2001; Lee and Turban, 2001; Lewis and Weigert, 1985). Example of multidisciplinary character of trust can be seen in the research conducted by Hu et al. (2019) who investigated fintech services adoption which relates behavioural management. Multidisciplinary character of trust makes trust a complex concept to understand. As if trust is understood in the context of discipline, its perception in the other discipline could give a different understanding. For instance, Banks provides mobile applications as fintech services for easier transactions to be conducted by consumers. Here the banks trust that management of consumer activities will be safe, sound and free of manual intervention which in turn is expected to increase operational efficiency and productivity. However, when viewed from the behavioural aspects of the consumer, the view of the consumers could be one of distrust based on threats and vulnerabilities that could be associated with the online transactions. These contradictory views present a challenge to address the concept of trust in research involving interdisciplinary aspects.

2.5.1 Relationship between trust and consumer intention to adopt fintech services

Further, with regard to the technologies that have been developed based on internet operations, the generation of trust has been considered a decisive factor in stimulating services provided over the internet (Meyliana et al. 2019; Hu et al. 2019; Muñoz-Leiva, et al. 2017; Stewart and Jujens, 2018; Hanafizadeh et al. 2014). This is because, in the absence of practical guarantee, users cannot be certain that the service provider or other parties will not resort to undesirable activities, such as unauthorized use of credit card information, violation of privacy, conducting an unauthorized transaction (Harper et al. 2021; Chen, 2013; Kim, et al. 2009). At the same time, it must be understood that developing trust through trustworthy stimulation of services is a major challenge. There appears to be a vacuum in the literature with researchers unable to anticipate successfully the generation of trust through stimulation of services. In this situation of lack of appropriate studies that could address consumers' concern about trust arising due to such aspects as security and privacy (Harper et al. 2021; Senyo & Osabutey, 2020 Hanafizadeh et al.,2014; Chen, 2013; Kim, et al. 2009) that are linked to the concept of trust is an important gap in the literature.

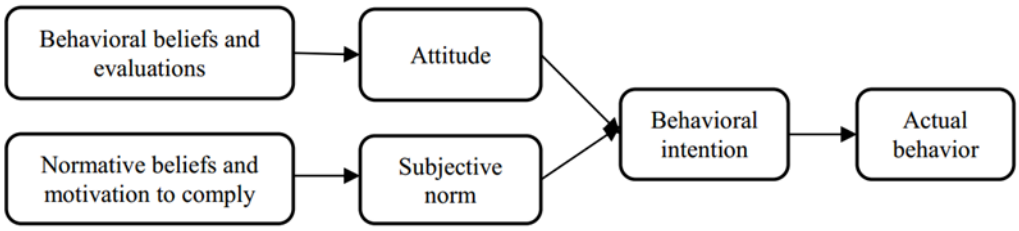
In regard to adoption of technology, researchers have highlighted the inseparability of trust and risk (Senyo & Osabutey, 2020; Hu et al. 2019; Meyliana et al. 2019). Thus, if a user is not confident of using fintech applications on mobile phones trust may not be generated in the user to adopt fintech. Similarly, if a user does not feel that the fintech operation through mobile applications is not reliable, then trust may not be generated in the mind of the user. These are usual happenings that are seen in everyday life and researchers are cognizant of it (Senyo & Osabutey, 2020; Hu et al. 2019; Meyliana et al. 2019). As far as the theoretical base is concerned, it can be seen that there are a few theories that could be applied to explain the phenomenon of trust. This is discussed next.

2.5.2 Theory Supporting Consumers Trust

As explained in the previous sections, trust as a factor that could leads to the acceptance of new technology, many theories are found to be used as an application of trust in the literature. For instance, Technology Acceptance Model (TAM), theory of Planned Behavior (TPB), Unified Theory of Acceptance and Use of Technology (UTAUT) and Theory of Reasoned Action (TRA) are some of the theories that can be applied to explain the concept of acceptance of technology. However, with regard to explaining the acceptance as a form of trust, TRA appears to be the most suitable of the available acceptance theories, as other theories do not provide the basis to explain trust. For instance, although literature shows that TAM constructs could be used with trust (e.g. Meyliana et al. 2019), such conceptualisations treat trust as the driver of acceptance of technology through perceived ease of use and perceived usefulness. However, such coneptualisations do not explain how trust as a factor can be made as an independent factor when trust itself is dependent on other factors like risk. For instance, Senyo and Osabutey (2020) and Kawaja and Zaman (2020) have argued that risk drives trust and hence trust needs to use in association with risk and not in a stand-alone fashion while investigating the adoption of new technology. Similar arguments can be made with regard to the use of UTAUT and TPB. UTAUT and TPB are variants of TRA and hence use of TRA which is a more basic model to explain trust as part this research, concerned with behavioral intention to adopt fintech can be justified. While there are other theories found in the extant literature including Commitment-Trust Theory (Morgan & Hunt, 1994), Trust Transfer Theory (Lu et al., 2010; Lim et al., 2006), and Attribution Theory (Kelley, 1973), empirically it is the technology acceptance or intention to accept theories like TAM, TPB, TRA and UTAUT that have been applied to conceptualize trust.

According to TRA, actual behavior can be anticipated through three main cognitive components, attitude subjective norms, and intentions. Furthermore, TRA explained that attitudes, as a person's positive or negative (unfavourableness or favourableness) feelings about preforming the target behavior. While, the theory defined subject norms (social influence) as a concept which depends on person's perception that most people who are considered important to that person (e.g., parents, friends, teachers) feel that the person should or should not preformed the behavior in question (Ajzen & Fishbein 1980). Ajzen and Fishbein (1980) articulated this concept first by explaining intentions as a person's decision to do or don't do a certain behavior. Besides, the theory says that behavioral beliefs are likely to influence attitude while normative beliefs influence subjective norm. An example of positive subjective norms could be when a consumer has a positive subject norm of buying organic foods, the consumer will be more likely to have the intention of buying organic foods (Marija et al. 2015; Chen, 2007).

Figure 2. 3 Theory of Reasoned Action



Source: Fishbein and Ajzen (1975, p.16)

The Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein 1980 in social psychology discipline, is one of the most widely used models to explain the role of users' trust in technology (Hallikainen & Laukkanen, 2018; Teo & Liu, 2007). According to Teo and Liu (2007) trust signifies an individual's beliefs and confidence, and as a result the individual's behavior could be determined by it (Teo & Liu, 2007). For example, in the case of behavioural intention of consumers of banks to adopt fintech services, it is the belief of the customer that the concept is useful, acceptable, as well as the confidence of the consumer to successfully employ it for banking transactions that would generate trust in the customer. This argument could be applied to explain why trust can influence adoption of fintech services. Examples of use of TRA in technology adoption can be seen in investigation of an individual's IT usage by researchers (Taherdoost, 2018; Kuo, et al. 2015). There are other examples of using TRA in intention to adopt technology research.

Moreover, literature shows that TRA has been used in research concerning technology acceptance to determine the behavioural intention of people in adopting the technology. For instance, Jian et al., (2017) used the concept of TRA in understanding trust and perceived usefulness in the consumer acceptance of e-services. Also, Lin et al. (2014) applied TRA in studying the evolution of consumer trust in mobile commerce. The application of TRA to fintech services adoption has been in the research efforts of Lishomwa and Phiri (2020) and Yousafzai (2010). Taking the support of the research outcome of Lishomwa and Phiri (2020) and Yousafzai (2010) it can be argued that the TRA can be applied to explain the concept of fintech services. However, the usefulness of TRA is limited since TRA does not specify practical behavioral beliefs that could affect an attitude (Jian et al., 2017; Bhattacherjee & Lin 2015). Also, TRA lacks ability to address the role of habit. Yet, applying TRA to explain the influence of trust on the intention to adopt fintech services could extend TRA to the area of fintech services adoption. After identifying TRA as the main theory that can explain the concept of trust of users in fintech adoption, the next section dwells on the operationalization of trust in the context of the diffusion of fintech and the behavioural intention of its adoption by users.

2.5.3 Operationalisation of trust of consumers in fintech services

Trust as a construct has been operationalized in different ways in the literature. For instance, Daud et al. (2018) conceptualized trust as a mediating variable between perceived ease of use and customer satisfaction and loyalty in while investigating the satisfaction and loyalty of customers of a particular telecommunication firm in Indonesia. Notable this research did not use the concept of diffusion of innovation. Ozen et al. (2018) suggested a complex model through a systematic review of the literature and used trust as the determinant of intention to use of e-government. In this study the researchers used TAM, TPB and DOI. Boz and Özen (2019) developed a conceptual model and showed that risk avoidance determines the trust on internet banking services. Hanafizadeh et al. (2014) showed that trust as a factor directly influences intention to adopt mobile banking in association with other covariates including perceived risk. Senyo and Osabutey (2020) conceptualized a complex model in which perceived risk influences service trust and agent trust which in turn determine the mobile money use. In another conceptualization Robbins (2016) using the Structural-cognitive model of trust that was built over the concepts of Dietz (2011) posited that trust as a construct influences perceived risk and uncertainty.

Some important aspects that need to be understood from the above conceptualisations are that none of the researchers, except Hanafizadeh et al. (2014) investigated the operationalization of trust in an environment where a technology is diffusing. Also, the research efforts of Hanafizadeh et al. (2014) utilize of DOI was restricted in one component of DOI namely compatibility, while other components of DOI have been ignored. Finally, it can be seen that trust as a factor has been shown to be associated in the models of only Senyo and Osabutey (2020) used risk as determining usage of mobile money through trust as a factor, while others have directly use risk and trust as influencing intention adopt directly or did not use risk as a factor at all. These arguments point towards lack of research outcomes that have discussed in-depth the concept of trust in an investigation concerning fintech services adoption in the presence of perceived risk. The importance to associate perceived risk in a model that concerns trust as a factor influencing intention to adopt fintech services arises from the fact the perceived risk and trust are considered to be interrelated in the literature (Meyliana et al. 2019). This is an important gap in the literature. At the same time, it can be seen that trust as a construct has been dealt with varyingly in the literature and employing it in a model could be challenge.

Furthermore, many researchers have confirmed that consumers' trust of specific services plays a major role in the adoption intention decision making, the same is also applies in the context of fintech services (Meyliana et al., 2019; Hu et al., 2019; Muñoz-Leiva et al., 2017; Malaquias and Hwang, 2016; Koksal,

2016; Kesharwani and Singh, 2012). The more the consumer trusts the service provider, the more the consumer's willingness to use the service, and the easier it is to promote behavior (Koksal, 2016). Therefore, it seems to be necessary to investigate trust as a factor that effects on the intention to adopt fintech services.

2.5.4 Relationship between trust and perceived risk

In studies related to fintech services, the role of trust is significantly important due to the big and high dimensional data involved in fintech services. Moreover, trust and perceived risk are an interrelated concept that has been repetitively identified in the literature as a key barrier of adopting fintech services such as, mobile banking and online services (Meyliana et al. 2019; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014). Consumers' trust needs to be formed and retained in the long term, and understating the risk perceived by the consumers is very important for the bank to identify the barriers of consumer's adoption and eliminate them. This was also proven by the research conducted by Kim et al. (2009) in which it was argued that fintech services are perceived to be associated with higher risk compared to the traditional methods of banking. Thus, trust of the consumer in the services is expressed as the key factor for adopting fintech services. Extending these arguments to this research which is being conducted in an environment where fintech services are still diffusing, it was necessary to understand how trust could impact intention to adopt fintech during the process of diffusion of fintech services as trust could change over a long term (Ryu & Ko, 2020). It was important to study how trust affects the intention of potential consumers to adopt fintech services, as well as the factors that can affect trust in an environment where fintech is still diffusing.

This study believes that trust refers to consumer's overall objects of perceived utility. Kesharwani and Singh (2012) revealed that consumers' trust can induce behaviors, and trust is formed by the consumers' inherent characteristics. Moreover, fintech services adoption characteristics have a certain inherent risk (Lee & Turban, 2001). Scholars indicate that trust is closely related to perceived risks, thus, consumer's perception of the service perceived of risk will have a significant impact on the trust of banks (Malaquias & Hwang, 2016). Despite the fact that some evidence exists in the extant literature on the relationship between trust and perceived risk, it must be noted that in an environment where fintech is still diffusing, the relationship between trust and perceived risk is an area that lacks clarity (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Hu et al. 2019). Lack of clarity in this area can clearly lead to misunderstanding concepts of trust and risk associated with fintech adoption. This is another gap that needs to be addressed.

As far as evaluation of trust is concerned, it can be seen that a majority of researchers have used empirical models that have been tested using quantitative studies (Meyliana et al. 2019; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014) with a few using qualitative studies (Ozen et al. 2018; Robbins, 2016). Considering

that the nearest research paper that can be compared to the current study is the one that is written by Senyo and Osabutey (2020), it can seen that the results of the research showed that relationship between trust and risk have been validated using Likert scale. Other researchers have also identified scales to measure trust using Likert scales (e.g. Munoz-Leiva et al. 2017; dan Bosque, 2013; Huang, 2015; Hanafizadeh, 2014) which provide the basis to identify a scale for measuring trust in any research concerning beahvioural intention to adopt fintech services. After discussing the application of TRA to explain the relationship between the trust perception and fintech adoption intention of consumers, the next section deals with the theory related to the customer perceived risk in fintech services and its adoption.

2.6 Concept of perceived risk

In general, most of the online technologies and innovations have inherent risks as those technologies are virtual (Abubakar et al. 2019). Featherman and Pavlou (2003) defined risk as the perception of losses related to the use of technology. Featherman and Pavlou (2003), also defined perceived risk as the potential for loss in the pursuit of getting benefits while using a certain type of technology. Literature refers to risk as the tendency of a person for accepting a threat (Rogers, 1995). Perceived risk has a relationship with the person's tendency for accepting particular innovation based on its negative side effect and the probability of that risk occurring (Rogers, 1995). As a practical example, it can be seen that fintech services are perceived to be risky especially to consumers who lack the knowledge or experience to assess or use them properly, leading to greater risks of harm such as threats of hacking the accounts and leak of private information. The perception of the consumers about the risks involved while using fintech services implies that consumers are prepared to face such threats and take a risk to adopt fintech services which is seen in the banking business. In recent decades, the concept of perceived risk has changed, due to change in consumers' behavior and their inclination to an online transaction (Rodrigo et al., 2019; Bhowmik, 2017; Bogdan et al., 2015; Laukkanen and Kiviniemi,2010). Previously, perceived risk referred mostly to product or service quality and fraud. However, today perceived risk is also referring to other types of risk such as to the social risk, psychological and financial risk that are possible in online transactions (Rodrigo et al., 2019; Bhowmik, 2017; Bogdan et al., 2015; Laukkanen and Kiviniemi,2010).

The literature shows that perceived risk is a major factor that could anticipate the sustainability of an innovation or new technology (Hanafizadeh et al. 2014). The various descriptions and definitions of risk point out that as a concept, the perception of risk of the consumers is a major area of concern for both the service providers and the consumers alike. Damage caused due to lack of implementation of appropriate risk mitigation techniques in the banks could seriously dent the adoption of fintech services by consumers and erode the custome

r trust in the banks. In addition, the concept of perceived risk and its impact on adoption of fintech services compounds when fintech services are still diffusing. For instance, in the relevant literature it is found that adoption of a technology at an early stage of diffusion could cause greater risk when compared to later adoption (Shin et al., 2016). However, there is no conclusive evidence to establish this and it is not clear whether perceived risk as a factor, affects the adoption intentions at the early stage or later stage of diffusion.

A number of areas of concern could be seen in the literature with regard to the way perceived risk is conceptualized and operationalized (Senyo & Osabutey, 2020; Caldwell & Holloway, 2017; Robbins, 2016). Researchers point out that risk is a major factor that needs to be addressed by the banks while offering fintech services, and must be treated more cautiously and carefully in order to prevent occurrence of any damage. In this context literature concerning technology adoption shows that current knowledge available to understand how perceived risks related to new online technologies and innovations like fintech services affect adoption intention of consumers is not complete and is murky (Lishomwa & Phiri, 2020; Hu et al. 2019; Meyliana et al. 2019). This is a gap in the literature. Lack of knowledge on how to understand perceived risk concerning fintech services can affect control mitigation plan leading to avoidable damages. Considering the fact that perceived risk can impact adoption of fintech services, the next section dwells on the relationship between perceived risk and intention to adopt. Additionally, it is seen in the relevant literature that perceived risk is almost always associated with trust, the following section addresses the linkage between perceived risk and intention to adopt fintech in the presence of trust.

2.6.1 Perceived Risk and its Relationship with Trust and Consumer Intention to Adopt Fintech Service

Perceived risk is considered as a very crucial factor that indicates consumer's adoption of new technology such as fintech services. Moreover, there is a greater risk in using fintech services in comparison to other traditional banking services due to distant connections (Rodrigo et al., 2019; Bhowmik, 2017). Additionally, studies indicate that perceived risk can be considered to be a form of lack of trust and most researchers believe that perceived risk is the main factor that negatively affects the adoption of a certain type of technology (Hu et al., 2019; Sikdar, 2015; Kesharwani et al.2012). While Khedmatgozar and Shahnazi (2018) argued that the degree of risk perception factor is highly affecting the adoption of e-services, Bansal et al. (2010), insisted that consumers worried when using fintech service due to the misuse of their personal information, which could lead to serious consequences.

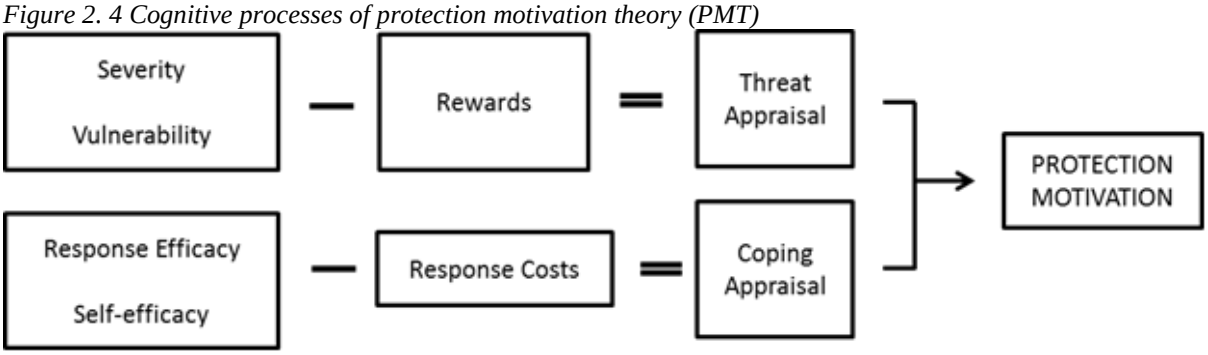
Additionally, although Hu et al (2019) and Meyliana et al (2019) indicate in their research that perceived risk does not affect consumers' intention toward the adoption of fintech services, Wu and Wan (2005) found that there is a strong association between perceived risk and the intention to adopt fintech services, such as mobile banking. For instance, fintech services involves technologies, including cloud computing, big data, and the internet of things, there are potential risks that could affect consumers availing those services (Zhou et al. 2010). Thus, perceived risks arising from the use of fintech services can significantly affect consumers' willingness to adopt the technology (Bansal et al. 2010). Furthermore, when banks provide financial services to consumers through technological means, consumers of banks must make available their private information to enable the banks to complete a comprehensive authentication of the consumers and to grant access to use the specific service. This could reduce the consumers' trust in fintech services provided by the banks (Malaquias & Hwang, 2018). On the other hand, Kim and Prabhakar (2000) found the perceived risk would affect the consumers' trust which could in turn affect the intention to adopt. These examples from the literature show that perceived risk is a very important construct that could affect the intention of the consumers to adopt fintech services and their trust. The above contradictions have caused more misunderstanding about the relationships that exist between perceived risk and intention to adopt fintech services on the one hand and perceived risk, trust and intention to adopt fintech on the other. Thus in this research perceived risk was investigated as part of this study in conjunction with trust and behavioural intention to adopt fintech. Further in order to understand how to operationalize perceived risk as part of the study, it was necessary to review the relevant theories that could lend support in conceptualizing and operationalizing of perceived risk. In this context the research critically reviews Protection Motivation Theory (PMT). Reason for choosing this theory is explained in the following sections.

2.6.2 Theory Supporting Consumers Perceived Risk

Protection Motivation Theory (PMT) (Figure 2.4) was founded by Rogers in 1975 to have a better understanding of fear appeals and how people deal with it. However, in 1983, Rogers expanded this to a more general theory of persuasive communication. Rogers' (1975) theory is one of the most cited theories in the literature. Amongst the different theories that have been used in the literature that explains how risk factor is associated with new technological innovation, protection motivation theory (PMT) was found to be useful in the context of fintech and supported in the literature (Jansen and Schaik, 2017; Boss et al. 2015; Vance et al. 2012). Literature shows that a majority of the technology adoption models concentrated on the beneficial technologies. However, PMT theory, considered to be a potentially valuable model for predicting the adoption of protective technologies, focused on helping users to avoid harmful, negative technologies

that are growing in number. Examples of such negative technologies include cybercrime, malware and data breaches (Chenoweth et al. 2009).

Figure 2. 4 Cognitive processes of protection motivation theory (PMT)



Source: Rogers (1983)

According to PMT, a person is likely to protect himself or herself when that person anticipates negative consequences, has the desire to avoid those consequences, and feel that he or she can initiate preventive measures (Inouye, 2014). PMT links risk perception with incidents and injuries and argued that personal protection increased when people have a reason for being alarmed, generally due to previous incidents (Sheeran et al., 2014). A classic example is the withdrawal of a particular brand of smartphone recently with users reporting serious battery problems. In this case batteries had the potential to blow off and were a threat to safety (Thomas et al., 2017). The use of PMT in understanding risk perception while the new technology is diffusing has been found in the literature (Bae, 2018; Chen, 2013; Pahnila et al., 2007). For instance, Bae (2018) used the concept of PMT in studying the factors that determined innovation resistance and innovation acceptance on internet primary bank in Korea. Similarly, Pahnila et al. (2007), studied the factors that explain employees' adherence to information security policies in the area of compliance. This study was conducted in Finland and data was collected from Finnish companies. Bae (2018), Chen (2013), and Pahnila et al. (2007) research concerns were related to the behavior intention of people when faced with risk. These examples provide support to the argument that PMT could be used to explain the behavioral intention of people when they perceive risk in the contexts of innovation diffusion of new technology and banking.

The banking sector has been always under attack for hundreds of years. Starting with physical theft, then moving to computer fraud. Today, the primary risk is cyber fraud and hacking into customers personal account. As consumers move to use fintech services and perform transactions online the risk of data breach increases. An example of the application of PMT regarding explaining risk while adopting fintech services could be seen when the consumers who have adopted fintech services, do not know the perceived risks associated with this technology (e.g. cyber risks, hacking, phishing, data breach). Those kinds of risks are

constantly apprised by banks to their consumers by conducting awareness campaigns through Short Message Service (SMS), emails, and social media channels. The awareness campaign aims to encourage safe online usage of services by consumers. This also enables the customers to be alert about the risk they could perceive which is explained by PMT.

However, PMT suffers from certain limitations for instance application of PMT to explain the diffusion of innovation that has a component of risk is mostly restricted to the development of theoretical models, that portray relationships between variables that are rarely experimentally tested (Andr´e & Laurencelle, 2020). Lack of experimental proof could be a major limitation to trust the application of any theory including PMT. Moreover, PMT is mostly applied in research concerning health issues and how people would react when they get diagnosed with health-related illnesses (Milne et al. 2000; Pechmann et al. 2003; Prentice-Dunn et al. 2009). Yet, there is a possibility shown by the research outcomes produced theoretically so far, that PMT could be applied to technologic innovations (Ifinedo, 2012; Johnston et al. 2010), for instance, fintech services, to understand how consumers perceived the risk about innovations like fintech. In the absence of a well-established model in the context of banks that have begun to offer services using fintech, explaining the perception of risk by applying PMT could expand the application of PMT to innovations. Thus, despite this limitation of PMT, it still offers a basis for its application to explain fintech service and its diffusion.

2.6.3 Operationalisation of perceived risk of consumers in fintech services

As far operationalisation of perceived risk is concerned, it can be seen that various researchers have operationalized it differently. For instance, Hanafizadeh et al. (2014) have conceptualized perceived risk as directly influencing intention to use mobile-banking as an independent variable which is echoed by Meyliana et al. (2019) who linked perceived risk to behaviour intention to adopt fintech services as an independent variable as well. However, Mu˜noz-Leiva et al. (2017) have conceptualized perceived risk as a mediating variable between trust and intention to use mobile banking application which is supported by other researchers including Ryu and Ko (2020) and Lin et al. (2014). Contradicting the mediating character of perceived risk, Al nawayseh (2020) argued that perceived risk can only drive trust and intention to adopt and not the other way an argument supported by Senyo and Osabutey (2020) and Hu et al. (2019) who researched on intention to adopt fintech. Hu et al. (2019) has also linked perceived risk as an independent variable that directly influence intention to adopt, through attitude of the users. Al nawayseh (2020) conceptualized perceived risk as an independent variable and linked it to trust and intention to adopt constructs directly and through trust to intention to adopt indirectly. These examples clearly indicate the

multiple character of perceived risk. This character enables the researchers to conceptualize perceived risk in multiple relationships depending on the way risk can operate. For instance, if fintech services are perceived to be risky, it will affect trust of the users directly which in turn could affect the intention to adopt fintech services.

On the other hand, if fintech services has already diffused to some extent and some users have started using it, then other users could start trusting fintech services and adopt it even if they know that there is some risk associated with fintech services. In this case due to trust the users are willing to take risk and then adopt fintech services. There are also instances where perceived risk is directly linked to intention to adopt regardless of trust and such situation may likely be those that are very essential for the users who cannot remain without adopting the technology, for instance use of mobile phone. Based on the above examples, it can be seen that researchers involved with fintech services adoption need to be understand in the context in which the concept of perceived risk of users is being addressed as a construct and accordingly conceptualise it. Rarely perceived risk is suggested to be investigated using qualitative methods as it is conceived to be a construct at the personal qualitative level based on a set of actions that cannot be objectively evaluated (Inouye, 2014). Despite contradictory conceptualisations and evaluations of perceived risk, literature shows that the conceptualization of perceived risk has been widely shown to be as a quantitative variable and measured using objective methods. Measurements of perceived risk are found to be made using Likert scale by most researchers (Thakur & Srivastava, 2013; Chen, 2013; Akturan & Tezcan, 2012; Koenig-Lewis et al. 2010; Lee, 2009).

2.7 Gap found in the literature

The adoption process of any innovational products or services is considered to be successful only if the innovation is found to be risk free, trusted and accepted by people (Al nawayseh, 2020; Damanpour & Gopalakrishnan, 2001; Damanpour & Gopalakrishnan, 1998). The same applies to fintech services (Lishomwa and Phiri, 2020; Hu et al., 2019; Bae, 2018 and Chen, 2013). Most researchers focused on studying the consumer acceptance by examining the behavior of consumers accepting an innovation by focusing in some aspects concerning diffusion, perceived risk and trust (Senyo & Osabutey, 2020; Hu et al. 2019; Meyliana et al. 2019; Ryu, 2018; Stewart & Jujens, 2018; Chuang et al. 2016; Kim et al. 2015). However, studies rarely examined the adoption, the diffusion, the perceived risk of consumers and trust in fintech services, collectively and in one research. The banking industry has spent huge amounts of money as investments in new technological innovation services. Yet, Banks often complain that consumers are not fully utilizing it, including fintech services (Senyo & Osabutey, 2020; Meyliana et al. 2019; Hu et al. 2019).

There is a need to understand the consumer behaviour with regard to fintech services adoption. Usually, it is thought that consumers are more conservative when they are exposed to a proposal of adopting a new banking technology and hence, the adoption of fintech services could be slow. However, the discussions in the previous sections have shown that may not be the case. Without a full understanding of possible barriers, banks are hard-pressed to develop sound strategies to encourage customers to adopt fintech services.
Research on fintech is a recent phenomenon. Knowledge on fintech services' adoption by consumers is still limited (Hu et al. 2019; Gomber et al. 2018). Especially, when fintech is still diffusing. The current understanding of the factors influencing the adoption of fintech services is clearly shrouded by clouds (Meyliana et al. 2019; Hu et al. 2019; Gomber et al. 2018; Hanafizadeh et al. 2014). While diffusion of fintech services is itself a complex phenomenon, current research outcomes do not provide a comprehensive and complete understanding on how fintech services is received by consumers and what their perceptions are with regard its risk and trust. At the same time examining the factors involved in the process of adoption of fintech services by consumers is becoming fundamental to the banking industry to ensure the success adoption (Meyliana et al. 2019; Hu et al. 2019; Gomber et al. 2018). A better understating of the adoption of fintech services by consumers during diffusion is an urgent need and would therefore lead to find ways that could enable the successful adoption and utilization of those fintech services by consumers. Lack of such an understanding in the literature is a major challenge facing the IS community and the banking service providers. So far research outcomes produced in this context are mixed and inconclusive (Senyo & Osabutey, 2020; Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018). Additionally, Gomber et al. (2018) points to the inconsistency in research findings related to fintech services adoption and diffusion research. These are important and major gaps found in the extant literature.

Moreover, the currently available research outcomes that have examined the factors that concern with fintech services adoption in the related literature fall short of providing a clear understanding and validation of the set of characteristics that influence the diffusion, perceived risk, trust and the adoption of fintech services. It is virtually impossible to draw a firm conclusion from the current research efforts on the factors that influence the diffusion of fintech service and its adoption. This is a major gap in the literature. Yet, identifying the factors that enable or inhibit the adoption of the fintech services is fundamental to address this gap and further investigations are needed. Despite this challenging situation literature offers some support to proceed with further investigations on diffusion of fintech services as an innovation and behavioural intention of consumers to adopt fintech services. Literature shows that researchers have identified various factors such as intention to adopt fintech services, perceived usefulness, perceived ease of use, trust, perceived risk, relative advantage, complexity, compatibility, trialability, and observability providing some basis to conduct further investigations. While there is no comprehensive study that

integrates these factors into a single conceptual model and measures how those factors work together when fintech services is still diffusing and influence the behavioural intention to adopt fintech services by bank consumers, still there are some useful concepts found in the extant literature that promise support.
Literature review shows that theories could provide support to investigate the abovementioned constructs namely, DOI, TAM, TRA and PMT. Also, there is a novel method of integrating DOI and TAM that was found to provide a strong basis for researchers to develop a parsimonious conceptual model that could explain the operation and functions of DOI factors and TAM factors when concurrently tested in one model to investigate the diffusion of fintech services as an innovation and behavioural intention of consumers to adopt fintech services. Furthermore, trust and perceived risk need to be brought into the same model in which consumers' behavioural intention to adopt fintech is a part. Thus there is a need to understand how TRA and PMT could be used to link the concepts of perceived risk and trust with an integrated DOI-TAM model. These are formidable gaps that need to be bridged.

2.8 Chapter Summary

This Chapter provided an extensive review of the literature, as it focused on the availability of previously models employed by researches in the area of intention behavior of the consumers' to adopt fintech services. The review of the literature delivers a summary of all the components along with the associated theories that will be part of the conceptual model and the hypotheses drawn in the next Chapter, in line with the existing literature to support the investigation being undertaken by this research. In short, the behavioural intention of users of banks to adopt fintech is an important area of concern for researchers, service providers and the consumers. Literature review shows understanding the behavioural intention of consumers of banks to adopt fintech services could be improved to enhance adoption rate. Two dominant theories, DOI and TAM, were found to be useful although integrating them was found to pose challenges. Next, an integrated DOI and TAM model was not found to be sufficient to explain behavioural intention of consumers of banks to adopt fintech services as factors like perceived risk and trust might require attention as well. Understanding the holistic operation of an integrated DOI-TAM model in the presence of perceived risk and trust was found to be an area not addressed in the literature but promising to bridge the many gaps that exist in the extant literature. This Chapter provided a review of all the concepts and the associated theories that need to be considered. The whole review suggests that there are possibilities to develop a conceptual model and draw hypotheses that could be used to investigate the gaps in the literature. Thus, in the next Chapter a theoretical framework is drawn to understand how the gaps in the literature could be addressed using the outcomes of Chapter.

Chapter 3: The conceptual framework and hypothesis development

3.1 Introduction

Advancing technologies are changing the entire landscape of modern living. As highlighted in Chapter 2, the world is witnessing the introduction of a host of new technologies that are promising to bring a total revolution in the financial industry. Fintech has the potential to change the way consumers transact in different sectors, most important banks. While fintech services has been already introduced in the banking sector in many countries recently, the effect of fintech services on consumers and the behavioural intention of consumers to adopt fintech services are yet to be fully understood. This argument is supported by the literature (Senyoa and Osabuteyb 2020; Meyliana et al. 2019; Hu et al. 2019). Also, the literature review shows that fintech as a concept has several advantages and limitations. While advantages promise to enhance the way banking has been carried out until now, the limitations can be unnecessary hindrances that could prevent the adoption of fintech services by end-users. The literature review showed various aspects concerning the adoption of fintech services and provides in-depth insight into the challenges faced by banks in dealing with consumer adoption of fintech services (Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart & Jujens, 2018). Additionally, literature shows that there is a lack of knowledge about factors that affect consumer's intention to adopt fintech services introduced by banks particularly when one considers the fact that fintech services as an innovation is still diffusing. Literature is silent on how adoption of fintech services happens during the process of diffusion and what factors determine its diffusion and adoption by consumers of banks.

Chapter 2 has identified certain gaps in the literature that contribute to those limitations. This research attempts to address some of those limitations in this Chapter through the development of a theoretical framework which is depicted as a conceptual model (Figure 3.1) supported by appropriate theories. This conceptual model has identified ten factors from the literature review. Those factors are perceived usefulness of fintech services, perceived ease of use of fintech services, diffusion of fintech services (including the five factors concerning diffusion namely relative advantage of fintech services, complexity of fintech services, compatibility of fintech services, trialability of fintech services and observability fintech services), trust of consumers on fintech services and the perception of risk by the consumers adopting fintech services. The Chapter has been laid out as follows. Section 3.2 provides an overview of idenified factors determining the consumers' adoption intention of fintech services, while section 3.3 to 3.6 discusses the theories that be applied to the various relationship between the factors identified. The theories lend support to explain the relationships that could be assumed amongst these factors and their influence on consumer intention to adopt fintech services is also discussed in those sections, followed by derivation of

the investigated hypotheses representing those relationships. The hypotheses led to the development of the proposed conceptual model, which is presented in section 3.7. Section 3.8 summarizes the Chapter.

3.2 Factors determining the consumers' adoption intention of fintech services

The adoption of fintech services by consumers using banking has attracted the attention of consumes, researchers, bankers, and policymakers (Kolesova & Girzheva, 2018). Banks across the world have already introduced fintech services as part of their business. However, there are concerns associated with the fact that adopting fintech services by the consumers are developing at a slower pace than fintech itself (Hu et al. 2019; Meyliana et al. 2019; Kolesova & Girzheva, 2018).

Two of the factors that have been already identified in the literature as affecting the behavioural intention of consumers to adopt fintech services of banks, which are perceived usefulness (PU) of fintech services and perceived ease of use (PEU) of fintech services and antecedents that affect both perceived usefulness and perceived ease of use of fintech services (Hu et al. 2019; Mutahar et al. 2017). However, there is no consensus amongst researchers on the different antecedents that affect perceived usefulness, perceived ease of use and consumers' adoption intention of fintech services while fintech is still diffusing. For instance, Meyliana et al. (2019) argue that trust and preserved risk are two independent factors affecting perceived usefulness. But, Hu et al. (2019) and Muñoz-Leiva et al. (2017) have tested a model involving the combination of preserved risk and trust as affecting the attitude of the consumers to adopt fintech services. The study by Hu et al. (2019) is in the context of China while the study by Muñoz-Leiva et al. (2017) is in the context of one of the largest European bank. Similarly, Al-rahmi et al. (2019) and Mutahar et al. (2017) have argued that factors delineated by the diffusion of an innovation, such as relative advantage, complexity, compatibility, trialability, and observability can be considered as the antecedents affecting both perceived usefulness and perceived ease of use.

While there is a lack of consensus amongst researchers on the set of antecedents that could affect perceived usefulness, perceived ease of use and behavioural intention to adopt technology. What emerges is that there are definite antecedents that need to be considered to explain how consumers' behavioural intention to adopt fintech services is affected by perceived usefulness, perceived ease of use and intention to adopt new technology. This argument is also supported by Mutahar et al. (2017) who have recommended further research to be conducted to understand the behavioural intention to adopt fintech services by including new factors that could influence the consumers behavioural intention to adopt fintech services. Similar arguments could be extended to the models developed by other researchers (Al-rahmi et al. 2019 Hu et al. 2019), Meyliana et al. 2019; Muñoz-Leiva et al. 2017; Mutahar et al. 2017).

Thus, this research applies the concepts of the model developed by Muñoz-Leiva et al. (2017) by including risk and trust as antecedents of behavioural intention to adopt fintech services. In addition, the concepts in the models developed by Al-rahmi et al. (2019) and Mutahar et al. (2017) have been used in this research to understand other factors that influence behavioural intention to adopt fintech services. Which led to the development of relationships between DOI factors namely relative advantage, complexity, compatibility, trialability and observability of fintech services as antecedents of TAM factors perceived usefulness and perceived ease of use. The combined effect of the factors (perceived risk, trust, relative advantage, complexity, compatibility, trialability and observability of fintech services, perceived ease of use and perceived usefulness) in an innovative way is expected to provide a way to anticipate consumers' behavioural intention to adopt fintech services introduced by banks.

To sum up this discussion, it can be said that it is important to examine how the integration of the relative factors of DOI and TAM can be applied to understand consumers' behavioural intention to adopt fintech services in the presence of perceptions of risk and lack of trust in the minds of consumers of banks. This argument provides the basis to draw the theoretical framework to understand the above linkages as described next.

3.3 Relationship between perceived ease of use, perceived usefulness, and intention to Adopt fintech services

Perceived usefulness and perceived ease of use influence the behavioural intention to adopt fintech services is supported by TAM (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Hu et al. 2019; Lee 2018; Stewart & Jujens, 2018). TAM is a widely used theory that enables the prediction of user behavioral intention to adopt the technology by using two constructs perceived usefulness and perceived ease of use to determine the third construct namely behavioral of intention of users to adopt a technology. TAM is widely represented by the three constructs over the past few decades. The studies of adoption of mobile banking Mutahar et al. (2017) (also see Hanafizadeh et al. 2014) and adoption of online banking services by Hu et al. (2019) (also see Meyliana et al. 2019) are examples that have used TAM to explain adoption of fintech services using perceived usefulness and perceived ease of use. Thus, through TAM theory it is possible to explain and establish a relationship between the three factors below.

3.3.1 Relationship between perceived usefulness and behavioural intention to adopt fintech services

Perceived usefulness of fintech services is a measure of the degree to which the use of a technology will improve consumers' banking experience. Thus, leading to its adoption by the consumers. Although, it is still not clear to what extent behavioural intention to adopt fintech services will be influenced by perceived

usefulness during diffusion and in what direction. It is possible to posit that perceived usefulness influences behavioural intention to adopt fintech positively during the diffusion of fintech services an argument supported by other researchers.

- Perceived usefulness → Intention to adopt fintech services (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017, Hanafizadeh et al. 2014)

The hypothesis is:

H1: During the diffusion of fintech services consumers' perceived usefulness of fintech services positively influences the consumers' behavioural intention to adopt fintech services.

As far as measuring the constructs perceived usefulness and behavioural intention to adopt fintech services, a five point Likert scale has been used widely by researchers to collect data and test the relationship. The instrumentation that measures the construct perceived usefulness in this research relied upon the instruments already developed and tested by other researchers, as those instruments have also been tested for their reliability and validity. Thus, perceived usefulness was measured based on the instruments developed by Chen (2013) and Davis et al. (1989) and adapted those instruments to suit this research. As far as the construct intention to adopt fintech services is concerned, this research relied upon the tested and validated research instrument developed by other researchers namely Hanafizadeh et al. (2014) and Venkatesh and Davis (2000).

3.3.2 Relationship between perceived ease of use and behavioural intention to adopt fintech services.

perceived ease of use refers to the consumers' perception of the amount of effort needed to use a technology and therefore they are likely to adopt that technology, e.g. fintech (Olushola & Abiola 2017). As explained in the previous section, perceived ease of use is an important construct of TAM and has been well explained in the literature using TAM. In addition, it has been widely used by researchers in which behavioural intention to adopt fintech services was investigated (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017, Hanafizadeh et al. 2014). The relationship between perceived ease of use as anticipator of behavioural intention to adopt technology has been well tested and established by researchers. Thus, as in the case of perceived usefulness, it is possible to posit that perceived ease of use, directly influences behavioural intention to adopt fintech services. However only a few researchers have investigated the direct influences behavioural intention to adopt fintech services while fintech services are still diffusing. Therefore, this research aims to understand the extent to which perceived ease of use directly influences behavioural intention to adopt fintech services during the diffusion of fintech services which is represented as follows:

- Perceived ease of use → Intention to adopt fintech services (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017, Hanafizadeh et al. 2014)

The hypothesis is:

H2: During the diffusion of fintech services consumers' perceived ease of use of fintech services positively influences the consumers' behavioural intention to adopt fintech services.

As far as measuring the constructs perceived ease of use and behavioural intention to adopt fintech services, a five point Likert scale has been used widely by researchers to collect data and test the relationship. The instrumentation adapted in this research to measures the construct perceived ease of use relied upon the instruments already developed and tested by other researchers as those instruments have also been tested for their reliability and validity. The instruments developed by Chen (2013), Yu (2012), Lin et al. (2008) and Gefen et al. (2003) were relied upon in the research to measure perceived ease of use.

3.3.3 Relationship between perceived usefulness and perceived ease of use

Apart from the relationships that could be established amongst perceived usefulness, perceived ease of use and behavioural intention to adopt fintech services as mentioned above, TAM posits that perceived ease of use influences behavioural intention to adopt fintech services through perceived usefulness. Thus, perceived ease of use is conceived to be influencing perceived usefulness in TAM literature and such a relationship has been well investigated and tested in multiple technological contexts involving fintech services (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017). An important caveat is that during the process of diffusion of an innovation it is not clear whether perceived ease of use will still influence perceived usefulness as literature provides evidence of contradictory postulations. For instance, Alwi et al. (2019) used perceived usefulness and perceived ease of use as independent variables to investigate consumer intention to adopt payment type of fintech services, but not during diffusion. While Lin et al. (2014) have conceptualized perceived usefulness as being driven by confirmation while investigating the evolution of consumer trust in mobile commerce. In addition, in the research conducted by Min et al. (2018) on adoption of a mobile application perceived usefulness was not shown to be influenced by perceived ease of use an argument that is contradictory to TAM.

However, in a majority of the investigations concerning the relationship between perceived usefulness and perceived ease of use cited in the TAM literature, perceived usefulness is shown to be influenced by perceived ease of use. However, research efforts that have investigated the relationship between perceived usefulness and perceived ease of use as postulated in TAM during the time of diffusion of an innovation are far and few which necessitates the examination of the relationship between the two. Thus, taking into account the paucity in the literature on the quantum of research outcomes produced in fintech services,

literature pertaining to the influence of perceived ease of use on perceived usefulness during diffusion of fintech services and the support of TAM the relationship between perceived ease of use and perceived usefulness is posited as:

- Perceived ease of use → perceived usefulness (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017)

Furthermore, literature shows that perceived ease of use has been conceptualized to influence perceived usefulness positively in TAM literature. Most research outcomes have established this conceptualization. Thus, applying these arguments to the current research the hypothesis is stated as:

H3: During the diffusion of fintech services consumers' perceived ease of use of fintech services positively influences the consumers' perceived usefulness of fintech services.

To sum it up, in terms of the relationship between perceived ease of use, perceived usefulness and intention to adopt fintech services, TAM as a theory has been well established. Moreover, Al-Rahmi et al. (2019), Mutahar et al. (2017), Mutahar et al. (2017) and Tang et al. (2005) have found statistically significant relationships amongst perceived ease of use, perceived usefulness, and intention to adopt the technology. Thus, this research applies the principles of TAM using the three factors namely perceived ease of use, perceived usefulness, and banks consumers' intention to adopt fintech services with the support of the researchers mentioned above. Further to providing the theoretical support for establishing the relationships amongst perceived ease of use, perceived usefulness and behavioural intention to adopt fintech services during diffusion of fintech services.

The next step taken was to explain the relationship between the antecedents of TAM constructs and DOI. As explained in the literature review it can be seen that fintech services are still diffusing. Here it is posited that the three TAM constructs are influenced by DOI factors as their antecedents based on prior research related to technology adoption (e.g. Hubert et al. 2018; Mutahar et al. 2017). The rationale for positing that DOI constructs can act as the antecedents of TAM constructs during diffusion of fintech services as an innovation can be provided by the fact that TAM allows external constructs to be the antecedents of TAM constructs. There is evidence to show in the recent literature that DOI and TAM have integrated to enhance the explanatory power of TAM. Thus the next sections discuss the theoretical basis on which DOI and TAM can be integrated to explain the influence of DOI factors on perceived ease of use, perceived usefulness and behavioural intention to adopt fintech services when fintech services are still diffusing.

3.4 Relationship between components of DOI, perceived usefulness and perceived ease of use of fintech services

The literature review shows that new technology diffuses before its adoption (Sharma & Mishra, 2014). While conceding that diffusion components have a role to play, to what extent their influence is exerted on the adoption of technology are needs to be investigated, to objectively know their contribution. In this context taking into account the diffusion of fintech services across a bank's consumers, it can be observed that the influence of five components identified in DOI, namely relative advantage, complexity, compatibility, trialability, and observability is needed to be studied on fintech services adoption intention of banks consumers (Yoon & Lim, 2020; Lou & Li, 2017; Mutahar et al. 2017). While examining whether fintech services have a relative advantage in using it by consumers in banking, its complexity, its compatibility with consumers' requirements, it is trialability before adoption and its observability, could not found to be clear in the literature. Literature has brought out a variety of ways by which the five components identified by DOI theory could be explain to adoption intention (Yoon & Lim, 2020; Lou & Li, 2017; Mutahar et al. 2017; Raza et al. 2017; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010) leading to a conclusion that there is a lack of a universal model that could be applied to understand the effect of DOI components on fintech services adoption intention.

In the proposed model, TAM is used as the underpinning theory. However, TAM does not measure all aspects that could affect individual behavioral intention and actual behavior in technology adoption as it only focuses on perceived ease of use and perceived usefulness (Davis 1989). Davis (1989) suggests that the effect of external variables on the construct of TAM model needs to studied. Moreover, many studies have used the combination of both TAM and DOI applications in different contexts (Al-rahimi et al. 2019; Hubert et al., 2019; Min et al. 2018; Hus and Lin, 2015; Al-Ajam and Nor, 2013; Zhong et al., 2013). For instance, Al-rahimi et al. (2019) found it useful to establish the relationship between the five components (relative advantage, complexity, compatibility, trialability and observability) in the research model and investigated the students' intention to use e-learning systems in the context of higher education undergraduate and postgraduate students in Malaysia. Also, Al-Jabri and Sohail (2012) linked the five DOI factors to behavioral intention to adopt in their investigation on mobile banking adoption.

However, other researchers have argued that not all five factors of DOI are needed to be used to determine the perceived usefulness and perceived ease of use of technology (Al-Rahmi et al. 2019; Tomatzky & Klein I982). There is no unanimity amongst researchers in applying the theory of DOI in totality to study phenomena related to conducting online business, including fintech services. For instance, Hubert et al. (2018) have use only four components depicted in DOI namely complexity, compatibility, trialability and observability to determine perceived ease of use and perceived usefulness of technology adoption. Lou and Li (2017) have used complexity, compatibility and relative advantage in studying the adoption of fintech services in industries. Mutahar et al. (2017) have argued that it is sufficient to use three components depicted in DOI namely compatibility, trialability and observability to determine perceived ease of use and perceived

usefulness in studying the adoption of Mobile Banking. On the other hand, Siddik et al. (2014) have argued that the diffusion of innovation theory can be applied in totality to understand the adoption behavior of new technology, implying financial technology.

Lack of knowledge on how the five components of DOI affect perceived ease of use and perceived usefulness and fintech services adoption intention of consumers has the potential to discourage the consumers in adopting fintech services. Thus, this research argues that DOI theory in totality should be used to have a better understanding of the relationship between the diffusion of fintech services as an innovation and behavioral intention to adopt fintech services. Also, to derive a stronger model to explain consumers' acceptance of fintech services introduced by banks, this research takes the example of the study of Al-Rahimi et al. (2019) which integrates both DOI and TAM. As per the researcher's knowledge the integration of both TAM and DOI (including the five DOI constructs) is the first study of its type in the context of fintech services so far. Thus, concedes to be a promising approach in the literature.

Furthermore, while reviewing the various models in the literature, it is argued that the assumptions of Al-rahimi et al. (2019) and Mutahar et al. (2017) which are closely related to the research models being developed in this research may not be considered as complete. For instance, trust and perceived risk are two additional factors directly affecting the behavioral intention to adopt new technology (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Hu et al. 2019). Thus, the effective influence of the DOI components on perceived ease of use and perceived usefulness alone may not be sufficing to explain the actual adoption intention of consumers. Adding DOI components as anticipators of perceived ease of use and perceived usefulness, as well as the behavioral intention to adopt new technology may not be the only way to examine DOI factors influence intention to adopt indirectly, an argument that may not be true for all times to come. In a way, this research attempts to remove the limitations found in the literature and brings out new knowledge. This research also in a way provides an alternative view with regard to the models developed by Hu et al. (2019) and Muñoz-Leiva et al. (2017) to include DOI components in a limited but more innovative way.

3.4.1 Relationship between relative advantage and perceived usefulness of fintech services

From section 2.4.1 it can be seen that relative advantage of fintech services is defined as "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 1983; p. 15). This implies that fintech services should be perceived to be better than the traditional banking. This definition is used to explain two issues. One is to know the extent to which relative advantage influences behavioural intention of consumers of banks to adopt fintech services during diffusion. The second issue is concerned with the question if it is perceived to be better than traditional banking. This concern is due to the fact that adoption of an innovation if viewed through a theory like TAM, then it is possible to know whether fintech services offers relative advantage and if so whether would be adopted by consumers or not. Precedence for such an

integration is provided by Al-rahimi et al. (2019), Min et al. (2018) and Yoon and Lim (2020) who have empirically tested the relationship between relative advantage and perceived usefulness, although in different contexts. Taking this as the theoretical support this research conceptualizes the relationship between relative advantage of fintech services with perceived usefulness of fintech services. That is to say during and post diffusion, if fintech services is perceived to be useful when compared to the traditional banking services, then it could be considered to offer relative advantage. It is also possible to interpret that if relative advantage of fintech services influences consumers' perceived usefulness of fintech services, then during or post diffusion, the consumer derives greater advantages in relation to the traditional banking leading to potential behavioural intention to adopt fintech services. Taking the relative example of quicker and efficient services available with fintech services as perceived usefulness over traditional banking methods, it can be seen that fintech services' relative advantage leads to perceived usefulness and the resultant construct is the behavioural intention to adopt fintech services. As far as conceptualizing this relationship, it is argued that from the results obtained by other researchers (e.g. Min et al. 2018; Yoon & Lim, 2020) who tested the abovementioned relationship empirically it is possible to conceive that relative advantage of fintech positively influences perceived usefulness of fintech. The relationship that emerges is:

- Relative advantage → perceived usefulness (Yoon & Lim, 2020; Al-rahmi et al. 2019)

The hypothesis is:

H4a: During diffusion relative advantage of fintech services positively influences the consumers' perceived usefulness of fintech services.

As far as evaluation of relative advantage of fintech, it could be seen that most researchers have used multi-point Likert scale to collect data and measure it (e.g. Mutuku, 2019; Siddik et al. 2014; Moore & Benbasat, 1991). This research proposes to adapt the instruments already tested by other researchers for testing relative advantage.

3.4.2 Relationship between relative advantage and perceived ease of use of fintech services

Linking relative advantage of fintech services to perceived ease of use of fintech services could provide knowledge on the relative advantage offered by fintech over traditional banking services, during or post diffusion of fintech services. All other explanations given with regard to linking DOI and TAM in the previous section apply to perceived ease of use. For instance, perceived ease of use of fintech services could perceived by doing transacting banking through fintech services channels instead of going to the bank to do the same transaction, which is a relative advantage that can be realized by the consumer in regard to traditional banking services. When the relative advantage of fintech services leads to perceived ease of use, then the resulting construct is that behavioural intention to adopt fintech services. Here integration of DOI

and TAM concepts are seen in operation. Thus, it is possible to develop a relationship between relative advantage of fintech services and perceived ease of fintech services which is supported by other researchers (e.g. Al-rahimi et al. 2019) and is as follows:

Relative advantage → perceived ease of use (Al-rahmi et al. 2019)

The hypothesis is:

H4b: During diffusion relative advantage of fintech services positively influences the consumers' perceived ease of use of fintech services.

Evaluation of relative advantage and perceived ease of use have already been discussed in sections 2.4.1 and 2.3.3 respectively.

3.4.3 Relationship between complexity and perceived usefulness of fintech services

Complexity is defined as the degree to which an innovation is perceived as difficult to understand and use (Rogers, 2002; p. 990). Complexity in using fintech services is described as the perceived difficulty of learning to use and understand technology (Sonnenwald et al. 2001). Whether a complex fintech service will be adopted during diffusion is the moot question that needs to be examined. Fintech services could be a complex technology to learn, understand and use by consumers. This could lead to drop in the growth rate of adoption of fintech services. In order to understand to what extent fintech services are complex or not during diffusion and to what extent it could influence the behavioural intention of the consumers of banks to adopt fintech services, the integration of TAM and DOI theories was used. The concept of integrating DOI and TAM constructs is suggested in the extant literature (e.g. Al-rahimi et al. 2019; Hubert et al. 2018) although in different contexts. Those arguments are taken in this research as a support to the linkage between complexity of fintech services and behavioural intention to adopt fintech services, by the mediation of perceived usefulness of fintech services, a TAM construct. Thus, it is argued that if fintech services is perceived to be useful (e.g. efficiency in operating consumers' bank accounts with a very high degree of safety), then it is possible that consumers could make efforts to learn to use a complex technology like fintech services leading to adoption. This implies that complexity of fintech services could be reduced if the perception of usefulness of fintech services are found to be high, encouraging the consumers to adopt fintech services. That is to say that if complexity of fintech services are low then its influence on perceived usefulness could be high. Similarly, if complexity of fintech services are high then its influence on perceived usefulness could be low. The relationship that emerges is:

Complexity → perceived usefulness (Yoon & Lim, 2020; Al-rahmi et al. 2019; Hubert et al. 2018).

The hypothesis is:

H5a: During diffusion complexity of fintech services negatively influences the consumers' perceived usefulness of fintech services.

While evaluation and measurement of perceived usefulness has already been discussed in section 2.3.2, complexity is measured using multi-point Likert scale by adapting the instruments developed and tested for its validity by other researchers (Sonnenwald et al. 2001).

3.4.4 Relationship between complexity and perceived ease of use of fintech services

Perceived ease of use is another TAM construct that could be used to integrate DOI and TAM theories. Such an integration could explain how complexity of fintech services could be linked to behavioural intention to use fintech services, by the mediation of perceived ease of use of fintech services. Noting that the arguments related to perceived usefulness of fintech services provided in the previous section could be extended to perceived ease of user fintech services. It is aruged that perceived ease of use could be used as a construct that could indicate whether consumers could be willing to adopt fintech services, if it is complex. For example, if fintech services is perceived to be easy to use (e.g. easiness in transacting without going to the bank physically, but in a secure manner) then consumers could make efforts to learn, understand and use fintech services. This implies that the complexity of fintech services could be reduced by the perception of the consumers on its ease of use through their efforts to learn how to use fintech services leading to its adoption. This implies that if the complexity of fintech services is reduced, then consumers may perceive a high level of ease of use of fintech services and hence adopt fintech services. The relationship that emerges is:

Complexity → perceived ease of use (Al-rahmi et al. 2019; Hubert et al. 2018)

This relationship is supported by other researchers (e.g. Al-rahmi et al. 2019; Hubert et al. 2018) although the research efforts of those researchers have been in different contexts. The hypothesis is:

H5b: During diffusion complexity of fintech services negatively influences the consumers' perceived ease of use of fintech services.

As far as evaluation and measurement of complexity and perceived ease of use of fintech services, it is seen that those have been discussed already in relevant sections earlier in this Chapter.

3.4.5 Relationship between compatibility and perceived usefulness of fintech services

Compatibility is defined as "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2002; p.990). In practical terms it is possible to explain compatibility through an example. Such as, a consumer of a bank could perceive

that fintech services are compatible, if that consumer is able to derive the same set of values derived from traditional banking, and if she or he can match their past experience concerning banking transactions and meet their needs, like efficiency and safety banking operation. However, whether compatibility of fintech services will directly lead to behavioural intention of consumers of the banks to adopt fintech services is not clear in the literature (Yoon and Lim, 2020; Lou and Li, 2017; Mutahar et al. 2017; Raza et al. 2017; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010). A few researchers have linked compatibility directly to intention to adopt a technology in the context of banking (Hanafizadeh et al. 2014; Siddik et al. 2014). In contrast to this a few other researchers (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017) have integrated TAM with Compatibility. In either case compatibility of a technology like fintech services could vary among consumers depends on their experience with various other technologies in their life. Hence, what is compatible for one consumer could be incompatible to another.

Considering the importance of compatibility of fintech services in enabling the consumer to perceive the usefulness of fintech services during diffusion, it is argued that the behavioural intention of consumers of banks to adopt fintech could lead to actual adoption (Mutahar et al. 2017). Thus, using the conceptualization of Yoon and Lim (2020) (also see Hubert et al. 2018; Mutahar et al. 2017) it is conceived that compatibility of fintech services influences behavioural intention of consumers to adopt fintech services through perceived usefulness of fintech services. It is further assumed based on the research work of Al-rahmi et al. (2019) (also see Hubert et al. 2018; Mutahar et al. 2017), although conceptualized in a different context, that if compatibility is high then perceived usefulness of fintech services will be high and hence greater possibility of adoption of fintech services by consumers during diffusion. The relationship that emerges is:

- Compatibility → perceived usefulness (Yoon & Lim, 2020; Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017

The hypothesis is:

H6a: During diffusion compatibility of fintech services positively influences the consumers' perceived usefulness of fintech services.

As far as evaluation of compatibility of fintech services is concerned, this research relies upon prior research outcomes found in the extant literature where a multi-point Likert scale has been used to measure compatibility (e.g. Mutahar et al. 2017; Zolkepli & Kamarulzaman, 2015; Hanafizadeh et al. 2014; Moore & Benbasat, 1991).

3.4.6 Relationship between compatibility and perceived ease of use of fintech services

Relationship between compatibility of fintech services and perceived ease of use of fintech services are very similar to the relationship between compatibility of fintech services and perceived usefulness of fintech

services explained in the previous section. Being a TAM construct, perceived ease of use is expected to enable the consumers of a bank to learn and understand the compatibility of fintech services leading to its adoption. That is to say if the compatibility of fintech services is high, then consumers are more likely to adopt fintech services. Similar arguments are posited by Al-rahmi et al. (2019) (also see Hubert et al. 2018; Mutahar et al. 2017). Although there are conceptualisations where compatibility is argued by a few researchers to be directly influencing the adoption of a technology (e.g. Siddik et al. 2014). It is to assume that a perception of a consumers about fintech services as easy to use is likely to enhance the adoption of fintech services. Considering the power that could be generated by integrating TAM and DOI (that is perceived ease of use and compatibility of fintech services) it is possible to conceive the following relationship.

- Compatibility of fintech to consumer use → perceived ease of use (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017)

The hypothesis is:

H6b: During diffusion compatibility of fintech services positively influences the consumers' perceived ease of use of fintech services.

Evaluation of both compatibility and ease of use of fintech has already been discussed in earlier sections.

3.4.7 Relationship between trialability and perceived usefulness of fintech services

Moore and Benbasat (1991) defined trialability as the degree to which a technology may be experimented before a person adopts that technology. Also, Rogers (2003), defines trialability as the degree to which an innovation may be experimented with on a limited basis before deciding to adopt it. Both definition clearly indicates that if fintech services as an innovation is to be adopted by the consumers, then it is arguable that those consumers will first try it out before adopting it. Trying out fintech services could be in any form including practicing the use of fintech services in another person's device like mobile phone or download any fintech application and try it out step by step. In such situations if the consumers perceive that fintech services could be useful to them and easy to use, then the consumers would adopt this services. Here it can be seen that during diffusion, if fintech services are to be adopted by consumers, it is useful to assume that those consumers may reject fintech services if it fails during experimentation, or intend to adopt it, if it is found to be useful and easy to use. Here in practical terms it can be seen that TAM and DOI operate in an integrated fashion which also corroborated by the literature (e.g. Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017). However, conceptualizing trialability in the literature is varied. For instance, Al-Jabri and Sohail (2012) have directly linked trialability with the construct intention to adopt. Contrasting this, Min et al. (2018) have linked trialability through TAM constructs. Considering the fact that researchers

have argued for integrating DOI constructs to TAM constructs as it increases the anticipating of the DOI and TAM constructs. It is argued that trialability of fintech services influences perceived usefulness positively. Implying that higher the trialability of fintech services the greater will be the perception of usefulness of fintech services. The relationship that emerges is:

- Trialability → perceived usefulness (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017)

The hypothesis is:

H7a: During diffusion trialability of fintech services positively influences the consumers' perceived usefulness of fintech services.

Evaluation of trialability has been widely conducted by researchers using instruments with multipoint Likert scales (e.g. Brown et al. 2003; Moore & Benbasat, 1991). As far this research is concerned, it is proposed that tested and empirically established instruments used in prior research will be adapted to measure trialability of fintech services in this research.

3.4.8 Relationship between trialability and perceived ease of use of fintech services

In line with the previous section, in this section it is argued that perceived ease of use of fintech services can be integrated with trialability of fintech using the concept of DOI-TAM integration. Accordingly, it is argued that if consumers perceived that during trials, if fintech services are perceived to be easy to use, then there is every possibility that the consumers would decide to adopt fintech services. However, conceptualization of the linkage between trialability of fintech services to behavioural intention of consumers to adopt fintech services in the literature are contrasting. For instance, Al-Jabri and Sohail (2012) have linked trialability of fintech services to behavioural intention to adopt fintech services directly. While Hubert et al. (2018) have linked trialability of fintech services to behavioural intention to adopt fintech indirectly through perceived ease of use. Considering the possible improvement in the power of the TAM constructs to anticipate behavioural intention to adopt fintech services, it is argued that trialability of fintech services directly influences perceived ease of use of fintech services, which in turn influences behavioural intention to adopt fintech directly. Further, taking the examples of the research outcomes provided by Al-rahmi et al. (2019), it is argued that higher the trialability of fintech services greater will be the influence of trialability of fintech services on perceived ease of use of fintech services. The relationship that emerges is:

- Trialability of fintech use by consumers → PEU (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017)

The hypothesis is:

H7b: During diffusion trialability of fintech services positively influences the consumers' perceived ease of

use of fintech services.

In earlier sections already the method to evaluate trialability and perceived ease of use of fintech services has been discussed.

3.4.9 Relationship between observability and perceived usefulness of fintech services

According to Rogers (2003) innovations that are observed clearly, visible and facilitate communication among user's networks create a positive attitude towards this technology. Moore and Benbasat (1991) define observability as the degree to which the results of using technology are observable to others. Yoon and Lim, (2020) and Mutahar et al. (2017) argue that the observability of fintech services could enable their adoption by consumers. Operationalization of observability as a concept and a variable influencing behavioral intention to adopt technology is not clear and well-identified in the literature leading to difficulties in identifying its nature. For instance, Al-Jabri and Sohail (2012) have argued that the observability of innovation directly influences behavioral intention to adopt. Yet, Mutahar et al. (2017) have used perceived usefulness, a TAM construct, as a mediator along with perceived ease of use to determine the behavioral intention of users to adopt a technology.Despite such contrasting views, it can be seen that considering the fact during diffusion, it is not sure whether consumers are going to adopt fintech services or not, it is hypothesised that observability of fintech services enhances the perceived usefulness of fintech service and hence the consumers' intention to adopt fintech services. It is argued that perceived usefulness of fintech services will be influenced by observability. The relationship that emerges is:

Observability → perceived usefulness (Yoon & Lim, 2020; Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017)

The hypothesis is:

H8a: During diffusion observability of fintech services positively influences the consumers' perceived usefulness of fintech services.

Evaluation of observability has been widely conducted using items measured on a multipoint Likert scale (e.g. Zolkepli & Kamarulzaman, 2015; Park & Chen, 2007). Considering the fact that most of the measurement of observability of a technology or innovation has been through the use of multipoint Likert scale, this research has adapted the scales developed and tested by other researchers, in contexts similar to that of this research.

3.4.10 Relationship between observability and perceived ease of use of fintech services

It has been already mentioned in the previous section that TAM constructs, perceived usefulness and perceived ease of use have been integrated by researchers with DOI constructs to enhance behavioural

intention to adopt fintech services. Consistent with the arguments provided in the previous section, it is hypothesised that observability of fintech services will be integrated with perceived ease of use of fintech services. Thus, could enhance the power of the predictability of TAM constructs during the diffusion of fintech services. Although, some other researchers have argued that observability of a technology could be directly linked to behavioural intention to adopt. That is to say if behavioural traits like perceived ease of use of fintech services are ignored. Thus it is hypothesised that observability directly and positively influences perceived ease of use when fintech services are still diffusing, an argument which is in line with some researchers' outcomes (e.g. Hubert et al. 2018; Mutahar et al. 2017). The relationship that emerges is:

Observability → perceived ease of use (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017).

The hypothesis is:

H8b: During diffusion observability of fintech services positively influences the consumers' perceived ease of use of fintech services.

As far as measurement of observability and ease of use of fintech services are concerned, it can be seen that those have been covered already in earlier sections.

After discussing the integration of DOI and TAM theories in the previous sections, this research examines the conceptualization of trust and its relationship to adopt fintech services.

3.5 Relationship between trust on and Intention to adopt fintech services

Trust is a factor that needs to be considered as an antecedent of intention to adopt fintech services, a relationship supported by Nkoyi et al. (2019). In the research conducted by Nkoyi et al. (2019), it is argued that trust influences consumers' intention to adopt technology in banks. As far as theoretical support to analyses the relationship between trust and intention to adopt a technology is concerned, it can be seen that there is a possibility to apply both social exchange theory and theory of reasoned action (TRA) (2.5.2). While social exchange theory argued that trust and commitment are essential to explain exchange relationships (e.g. purchase intentions) (Yang et al. 2019; Mou et al. 2017), TRA explains the effects of trust on perceptions of consumers' initial acceptance and usage behaviors (e.g. usage of fintech services). However, to support the establishment of a relationship between trust and consumer intention to adopt fintech services (Yang et al. 2019; Mou et al. 2017; Mou & Cohen, 2014), it appears application of TRA is more appropriate to the current research (Taherdoost, 2018; Kuo, et al. 2015). TRA believes that subjective norms are essential determinants of consumer behavioral intention of adopting and drove the actual use of

technology or e-services. Thus, applying TRA in this theoretical framework provide the basis to link trust to intention to adopt fintech services (Taherdoost, 2018; Kuo, et al. 2015).

While trust is assumed to influence intention to adopt in this research, it is necessary to clarify the coexist of TAM constructs and trust in one model, determining a common dependent variable. TAM (Davis, 1989) provides a basis for measuring the effect of external variables on internal beliefs and is found to be one of the most robust models to explain the adoption intention of the technology. However, TAM has ignored inherent factors that could enhance consumers' attitudes towards technology adoption and continued usage behavior (section 2.3). For instance, although previous studies have identified trust as a crucial determinant that could influence the behavioral intentions of customers to adopt technology, its role as an intangible factor affecting adoption intentions of fintech consumers, by interacting with other TAM factors is not explained in the literature. Hence researchers have recommended the inclusion of trust as a factor in future studies and integrated it with the TAM constructs to gain knowledge on its impact on behavioral intention to adopt technology alongside perceived ease of use and usefulness (Yang et al. 2019; Mou et al. 2017) (also section 2.5.1).Thus, trust as a factor can influence behavioural intention of consumers of banks alongside the TAM constructs, perceived ease of use and perceived usefulness. This implies that trust, perceived ease of use and perceived usefulness could have interrelationship. Such a relationship could explain hitherto undiscovered knowledge that could emerge due to the operation of the interrelationship.

Moreover, this research relies upon the theory of reasoned action which argues that trust influences perceptions of consumers' initial acceptance and usage behaviors. Applying TRA leads to two conclusions. first is that TAM constructs are derived from TRA and both address intention to adopt behaviour of users of technology (Meyliana et al. 2019). That is to say the TAM and TRA provide the support for trust, perceived ease of use and perceived usefulness with regard to intention to adopt. Although, each one of them perform different function as indicated by their respective definitions. Secondly, if trust, perceived ease of use and perceived usefulness are used in one model to determine intention to adopt, then there could be a correlation amongst the three. While the theoretical basis for the linkage between perceived ease of use and perceived usefulness to intention to adopt has already been explained in sections 2.5.1.

Although, the relationship between trust, perceived ease of use and perceived usefulness and intention to adopt among researches is inconsistent. While some scholars (e.g. Ozen, 2018) argue that trust affects both perceived ease of use and perceived usefulness when technology adoption intention is anticipated. Some other scholars argue that trust affects perceived ease of use and perceived usefulness directly (Daud et al. 2018 & Muñoz-Leiva et al. 2017). Also, literature shows a reverse relationship established by Meyliana et al. (2019) who argue that both perceived ease of use and perceived usefulness determine trust. Moreover, in many other configurations developed by other scholars it is argued that trust directly affects consumers' attitude or intention of technology adoption in parallel with perceived ease of use and perceived usefulness

(e.g. Hu et al. 2019; Wong & Mo, 2019; Nkoyi et al. 2019; Rodrigo et al. 2019) and not through either perceived ease of use or perceived usefulness. While it is seen that most of the recently published papers have used trust as a construct directly affecting consumers' adoption intention or attitude towards adopting new technology and not through perceived ease of use and perceived usefulness, considering those findings this research argues that trust influences fintech adoption intention of banks consumers.

Linking trust to intention to adopt fintech follows the principles adopted by Lien et al. (2020), Hu et al. (2019) and Muñoz-Leiva et al. (2017) in the context of the diffusion of fintech services. The relationship that emerges is:

Trust → Intention to adopt fintech services (Lien et al. 2020, Hu et al. 2019; Muñoz-Leiva et al. 2017)

An important aspect about this relationship is that during diffusion of fintech services, if the trust of consumers in fintech services is high, then the consumers' intention to adopt fintech services will be high as well. This argument is supported by Lien et al. (2020), Hu et al. (2019) and Muñoz-Leiva et al. (2017). That is to say that trust in fintech services are positively and directly influences intention to adopt fintech services during diffusion of fintech services.

The hypothesis is:

H9: During diffusion, trusting behavior of consumers of banks positively influences the fintech adoption behavior of those consumers.

The concept of trust has been measured by some scholars in the literature including Muñoz-Leiva et al. (2017), Tang and Huang (2015), Hanafizadeh (2014) and Martínez and Bosque (2013) using multipoint Likert scale. This research relied upon the instruments developed by those authors to measure trust. As those instruments have been already tested for their reliability and validity.

At this point it is important to bring in the concept of risk involved in adopting fintech services. The rationale for bringing in risk as a factor at this point is that in the literature it is argued that trust in a technology or innovation is most often associated with risk (section 2.5.4).

3.6 Relationship between perceived risk and trust

Rogers (1995) defines risk as the tendency of a person for accepting threat. Further, perceived risk has a relationship with the person's tendency for accepting particular innovation based on its negative side effect and the probability of that risk occurring (Rogers, 1995). In the context of diffusion of fintech as an innovation, it can be argued that consumers are unlikely to ignore the existence of risk in using fintech services. Supporting this argument Ryu et al. (2020) say that uncertainty associated with fintech services

make customers to hesitate in adopting and using of fintech services, which perception of risk. There are many examples in the literature that support the existence of risk and perception of risk amongst consumers of innovation and fintech services e.g. Namahoot et al. (2018), Sobehart (2016) and Song (2010). While Namahoot et al. (2018) investigated the role of perceived risk and trust as mediating factors in assessing the intentions to use internet banking, Sobehart (2016) studied the concept of fintech services using the factors earnings uncertainty and credit risk in competitive business environments with disruptive technologies. In fact, Song (2010) studied the integration of TAM with trust, perceived risk and quality while investigating the customer adoption of Internet banking. These examples clearly point out the existence of perception of risk in the minds of users of fintech services and innovation. Also, it appears that it is imperative to include perceived risk alongside trust as an important element while discussing an innovation and its diffusion.

Moreover, to establish perceived risk as a factor affects the fintech services adoption intention of consumers and identify the theory that could be used to support the argument. According to literature (Meyliana et al. 2019; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014) perceived risk is an intangible factor inversely affecting the trust of consumers and their intentions to adopt the technology. This research uses the Protection Motivation Theory (PMT), one of the most cited theories related to explaining risk perceptions, which argues that risk perception, injuries, and incidents are related, and peoples take shielding action when they are motivated and have the agency to do so (Bodemer & Gaissmaier, 2015) (Also section 2.6.2). For instance, in the case of the adoption of fintech services, most consumers will take protective action before adoption to eliminate anticipated negative consequences that could cause them damage. Fintech is a new technology and customers may be initially skeptical to adopt fintech services as consumers could perceived that it may be risky to adopt. It may take some time for the consumers to overcome the feeling of risk as they evaluate fintech services over some time and develop trust in fintech servcies. Moreover, as mentioned above several researchers have recommended to include beliefs such as risk while studying the adoption of new technology. PMT supports the inclusion of risk in this research. Furthermore, while the use of a trust in this research has been justified in section 3.5, it must be noted that the relationship between perceived risk, trust and consumers' intention to adopt fintech services, in this research relied on TRA and PMT. TRA says that beliefs and subjective norms are the key determinants of consumer intention to accept information systems or e-services (Mou et al. 2017; Mou & Cohen, 2014). Beliefs mentioned in TRA could be linked to risk perceptions by applying PMT. For instance, if a consumer wants to adopt fintech services, then by applying the PMT it can be argued that the consumer will initially weigh the extent of risk involved in adopting fintech services and over a period of time may opt to adopt or ignore fintech services based on reasoning and perception of risk involved in adopting fintech services which could be explained by TRA. Thus, this research examine the application of PMT and TRA to the central issue of determining the behavioural intention to adopt fintech services using perceived risk and trust during diffusion and in the

presence of TAM factors.

According to the literature, the advent of new technology initially is unlikely to be accepted straight away by the end-users. Users are cautious about using new technology until they develop trust in technology. There have been many examples cited in the literature that indicate risk as a factor that negatively influences many other factors including those linked to the intention to adopt technology and trust (Meyliana et al. 2019; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014). Since the focus of this section is on the relationship between perceived risk and trust, the discussions center around those two factors. Literature (e.g. Ayo et al. 2015) shows that perceived risk has been argued to influence perceived usefulness regarding the intention of citizens of Nigeria to use E-Democracy. Ayo et al. (2015) showed that perceived risk was considered as an independent variable. Similarly, perceived risk has been argued to negatively influence trust in the context of citizens dealing with e-government by Inglehart and Norris (2016). Meyliana et al. (2019) argue that trust and perceived risk independently affect perceived ease of use and perceived usefulness respectively and there is no relationship between the two.

While Muñoz-Leiva et al. (2017) in their research on banks argue that perceived risk not only affects perceived trust, but also consumers' intention to adopt new technology in the context of fintech servcies adoption. Although the results of those researchers showed that the direct relationship between perceived risk and intention to adopt was not significant. Thus, operationalizing perceived risk has not been consistent in the literature. For instance, Hu et al. (2019) (also see Senyo & Osabutey, 2020) empirically tested the relationship between perceived risk and trust as influencing the attitude towards adopting fintech services and intention to adopt fintech services in the context of users of bank in which perceived risk was an independent variable. Trust was shown to mediate between perceived risk and attitude of the users and eventually intention to adopt. An important finding of the studies conducted of Hu et al. (2019) and Senyo and Osabutey (2020) is that perceived risk is an independent variable that affects trust negatively. However, Ryu et al. (2020) used perceived risk as a mediating variable driven by trust of the consumers continuously using fintech services. In their research Ryu et al. (2020) showed that both trust and perceived risk mediated between quality and fintech servcies continuous intention to adopt. The significant finding of Ryu et al. (2020) is that trust inversely affects perceived risk of consumers. The foregoing arguments clearly show that conceptualization of perceived risk and its relationship with trust is not consistent and well understood in the fintech services literature. That is to say that it is not clear in the literature how trust as an intangible factor needs to be conceptualized while dealing with TAM constructs and in the presence of perceived risk as an independent or dependent mediating factor (Senyo & Osabutey, 2020). This implies that without an understanding of how trust can be conceptualized it will be difficult to determine the impact of perceived risk on the behavioral intention of consumers to adopt fintech services which are gaps in the literature. Moreover, it must be highlighted that concepts examined by the abovementioned research efforts have not

considered the aspect of diffusion of fintech services. This is another gap found in the relevant literature which this research aims to fill.

Existing literature clearly shows divergence amongst researchers on the relationship between perceived risk and trust in the literature concerning adoption of technology. Hence, it is reasonable to argue that in the context of fintech services, a relationship between trust and perceived risk needs to be examined to gain a better understanding of the effects consumers' behavioural intention to adopt fintech services. While examining this aspect in this research, the researcher has assosicated with the research efforts of Boz & Özen (2019), OECD (2018) and Corritore et al. (2003). Thus, it is possible to argue that perceived risk of consumers whose behavioural intention to adopt fintech services, influences the trust of the consumers who intend to use fintech services negatively when fintech services are still diffusing. The emerging relationship is:

- Perceived Risk → Trust

The hypothesis is:

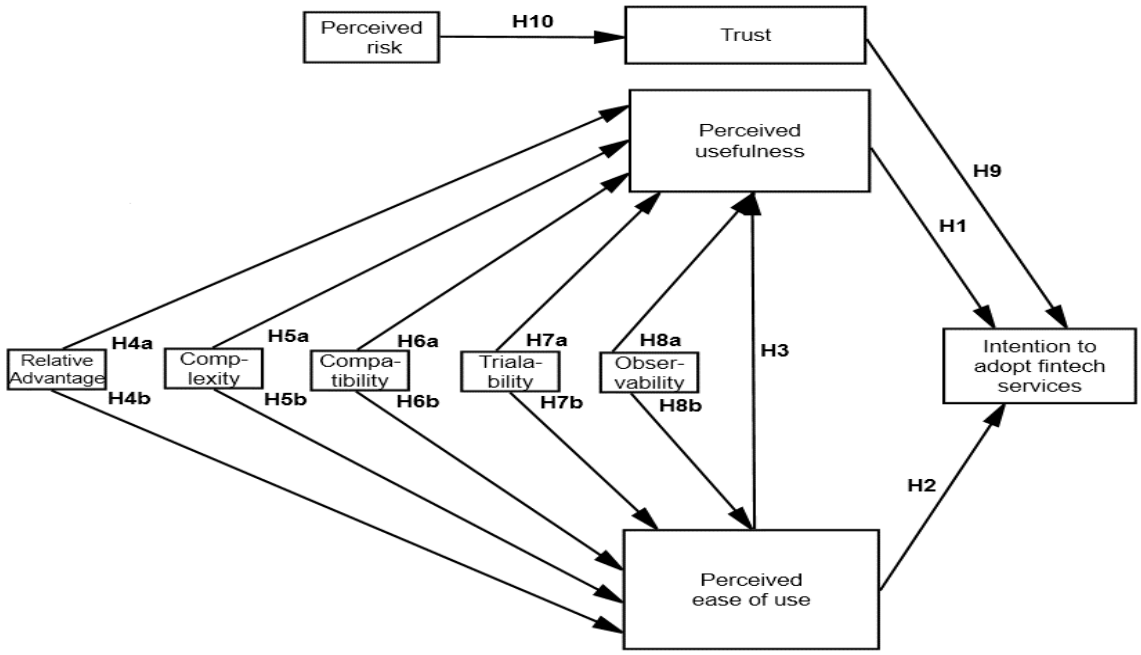
H10: During diffusion, the perceived risk perceived of consumers of fintech services, negatively influences the trust behavior of consumers of fintech services.

Furthermore, the measurement of the constructs perceived risk has been dealt with by a few researchers in the literature including Thakur and Srivastava (2013), Chen (2013), Akturan and Tezcan (2012), Koenig-Lewis et al. (2010) and Lee (2009). This research has developed a Likert based instrument to measure perceived risk of the consumers by adapting the developed and tested instruments of the researchers mentioned above.

3.7 Proposed conceptual model and extracted theories

Figure 3.1 shows the proposed conceptual model drawn based on the above hypotheses and arguments. Also, this research focus on consumers' perceptions of constructs and hypotheses in the proposed conceptual model.

Figure 3. 1 Proposed Conceptual Model



Based on the above theoretical model, the following mathematical relationships has been stabilished:

Structural equation

1) Intention to adopt fintech services = $k_1 + \beta_1$ Perceived usefulness + β_2 Perceived ease of use + $e_1 \rightarrow$ ①
2) Perceived usefulness = $k_2 + \beta_3$ Perceived ease of use + β_4 Relative advantage + β_5 Complexity + β_6 Compatibility + β_7 Trialability + β_8 Observability + $e_2 \rightarrow$ ②
3) Perceived ease of use = $k_3 + \beta_9$ Relative advantage + β_{10} Complexity + β_{11} Compatibility + β_{12} Trialability + β_{13} Observability + $e_3 \rightarrow$ ③
4) Intention to adopt fintech services = $k_4 + \beta_{14}$ Trust + $e_4 \rightarrow$ ④
5) Trust = $K_5 + \beta_{15}$ Perceived risk + $e_5 \rightarrow$ ⑤

where 'β' refers to the regression coefficient, 'e' represents the error component and 'k' is the constant.

Independent variable:

1) Risk 2) Relative Advantage 3) Complexity 4) Compatibility, 5) Trialability 6) Observability

Dependent variable:

1) Intention to Adopt fintech servcies

Mediating variable:

1) Trust 2) Perceived usefulness 3) Perceived ease of use

3.8 Chapter Summary

Chapter 3 provides detailed explanations on how the conceptual model was developed and proposed hypotheses were drawn supported by the literature review. From the above discussion, it is conceived that perceived risk in the minds of consumers intending to adopt or have adopted fintech services could affect the trusting behavior of those consumers negatively. In such a situation, it is not easy to anticipate how trust could impact the TAM components, perceived ease of use, perceived usefulness, and how new technology (e.g. touch screen mobile devises) diffuses amongst the consuemrs. Most often, answers to these questions are not easily provided and it is over a period of time that users either accept or reject the technology. For any reason the technology is a failure (e.g. blackberry) then it could involve huge costs incurred by the banks, consumers and other stakeholders. Therefore, it will be worthwhile to find out a mechanism that could indicate in advance whether fintech services will be useful during diffusion and could sustain over a period of time taking into account the combined effects of perceived risk, trust, perceived usefulness, perceived ease of use and the DOI components on the consumer. The anticipation of the fintech services adoption intention for its success using as an indicator like usefulness of a technology by applying the concepts of risk, trust, DOI and TAM is new knowledge not found in the literature. Therefore, this research bridges the aforementioned gap by proposing a conceptual model, which is a first of its kind to investigate the relationship between consumers' behavioral intention to adopt fintech services using TAM and DOI components in presence of other factors such as trust and risk. The next Chapter will present the methodology that will be followed to investigate the proposed conceptual model.

Chapter 4: Research Methodology

4.1 Introduction

While Chapter 3 familiarizes the proposed conceptual framework model along with ten hypotheses for investigating the behavioral intention to adopt fintech services form the consumers' perspective. This Chapter aims to explain and justify the purpose of selecting the chosen research methodology, framework, design, strategy and data collection methods and data analysis.

The Chapter is structured as follows. Section 4.2 covers the three phases of the research structure (i.e. theoretical phase, statistical analysis phase and interpretation phase). While the explanation of the nature of the study and identifying the best type fits for this research is provided in section 4.3. Section 4.4 covers the three types of research philosophies along with the justification behind selecting positivism assumptions as of the underlying philosophy for this research and the foundation assumption of the research ontology and epistemology. Section 4.5 illustrated the difference between the deductive and the indicative research approaches, then justifies the reason behind utilizing the deductive approach for data collection in this study. Moreover, section 4.7 highlighted the main element of research design, such as the research strategy, research purpose, extent of researcher interference with the study, study settings, the time horizon, the unit of analysis, data collection and data analysis. Details of the research survey and the development and the validation of the research questionnaire are provided in section 4.8 and 4.9. An overview of the data analysis software tool used in this research and emphasized the justification behind using SEM and AMOS tools for data analysis is provided in section 4.10. Section 4.11 covers the ethics approval. The research stages that best serve the research questions put forward in this study and the Chapter summary are outlined in section 4.12 and section 4.13.

4.2 Research Structure

According to Tornatzky and Klein (1982) for an ideal innovation adoption research, the research should use research approaches that are replicable, reliable, and allow some degree of statistical power. Thus, to address the research questions in Chapter1, this research structure could be divided into three phases as listed below and illustrated in Figure 4.1.

4.2.1 Theoretical analysis phase

The initial stage of this research starts with exploring and understating the concept of the diffusion and the adoption of fintech services among the bank consumers and how it has been pursued. During this stage, the researcher performs a theoretical analysis to develop a conceptual model. Thus, the theoretical analysis formed the foundation for this study. The objective of the theoretical analysis is as follow:

- Examine the current related literature for the main theoretical models formulated to study the adoption of consumers of fintech services introduced by banks.
- Identify the critical factors that influence the adoption of fintech services from the related literature.
- Develop the conceptualize a theoretical framework for the adoption of fintech services based on the appropriate theories and factors in the literature.

4.2.2 Statistical analysis phase

The statistical analysis stage examines which of the factors identified in the literature could affect the adoption of fintech services by the consumers of the bank in practice. The objective of the statistical analyses is as follow:

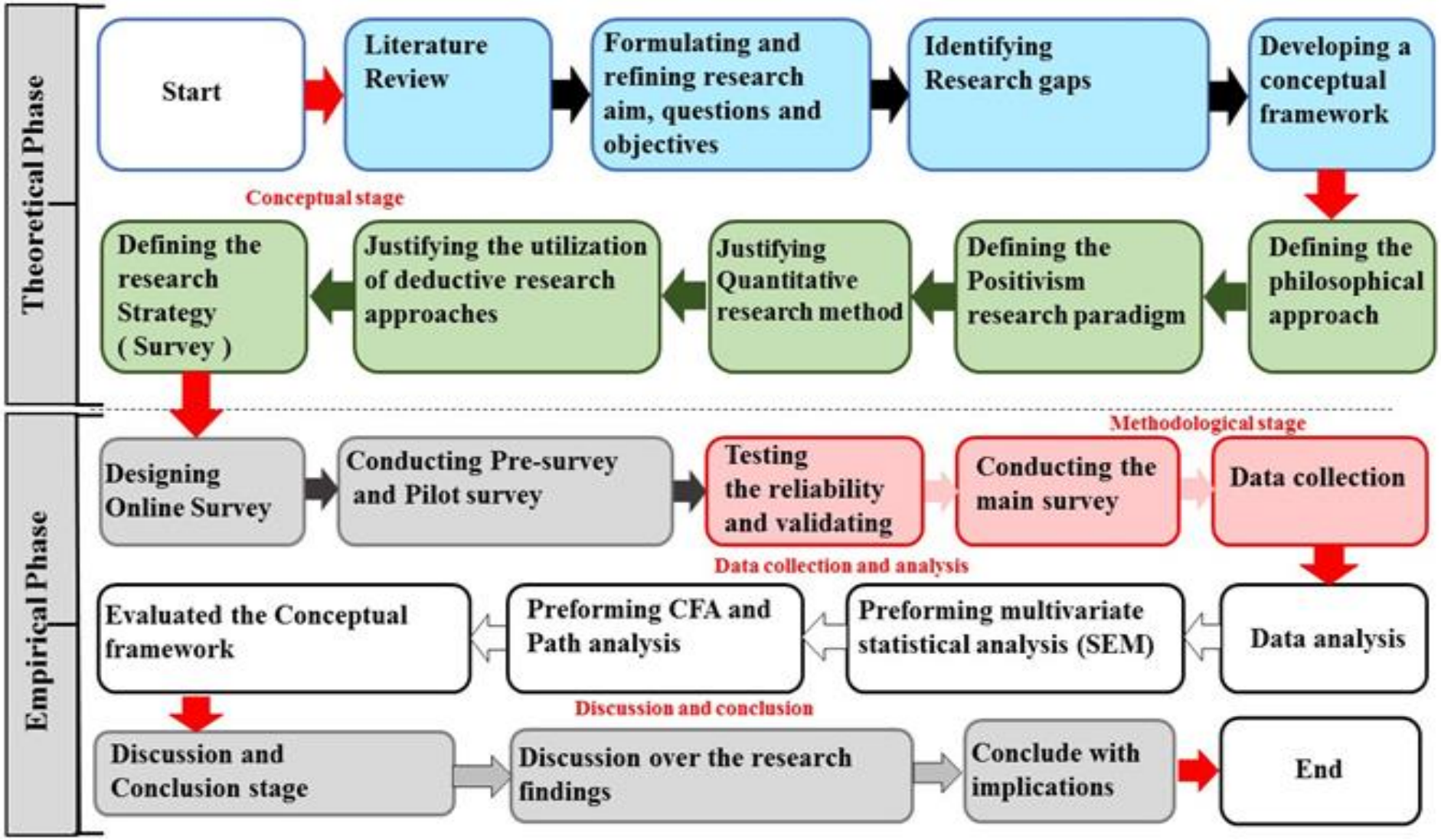
- Examine the factors that determine the consumers' behavioral intention to adopt fintech services of the consumers of the bank.
- Explore various research conditions that influence the relationship between the identified determinants and fintech services adoption.
- Propose, hypotheses and verify the factors through an appropriate methodology, and test the developed conceptual model.

4.2.3 Interpretation phase

The last stage of the study integrates the result acquired from the theoretical analyses and the statistical analyses to derive the overall framework for the behavioral intention to adopt fintech services. The objective of this stage is as follow:

- Proposed a model that incorporated the factors that supposedly influence behavioral intention to adopt fintech services among the bank consumers.
- Discuss the significance of such a model for successful adoption and implementation for the banks
- Discuss the overall results and the contribution to the body of knowledge in terms fintech services adoption research area.

Figure 4. 1 The research structure of this study

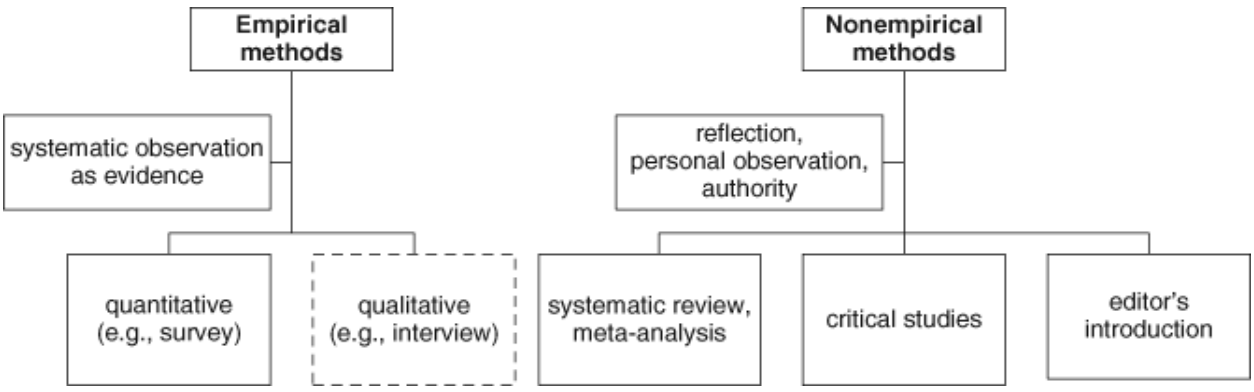


4.3 Nature of the research

Research methods can be classified as empirical or non-empirical. Empirical research is carried out based on a scientific method where information is gained by observation, experience, or experiments (DePoy and Gitlin, 2011). This method is engaged in communication studies to yield objective and consistent findings. The key principle of empirical research is to utilize the data to test the theory. According to Bryman, and Bell (2011) empirical method is the approach used to study the reality where knowledge gained is subject to rigorous testing. Empirical is positivistic by its nature, in the sense that the social world is perceived as governed by laws. Generally, empirical research is associated with quantitative measures, such as surveys and content analyses (Dan, 2018). Nevertheless, nowadays secondary data analyses and qualitative research could be also considered as empirical (See Figure 4.2). While, in non-empirical research methods subjective arguments can be built by the researcher, without data being validated. Non-empirical research methods do not convey any form of investigation and are only conducted by reviewing the literature on a certain subject. Thus, non-empirical research methods are generally divided into two, the first non-empirical methods intend to review the progress of certain research field, such as meta-analysis and literature review (Creswell et al. 2016; Bryman, and Bell, 2011; DePoy and Gitlin, 2011). The second non-empirical research methods are drawn on personal observations, reflections on current events, and the authority of the author's experience, such as the editor's introduction and critical studies. Moreover, research methods can be entirely empirical, non-empirical, or a combination of both (Dan, 2018; Creswell et al. 2016; DePoy and Gitlin, 2011).

The evaluation of this study could be described as empirical nature. As, this research required an experimental-type assessment indicate the relationship between the identified factors and behavioral intention to adopt fintech services.

Figure 4. 2 Empirical and non-empirical methods



Source: Dan (2018, p. 985)

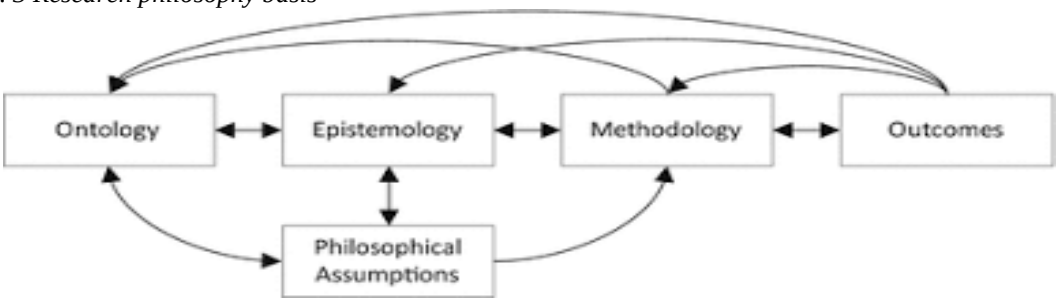
4.4 Research Philosophy

Before carrying out the empirical research of the consumers' behavioral intention to adopt fintech services, identifying philosophical underpinning on which the research methodology was grounded needs to be explained (Saunders et al. 2019). Therefore, in this section, the philosophical assumption and paradigms used in this research are discussed (Saunders et al. 2019).

The research philosophy is what a researcher perceives to be a reality, truth, and knowledge (Nguyen et al. 2019; Ryan, 2018; Yin, 2013; Vaishnavi and Kuechler, 2015; Creswell, 2003). The research philosophy comprises the researcher's views and assumptions about the world (Saunders et al. 2019). The outlines of these beliefs, assumptions, and values guide the researcher to apply the required knowledge with regard to research strategy, design, formulation and problem as well as data collection and analysis (Saunders et al.2019; Bryman and Bell, 2011).

In academic research studies, researcher views of the world are also known as 'Paradigm'. Kuhn (1970) introduced the concept of paradigm. But Creswell (2009) refers to the research paradigm as a school of thought or the framework for thinking about how the research inquiry should be guided to demonstrate reality. The paradigm of research entails epistemology (knowledge), ontology (reality), and methodology (Nguyen et al. 2019; Jolita, 2018; Holden and Lynch, 2004). Therefore, identifying the basis of philosophy reveals the central assumption of the epistemology, ontology and research methodology (Figure 4.3).

Figure 4. 3 Research philosophy basis



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Source: Schlegel (2015, p.98)

4.4.1 Research ontology

Ontology is based on the nature of reality or the nature of the world. According to Fox et al. (2007) social entity in the ontology should be considered as threefold:

1) Objectivism "Objective world": independent of social actors.
2) Constructivism "Socially constructed world": shaped from social actors' perception and actions.
3) Realism "Individually constructed world": views the world as the construction of individuals' reality and experiences.

Research disciplines are either parallel to one of the above world views or represent a combination of those models. Research disciplines are classified as objective or subjective of the research (Matthews and Ross, 2010). Moreover, the methodological choice is related to the philosophical position of the analysis of the social science phenomenon (Jolita, 2018; Holden and Lynch, 2004).

Objectivism is a form of ontology that asserts social phenomena and their meanings have an existence that is independent of social actors (Bryman and Bell, 2011). Objectivism refers to the structure of the social world that is not subjective to human beliefs, language, culture, and perceptions that it describes. Objectivism takes into account verifying the reality of a social phenomenon using reliable measures, such as the use of experiments to gather data and test research hypotheses (Bryman and Bell, 2011; Creswell, 2009; Fox et al., 2008). The constructivism position emphasizes the dynamic role of social actors and regularly changes as the people and society change (Creswell et al., 2016; Bryman and Bell, 2011). Thus, there is no single reality in the constructivism ontology position and researchers ascribe their understanding and perception to their study as part of the social world (Matthews and Ross, 2010). However, both objectivist and constructivist ontological positions introduce a conflicting point to uncover the reality of the social world. Furthermore, the realism ontological position partly believes in reality related to the social members involved in it and things that can be known through senses (Matthews and Ross, 2010). In realism ontology both researchers and social actors construct their reality. Researchers' objectives are to attain some level of objectivity and guarantee that interoperations, experiences, and biases do not influence the research results.

This study adopts the objectivism proposition as the ontological position for this research through the user's experimental-type predictive evaluation. As explained earlier, this approach concludes that there is just one single truth, which can be objectively anticipated in the behavioral intention to adopt fintech services by the bank consumers.

4.4.2 Epistemology

Epistemology symbolizes the assumptions of the research knowledge and method in which it is obtained. Epistemological assumptions guide the answer to the research questions of "how do we come to know it" (DePoy & Gitlin, 2016). Epistemology deals with the philosophy that determines the kinds of knowledge that is sufficient and valid for the research (Saunders et al. 2019). Three philosophical/epistemological assumptions are frequently used to guide the methods and analysis of research: positivism, interpretivism, and critical realism (Saunders et al.2012; Bryman and Bell, 2011; Mingers, 2003; Orlikowski and Baroudi, 1991). However, the main two assumptions used in the IS research are positivism and interpretivism (Gregor, 2006; Chen, 2004; Orlikowski and Baroudi, 1991). Among those two assumptions, the positivism approach is the most common one used in the related literature (Yin, 2009; Mingers, 2003; Orlikowski and

Baroudi, 1991). Moreover, critical theory is rarely applied in IS research.

Positivist research philosophy claims that the social world can be understood in an objective way (Bryman and Bell, 2011). Positivist research utilizes natural science methods in the study of social reality. Under this research philosophy, the researcher is an objective analyst who believes in science and the neutral process to discover a single truth (Jolita, 2018; Holden and Lynch, 2004). This means that the researcher will dissociate himself or herself from personal values. The research philosophy justification under this approach is based on empirical verification and tested theories. Researcher adopts cause and effect analysis to anticipate the relationships among key variables to explain the social phenomena (Saunders et al., 2019; Creswell et al., 2016). Thus, data collection, hypothesis development, and conceptual model are used to test theory for understanding a certain phenomenon that is in question (Creswell, 2009; Weber, 2004; Orlikowski and Baroudi, 1991). The hypotheses will be tested, confirmed with facts, figures, measures, and numbers as opposed to the researchers' beliefs and the same could be used for further research (Schlegel, 2015; Orlikowski and Baroudi, 1991).

Positivism philosophy follows a highly structured methodology, quantifiable observations in which reliable statistical analysis is obtained (Saunders, 2019). With regard to research concerning social science empirical research (e.g. technology acceptance research), most of the researchers have adopted the positivist epistemology (Mohamed & Jokonya, 2021; Coleman, 2020; Khwaja & Zaman 2020; Qasem ete al. 2020). Moreover, Table 4.1 provides some of the strengths and weaknesses attributed to the positivist philosophy.

Table 4. 1 Strength and weakness of positivist philosophy

Philosophies	**Strengths**	**Weaknesses**
Positivist	• May provide broad coverage of the range of a situation. • Can be economical and fast. • Where statistics are aggregated from large sample, they can of considerable relevance to policy decisions.	• Methods employed tend to be rather artificial and inflexible. • Not very effective for understanding processes or significance that people attach to actions. • Not very helpful in generating theories. • In having a focus on what is, or what has been recently, positivist approaches make it hard for policy makers to infer what action and changes ought to take place in the future.

Source: Amaratunga et al. (2002, p.20)

Despite its weaknesses, it can be seen from Table 4.1 that the strengths of positivist philosophy provide significant advantages to conduct empirical research. In addition, it must be noted that positivist research philosophy is concerned with objective ontology, deductive research approach and quantitative research method (Winit-Watjana, 2016).

Interpretive research philosophy claims that when the basis of the principles is not easy to understand to the social world, then it can be interpreted in a subjective manner (Schlegel, 2015). Different subjective interpretations of reality are considered scientific knowledge. Thus, this approach aims to understand certain phenomena through human behavior (Bryman and Bell, 2011; Orlikowski & Baroudi, 1991). Further, researchers state that the greatest attention here is given to understand the ways through which people experience from the participant's own belief (Saunders, 2019; Yin, 2009; Mingers, 2003). This research philosophy emphasizes the difference between researching humans rather than objects such as computers or medicines. Under this philosophy, the interpretation of the social reality will be presented based on the researcher's perspective of a set of meanings that is mainly associated with his or her beliefs and intention. Thus, there is no single reality "truth", rather, the reality is based on the individual's perceptions and experience (Saunders et al., 2019). This is in contrast to positivist research, which is based on figures and measures (Creswell and Poth, 2017; Schlegel, 2015; Bryman and Bell, 2011; Orlikowski and Baroudi, 1991). While subjectivity and bias are taken into account, interpretive research philosophy, to some extent, tends to be unstructured and flexible. Moreover, a qualitative or descriptive research method is used for small-scale data collection such as interviews and ethnographic methods (Weber, 2004). As far as its strength and weaknesses are concerned, those are tabulated in Table 4.2.

Table 4. 2 Strength and weakness of interpretive philosophy

Philosophies	Strengths	Weaknesses
Interpretive	• Data gathering methods are seen as to be natural rather than artificial • Ability to look at change processes overtime, • Ability to understand peoples meaning. • Ability to adjust to new issues and ideas as the emerge. • Contribute to theory generation	• Collection to be tedious are require more resources. • Analysis and interpretation of data may be more difficult. • Harder to control the pace, progress and points of research process • Policy makers may give low creditability to results emerging from qualitative approach.

Source: Amaratunga et al. (2002, p.20)

Critical realism is the type of research philosophy that normally seeks to challenge world views and the underlying power structures that create them (Ryan, 2018; Bronner, 2011). Critical realism takes into account the historical realist perspective on ontology and argues that "to move forward", a researcher must "look backward" (Ryan, 2018; Bronner, 2011). Critical theory research focuses on developing or changing reality by promoting emancipation (Bryman and Bell, 2011; Creswell, 2009; Orlikowski and Baroudi, 1991). Moreover, critical research tends to criticize or question reality effectively and efficiently. Although, there is no single defined methodology approach used for critical research, yet this research philosophy leans toward the interpretive approach (Bryman and Bell, 2011). IS research generally discussing matters related to previous studies concerning gender, power, digital divide, and IS failure indicating that IS researchers concentrate on some groups only and promote and further the concept of emancipation. Because

of this reason, the critical research approach is not widely used in IS research (Richardson and Robinson, 2007; Niehaves & Stahl, 2006).

Table 4. 3 Illustrate and summarized the three philosophical/epistemology assumptions

Assumptions	Positivist	Interpretivism	Critical realism
Ontology	Single reality is related to natural phenomena and their properties and relations.	Multiple socially constructed realities.	Historically constituted social reality.
Epistemology	Objective sensory experience is interpreted through reason and logic.	Subjective understandings through the meanings that people assign.	Social critique whereby the restrictive and alienating conditions of the status quo are brought to light
Axiology	Universal facts, prediction, and probability	Hermeneutical and phenomenological understandings	Conflicts and contradictions in contemporary society
Common Methods	• Observation, • statistical • Quantitative	• Hermeneutical dialectical • and qualitative	• Action research • Case study

Based on the foregoing discussion, and the objectivist ontological position of this research, the most appropriate philosophy approach to be used in this research is the positivism paradigm, as this research aims to explain a reality that exists and does not seek to create a new reality. This research aims to determine the reality of events experienced by the bank consumers for the diffusion and the adoption of fintech services. Thus, the critical realism philosophy is excluded from the selection. Moreover, this research tends to investigate a certain phenomenon by testing existing theories and not focus on understating this phenomenon over accessing the 'meaning' and prospective of participants have about the phenomenal. Therefore, interpretive research philosophy is also excluded from the selection. Besides, this research aims to investigate the adoption of fintech services on the bank consumer by adopting a quantitative research methodology to validates the developed conceptual model that builds upon previous theoretical framework and model. Causal relationships between the key variables and fintech adoption will be anticipated. Therefore, positivist philosophy viewpoints consider being more appropriate research for this study.

Taking example of the phenomenon of diffusion of fintech services and its adoption by consumers of banks, it can be seen that consumers could either adopt fintech services or may not adopt. In either case it is clear that the decision of the consumer is positive. The consumers are able to clearly and tangibly feel the presence of the technology. This is clear knowledge that is understood by the consumers. Moreover, when the consumers want to use it, they must adopt the principle behind fintech and start using it. This also well-defined knowledge without any scope for ambiguity. Thus it can be seen that customers have understood "what is the knowledge behind usefulness of fintech services" which enables them to be positively adopt fintech services. Thus, the role played by positivism which could be adopted as the philosophy by the

researcher who is studying the adoption behaviour of consumers of banks.

4.5 Research approach

‘Research approach’ is a term used to refer to the combination of theory construction and data collection (Saunders et al., 2019). According to Creswell et al (2016) research logic is classified into two central approaches namely inductive and deductive. A researcher should take into account whether a theory itself would result in an outcome of the conducted research or the conducted research should start with a theory. Thus, choosing the appropriate research approach is crucial (Creswell and Poth, 2017).

Deductive studies or what is commonly known as "top-down" are the kind of studies that test a theory by empirical observation (Kowalski, 2020). One way of testing a theory is by using hypotheses (Huang et al.,2020). Therefore, several developed hypotheses were introduced based on a theory, causal relationships, and conceptual framework. This approach tends to collect, analyze, and explain the data to provide answers to the posited hypotheses through empirical observation and experimentation (Bryman and Bell, 2011). Following the testing of the proposed hypotheses, the underlying principles are either confirmed, modified, or rejected scientifically. The operationalized data gathered for sufficient sample size, are quantitatively observed and could be generalized to a wider context (Saunders et al., 2019).

Although positivist philosophical approaches and quantitative methods are commonly used in deductive studies (Kowalski, 2020). Some studies might utilize qualitative methods (Saunders et al 2019; Hyde, 2000). Moreover, the purpose of the deductive approach is to prove if the proposed conceptual framework is applicable or inapplicable. Thus, the deductive process aims to advance and not building a new theory (Saunders et al., 2019; Creswell et al., 2016; Hyde, 2000).

Inductive studies or what is commonly known as “bottom-up" refer to the studies that build theories from observations of empirical reality (Saunders et al., 2019). Unlike deductive studies, the inductive approach starts with a small amount of supporting content, and then the researcher builds the concepts and the theories (Saunders et al., 2019).

Keeping in mind the above argument, this research employed a deductive approach by utilizing the developed conceptual framework that guided the empirical study. Also, taking into account the philosophical background, and in line with the positivist paradigm, the deductive approach was considered to be more suitable for this research. The aim was to utilize the deductive approach to understand and anticipate the relationship between different attributes concerning fintech services adoption using adoption and diffusion theories.

4.6 Research methodology

Generally, there are three types of methodologies implemented for research: quantitative, qualitative, and mixed methods (Bryman and Bell, 2011; Creswell et al., 2016). According to Bryman and Bell (2011), the process of characterizing the suitable research method is grounded on several elements such as research assumptions, research problem, research design and techniques, and the type of data needed along with the level of accessibility of this data. Moreover, each research methodology has its unique approaches in terms of the role of the theory used, research epistemological positions, and ontological concerns (Bryman and Bell, 2011).

The quantitative method is commonly applied in research disciplines such as sociology, epidemiology, biology and business (Saunders et al., 2019). Also, the quantitative method is usually used in IS research, not either qualitative or mixed method. This methodology follows the positivist philosophy and thus deals with statistical analysis and numeric forms of data to explain a phenomenon by testing a theory (Creswell et al., 2016). Simultaneously, quantitative research utilizes a deductive approach to create hypotheses and causal relationships between the theory and research. The main techniques of data collection used in the quantitative method are surveys, questionnaires, and experiments. In addition, sample sizes used are normally larger when compared to the qualitative method (Matthews and Ross, 2010).

On the other hand, the qualitative method is empirical research in which the form of data used is not numbers. However, it is associated with words and textual data. The qualitative method normally employs an inductive approach as a base for data analysis and building of new theories (Bryman and Bell, 2011). Moreover, the qualitative method is grounded on an interpretive and constructivist epistemological position leading to beliefs in various realities and evaluates data by studying things within a context (Saunders et al., 2019). Qualitative research is employed to explore a phenomenon in subjective meanings that social actors bring to the situation through the form of case studies, observation, and open-ended interviews (Creswell and Poth, 2017). Qualitative research selects a smaller group of a participant to collect data such as words, field notes, reflection number and statistics, objects and images to look at causes and effect and objective explore (Creswell and Poth, 2017). In qualitative research, the researcher analyses the data by identifying patterns, themes of the data, and features using structuring and data validation. Qualitative methods have been widely used in social science research due to its effectiveness in exploring in detail certain phenomenon that reflects reality (Creswell and Poth, 2017). Yet, Qualitative methods are generally considered less reliable and valid compared to quantitative methods (Gray, 2017).

The mixed-method or what commonly referred to as the "triangulation" method is employed for better understating of the research problem through utilizing the best techniques of both methodologies (i.e. the qualitative and the quantitative) (Creswell et al., 2016; Bryman and Bell, 2011), while which one of the two techniques or methods should be employed, depends on the essence of the research problem (Creswell et

al., 2016).

This research seeks to understand the central issue of the behavioural intention of consumers banks through the perceptions of certain behavioural attributes including usefulness of, ease of use of, risk in using and trust in fintech services and the diffusion effect of fintech services as an innovation identified in the theoretical framework (Figure 3.1). The research conceives that it is possible to anticipate the behavioural intention of consumers of banks to adopt fintech services using those variables mentioned above which points towards the use of positivist epistemology and objectivist ontological positions which in turn lead the researcher to adopt the deductive research approach and quantitative research method. The quantitative method is the best fit in line for this study, in terms of capturing the behavioural aspects of a target sample identified for conducting this research. Furthermore, the quantitative method techniques allow utilizing statistical and mathematical means to obtain a result that reflects the adoption of fintech services by the bank consumers' reality. The researcher seeks to obtain outcomes from this study that are objective, reliable, and valid. Therefore, using the quantitative method for this research could be justified. This is also, in line with similar studies conducted previously in IS research (e.g. Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018 Ryu, 2018; Hanafizadeh et al. 2014; Kim et al. 2015; Chuang et al. 2016).

4.7 Research design

To achieve the aim and objectives of the research that were outlined in Chapter one, selecting a suitable research design for this study was crucial. Thus, the research design is referring to the framework or the systematic approach adopted to achieve the aim and the objectives of this research (Bryman and Bell, 2011; Creswell, 2003). The main steps involved in the research design include research strategy, purpose of study, extent of researcher interference in the study, study settings, time horizon of study, unit of analysis, data collection and data analysis. The following subsections describe the research design adopted for this research.

4.7.1 Research strategy

According to Sekaran and Bougie (2019), there are many research strategies that could be used in research but the choice depends on the research question under examination, the research objectives, the researcher view point and the practical aspects involved in the investigation. Strategies include experiment, survey research, observation, case studies, grounded theory, action research and mixed methods. However, this research uses the survey as the strategy to study the consumers of the banks offering fintech services. Survey research is about the study of people (e.g. consumers of bank). In understand the behavioural intention of the consumers, there was a necessity to gather data from those consumers. A survey instrument was developed to gather information. A survey instrument was thought to be the most useful research because

it is efficient and cost effective (Sekaran & Bougie, 2016). The choice of survey research was based on the guidance provided in the methodology research. For instance, experiment strategy could not be used because it is about manipulating independent variable to understand its influence on the dependent variable. Since the study is explanatory in nature and aims to explain the predictability of behavioural intention of consumers of bank to adopt fintech services, experimental research was not used. Furthermore, since this study is based on the quantitative research method, other research strategies including case study method or grounded theory or action research were not considered as those research strategies are more oriented towards exploratory research (Sekaran &Bougie, 2019). Details of the survey strategy is provided in section 4.8.

4.7.2 Research purpose

Clark-Carter (2004), refers to the research purpose as the knowledge of understanding, describing, or anticipating a certain type of activity. Different research purposes are served by different research designs. However, the most frequently used research purposes identified in the literature are exploratory, predictive (explanatory), and descriptive (Saunders et al., 2019; Robson; 2002).

Exploratory research seeks to explore complex phenomena to gain a thorough understating of the nature of that phenomenon, by gathering new facts concerning the problem, and looking for ideas (Sekaran & Bugie, 2016; Robson, 2002). The primary purpose of the research is to help to establish the most appropriate research design and the method of data collection. This type of research comes with three principles for guiding the research namely interviews with experts, literature research, and focus groups (Robson, 2002). The results of this research purpose are expected to provide significant insights into the research problem. Yet the findings normally do not generalize to the population at the large. Exploratory research lays the groundwork for other research or provides an exciting comparison variation between the well-studied and those that are not well studied.

The second type of research purpose is explanatory research that refers to the studies that use hypothesis testing and causal relationships between variables (Robson, 2002). In such a study, the key variables are defined, and quantitative research methodology is used to explain the phenomena that are in question through explaining the inter-relationships between the defined variables (Saunders et al. 2011; Robson, 2002). Explanatory research is characteristically empirical (Saunders et al., 2013). Hence, it is normally based on an existing study where certain hypotheses are tested and verified with an empirical evaluation to support or reject those hypotheses (Saunders et al., 2019).

The third type is descriptive research where researchers tend to accurately express the phenomena under investigation e.g., a situation, an event, or a person (Robson, 2002). Descriptive research summarizes the information gathered about the research topic under examination to conclude the data gathered using

quantitative or qualitative approaches (Saunders et al., 2011; Robson, 2002). According to Punch (2000), descriptive research is a type of research that applies to naturalistic inquiry.

As far this study was concerned explanatory examination was found to be suitable. The reason is that this study investigated fintech services adoption by the bank consumers by identifying the factors that influenced the consumers' behavioral intention to adopt fintech services. In doing so, this research sought to examine the effects of the determinants on the determined constructs using hypotheses testing and causal relationships between that determinant and the determined. This argument points towards to need to adopt an explanatory study. A conceptual model was developed and hypotheses were drawn, validated, and tested. Choice of the explanatory examination of the relationships and hypotheses therefore was necessary and justified. Use of explanatory study enabled an explanation of the causal relationships between the variables and anticipate the association between the various defined variables and the hypotheses.

4.7.3 Extent of researcher interference with the study

Researcher bias is an important aspect in research. Sekaran and Bougie (2019) argue that this depends on the extent of researcher interference with the study which in turn depends on the type of study namely correlational or causal. Correlational studies are conducted in the natural environment where the researcher interference is expected to be minimum. In contrast causal studies are conducted in either natural or artificial settings where the researchers manipulate the independent variable and hence the dependent variable. In this case the researcher interference is deliberate. Examples of correlational studies include those that study factors that influence a dependent variable, like the case of this research, where the research is investigating the factors that influence the behavioural intention to adopt fintech services of consumers of banks. In this case the researcher has delineated the relevant variables, collected the relevant data, and analyze them to come up with the findings. However, in causal studies there could be varying degrees of interference by the researcher while manipulating and controlling variables with the study taking place in either a natural or artificial setting (Sekaran & Bougie, 2019). Thus, in this research it can be seen that the researcher's interference in the study is bare minimum as the research correlational and has been conducted in the natural settings.

4.7.4 Study settings

Studies are usually conducted in either in contrived or non-contrived settings. Non-contrived settings are those in which the researcher conducts the research in the natural environment where events proceed normally. Contrived settings are those that are artificially created. This research was conducted in non-contrived settings where the consumers were studied in their natural banking environment were those consumers were carrying out the banking business normally without any change or manipulation to the environment.

4.7.5 Time horizon of study

This research aim, objective, and questions were limited to a budget and timeframe for the accomplishment of this research. There are two types of studies namely longitudinal studies, and cross-sectional studies. In longitudinal studies data about the same individuals is gathered repeatedly over time. The majority of the longitudinal studies focus upon individuals as the participants of the study, yet some longitudinal studies have also focused on organizations and households (Bryman and Bell, 2011; Rindfleisch et al.,2008). The cross-sectional surveys focus on gathering the data of a fresh sample of individuals each time the research is carried out. Some cross-sectional studies are repeated regularly and can consist of a large number of repeated questions (Bryman and Bell, 2011; Rindfleisch, et al.,2008). Moreover, cross-sectional surveys are completed by a single respondent at a single point of time (Bryman and Bell, 2011).

Both cross-sectional and longitudinal surveys employ observations mode research by relying on covariation rather than manipulation as an important causal cue (Sekaran and Bougie, 2013; Rindfleisch, et al., 2008). In comparison to cross sectional study, longitudinal survey data will not necessarily provide stronger evidence of coherence than cross-sectional data, as most longitudinal studies require a single follow-up study (Rindfleisch, et al.,2008; Pauwels, et al.,2004). Besides, longitudinal surveys require additional expenditure in terms of money and time which could be considered as hassles for some academic research activities (Sekaran and Bougie, 2013).

The aim, objective, and questions for this research are limited by the defined timeframe and budget for the accomplishment of this study. Thus, a cross-sectional survey was considered better suited for this research. This is consistent with similar previous studies conducted in IS research (e.g. Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018; Ryu, 2018; Kim et al. 2015)

4.7.6 Unit of Analysis

A unit of analysis refers to the level of aggregation of the data collected during the data analysis stage that follows. For example, in the current research the problem statement focuses on understanding the individual consumer's behavioural intention to adopt fintech services. The research therefore investigates the intention of consumers to adopt fintech services. Thus, the target audience is the bank consumers' in which they are the unit of analysis for this research. This implies that the researcher is interested in the individual consumer of the bank to improve the behavioural intention to adopt fintech services by understanding the behavioural aspects. The consumers of banks were all either citizens or residents in the Kingdom of Bahrain. The consumers targeted were either having an account in a bank and invariably using the banking facilities offered by the bank to conduct banking transactions either through traditional banking methods or fintech services including mobile banking, internet banking, automated teller machines (ATM), and cryptocurrencies. The consumer-targeted was anyone above the age of 18 regardless of gender. Since Bahrain is a cosmopolitan country with different nationalities living here and conducting transactions in

banks there was no restriction placed with regard to the nationality of the consumer while collecting data. In addition, no specific condition was applied to the consumers who were approached in terms of employment status and income limits. Finally, consumers who were approached for data collection were all expected to understand basic English.

4.7.7 Data collection

This research collected primary data from the consumers of the banks using a survey instrument. Where necessary the research relied up on published data that was available on the internet. The details are explained in section 4.8.

4.7.8 Data analysis

According to Glass et al. (1981) research is categorized as per the structure of data analysis, which are primary, secondary, and meta-analysis. Primary data involves analyzing the data collected by the researcher for addressing a particular research aim, objectives, and question (Collis and Hussey, 2003). Primary data can be collected through laboratory experiments, surveys, action research, and case studies (Bryman and Bell, 2011; Orlikowski and Baroudi, 1991). The second type of research analysis is the secondary data, where the data is not directly collected by the researcher for the research in hand, however, the researcher re-analysis data collected previously to answer a research question using different analytical technical (Bryman and Bell, 2011; Orlikowski and Baroudi, 1991). An example of secondary data analysis could be published summaries, statistics, and reports. Moreover, this kind of research could be performed where there is a need to conduct comparative research nationally or internationally (Bryman and Bell, 2011). While, the meta-analysis research data using statistical techniques for reviewing, amalgamating, and summarizing previous quantitative research to find the relative impact of independent variables and the association strength between the variables (Glass et al.,1981). Meta-analysis research strongly relays on statistically analyze a collection of large analyzed results from individual studies acquired through an SLR and synthesize them to find an average outcome. Therefore, this research analysis is also referring to as “analysis of analyses” (Glass et al.,1981).

The choice between the research data analysis depends on the research question to be answered. Thus, some researchers may need to use the primary data, while others may need to use the secondary data or Meta-analysis (Saunders et al., 2011). In this study, the primary data is used in obtaining the related data to each construct within the developed conceptual model. Hence, primary data will be collected from bank consumers living in the Kingdom of Bahrain to address the research question for this study.

The research involves descriptive statistics and structural equation modelling. The data analysis includes a number of steps which have been explained in detail in section (4.10). The first step involves the survey followed by data collection process of the primary data.

4.8 The survey

The survey was conducted in the Kingdom of Bahrain. The choice of the geography to conduct the research was based on several factors. Foremost amongst them is the availability of banks that offer fintech services and the users of fintech services. Bahrain is the de facto hub of banking industry in the Gulf Cooperation Council (GCC) region and is considered to be the banking hub of the Middle East also, with a number of international banks operating business profitably since a few decades (Corporate Finance Institute (CFI)), 2021). According to CFI (2021) there are 114 banks doing business in Bahrain. This includes retail banks (23), wholesale banks (69), specialized banks (2) and representative offices of overseas banks (36). The banking system is diverse with both conventional and Islamic banks operating on the island. In addition, technologically Bahrain is in the forefront and uses the latest technologies for banking operations (Bridge, 2020). According to the United Nations e-government survey (2018), Bahrain stands number one in the GCC, ranked 5th in Asia and 26th globally (United Nations survey, 2018). Oxford Business Group (OBG) (2021), reports that in 2016 the Central Bank of Bahrain (CBB) had initiated action to transform the banking sector and introduced fintech framework for the banks to operate using fintech services. OBG (2021) also reported that by the end of 2017, the number of account holders in bank was estimated at 1.89 million, an increase of 37.9% with regard to the 2011 number of 1.37 million. This figure indicates that for a population of around 1.5 million in 2017 the number of bank accounts per thousand was estimated to be 1257 (OBG, 2021). These figures indicate the extent of use of banking facilities in Bahrain and how technology is becoming indispensable in operating bank accounts by consumers. It important to recognize here that fintech services is being pushed as an important transforming agent by the CBB and hence studying the behavioural intention of consumers of the banks in Bahrain gains currency with diffusing still across the consumers.

Furthermore, the country provides a good environment for businesses to be set up and such an environment enables businesses to flourish. According EDB (2021) Manama, the capital of the Kingdom of Bahrain is ranked 5th globally amongst all-sized cities and 1st amongst small and mid-sized cities as can be seen from the 2021 Global cities of the Future index. EDB's (2021) website says that within the GCC, Bahrain's economy is the most diversified and indicates that the country is strong in areas including financial services, technology sectors, manufacturing and logistics. In addition, it is argued that Bahrain's pro-innovation business policies and laws have encouraged businesses in different sectors and provided opportunities to thrive (EDB, 2021).

The abovementioned arguments show that Bahrain offers a strong basis for conducting a research on fintech services as two of the main requirements namely, the availability of a strong banking sector offering fintech services and the latest technology needed to access fintech services by the consumers exist. In addition, collecting data from the target population was also less complicated in Bahrain as the proximity of the

banks and the consumers is very close to the researcher because Bahrain is a small country by area but having a multicultural population of over 1.5 million. Conducting a survey is more efficient when compared to other territories in the world. Thus the choice of Bahrain as the testing ground for this research is justified.

4.8.1 The strategy

Since this research employed a quantitative method, a systematic approach was utilized for gathering the required data from the target audience in the form of a surve. Section 4.7.6 highlighted the target audience for this research as "bank consumers". This research employed a self-administrated structured internet-mediated questionnaire as research instrument, which allowed the bank consumers to participate in the study. The instrument used multi-choice Likert scale type of questionnaire which enabled the participants to choose the most suitable answer based on their perception from the multiple choices provided in the instrument. Details about the development of the research instrument are provided in section 4.9. Considering the large population of consumers doing business with banks which is estimated at close to 1.5 million, it was necessary to use sampling strategy as an important part of the research. Sampling represents the percentage of data drawn out of the total population for the research (Saunders et al., 2019; Bryman and Bell, 2011).

The probability sampling technique was used to collect data from a representative population of the consumers of banks using fintech services. Thus, all "bank consumers" had the probability of being a part of the sample. Probability sampling was used to ensure that the research captures bank consumers' perceptions, and all subjects in the population could have an equal opportunity to be part of this research (Saunders et al., 2019). Moreover, random sampling was used for data collection to ensure that the data was collected efficiently without the intervention of any manual effort leading collection of more accurate data. The reason for selecting the online method of conducting the survey was that the majority of bank consumers in Bahrain are well educated and could use the internet and the operations through internet on everyday basis in their lives without any difficulty. A hyperlink was generated using Google Forms and the hyperlink was sent to the consumers of different banks living in the Kingdom of Bahrain via emails and social media channels such as WhatsApp, LinkedIn, Twitter, and Facebook, since social media is considered as a powerful distribution tool (Merolli, 2014). Once media are chosen for distributing the survey instrument, then the sample size was calculated. Also, the samples were identified through the support of banking staff in different banks. The hyperlink containing the research instrument was sent to employees of different banks to share with their consumers. Accordingly, the bank employees who were requested to help sent the hyperlink to their customers having an e-mail address or social media account. The consumers who were approached through this mechanism became samples for this research. In addition, each research instrument was accompanied by the informed consent form that ensured that the participant has responded with the required criteria specified in the form.

The hyperlink was generated through google forms which had the facility to block a participant from responding to the research instrument more than once. This ensured that sharing of a sample subject with membership in more than one bank in the survey is prevented. As far as the possible variation in the fintech service offered by different banks, which could have some impact on the adoption behavior, the researcher relied upon the policy of the Central Bank of Bahrain related fintech service, that required all banks to adhere to definite regulations without any deviation across the banking sector. This ensured that the quality of service provided by the various banks and the policies followed by those banks are uniform creating a homogenous environment that enabled the respondents participating in the survey to have equal opportunity to participate and provide their response.

4.8.2 Sampling strategy

The formula usually suggested by Cochran (1977; pp. 23-24) for calculating the sample size for continuous data is:

- $n_0 = [t^2 \times s^2] \div d^2 \rightarrow (1)$
- where n_0= sample size;
- t = the t-value for a particular confidence level (confidence level usually used by researchers is 95%);
- s = estimate of standard deviation (calculated as s = number of points on the scale ÷ number of standard deviations) [e.g. if a researcher used a 5-point scale and given that 4 standard deviations (2 to each side of the mean)]; and
- d = acceptable margin of error [calculated using the formula (number of points on primary scale multiplied by acceptable margin of error).

From the above the following could be derived to determine the sample size.

- t = 1.96 (for a confidence level of 95%)
- s = 5 ÷ 4 = 1.25
- d = 5 x 0.03 where 0.03 is the assumed margin of error = 0.15

From equation (1) it follows that:

$n_0 = [(1.96)^2 (1.25)^2] \div (0.15)^2 = (3.84)(1.56) \div (0.0225) = 5.99 \div (0.0225) = 266.22$ Thus sample size of consumers for this research is estimated 266.

While 266 appears to be an acceptable figure as a sample, however Cochran (1977) argues that a correction formula (equation 2) needs to be used for the results obtained using equation (1) to ensure that the figure calculated is accurate if the sample size calculated exceeds 5% of the total population. Thus

$n = (n_0) \div [1 + (n_0 / \text{Population})] \rightarrow (2)$

where n is the new sample size calculated after correction;

Population is the actual population size = 1,500,000; and $n_0 = 266$.

Therefore, $n = (266) \div [1+ (266/1,500,000)] = (266) \div (1+0.000177) = 265.95 \approx 266$.

From the figure obtained using the correction formula given in equation (2) if the sample size is taken as 266, the verifying whether it is >5% of the total population shows that it is not. That is to say the 5% of 1,500,000 is 75,000 and 266 is much less than 266. Thus there is no need for a correction factor to be used in determining the sample size. The final acceptable sample size therefore is 266. Although a larger sample size provides a more accurate result (Creswell, 2009) it is seen that increasing the sample size can only marginally improve the results which may not be significant. The total sample size of this research is 390, which is considered to be adequate for this research (Pallant, 2016; Malhotra & Peterson, 2006).

4.9 The Development and Validation of the Questionnaire

After identifying the target population and the sample size, the next step involved the development of the survey instrument that was used to collect primary data from the participants. Based on the inferences drawn in Chapter 3, a questionnaire was developed to test the empirical model created for this research. The survey instrument was developed based on developed and validated instruments by other researchers involved in similar research. However, it was necessary to describe the process of developing the instrument to provide an understanding of how the instrument corresponds to the research model. This is discussed next.

4.9.1 Overview

The development of the survey instrument followed a few steps until it was finalized for use in the main survey details of which are provided in the Table 4.4. The questionnaire was developed based on tested and validated instruments used in prior research, found in the literature (e.g. Tang and Huang, 2015; Koenig-Lewis et al.,2010; Chen, 2013; Denktash and Davis, 2000).

Table 4. 4 Questionnaire Development Phases

No.	Steps used to finalize the questionnaire	Number of items
1	Pre-Test	51
2	Pilot Survey	50
3	Main Survey	49

The survey questionnaire was used to collect data from the consumers of bank who had either used fintech services or would use fintech services in future. Kingdom of Bahrain was chosen as the testing ground. As mentioned earlier in section 4.8, it can be seen that Bahrain is a country where reputed national and international banks operate. Moreover, its considered to be the hub of banking in GCC. Although Bahrain is an Arabic country, the language used in the questionnaire was English. Since English is the second

language of the county, the questionnaire was conducted in English and was not translated into Arabic. In addition, UNDP (2016) reports that the e-literacy percentage of Bahrain is very high when compared to other nations around and stood at 96.1% in 2016. This enabled the researcher to use English language in developing the questionnaire.

The questionnaire comprised close-ended statements. Section 1 was concerned with demographics. There were five questions to collect data about gender, age group, employment status, income category, and consumers' awareness level of Fintech services. Section II comprised observed variables that measured the latent variables using a 5-point Likert scale and respondents were required to rate the degree to which they disagreed or agreed with the statements, using their perception about each construct of the conceptual model. 5-point scale format is one of the most common scales used, as it is quite simple for respondents to read out the complete list of scale descriptors (Dawes, 2008). Also, simulation studies and empirical studies have generally concurred that improved reliability and validity could be achieved using a 5-point scales when compared to those with fewer scales point (Dawes, 2008; Malhotra & Peterson, 2006). While literature points out that the majority of the Likert scales employed in a research are either 5-point or 7-point (Colman & Norris, 1997). There is no clarity in the literature to clearly say that one scale is better than the other. As far as 5-point scales are concerned Matell and Jacoby (1971) argued that the number of response points does not matter with regard to the reliability and validity of an instrument. However, Nunnally (1967) pointed out that a 7-point scale is better than a 5-point scale. Furthermore, Finstad (2010) pointed out that subjects of a survey are more likely to interpolate (more likely to respond) a 5-point scale when compared to a 7-point scale. Additionally, Finstad (2010) explains that on one of the Fisher's Exact Test conducted in research related to testing the usefulness of the 5-point and 7-point scales, it was found that 5-point Likert items generated a higher number of interpolations than the 7-point scale and the difference in the responses were significant. Similar sentiments were espoused by Bouranta et al. (2009) who explained that 5-point Likert scales are less confusing and enhance the response rate when compared to 7-point Likert scales. Based on the above arguments 5-point scales were chosen for collecting data in this research.

4.9.2 Structure of the survey instrument

The structured instrument design consisted of a cover page that informed the participants about the purpose of the questionnaire and the aim of the research (Appendix 1). The second part was the Consent form. Through this form, the participants were requested to confirm that they are participating voluntarily and they have read the various aspects that concern their participation. This form listed 5 closed questions with the choice of only two possible responses namely 'yes' or 'no'. This section was used to confirm that the participants have read the information sheet and hence were informed about the research. Additionally, the participants were informed that the research instrument was approved by the Research Ethical Committee,

Brunel University London.The participants chosen were over 18 years of age and agreed to take part in this study. Section I included five questions with multiple choice responses related to the demographic variables, such as gender, age group, employment status, income category, and consumer's awareness level of Fintech services. The section II contained forty-nine items with a 5-point Likert type ordinal scale, covering the measurement of all the ten constructs that are part of the proposed conceptual model. The instrument was initially tested using pre-test and then pilot survey before it could be used in the main survey. Details of these tests are provided next.

4.9.3 Pre-test result

A pre-test of the questionnaire was conducted before the actual survey to ensure the content validity of the questionnaire to avoid repetitive items and to ensure that all items are clear and understandable (Sekaran and Bougie,2013; Cohen,1988). At the pre-test stage the instrument consisted of 51 items. The pre-test was carried out by two experts in the area of fintech, two academics (Ph.D. scholars), two practitioners, and two bank consumers. The pre-test resulted in deleting one question and some minor modification in a few other questions including editing and improving the language and the grammar used in constructing the items. The pre-test was followed by a pilot survey.

4.9.4 Pilot survey result

Before conducting the main survey, a pilot survey was carried out in January 2020. According to Creswell (2009), pilot study results provide an opportunity to assess the content validity of the scores of an instrument as well improve the questions used to measure the constructs, the format of the instrument and the scales. The context of this research was banking and the target population under investigation were consumers of banks who are either fintech service users, aware of fintech service, intend to use fintech service in the future, or not familiar with fintech services. Thus, consumers from different banks in the Kingdom of Bahrain were approached. It is also worth mentioning that all banks in the Kingdom of Bahrain offer fintech services to their consumers, hence the study settings were satisfying to the needs for the research. During the pilot survey, it was found that some participants were not aware of fintech services even though they were using fintech applications by default. This research enabled those participants to gain awareness about their usage of fintech services since the questionnaire highlighted examples of different types of fintech services offered by banks in Bahrain to their consumers.

Google Survey was the website used to post the survey questionnaire online (Appendix 2). The hyperlink of the survey was distributed by different social media applications, such as WhatsApp, Twitter, LinkedIn, and Facebook. A total of 42 responses was received in which 3 responses were rejected due to lack of fulfilling the required condition mentioned on the consent form (two responses were below 18 years, and 1 response confirm not reading the Participant Information Sheet included with this questionnaire), those responses were not included in the analysis. The Table 4.5 below illustrates the measuring items for each

construct along with the supporting evidence from the literature.

Table 4. 5 Research Questions and Evidence for the literature

No.	Construct	Measuring items	Adopted from
1	Intention to Adopt	Q1 – Q3	Denktash and Davis (2000)
		Q4	Hanafizadeh et al. (2014)
2	Perceived Usefulness	Q5 – Q7	Chen (2013)
		Q8 – Q9	Davis et al. (1989)
3	Perceived Ease of Use	Q10 –Q12	Gefen et al. (2003); Chen (2013)
		Q13	Yu (2012)
		Q14	Lin et al. (2008)
4	Trust	Q15 – Q17	Muñoz-Leiva et al. (2017)
		Q18	Tang &Huang (2015); Martínez & Bosque, (2013)
		Q19	Hanafizadeh (2014)
5	Perceived Risk	Q20	Thakur and Srivastava (2013)
		Q21 – Q23	Chen (2013)
		Q24	Akturan and Tezcan (2012)
		Q25	Lee (2009)
		Q26	Koenig-Lewis et al. (2010)
6	Relative advantage	Q27	Siddik et al. (2014)
		Q28 – Q30	Moore and Benbasat (1991)
		Q31	Mutuku (2019)
7	Complexity	Q32 – Q36	Sonnenwald et al. (2001)
8	Compatibility	Q37 – Q38	Hanafizadeh et al. (2014)
		Q39	Mutahar et al. (2017)
		Q40	Moore and Benbasat (1991)
		Q41	Zolkepli and Kamarulzaman (2015)
9	Trialability	Q42 – Q43	Brown et al. (2003)
		Q44 – Q46	Moore and Benbasat (1991)
10	Observability	Q47 – Q49	Zolkepli and Kamarulzaman (2015)
		Q50	Park and Chen (2007)

Statistical Package for Social Sciences (SPSS) version 21.0 was used by the researcher to perform the statistical analysis to test the conceptual model. For the pilot analysis reliability and validity, tests were conducted in which the acceptable range of the minimum and maximum values of the tests conducted, were derived from previously published research outcomes (Pallant,2016; Sekaran and Bougie,2013; Cohen,1988). The reliability test was conducted by using Cronbach's alpha to measure the internal consistency of how closely items related to each construct are as a group. While Cronbach's alpha can vary between a minimum of 0 and a maximum of 1, the minimum value acceptable value of alpha fixed for this research, at the pilot stage was 0.7 (Sekaran and Bougie,2013; Sekaran, 2000). According to Sekaran and Bougie (2013) an alpha value of less than 0.7 is considered as indicating poor reliability and those falling in the range above 0.7 considered as indicating good reliability. More details about reliability and Cronbach's alpha are provided in section 5.7.

The validity of the questionnaire was assessed using Pearson Product Moment correlations. Also, the item-

to-item correlation was tested to assess whether the items were correlated with each other or not, which is an essential criterion that needs to be satisfied if the instrument is to be used in the survey (Hair et al. 2006). Inter-item correlation, and item to total correlation of all items used in the research model, along with Cronbach's alpha provide a good idea about the reliability of the instrument. As far as the limits of correlation values were concerned, literature shows that those correlations range from -1 to 1 with negative values that were usually not accepted. Based on prior research a correlation value for inter-item was set as acceptable at a minimum of 0.3. Similarly, item to total correlation value was set as acceptable at a minimum of 0.5 (Sekaran and Bougie,2013; Sekaran, 2000; Cohen,1988). During the pilot analysis, where an item was found to cause concern, that is lower than the above acceptable values, depending on how far the statistical value differed from the acceptable value, and how many items would remain, decision to whether to retain or delete the item to measure each construct was taken.

The Tables 4.6 and 4.7 below give the summary of reliability and validity analyses for the instrument used at the pilot survey stage. It can be seen that construct numbers 2, 5, and 10 (Perceived Usefulness, Perceived Risk, Observability), have issues with validity caused by some items as indicated in Table 4.7. This could be due to low sample size as literature shows that Cronbach's alpha and correlation tests depend on sample sizes with higher sample sizes improving those values. Therefore, it was decided that those items could be retained and observed at the main survey stage, at which point a proper decision could be taken by the researcher using item to item and item to total correlation values as those values were expected to be improve with the larger sample size. Moreover, with regard to constructs Relative Advantage, and Complexity, some items that were included caused concern with both reliability and validity (Table 4.6). However, those items which caused concern were either item(s) that had to be reverse coded during analysis because of the negative tone attached to those items. Although deleting those items could have improved both reliability and validity without causing concern to the adequacy of the number of items needed to measure the constructs (Table 4.7), yet, based on the advice of the academic and practitioner of fintech, those items were retained. Where necessary the contents were rephrased for testing during the main survey using reliability and validity measures. Furthermore, one item (Q43) measuring Trialability caused concern with validity (Table 4.6) which was deleted. Removing item Q43 resulted in improving the validity significantly (Table 4.7). Final set of items used to measure the constructs is provided in Table 4.8. As far as validity is concerned this research examined the content validity, criterion validity, convergent validity, discriminant validity and construct validity. According to Creswell et al. (2016) criterion validity (also called predictive or concurrent validity) measures the items and enables the researchers to find out whether scores anticipate a criterion measure. Sekaran and Bougie (2019) define convergent validity as the existence of high correlation between two items used in an instrument to measure a construct. Furthermore, Sekaran and Bougie argue that discriminant validity can be defined as the level to which two variables are anticipated to be uncorrelated and backed up by theory. Measurements in empirical studies indeed should

show the existence of such a phenomenon. Construct validity is defined as the extent to which items measuring a construct indeed measure that construct (Creswell, et al. 2016). If the convergent and discriminant validities are established, then it is considered that construct validity is established. These aspects are discussed in detail in Chapter 5.

Table 4. 6 Summary of content reliability and validity analyses (before deleting questions)

No.	Construct	Codes	Items	Cronbach's Alpha (>0.7)	Item-item correlation (>0.3)		Item- total correlation (>0.5)		Remarks
					Min	**Max**	**Min**	**Max**	
1	Adopt Fintech Services	INTADOP	Q1-Q4	0.842	0.321	0.771	0.465	0.807	Reliability, item to item correlation, and item to total correlation values are found to be within the acceptable limit. ***All items will be retained for the main survey.***
2	Perceived Usefulness	PU	Q5 – Q9	0.836	0.268	0.670	0.566	0.682	Items Q5, Q7, and Q9 reliability, item to item correlation, item to total correlation values are found to be within acceptable limits. However, items Q6 and Q8 were causing some concern, as the correlation between these two items is found to range from poor to good with a minimum of 0.268 which is slightly lower than 0.3. ***Items Q6 and Q8 might improve with larger sample size. Hence, items Q6 and Q8 will be under observation in the main survey for its validity. All items will be retained for the main survey.***
3	Perceived Ease of Use	PEU	Q10 – Q14	0.867	0.378	0.805	0.577	0.761	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
4	Trust	TRU	Q15-Q19	0.885	0.387	0739	0.621	0.825	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
5	Perceived Risk (Reversed Coded)	PRISK	Q20-Q26	0.866	0.202	0.776	0.519	0.820	Items Q21, Q22, Q23, Q24, and Q26 reliability, item to item correlation, and item to total correlation values are found to be within acceptable limits. However, items Q20 and Q25 were causing some concern, as the correlation between these two items is 0.202 which is slightly lower than 0.3. ***Items Q20 and Q25 might improve with larger sample size. Hence, items Q20 and Q25 will be under observation in the main survey for its validity. All items will be retained for the main survey.***
6	Relative Advantage	RA	Q27-Q31	0.636	-0.210	0.763	-0.129	0.697	Items Q27, Q28, Q29, and Q31 reliability, item to item correlation, item to total correlation values are found to be within acceptable limits. However, item Q30 is causing

	(Q30 Reversed Coded)								serious problems concerning reliability, item to item, and item to total correlations. Item Q30 is a reversed coded, being a negative question, rephrasing the content to a positive question might produce a different result. ***Based on the advice of the academic and practitioner of Fintech, item Q30 will be revisited, the contents will be rephrased (not reversed coded) and will be under observation in the main survey for its reliability and validity. All items will be retained for the main survey.***
7	Complexity (Q32, Q33, Q35 Reversed Coded)	COMPLX	Q32-Q36	0.532	-0.148	0.644	-0.081	0.660	Items Q32, Q33, and Q35 reliability, item to item correlation, item to total correlation values are found to be within acceptable limits. However, items Q34 and Q35 are causing serious problems concerning reliability, item to item, and item to total correlations values. Again Q34 and Q36 are found to have content indicating positive statements used to measure complexity. while, complexity by itself is a factor indicating a negative quality, rephrasing the content to a negative question might produce a different result. ***Based on the advice of the academic and practitioner of Fintech, item Q34 'While banking, I find it easy to get fintech services to do what I want it to do' and Q36 'Overall, for conducting banking transactions, I find the fintech services easy to use.' will be revisited (Q34 'While banking, I find it difficult to get fintech services to do what I want it to do' and Q36 'Overall, for conducting banking transactions, I find the fintech services not easy to use')the contents will be rephrased (reversed coded) and will be under observation in the main survey for its reliability and validity. All items will be retained for the main survey.***
8	Compatibility	COMPAT	Q37-Q41	0.869	0.468	0.756	0.641	0.765	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
9	Trialability	TRIABI	Q42-Q46	0.785	-.045	0.752	0.409	0.775	Reliability is found to be acceptable, however, correlation between the item to item and item to total correlation is found

									to be ringing from poor to good. With item Q43 causing serious problems concerning the item to item and item to total correlations. thus, item Q43 correlation with item Q46 correlation was found to be -0.045, also item Q43 correlation with item Q44 correlation were found to be 0.255 which were both lower than 0.30. Moreover, item Q43 to total correlation is 0.409 which is lower than 0.5. Also, item Q42 correlation causes some concern with item Q46 correlation of 0.112 which is lower than 0.30. ***Items Q43 will be deleted as it is contributing to error to the item to item and item to total correlation and it is unlikely to improve in value even if the size of the sample increased. While item Q42 might improve with larger sample size, hence, items Q42 will be retained under observation in the main survey for its validity. All items will be retained for the main survey except items Q43 will be deleted.***
10	Observability	OBSERV	Q47-Q50	0.726	0.294	0.613	0.412	0.658	Items Q47, Q46, Q48, and Q49 reliability, item to item correlation, item to total correlation is found to be within acceptable limits. However, item Q50 correlation causes some concern with item Q49 correlation of 0.211 which is slightly lower than 0.30. Also, Item Q50 to the total correlation of 0.412 which is also slightly lower than 0.50. ***Items Q50 might improve with larger sample size. Hence, items Q50 will be retained under observation in the main survey for its validity. All items will be retained for the main survey.***

Table 4. 7 Summary of content reliability and validity analyses (after deleting Q30, Q34, Q36, and Q43)

No.	**Construct**	**Codes**	**Items**	**Cronbach's Alpha (>0.7)**	**Item-item correlation (>0.3)**		**Item- total correlation (>0.5)**		**Remarks**
					Min	**Max**	**Min**	**Max**	
1	Adopt Fintech Services	INTADOP	Q1-Q4	0.842	0.321	0.771	0.465	0.807	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***

2	Perceived Usefulness	PU	Q5 – Q9	0.836	0.268	0.670	0.566	0.682	Items Q5, Q7, and Q9 reliability, item to item correlation, item to total correlation values are found to be within acceptable limits. However, items Q6 and Q8 were causing some concern, as the correlation between these two items is found to range from poor to good with a minimum of 0.268 which is slightly lower than 0.3. ***Items Q6 and Q8 might improve with larger sample size. Hence, items Q6 and Q8 will be under observation in the main survey for its validity. All items will be retained for the main survey.***
3	Perceived Ease of Use	PEU	Q10 –Q14	0.867	0.378	0.805	0.577	0.761	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
4	Trust	TRU	Q15-Q19	0.885	0.387	0739	0.621	0.825	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
5	Perceived Risk (Reversed Coded)	PRISK	Q20-Q26	0.866	0.202	0.776	0.519	0.820	Items Q21, Q22, Q23, Q24, and Q26 reliability, item to item correlation, and item to total correlation values are found to be within acceptable limits. However, items Q20 and Q25 were causing some concern, as the correlation between these two items is 0.202 which is slightly lower than 0.3. ***Items Q20 and Q25 might improve with larger sample size. Hence, items Q20 and Q25 will be under observation in the main survey for its validity***. ***All items will be retained for the main survey.***
6	Relative Advantage	RA	Q27-Q29 Q31	0.861	0.447	0. 763	0.594	0.797	After deleting item Q30, reliability, item to item correlation, and item to total correlation are found to be within an acceptable limit. ***Deleting item Q30 still left four items to measure the construct, and thus will cause no concern to the adequacy of the number of items needed to measure the construct. Yet, based on the advice of the academic and practitioner of Fintech, item Q30 'The disadvantages of my using fintech services far outweigh the advantages' will be revisited, the contents will be rephrased 'The advantages of my using fintech services far outweigh the disadvantages (not***

									reversed coded) and will be under observation in the main survey for its reliability and validity*. *All items will be retained for the main survey.
7	Complexity (Q32, Q33, Q35 Reversed Coded)	COMPLX	Q32-Q33 35	0.787	0.445	0.644	0.559	0.719	After deleting items Q34 and Q36, reliability, item to item correlation, and item to total correlation are found to be within an acceptable limit. ***Deleting items Q34 and Q36 still left three items to measure the construct and thus will cause no concern to the adequacy of the number of items needed to measure the construct. Yet, based on the advice of the academic and practitioner of Fintech, item Q34 and Q36 will be revisited, the contents will be rephrased (reversed coded) and will be under observation in the main survey for its reliability and validity*. *All items will be retained for the main survey.***
8	Compatibility	COMPAT	Q37-Q41	0.869	0.468	0.756	0.641	0.765	Reliability, item to item correlation, and item to total correlation values are found to be within an acceptable limit. ***All items will be retained for the main survey.***
9	Trialability	TRIABI	Q42 Q44-Q46	0.793	0.211	0.752	0.367	0.802	After deleting item Q43, reliability, item to item correlation, and item to total correlation values of items Q44, Q45, and Q46 are found to be within an acceptable limit. However, item Q42 correlation causing some concern with item Q46 correlation of 0.112 which is lower than 0.30. Also, item Q42 to the total correlation of 0.367 which is also slightly lower than 0.50. ***Item Q42 might improve with larger sample size. Hence, item Q42 will be retained under observation in the main survey for its validity. All remaining items will be also retained for the main survey.***
10	Observability	OBSERV	Q47-Q50	0.726	0.294	0.613	0.412	0.658	Items Q47, Q46, Q48, and Q49 reliability, item to item correlation, item to total correlation is found to be within acceptable limits. However, item Q50 correlation causes some concern with item Q49 correlation of 0.211 which is slightly lower than 0.30. Also, Item Q50 to the total correlation of 0.412 which is also slightly lower than 0.50.

									Items Q50 might improve with larger sample size. Hence, items Q50 will be retained under observation in the main survey for its validity. All items will be retained for the main survey.

4.9.5 Main Survey

The main survey was carried out between September 2020 and October 2020 using the research instrument provided in Appendix 1, by employing the same methodology adopted in the pilot survey. Around 1000 respondents were accessed through e-mail and social media. 407 responses were received, out of which only 17 responses were rejected due to lack of fulfilling the required condition mentioned on the consent form. This is approximately equal to 40% of response rate which is an acceptable rate according to Sekaran and Bougie (2019). Table 4.8 provides the list of observed variables and latent variable. After collecting data using the instrument, the next step taken was the data analysis.

Table 4. 8 Main Survey

No.	Construct (latent)	Measuring items (observed variable)
1	Intention to Adopt	Q1 – Q4
2	Perceived Usefulness	Q5 – Q9
3	Perceived Ease of Use	Q10 – Q14
4	Trust	Q15 – Q19
5	Perceived Risk	Q20 – Q26
6	Relative advantage	Q27 – Q31
7	Complexity	Q32 – Q36
8	Compatibility	Q37 – Q41
9	Trialability	Q42 – Q45
10	Observability	Q46 – Q49

4.10 Data Analysis

In this research, statistical package for social sciences (SPSS) version 21.0 was applied to implement an advanced statistical analysis which offered scalaility and flexibility. SPSS software is considered to the most suitable software tool for research in the literature as it provides facilities to organize, improve efficiency, and minimize any risk that could creep in during data analysis process (Pallant, 2016). Moreover, to analyze the structural relationships between the variables and to validate the fitness of the developed conceptual model, a multivariate statistical analysis namely structural equation modelling (SEM) was used which supported by the literature (Pallant, 2016). Also, Analysis of Moment Structure (AMOS) version 18 was used to test the hypotheses through performing confirmatory factor analysis (CFA) and path analysis (Pallant, 2016). The complete detail about the data analysis is explained in Chapter 5.

4.10.1 Structural equation modelling (SEM)

One of the dominant methods used in quantitative studies for analysing data in the area of behavioural sciences is the structural equation modelling (Chen & Pearl, 2015). This research deals with the consumer adoption behaviour of fintech services, hence SEM finds application as similar examples of applying SEM are found in the technology adoption literature (Meyliana et al. 2019, Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018; Ryu, 2018; Raza et al. 2017; Chuang et al. 2016; Kim et al. 2015; Hanafizadeh et al. 2014). SEM is a method that is used to analyze a set of regression equation simultaneously (Janssens et al.

2008). Boomsma et al. (2012) claim that SEM comprises a set of statistical techniques that could be employed to examine certain variables termed as observable and latent variables.

Terminologies used in SEM include latent variables, observed variables, confirmatory factor analysis (CFA), path analysis, exogenous variables, endogenous variables, measurement model and structural model (Janssens et al. 2008). Latent variables (e.g. relative advantage of fintech services and perceived ease of use) are those that are not directly measured but through observed variables (e.g. Q1, Q2, Q3 and the like) which are directly measured. CFA involves the testing of the measurement model and latent variables (Janssens et al. 2008). Measurement model provides the relationship between the observed variables and latent variables while structural model provides knowledge about the interrelationship between the constructs (Mundra & Mishra, 2020). Path analysis enables the estimation of the relationship between the endogenous and exogenous variables (Janssens et al. 2008). Endogenous variables are independent variables (e.g. relative advantage of fintech services and perceived risk), while exogenous variables are dependent variables (e.g. perceived ease of use, perceived usefulness, behavioural intention to adopt and trust) (Janssens et al. 2008).

Measurements made using SEM involve construct reliability (squared multiple correlation), discriminant validity, regression weights, correlation matrix, residual covariance, standard residual covariance, model fit, direct effect, indirect effect and total effect (Janssens et al. 2008). These have been discussed in Chapters 5 and 6 in detail. SEM was implanted using AMOS, a statistical package widely used by researchers (see section 5.10). In addition to using the SEM, this research also measured the unidimensionality and average variance extracted. While unidimensionality explains whether a set of variables (e.g. observed variables) have only one underlying dimension in common (Janssens et. al. 2008). Average variance extracted (AVE) provides a measure of the discriminant validity as well as the presence or the absence of common method bias. Method bias is said to exist when measures use the same method (self-report, scale type) which may lead to highly inflated correlation between constructs (San-Martín et al. 2020).

4.11 Research Ethics

Ethical conduct while researching on business topics is considered to be important in the literature (Saunders et al. 2019). Since research usually involves human participants, there is a requirement for obtaining ethical approval from the organization concerned with the researcher, which in this research is Brunel University London. Ethical conduct commonly refers to the code of conduct or societal norm of behavior expected on the part of the researcher, participants, or respondents who provide the data necessary for the research and the organization sponsoring or supporting the research while conducting research (Saunders et al. 2019). The steps involved in adopting ethics in the research began with gaining awareness about the requirements of the ethical aspects that need to be put in place as required by Brunel University London. There was a procedure to be followed to obtain the ethical approval from a designated committee

of Brunel University London, called the Research Ethics Committee. The procedure required the researcher to observe ethics from the time the research was instituted and pay attention to what the outcomes may indicate. Further ethical conduct involved reflecting on the behavior of the researcher, the participants from whom data is collected, the resources who provide support in analyzing the data, and others who are part of the research team (Sekaran & Bougie, 2019). The researcher recognized the fact the ethical behavior permeates all levels in the study and obtained the research ethical approval from the Research Ethics Committee of Brunel University London (See Appendix 3). The approval comprised the participant information sheet and consent form which were prepared and submitted as part of the application presented to Brunel University London. The participants were informed about various aspects concerning their participation including their anonymity, voluntary participation, withdrawal at any stage during their participation in the survey, arrangements made to ensure confidentiality of the data and information provided by them, and their safety.

4.12 Research Process Stages

This section highlighted the process that followed for achieving the aim of this research, including the descriptions of each stage within the Chapters of this thesis. Figure 4.4 demonstrates the six stages performed in this research, including literature review, conceptual model development, research design, collection of the data, data analysis, and finally findings discussion and key conclusions.

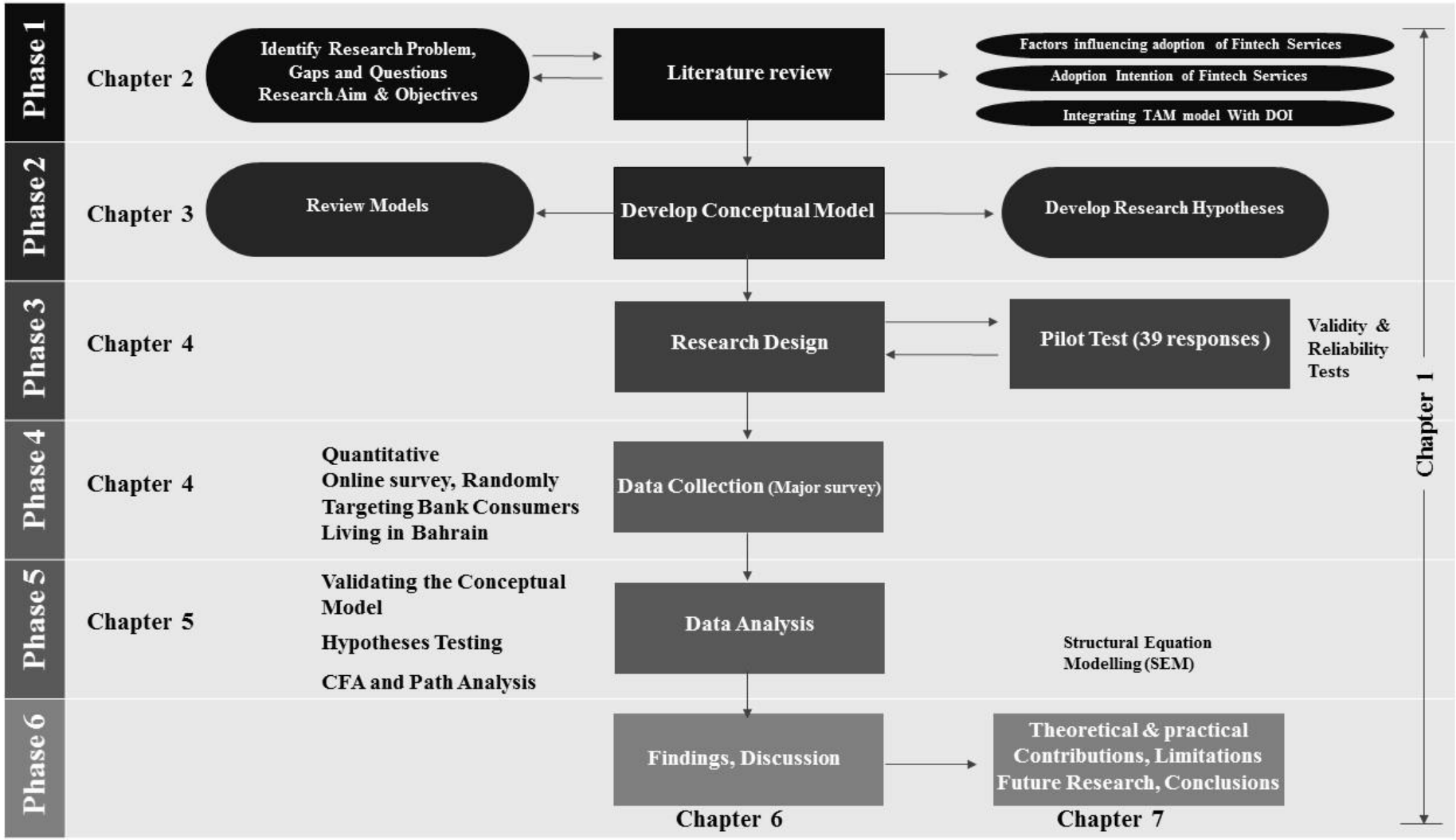
The first stage, that includes the review of the literature using secondary sources. During this stage, the research problem, the research gaps, the research questions, and the research aim and objectives are identified. Besides, this stage identified the key factors that influencing the behavioural intention to adopt fintech services. In this stage, the researcher adopted specific criteria to ensure conducting a comprehensive literature search in the area of adoption of fintech services. In which a list of all possible keywords and synonyms terms for this study were identified to obtain the relevant article for the adoption and diffusion of fintech services, such as ‘diffusion’, ‘adoption’, ‘innovation’, ‘integration’ and ‘fintech implementation’, etc. The second stage takes into account the factors identified in the first stage to build up a conceptual model along with the proposed hypotheses and supporting theories for all constructs within the developed conceptual model.

While the third and fourth stages of this research discussed the research design in terms of the research philosophy, the research methodology, and data collection mechanisms and analysis. As this research investigates consumers' perspective of the influence of behavioural intention to adopt fintech services, quantitative research methodology was adopted using an online survey that was developed and distributed to random bank consumers in the Kingdom of Bahrain. Pre-survey and pilot survey was preformed prioir conducting the main survey to test the validity and the reliability of the conceptual model and ensure that the data collected from the target audience are answerable.

The fifth stage involves the analysis of the data collected in the previous stage. To do so, the SEM multivariate technique was selected to validate the fitness of the proposed conceptual model, while confirmatory factor analysis (CFA) and path techniques were chosen to validate the hypotheses.

While the last stage discussed the findings of the analysis performed in the earlier stage. Also, this stage covers the theoretical and practical contributions, the research limitation, and future direction. Then drives the key conclusion of this research. The below figure 4.4 relate each stage with the Chapter associated with it.

Figure 4. 4 Research Process Stages



4. 13 Chapter Summary

Chapter 4 provides an overview of the most appropriate methodology adopted for this research. The research framework was developed based on the epistemological, ontological, approach to research and quantitative methodological consideration. The resulting framework included the positivist epistemology and objective ontology. Also, this research utilizes a deductive research approach and quantitative research method. This led to the research design which explained the need to adopt the survey strategy and other aspects concerning the place of study, type of study, the unit of analysis, the time horizon of study, data collection, sampling aspects and method of data analysis. Furthermore, this Chapter explains the questionnaire development and validation process, by including the result of the pre-test and the pilot test. The selection of SEM and AMOS tool for data analysis were justified and information on the research ethics concerns for data collection were provided. Hence, Chapter 4 provide the foundation for the data anlysis provided in chapter 5.

Chapter 5: Data collection and Data analysis

5.1 Introduction

Chapter 4 explained the methodology used in this research, including the research design, research philosophy, research process, and data collection mechanisms. A quantitative research method was used. An online survey distributed to the consumers of the Bank in the Kingdom of Bahrain to investigate the influence of consumers' behavioural intention to adopt fintech services introduced by the bank. In this Chapter, SEM multivariate technique is utilized to validate the fitness of the proposed conceptual model. A total of 407 responses are collected. The empirical data analysis begins with several tests conducted to clean the data, such as reliability, correlation, and normality test.

Chapter 5 structure is as follows. The response rate and respondents of the profile are covers in sections 5.2 and 5.3. Section 5.4 shows the normality test performs using two numerical measures of shape; skewness and kurtosis. The descriptive statistics that studies the responses of all items by using the mean, and standard deviation (SD), and advance descriptive statistics are discuss in section 5.5 and 5.6, respectively. Section 5.7 and 5.8 presents and explains the validity and reliability of the research instrument. While section 5.9 explains The one-to-one association between the constructs using the correlation analysis. Moreover, analyses conducted using SEM, including CFA and path analysis, are presents from section 5.10 to section 5.14. Also, section 5.15 and section 5.16 shows the result of unidimensionality and method bias tests. Finally, the summary of the Chapter is in section 5.17.

5.2 Response rate

An online survey consisting of 49 items was distributed to the consumers of 114 banks in the Kingdom of Bahrain through a hyperlink between September 2020 and October 2020. The hyperlink was distributed using email and social media applications, such as WhatsApp, Twitter, LinkedIn, and Facebook. The hyperlink was sent to participants numbering around 1,000. A total of 407 responses were received which indicates a response rate of 40.7%. According to Sekaran and Bougie (2016) a response rate of 30% is acceptable in surveys. Out of the 407 responses received 17 responses were rejected due to lack of fulfilling the required condition mentioned on the consent form, such as responses below 18 years, or responses that confirm not reading the participant information sheet included with this questionnaire. A total of 390 responses were found valid for use in this research. The data was cleaned for any errors and prepared for analysis.

5.3 Respondent profile (Demographics)

The online survey comprised 5 demographics questions that are collected through the questionnaire. These are gender, age group, employment status, income category, the awareness level of Fintech services. The below Table 5.1 illustrated the profile respondents.

Table 5. 1 Respondents profile

Gender	Freq.	%
Male	189	48.5%
Female	**201**	**51.5%**
Total: 390		

Age Group	Freq.	%
18-24 years old	32	8.2%
25-34 years old	**189**	**48.5%**
35-44 years old	90	23.1%
45-54 years old	38	9.7%
55-64 years old	31	7.9%
65 years old and above	10	2.6%
Total: 390		

Employment Status	Freq.	%
Employee	**292**	**74.9%**
Not employed	14	3.6%
Retired	30	7.7%
Student	24	6.2%
Housewife	14	3.6%
Self-employed	16	4%
Total: 390		

Income Category	Freq.	%
≤ BD 300	51	13.1%
BD301-BD600	64	16.4%
BD601-BD900	**103**	**26.4%**
BD901-BD1200	69	17.7%
BD1201-BD1500	29	7.4%
>BD1500	74	19%
Total: 390		

Awareness Level of Fintech Services	Freq.	%
Fintech services user	**175**	**44.9%**
Aware of fintech services	92	23.6%
Intend to use fintech services in future	60	15.4%
Not familiar with fintech services	63	16.1%
Total: 390		

Table 5.1 indicates that from the respondents profile no significant gender bias was indentify i.e. Male (48.5%) and Female (51.5%) which indicates that there is very little gender difference in regard to the respondents. Thus, there is unlikely impact on behavioural intention to adopt due to gender difference. As for the age group of the participants is concerned, it can be seen that a large number of participants are from the age group 25-34 years (48.5%) That is to say that the age group between 25-34 years (48.5%) are most acquainted with technology and innovation, and are most likely to be interested in adopting fintech services. Further, with regard to income, it can be noticed that numerous participants are from the age group between 25-34 years (48.5%) and are employed (74.9%). Moreover, the statistic of 74.9% of the participants being employed shows that they are more likely to use fintech services to transact money.

Additionally, the statistic related to the income category shows that a large proportion of respondents' income is between BD601-BD900 (26.4%) followed by category >BD1,500 (19%). Taking into account the categories of participants that is BD901-BD1200 (17.7%) and BD1201-BD1500 (7.4%), it can be seen that the proportion of earners fall in the bracket BD601 to above BD1,500 contribute to around 70.5%. These figures indicate that fintech technology is being used by consumers classified under

different income groups and income is not a criterion for adopting fintech..

In the awareness level of fintech services, it can be noticed that a high percentage (44.9%) of participants are already using fintech services, while 23.6% of the participants were aware of fintech services. In addition, about 15.4% of the participants have clearly indicated that they intend to use fintech services in future. This leaves 16.1% of the participants who were not familiar with fintech services which is a small percentage when compared to the other categories. Thus, it is reasonable to conclude that the respondents can be understood to be the right population targeted for this research.

5.4 Data preparation

Data preparation is an important part of data analysis; in this stage the researcher ensures the elimination of errors that might have crept in due to data entry or data organization. Since the survey was conducted online, and participants had to answer all questions before a response was considered complete, there was no involvement of data entry at the researcher's side. All the responses collected through the online survey were captured and the data was organized on SPSS version 21.0 directly for analysis. The preliminary tests involved the checking for normal distribution of data, outliers and presence of multicollinearity, which are discussed in the next sections.

5.4.1 Normality of the data

Normality test was performed using statistical tools to validate the normality of the distribution of the data by using two numerical measures of shape; skewness and kurtosis (Kim, 2013; Hair et al., 2010) as well as standard deviation (Sandoval et al., 2020). Skewness refers to the asymmetry of the distribution of a variable (symmetric distribution usually has skew value of zero), while kurtosis was used to describe the combined weight of a distribution's tails relative to the center of the distribution. Thus, kurtosis measures the 'tailedness", not "peakedness". A perfectly normal distribution shows a bell peak and usually having an excess kurtosis of zero. Table 5.2 illustrated skewness and kurtosis parameter of measurement.

Table 5. 2 parameters for measuring the skewness and kurtosis

	Positive Form	Negative Form	Acceptable level	References
Skewness	Distribution has a long right tail (i.e. shifted to the left)	Distribution has a long left tail (i.e. shifted to the right)	+1.5 to -1.5	Tabachnick and Fidell (2018); Pallant (2010).
Kurtosis	Distribution has a higher peak and longer tails (Leptokurtic)	Distribution has a flatter peak and shorter tails (Platykurtic)	+3 to -3	Westfall (2014); Pallant (2010).

While Table 5.3 shows the test results of the skewness and the kurtosis. The table indicates that no construct measuring items' skewness exceeded the +1.5 and -1.5 and no kurtosis value exceeded the +3 and -3. Hence, the distribution of the data is considered normal

Table 5. 3 Skewness and Kurtosis test result

No.	Construct	Measuring items	Mean	Std. Deviation	Skewness		Kurtosis	
			Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error

1	INTADOP	Q1-Q4	3.9429	0.82719	-1.134	0.124	2.062	0.247
2	PU	Q5 –Q9	3.9686	0.85720	-1.254	0.124	2.035	0.247
3	PEU	Q10 –Q14	3.8379	0.76424	-0.863	0.124	1.634	0.247
4	TRU	Q15-Q19	3.8749	0.78189	-0.948	0.124	1.645	0.247
5	PRISK	Q20-Q26	2.9176	1.04906	0.076	0.124	-0.631	0.247
6	RA	Q27-Q31	3.9497	0.81587	-1.178	0.124	1.998	0.247
7	COMPLX	Q32-Q36	2.6826	0.98850	0.298	0.124	-0.626	0.247
8	COMPAT	Q37-Q41	3.8713	0.80929	-1.042	0.124	1.468	0.247
9	TRIABI	Q42-Q45	3.6712	0.88929	-0.552	0.124	0.103	0.247
10	OBSERV	Q46-Q49	3.9090	0.82462	-0.958	0.124	1.415	0.247

As far as standard deviation was concerned, it can be seen from section 5.2 that for data to be normally distributed, the values of standard deviation should fall in the range of ±2.0 (Brace & Brace, 2016). It can be seen from Table 5.3 that all values of standard deviation were found to fall within the range ±2.0.

Moreover, Outliers were detected using Mahalanobis distance. The tests indicated that no outliers were found in the responses received with the Mahalanobis distance pertaining to all responses falling within the acceptable value of 3-4. Test of multicollinearity has been reported in section 5.11.2 as it is concerned with the SEM.

5.5 Descriptive statistics

Descriptive statistics are performed to describe the basic features of the raw data collected for this study including mean, frequency and standard deviation, thereby, providing a simple summarization of the sample and measures. Descriptive statistics were interpreted for the constructs and the items measuring them using the collected data to provide meaning to the numbers, by using the mean, and the standard deviation (SD). The list of constructs and their codes along with the items measuring them are provided in Table 5.4.

Table 5. 4 List of constructs, coding and items used to measure the constructs

No.	Name of the construct	Code	Measuring items	No. of Items
1	Intention to adopt fintech services	INTADOP	Q1-Q4	4
2	Perceived usefulness	PU	Q5 –Q9	5
3	Perceived ease of use	PEU	Q10 –Q14	5
4	Trust	TRU	Q15-Q19	5
5	Perceived risk	PRISK	Q20-Q26	7
6	Relative advantage	RA	Q27-Q31	5
7	Complexity	COMPLX	Q32-Q36	5
8	Compatibility	COMPAT	Q37-Q41	5
9	Trialability	TRIABI	Q42-Q45	4
10	Observability	OBSERV	Q46-Q49	4

Since the objective of this research is to study the factors that influence the behavioural intention of consumers to adopt fintech services in the context of banking, the data was collected from consumers of the banking industry. Table 5.5 provides the mean and the standard deviation for each item of the ten constructs included in this research. Responses have been collected from 390 participants and the descriptive analysis provide an overall understanding of the responses received for each variable using the 5-point Likert scale. A total of 49 questions are coded to kink each item with its construct. Besides,

the coding helps the researcher in organizing the data for the analysis phase.

Table 5. 5 Descriptive Statistic (Mean & Standard Deviation)

			SD	D	N	A	SA		
1	INTADOP	Q1	3.8	4.6	16.7	46.7	28.2	3.9077	0.98664
		Q2	3.6	3.6	13.6	52.1	27.2	3.9564	0.93525
		Q3	2.6	4.9	14.9	48.5	29.2	3.9692	0.93164
		Q4	2.3	5.1	15.1	51.3	26.2	3.9385	0.90773
2	PU	Q5	4.1	5.6	11.0	52.6	26.7	3.9205	0.98385
		Q6	4.4	4.4	10.8	50.0	30.5	3.9795	0.99075
		Q7	2.6	4.4	13.3	48.5	31.3	4.0154	0.92371
		Q8	2.6	5.4	11.3	52.1	28.7	3.9897	0.92099
		Q9	4.1	5.1	11.3	51.8	27.7	3.9385	0.98122
3	PEU	Q10	2.6	4.9	22.6	50.0	20.0	3.8000	0.90187
		Q11	1.5	5.1	17.2	55.4	20.8	3.8872	0.84390
		Q12	3.6	6.9	22.3	46.4	20.8	3.7385	0.98226
		Q13	2.1	4.1	16.2	56.9	20.8	3.9026	0.84278
		Q14	2.3	3.3	21.0	52.6	20.8	3.8615	0.86122
4	TRU	Q15	1.8	7.4	20.3	49.0	21.5	3.8103	0.91820
		Q16	1.5	4.6	21.3	51.5	21.0	3.8590	0.85331
		Q17	1.5	6.4	18.2	53.1	20.8	3.8513	0.87433
		Q18	2.3	5.1	14.6	54.4	23.6	3.9179	0.88891
		Q19	2.1	5.4	15.6	50.8	26.2	3.9359	0.90329
5	PRISK	Q20	11.3	28.7	25.6	23.8	10.5	2.9359	1.18191
		Q21	13.6	36.7	19.7	20.5	9.5	2.7564	1.19968
		Q22	14.4	27.7	19.2	28.7	10.0	2.9231	1.23955
		Q23	10.5	25.9	22.1	30.8	10.8	3.0538	1.19109
		Q24	12.6	26.7	15.9	34.1	10.8	3.0385	1.24238
		Q25	12.1	27.2	22.1	28.5	10.3	2.9769	1.20495
		Q26	16.4	30.8	23.3	21.5	7.9	2.7385	1.19696
6	RA	Q27	3.3	5.6	13.1	51.5	26.4	3.9205	0.95736
		Q28	1.8	5.1	15.6	52.1	25.4	3.9410	0.88059
		Q29	2.1	5.9	11.8	47.9	32.3	4.0256	0.92903
		Q30	2.6	4.9	20.5	47.2	24.9	3.8692	0.92984
		Q31	3.3	3.3	14.4	48.7	30.3	3.9923	0.93898
7	COMPLX	Q32	10.8	33.8	25.4	23.3	6.7	2.8128	1.11237
		Q33	12.1	40.3	20.8	21.0	5.9	2.6846	1.11107
		Q34	10.8	42.3	19.7	20.0	7.2	2.7051	1.12129
		Q35	11.5	40.0	24.9	17.9	5.6	2.6615	1.07474
		Q36	16.4	42.6	16.2	19.5	5.4	2.5487	1.13665
8	COMPAT	Q37	4.4	5.6	21.5	47.9	20.5	3.7462	0.98819
		Q38	1.3	5.1	17.2	54.1	22.3	3.9103	0.84211
		Q39	3.3	6.9	16.9	52.3	20.5	3.7974	0.95530
		Q40	3.1	4.6	14.1	49.0	29.2	3.9667	0.94660
		Q41	3.3	3.1	15.4	53.1	25.1	3.9359	0.90896
9	TRIABI	Q42	3.6	7.4	14.1	46.4	28.5	3.8872	1.01788
		Q43	3.1	12.1	21.3	42.8	20.8	3.6615	1.03328
		Q44	2.8	15.6	21.0	42.1	18.5	3.5769	1.04794
		Q45	3.1	16.7	19.7	42.3	18.2	3.5590	1.06371
10	OBSERV	Q46	4.1	5.1	18.2	48.5	24.1	3.8333	0.98598
		Q47	2.8	4.4	20.5	45.1	27.2	3.8949	0.94677
		Q48	2.3	3.3	16.4	49.5	28.5	3.9846	0.88968
		Q49	2.8	4.9	17.4	46.9	27.9	3.9231	0.94813

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

The above data shows that the mean ranges from 2.54 to 4.02 (where =1 minimum, and 5= maximum) and standard deviation ranges between 0.84211 to 1.24238. Moreover, for variables namely the intention to adopt fintech services (INTADOP), perceived usefulness (PU), perceived ease of use (PEU), trust (TRU), relative advantage (RA), compatibility (COMPAT), trialability (TRIABI), and observability (OBSERV), higher percentage of responses were tending towards the point 'agree' on the scale with the frequency ranging from 56.9% to 42.1% across constructs mentioned above, followed by the point 'strongly agree' on the scale, with the frequency ranging from 32.3% to 18.2% across those constructs. The responses measured by other points on the scale were less significant than the two points mentioned above and hence have not been reported.

The descriptive analysis indicates that for the constructs mentioned above the responses show that the respondents are likely to intend to adopt fintech services. As far as the remaining two constructs perceived Risk (PRISK) and complexity (COMPLX) were concerned, responses were tending towards the 'disagree' point on the scale with the frequency ranging from 42.6% to 25.9%. In addition, the respondents have also given the 'strongly disagree' on the Likert scale for the two constructs which ranged between 16.4% and 10.5%. This could indicate that although fintech services could be considered as complex and perceived to be risky, yet it appears that the majority of the respondents do not feel like that. Further to the analysis of the descriptive related to the items using the range of the frequencies at the construct level grouped based on the nature of the construct (e.g. perceived risk and complexity indicate negative features and hence grouped together), the following analyses go deeper into individual item analysis and provides descriptive analyses of the items using their average value at the individual construct level. These analyses are expected to reveal more clearly the behavioural intention of the respondents to adopt fintech services.

5.5.1 Descriptive statistics for Intention to adopt fintech services (INTADOP)

Table 5.5. 1 Descriptive Statistic for Intention to adopt (INTADOP)

	SD	D	N	A	SA		
Q1: Given a chance to access fintech services while banking, I expect I would use it	3.8	4.6	16.7	46.7	28.2	3.9077	0.98664
Q2: Assuming there is access to fintech services while banking, I intend to use it	3.6	3.6	13.6	52.1	27.2	3.9564	0.93525
Q3: Whenever I get a chance, I will use fintech services in my banking activity	2.6	4.9	14.9	48.5	29.2	3.9692	0.93164
Q4: To the extent possible, I would take advantage of fintech services in my banking activity	2.3	5.1	15.1	51.3	26.2	3.9385	0.90773
Average	**3.1**	**4.6**	**15.1**	**49.7**	**27.7**	**3.9430**	**0.94032**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 1 Intention to Adopt

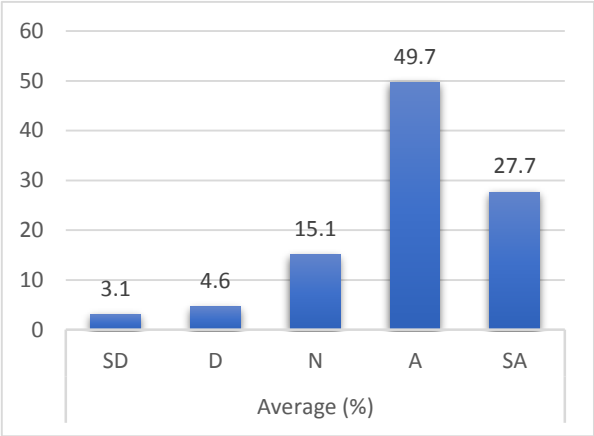


Figure 5.1 provides an overview of the descriptive results for the construct INTADOP. INTADOP was measured using four items. Descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured INTADOP, higher responses were found on the 'agree' point on the scale (average of 49.7%), followed by responses approaching the 'strongly agree' point on the scale (average of 27.7%). There were also considerable responses that approached the 'neutral' point on the scale (average of 15.1%). The Table 5.5.1 above provides the results of the descriptive analysis for INTADOP. The mean values are seen to be above 3.9 with a standard deviation ranging between 0.9077 to 0.9866, indicating that the distribution of data pertaining to the 5-point scale for the INTADOP items is normal. The interpretation is that intention to adopt fintech services of the respondents is clearly pointing towards the affirmative. The findings of the descriptive analysis for the item Q1 shows that 46.7% and 28.2% of the respondents have indicated their option on the scale as 'agreed' and 'strongly agreed' respectively. This implies that the respondents in both likelihoods are expected to use fintech service while banking. Similarly, analysis with regard to Q2 shows that the respondents are intending to use fintech services (agree = 52.1% and strongly agree = 27.2%). Arguing in similar lines it can be seen that for the items Q3 (agree = 48.5% and strongly agree = 29.2%) and Q4 (agree = 51.3% and strongly agree = 26.2%) respondents have indicated that they will use fintech services in their banking activities and take advantage of using fintech services in their banking activity. Overall the findings indicate that with regard to construct INTADOP, the respondents have shown their overwhelming response in favour of adoption of fintech services.

5.5.2 Descriptive statistics for Perceived Usefulness (PU)

Table 5.5. 2 Descriptive Statistic for Perceived Usefulness (PU)

	SD	D	N	A	SA		
Q5: I can do transaction better with my bank using fintech services	4.1	5.6	11.0	52.6	26.7	3.9205	0.98385
Q6: My online banking transactions are more efficient through fintech services	4.4	4.4	10.8	50.0	30.5	3.9795	0.99075
Q7: I can easily log in and log out online while using fintech services while banking	2.6	4.4	13.3	48.5	31.3	4.0154	0.92371
Q8: I feel using fintech services will be more convenient while banking	2.6	5.4	11.3	52.1	28.7	3.9897	0.92099
Q9: Using fintech services is perceived by me to be more useful in my banking activities	4.1	5.1	11.3	51.8	27.7	3.9385	0.98122
Average	**3.6**	**5.0**	**11.5**	**51.0**	**29.0**	**3.9687**	**0.96010**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 2 Perceived Usefulness

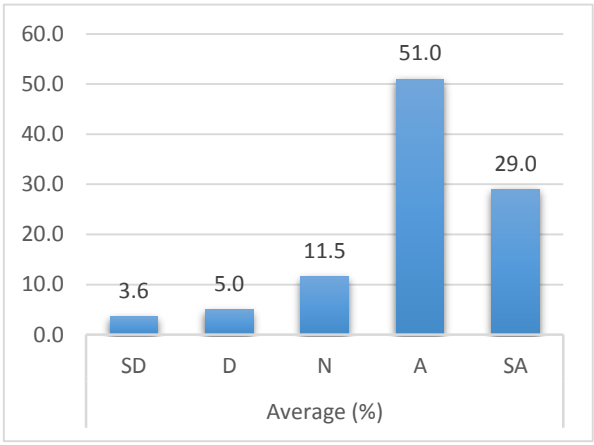


Figure 5.2 provides an overview of the descriptive results for the construct PU. PU was measured using five items. The descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the 5 items that measured PU, higher responses were found to tend towards the 'agree' point on the scale (average of 51%), followed by responses approaching the 'strongly agree' point on the scale (average of 29%). There were also considerable responses that approached the 'neutral' point on the scale (average of 11.5%). The descriptive Table 5.5.2 above provides the results of the descriptive analysis for PU. The mean values were seen to be above 3.9 with an SD value ranging between 0.9209 and 0.9907, indicating that the distribution of data pertaining to the 5-point scale for the items measuring PU is normal. The interpretation is

that perceived usefulness of fintech services of the respondents is clearly pointing towards the affirmative. For example, the findings of the descriptive analysis for the item Q5 shows that 52.6% and 26.7% of the respondents have indicated their option on the scale as 'agreed' and 'strongly agreed' respectively. This implies that the respondents were transacting better using fintech services. Analysis with regard to Q6 shows that the respondents perceived that transactions were more efficient through fintech services. (agree = 50% and strongly agree = 30.5%). For the item Q7, 48.5% of the respondents have indicated their option on the scale as 'agree', and 31.3% of the respondents have indicated their option on the scale as 'strongly agree' meaning that log in and log out is easy using fintech services. Arguing in similar lines it can be seen that for the items Q8 (agree = 52.1% and strongly agree = 28.7%) and Q9 (agree = 51.8% and strongly agree = 27.7%) respondents felt that using fintech services is perceived to be more convenient and useful while banking. Overall, the findings indicate that with regard to construct PU, the respondents have shown through their overwhelming response that they perceive fintech services to be useful.

5.5.3 Descriptive statistics for Perceived Ease of Use (PEU)

Table 5.5. 3 Descriptive Statistic for Perceived Ease of Use (PEU)

	SD	D	N	A	SA		
Q10: While banking I can learn the operation of the fintech services easily	2.6	4.9	22.6	50.0	20.0	3.8000	0.90187
Q11: While banking I became adept at using fintech services fast	1.5	5.1	17.2	55.4	20.8	3.8872	0.84390
Q12: I get clear information about fintech services easily for my banking activity	3.6	6.9	22.3	46.4	20.8	3.7385	0.98226
Q13: While banking I would find fintech services easy to use	2.1	4.1	16.2	56.9	20.8	3.9026	0.84278

Q14: While banking I would find fintech services flexible to interact with	2.3	3.3	21.0	52.6	20.8	3.8615	0.86122
Average	**2.4**	**4.9**	**19.9**	**52.3**	**20.6**	**3.8380**	**0.88641**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 3 Perceived Ease of Use

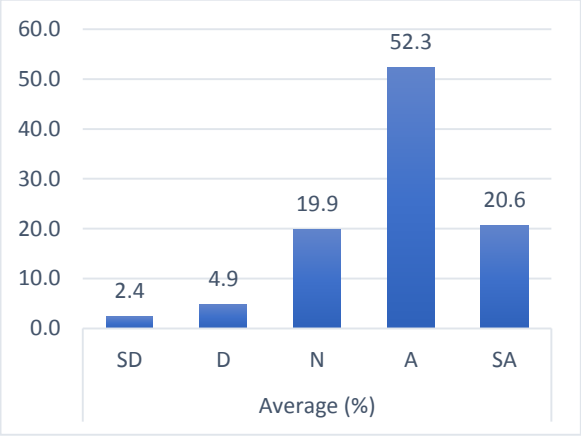


Figure 5.3 provides an overview of the descriptive results for the construct PEU. PEU was measured using five items whose descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured PEU, higher responses were found to tend towards the 'agree' point on the scale (average of 52.3%), followed by responses approaching the 'strongly agree' point on the scale (average of 20.6%). There were also considerable responses that approached the 'neutral' point on the scale (average of 19.9%). The Table 5.5.3 above provides the results of the descriptive analysis for PEU. The mean values are seen to be above 3.7 with a standard deviation ranging between 0. 8427 and 0. 9822, indicating that the distribution of data pertaining to the 5-point scale for PEU items is normal. The interpretation is that perceived ease of use of fintech services of the respondents is clearly pointing towards the affirmative. The findings of the descriptive analysis for the item Q10 shows that the respondents indicated that they can learn the operation of the fintech services easily (agree = 50% and strongly agree = 20%). Descriptive analysis with regard to Q11 shows that the respondents are becoming adept at using fintech services fast (agree = 55.4% and strongly agree = 20.8%). Descriptive analysis for the item Q12 shows that the respondents indicated that they can gets clear information about fintech services easily (agree = 46.4% and strongly agree = 20.8% %). Similarly, findings of the descriptive analysis for the item Q13 and Q14 show that the majority of the of respondents have selected the 'agree' or 'strongly agree' points on the scale, indicating that fintech services are easy to use and flexible to interact with. Overall, the findings indicate that with regard to the construct perceived ease of use, the respondents have shown their overwhelming response they perceive fintech services to be easy to use.

5.5.4 Descriptive statistics for Trust (TRU)

Table 5.5. 4 Descriptive Statistic for Trust (TRU)

	SD	**D**	**N**	**A**	**SA**		
Q15: I think that my bank will maintain the terms and commitments made in relation to offering fintech services	1.8	7.4	20.3	49.0	21.5	3.8103	0.91820
Q16: I think the fintech service offered by my bank is reliable	1.5	4.6	21.3	51.5	21.0	3.8590	0.85331
Q17: In general, I trust the fintech services offered by my bank	1.5	6.4	18.2	53.1	20.8	3.8513	0.87433

Q18: I trust the information provided by my bank on fintech services	2.3	5.1	14.6	54.4	23.6	3.9179	0.88891
Q19: I would trust my bank to offer secure fintech services	2.1	5.4	15.6	50.8	26.2	3.9359	0.90329
Average	**1.8**	**5.8**	**18.0**	**51.8**	**22.6**	**3.8749**	**0.88761**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 4 Trust

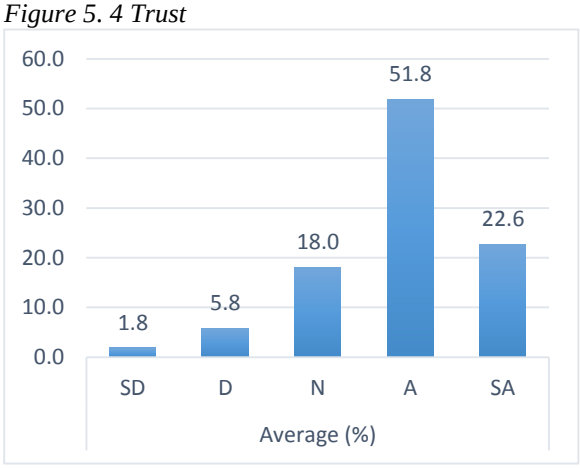


Figure 5.4 provides an overview of the descriptive results for TRU. TRU was measured using five items whose descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured TRU, higher responses were found to tend towards the 'agree' point the scale (average of 51.8%), followed by responses approaching the 'strongly agree' point on the scale (average of 22.6%). There were also considerable responses that approached the 'neutral' point on the scale (average of 18%). The Table 5.5.4 above provides the results of the descriptive analysis for TRU. The mean values are seen to be above 3.8 with a standard deviation ranging between 0. 8533 and 0. 9182, indicating that the distribution of data pertaining to the 5-point scale for the TRU items is normal. The interpretation is that trust on fintech services of the respondents is clearly pointing towards the affirmative. The findings of the descriptive analysis for the item Q15 show that 49% and 21.5% of the respondents have indicated their option on the scale as 'agreed' and 'strongly agreed' respectively. This implies that the respondents think that their bank will maintain the terms and commitments made in relation to offering fintech services. Similarly, analysis with regard to Q16 shows that the respondents think that fintech service offered by their bank are reliable (agree = 51.5% and strongly agree = 21%). Arguing in similar lines it can be seen that for the items Q17 (agree = 53.1% and strongly agree = 20.8%) and Q18 (agree = 54.4% and strongly agree = 23.6%) respondents have indicated that they trust that fintech services offered by their bank and the information provided by their bank on fintech services. Moreover, descriptive analysis with regard to Q19 shows that the majority of respondents would trust that their bank offers secure fintech service (agree = 50.8 % and strongly agree = 26.2%). Overall, the findings indicate that with regard to the construct TRU, the respondents have shown their overwhelming response in favour of trust of fintech services.

5.5.5 Descriptive statistics for Perceived Risk (PRISK)

Table 5.5. 5 Descriptive Statistic for Perceived Risk (PRISK)

	SD	**D**	**N**	**A**	**SA**		
Q20: While banking online I think using fintech services could endanger my privacy by utilizing my personal information without my knowledge	11.3	28.7	25.6	23.8	10.5	2.9359	1.18191
Q21: While using the fintech services of my bank, I cannot keep my personal data private	13.6	36.7	19.7	20.5	9.5	2.7564	1.19968

Q22: While using fintech services of my bank, personal information could be stolen	14.4	27.7	19.2	28.7	10.0	2.9231	1.23955
Q23: Financial risk exists if I use fintech services of my bank	10.5	25.9	22.1	30.8	10.8	3.0538	1.19109
Q24: While banking using fintech services, there is a threat of losing money due to hacking	12.6	26.7	15.9	34.1	10.8	3.0385	1.24238
Q25: I would not feel completely safe while providing personal information through online fintech services of my bank	12.1	27.2	22.1	28.5	10.3	2.9769	1.20495
Q26: While conducting banking transactions online I would not find fintech services of my bank secure	16.4	30.8	23.3	21.5	7.9	2.7385	1.19696
Average	**13.0**	**29.1**	**21.1**	**26.8**	**10.0**	**2.9176**	**1.20807**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 5 Perceived Risk

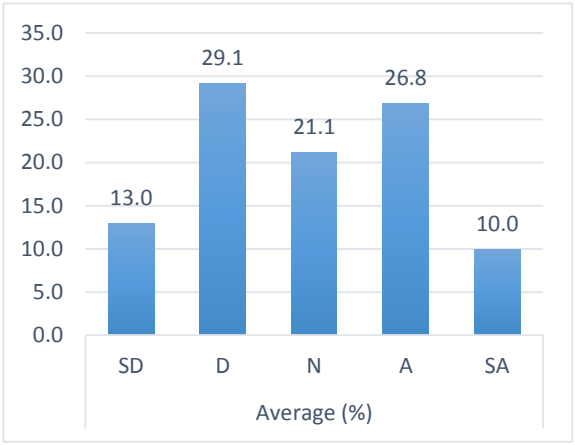


Figure 5.5 provides an overview of the descriptive results for the construct PRISK. Seven items were used to measure PRISK. The descriptive analysis of which showed that with regard to the five items majority of respondents opted for 'disagree' point on the scale, while with regard to the remaining two items the responses tended towards the 'agree' point on the scale. For the items that measured PRISK, higher responses were found towards the 'disagree' point on the scale (average of 29.1%), followed by responses approaching the 'agree' point on the scale (average of 26.8%), and responses approaching the 'neutral' point on the scale (average of 21.1%). The descriptive Table 5.5.5 above provides the results of the descriptive analysis for PRISK. The mean values are seen to be above 2.7 with an SD value range between 1.1819 and 1.2423, indicating that the distribution of data pertaining to the 5-point scale for the PRISK items is normal. The interpretation is that perceived risk of fintech services of the respondents is pointing towards lower level perception of risk while using fintech services. For example, the findings of the descriptive analysis for the item Q20 shows that 28.7 % and 11.3% of the respondents have indicated their option on the scale as 'disagree' and 'strongly disagree' respectively. This implies that the respondents think that while banking online using fintech services their privacy could not be endangered. With regard to Q21 the result shows that 36.7 % and 13.6% of the respondents have indicated their option on the scale as 'disagree and 'strongly disagree' respectively. This implies that the respondents have indicated that the banks offering fintech services can ensure that privacy of their personal data is kept up. Item Q22 shows that 27.7 % of the respondents have indicated their option on the scale as 'disagree' and 14.4% of the respondents have indicated their option on the scale as 'strongly disagree' meaning that their personal information could not be stolen while using fintech services. Items Q22 shows that 27.2 % of the respondents have indicated their option on the scale as 'disagree' and 12.1% of the respondents have indicated their option on the scale as 'strongly disagree'

that while providing personal information they would not feel completely safe. Also, descriptive analysis with regard to Q26 shows that the majority respondents (30.8% 'disagree' and 16.4% 'strongly disagree') indicated that while conducting banking transactions online they would not find transacting through fintech services of their bank, insecure. However, the remaining two items related to PRISK were seen to tend towards the 'agree' point on the scale. For instance, response to item Q23 shows that 30.8% of the respondents have indicated their option on the scale as 'agree' and 10.8% of the respondents have indicated their option on the scale as 'strongly agree' meaning that while banking using fintech services, there is a threat of losing money due to hacking. Also, descriptive analysis with regard to Q24 shows that the majority of the respondents (34.1% 'agree' and 10.8% 'strongly agree') indicate that while banking using fintech services, they perceived that there is a threat of losing money due to hacking. The descriptive findings at this stage also indicate that some of the consumers (those who have opted for the point 'neutral amounting to 21.1%) were indecisive in their conclusions regarding their beliefs with regard to the potential loss they could incur while using fintech services. The overall all findings at this stage indicate that the concern of consumers with regard to the potential to lose while using fintech services need to be addressed as many consumers perceive risk in using fintech services. The points on the scale were reverse coded during analysis.

5.5.6 Descriptive statistics for Relative Advantage (RA)

Table 5.5. 6 Descriptive Statistic for Relative Advantage (RA)

	SD	D	N	A	SA		
Q27: Adopting fintech services in my banking activity will allow me to conduct banking transactions more efficiently.	3.3	5.6	13.1	51.5	26.4	3.9205	0.95736
Q28: Using fintech services improves the quality of the banking activities I do.	1.8	5.1	15.6	52.1	25.4	3.9410	0.88059
Q29: Using fintech services makes my banking activities easier.	2.1	5.9	11.8	47.9	32.3	4.0256	0.92903
Q30: The advantages of my using fintech services far outweigh the disadvantages	2.6	4.9	20.5	47.2	24.9	3.8692	0.92984
Q31: Using fintech enhances my access to my banking information.	3.3	3.3	14.4	48.7	30.3	3.9923	0.93898
Average	**2.6**	**5.0**	**15.1**	**49.5**	**27.9**	**3.9497**	**0.92716**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 6 Relative Advantage

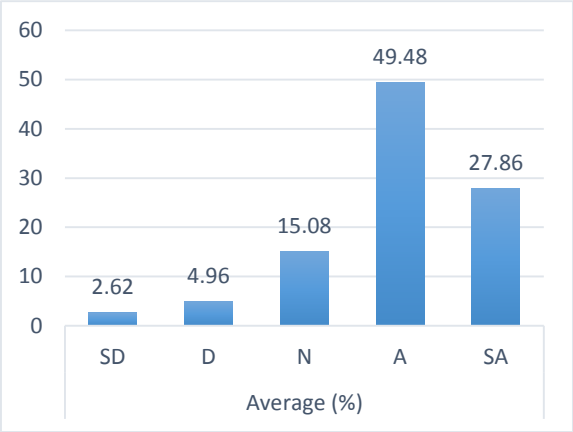


Figure 5.6 provides an overview of the descriptive results for the construct RA. RA has five items which descriptive analysis showed that the majority of respondents have opted for the points either 'agree' or 'strongly agree' on the scale. For the items that measured RA, higher responses were found to tend towards the 'agree' point on the scale (average of 49.5%), followed by responses approaching the 'strongly agree' point on the scale (average of 27.9%). There were also considerable responses that approached the 'neutral' point on the scale (average of 15.1%). The Table 5.5.6 above provides the results of the descriptive analysis for RA. The mean values are seen to be above 3.8 with a standard deviation ranging between 0. 8805 to 0.9573, indicating that the distribution of data pertaining to the 5-point scale for the RA items is normal. Moreover, RA has 5 items of which 4 items were found to elicit responses higher than 3.9 on the Likert scale, with an average standard deviation of 0.92, indicating that the data is largely inclined towards the points 4 and 5 on the scale. The interpretation is that relative advantage of fintech services of the respondents is clearly pointing towards the affirmative. Findings of the descriptive analysis for the item Q27 to item Q31 show that the majority of the of respondents have selected the 'agree' or 'strongly agree' points on the scale, indicating that conducting transactions are more efficient using fintech services, fintech services improves the quality of the banking activities, fintech services make banking activities easier, fintech services enhances the access to the personal banking information, and that the advantages of using fintech services far outweigh the disadvantages. Overall, the findings indicate that with regard to construct relative advantage, the respondents have shown their overwhelming response in favour of relative advantage of use of fintech services.

5.5.7 Descriptive statistics for Complexity (COMPLX)

Table 5.5. 7 Descriptive Statistic for Complexity (COMPLX)

	SD	D	N	A	SA		
Q32: Interacting with fintech services could be frustrating in banking transactions.	10.8	33.8	25.4	23.3	6.7	2.8128	1.11237
Q33: Banking transactions conducted on fintech services are inflexible.	12.1	40.3	20.8	21.0	5.9	2.6846	1.11107
Q34: While banking, I find it difficult to get fintech services to do what I want it to do.	10.8	42.3	19.7	20.0	7.2	2.7051	1.12129
Q35: While using banking services, fintech system often behaves in unexpected ways.	11.5	40.0	24.9	17.9	5.6	2.6615	1.07474
Q36: Overall, for conducting banking transactions, I find the fintech services not easy to use.	16.4	42.6	16.2	19.5	5.4	2.5487	1.13665

Average	**12.3**	**39.8**	**21.4**	**20.3**	**6.2**	**2.6825**	**1.11122**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 7 Complexity

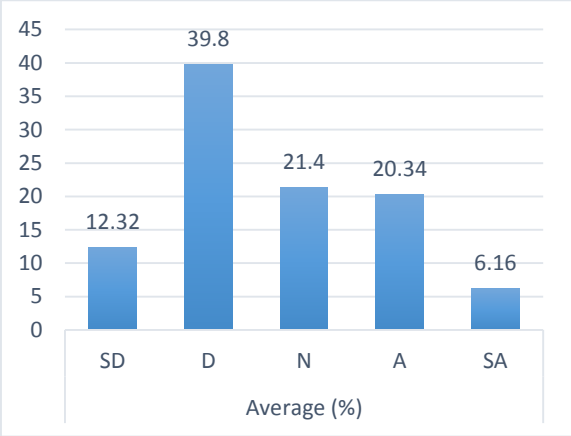


Figure 5.7 provides an overview of the descriptive results for the construct COMPLX. COMPLX was measured using five items whose descriptive analysis showed that the majority of respondents have opted for the points either 'disagree' or 'neutral' on the scale. For the items that measured COMPLX, higher responses were found to tend towards the 'disagree' point on the scale (average of 39.8%), followed by responses approaching the 'natural' point on the scale (average of 21.4%). There were also considerable responses that approached the 'agree' point on the scale (average of 20.34.1%). The Table 5.4.1 above provides the results of the descriptive analysis for COMPLX. The mean values were seen to be above 2.6 with a standard deviation ranging between 1.0747 and 1.1366, indicating that the distribution of data pertaining to the 5-point scale for the COMPLX items is normal. The overall findings for COMPLX indicated that all five items are having negative responses. An average of 52.8% (39.8% 'disagree' + 13% 'strongly disagree') of the respondents did not perceive difficulty in learning to use and understand fintech services, followed by 21.4% who were neutral indicating that they could not agree or disagree (indecisive) on the complexity of using fintech services. However, it is important to note that 20.34% of the respondents find interacting with fintech services could be frustrating, inflexible, difficult, not easy to use, and often behaves in unexpected ways. This is an important warning that needs to be taken by service providers of fintech services and ensure that fintech services are customer friendly and easy to use. It must me noted here that the scales were reverse coded at the data analysis stage.

5.6.8 Descriptive statistics for Compatibility (COMPAT)

Table 5.5. 8 Descriptive Statistic for Compatibility (COMPAT)

	SD	**D**	**N**	**A**	**SA**		
Q37: Using fintech services in banking would be compatible with most activities of banking.	4.4	5.6	21.5	47.9	20.5	3.7462	0.98819
Q38: Using fintech services while banking would fit well with how I like to do my banking	1.3	5.1	17.2	54.1	22.3	3.9103	0.84211
Q39: Fintech services would be compatible with my banking needs.	3.3	6.9	16.9	52.3	20.5	3.7974	0.95530
Q40: Using fintech services while banking fits into my lifestyle	3.1	4.6	14.1	49.0	29.2	3.9667	0.94660
Q41: Fintech services fit with other technologies while banking.	3.3	3.1	15.4	53.1	25.1	3.9359	0.90896
Average	**3.1**	**5.1**	**17.0**	**51.3**	**23.5**	**3.8713**	**0.928232**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 8 Compatibility

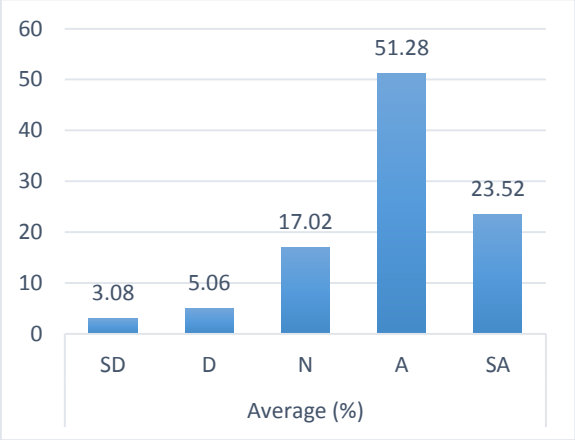


Figure 5.8 provides an overview of the descriptive results for the construct COMPAT. COMPAT was measured using five items whose descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured COMPAT, higher responses were found to tend towards the 'agree' point on the scale (average of 51.3%), followed by responses approaching the 'strongly agree' point on the scale (average of 23.5%). There were also considerable responses that approached the 'neutral' point on the scale (average of 17%). The Table 5.5.8 above provides the results of the descriptive analysis for COMPAT. The mean values are seen to be above 3.7 with a standard deviation ranging between 0.8421 to 0. 0.9882, indicating that the distribution of data pertaining to the 5-point scale for the COMPAT items is normal. The interpretation is that compatibility of fintech services of the respondents is clearly pointing towards the affirmative. For example, descriptive analysis with regard to Q37 shows that the respondents perceived that using fintech services in banking would be compatible with most activities of banking (47.9% 'agree' and 20.5% 'strongly agree'). Arguing in similar lines it can be seen that for the items Q38 (54.1% 'agree' and 22.3% 'strongly agree') and Q39 (52.3% 'agree' and 20.5% 'strongly agree') respondents have indicated that using fintech services while banking would fit well with how they like to do their banking and fintech services would be compatible with their banking needs. Moreover, descriptive analyses with regard to Q40 and 41 show that the majority of respondents perceived that using fintech services while banking fits their lifestyle and that fintech services fit with other technologies while banking. Overall, the findings indicate that with regard to the construct COMPAT, the respondents have shown their overwhelming response in favour of compatibility of fintech services.

5.5.9 Descriptive statistics for Trialability (TRIABI)

Table 5.5. 9 Descriptive Statistic for Trialability (TRIABI)

	SD	D	N	A	SA		
Q42: I am more likely to use fintech services for my banking purposes if I could test it on online banking	3.6	7.4	14.1	46.4	28.5	3.8872	1.01788
Q43: I've had a great deal of opportunity to try various fintech service features.	3.1	12.1	21.3	42.8	20.8	3.6615	1.03328
Q44: I know where I can go to satisfactorily try out various uses of fintech services while banking.	2.8	15.6	21.0	42.1	18.5	3.5769	1.04794
Q45: Fintech services were available to me to adequately test various features required for banking.	3.1	16.7	19.7	42.3	18.2	3.5590	1.06371
Average	**3.2**	**13.0**	**19.0**	**43.4**	**21.5**	**3.6712**	**1.040703**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 9 Trialability

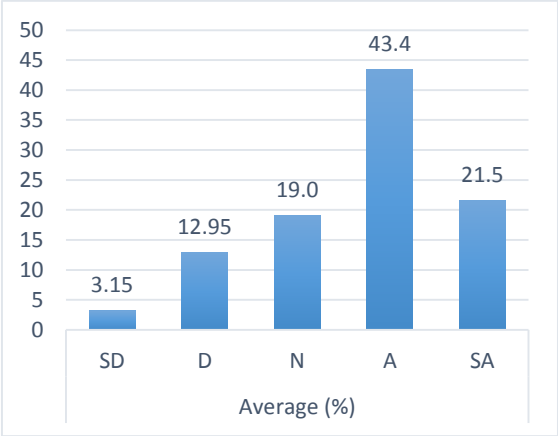


Figure 5.9 provides an overview of the descriptive results for the construct TRIABI. TRIABI was measured using four items whose descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured TRIABI, higher responses were found to tend towards the 'agree' point on the scale (average of 43.4%), followed by responses approaching the 'strongly agree' point on the scale (average of 21.5%). There were also considerable responses that approached the 'neutral' point on the scale (average of 19%). The Table 5.5.9 above provides the results of the descriptive analysis for TRIABI. The mean value is seen to be is 3.6 with an average standard deviation of 1.0407, indicating that the distribution of data pertaining to the 5-point scale use to measure the TRIABI items is normal. The interpretation is that TRIABI of fintech services of the respondents is clearly pointing towards the affirmative. Descriptive analysis with regard to Q42 shows that the respondents are more likely to use fintech services for their banking purposes if they could test it on online (agree = 46.4% and strongly agree = 28.5%). This is in line with responses received for the item Q43 where respondents indicated that they have had a great deal of opportunity to try various fintech service features (agree = 42.8% and strongly agree = 20.8%). Moreover, descriptive analyses with regard to Q44 and Q45 show that the majority of respondents know where they can go to satisfactorily try out various uses of fintech services while banking and that fintech services were available to them to adequately test various features required for banking. Overall, the findings indicate that with regard to the construct TRIABI, the respondents have shown their overwhelming response in favour of TRIABI of fintech services.

5.5.10 Descriptive statistics for Observability (OBSERV)

Table 5.5. 10 Descriptive Statistic for Observability (OBSERV)

	SD	D	N	A	SA		
Q46: The usefulness of fintech services while banking is highly observable.	4.1	5.1	18.2	48.5	24.1	3.8333	0.98598
Q47: The advantages of using fintech services while banking can be noticed by others.	2.8	4.4	20.5	45.1	27.2	3.8949	0.94677
Q48: Fintech services are recommendable in banking activities	2.3	3.3	16.4	49.5	28.5	3.9846	0.88968
Q49: I've had a great deal of opportunity to see various fintech service features being used by others in banking activities.	2.8	4.9	17.4	46.9	27.9	3.9231	0.94813
Average	**3.0**	**4.4**	**18.1**	**47.5**	**26.9**	**3.9090**	**0.94264**

Legend: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, S=Strongly agree

Figure 5. 10 Observability

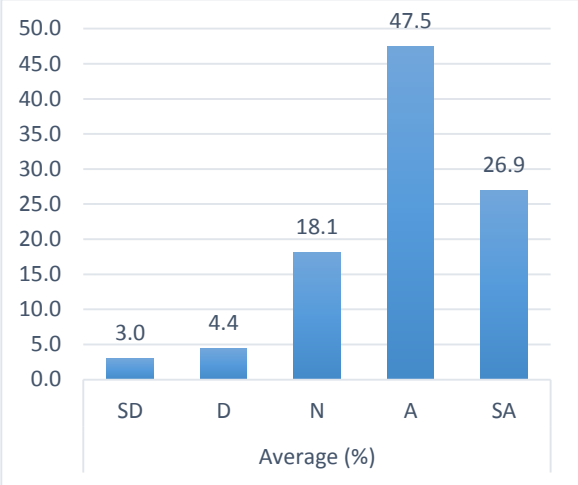


Figure 5.10 provides an overview of the descriptive results for the construct OBSERV. OBSERV was measured using four items whose descriptive analysis showed that the majority of respondents have opted for the 'agree' or 'strongly agree' points on the scale. For the items that measured OBSERV, higher responses were found to tend towards the 'agree' point on the scale (average of 47.5%), followed by responses approaching the 'strongly agree' point on the scale (average of 26.9%). There were also considerable responses that approached the 'neutral' point on the scale (average of 18.1%). The Table 5.5.10 above provides the results of the descriptive analysis for OBSERV. The mean values are seen to be above 3.8 with a standard deviation ranging between 0.8896 to 0. 9859, indicating that the distribution of data pertaining to the 5-point scale for the OBSERV items is normal. The interpretation is that observability of fintech services of the respondents is clearly pointing towards the affirmative. For example, the descriptive analysis with regard to Q46 shows that the respondents perceived that usefulness of fintech services while banking is highly observable (agree = 48.5% and strongly agree = 24. 1%). Item Q47 shows that the respondents believe that the advantages of using fintech services while banking can be noticed by others (agree = 45.1% and strongly agree = 27.2%). Also, the descriptive findings for the item Q48 and Q49 show that the majority of the respondents have selected the 'agree' or 'strongly agree' points on the scale, indicating that fintech services are recommendable in banking activities and that they have had a great deal of opportunity to see various fintech service features being used by others in banking activities. Overall, the findings indicate that with regard to the construct OBSERV, the respondents have shown their overwhelming response in favour of observability of fintech services.

5.6 Advance descriptive statistics

Advance descriptive statistical analyses were carried out for two of the demographic questions 'age group' and 'awareness level' of fintech services and two of the conceptual framework variables namely perceived risk and complexity. One-way ANOVA test was conducted to compare means of the 'age group' and 'awareness level' of fintech services with regard to two constructs 'perceived risk' and 'complexity' using the least significant difference (LSD) post-hoc test. According to Hall (1986), LSD as a measure of variation is reported by researchers, that has the advantage of being readily understood by the readers to identify differences in mean. Although it has the disadvantage of the readers who want to use a different means separation test or carryout more statistical analyses, readers must work backward from it to the standard error before proceeding further with the analysis. Taking into consideration the above in the following sections one-way ANOVA has been reported. The analysis checked whether significant differences in the means of PRISK and COMPLX existed with regard to different 'age groups' and 'awareness level' amongst consumers regarding fintech services. Any

difference found in the means indicates that in regard to PRISK and COMPLX variance is caused by 'age groups' and 'awareness level' of the participants (Janssens et al. 2008). This indicates that demographic characteristics have a bearing on the independent variables that influence behavioural intention to adopt fintech services. Table 5.6.1 illustrates the result of the advance descriptive test as an example.

Table 5. 6 .1Advance descriptive statistic for age group

	Sum of Squares	Sig.
Perceived Risk	20.120	**0.002**
Complexity	6.895	**0.216**

Table 5.6. 1 Multiple Comparisons Statistic for 'age group' with 'perceived risk' and 'complexity'

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
Perceived Risk	18 - 24	25-34	**-.60908***	0.19704	**0.002**	-0.9965
		35-44	-0.36290	0.21215	0.088	-0.7800
		45-54	-0.31344	0.24731	0.206	-0.7997
		55-64	**-.71400***	0.25976	**0.006**	-1.2247
		>65	**-1.23750***	0.37343	**0.001**	-1.9717
Complexity	18 - 24	25-34	-0.12073	0.18845	0.522	-0.4913
		35-44	0.01736	0.20290	0.932	-0.3816
		45-54	0.12730	0.23653	0.591	-0.3378
		55-64	-0.21956	0.24844	0.377	-0.7080
		>65	-0.65375	0.35716	0.068	-1.3560

** The mean difference is significant at the 0.05 level.*

The findings associated with the advanced descriptive analysis of the 'age group' and the perceived risk indicated that there is a significant difference at a p-value less than 0.05 between groups of consumers under different categories of age with regard to their perception of risk about fintech services. That is to say that perception of risk varies across age groups. However, there was no statistically significant difference (p-value >0.05) amongst the different age groups of consumers with regard to the complexity which indicates that there is no direct effect between the participants' perception of the complexity of fintech services and 'age group' (Table 5.6.1). Difference in perceptions across the individual age groups with regard to perceived risk is provided in Table 5.6.2 shows that the following age groups namely 25-34, 55-64 and >65 have statistically significant differences with regard to the lowest age group 18-24, while the age group 35-44 does not indicate any such difference. Overall it can be concluded that perceived risk of fintech services varies across age group, a finding that can used to understand how to deal with consumers belonging to different age groups while providing fintech services.

Table 5.6. 2 Advance descriptive statistic for 'awareness level' of fintech services

	Sum of Squares	Sig.
Perceived Risk	19.006	**0.001**
Complexity	53.770	**0.000**

Table 5.6. 3 Advance descriptive statistic for 'awareness level' of fintech services with 'perceived risk' and 'complexity'

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
Perceived Risk	Fintech services user	Aware of fintech services	**-.49206***	0.13305	**0.000**	-0.7537
		Intend to use fintech services in future	**-.38837***	0.15401	**0.012**	-0.6912
		Not familiar with fintech services	**-.40890***	0.15039	**0.007**	-0.7046
Complexity	Fintech services user	Aware of fintech services	**-.78259***	0.11883	**0.000**	-1.0162
		Intend to use fintech services in future	**-.55219***	0.13755	**0.000**	-0.8226
		Not familiar with fintech services	**-.81573***	0.13432	**0.000**	-1.0798

**The mean difference is significant at the 0.05 level.*

The findings associated with the advance descriptive analysis of the 'awareness level' of fintech services with the perceived risk and complexity indicated that there is a statistically significant difference (p-value <0.05) amongst consumers having different levels of awareness about fintech services and the two main constructs perceived risk and complexity (Table 5.6.3). This is further confirmed when the means of the individual items measuring 'awareness level' of fintech were compared with regard to perceived risk and complexity (Table 5.6.4). An important element that needs to be noted here is the inverse relationship that exists between participants' awareness level of fintech services on the one hand and their perceived of risk and complexity on the other. This indicates that the banks should enhance the awareness level about fintech services amongst consumers leading a perception of lower risk and reduced complexity, thus greater adoption of fintech services.

5.7 Analysis of reliability

Reliability and validity tests are performed on the research instrument to ensure accuracy and internal consistency of the research items using Cronbach's Alpha generated by SPSS. reliability tests were performed on the research instrument to measure the usefulness of the instrument using Cronbach's alpha. Achieving acceptable values of Cronbach's alpha indicates that in case the instrument is used again to collect data from a different sample of the same population the results could be relied upon. In addition, internal consistency of the items was measured using Cronbach's Alpha generated by SPSS version 21.0. Cronbach's Alpha scale ranges from 0 to 1, with a value approaching 1 indicating the presence of greater internal consistency of the items. The proposed minimum and maximum values for the reliability testing used in this research are illustrated in Table 5.7.

Table 5. 7 Table Reliability analysis

	Measuring Tool	Recommended Value	References
Reliability	Cronbach's Alpah	Value = 0.7: Acceptable Value > 0.7: Good Value < 0.7: Poor	Sekaran and Bougie (2013); Sekaran, (2000)
	Inter-Item Correlation	≥ 0.3 ≤0.8	Sekaran and Bougie (2013); Sekaran, (2000); Cohen (1988)
	Item to Total Correlation	≥ 0.5	

While Table 5.8 provides the results of the reliability and validity analyses carried out on the 49 questions. The below Table indicated that the analysis conducted for Cronbach's alpha shows all variables have values above 0.8, indicating good reliability and that all items in each concept are positively correlated to one another (Sekaran, 2000). Therefore, items in each set are independent

measures of the same concept. Hence, indicate accuracy in measurement in the main survey.

Table 5. 8 Reliability Analysis

#	Construct	Measuring items	No. of Items	Cronbach's Alpha	Item-item correlation (range)	Item-total correlation (range)	Remarks
1	INTADOP	Q1-Q4	4	0.902	0.635 to 0.778	0.765 to 0.815	Reliability, inter-item correlation and item-to-total correlation are good
2	PU	Q5 –Q9	5	0.935	0.686 to 0.792	0.807 to 0.864	Reliability, inter-item correlation and item-to-total correlation are good
3	PEU	Q10 –Q14	5	0.913	0.612 to 0.792	0.745 to 0.793	Reliability, inter-item correlation and item-to-total correlation are good
4	TRU	Q15-Q19	5	0.928	0.602 to 0.791	0.761 to 0.851	Reliability, inter-item correlation and item-to-total correlation are good
5	PRISK	Q20-Q26	7	0.946	0.639 to 0.808	0.775 to 0.841	Reliability, inter-item correlation and item-to-total correlation are good
6	RA	Q27-Q31	5	0.927	0.615 to 0.803	0.717 to 0.843	Reliability, inter-item correlation and item-to-total correlation are good
7	COMPLX	Q32-Q36	5	0.934	0.616 to 0.798	0.768 to 0.856	Reliability, inter-item correlation and item-to-total correlation are good
8	COMPAT	Q37-Q41	5	0.920	0.659 to 0.777	0.765 to 0.823	Reliability, inter-item correlation and item-to-total correlation are good
9	TRIABI	Q42-Q45	4	0.877	0.436 to 0.805	0.537 to 0.849	Reliability, inter-item correlation and item-to-total correlation are good
10	OBSERV	Q46-Q49	4	0.897	0.621 to 0.744	0.730 to 0.803	Reliability, inter-item correlation and item-to-total correlation are good

5.8 Analysis of validity

Analysis of validity includes content validity, convergent validity, criterion validity, discriminant validity and construct validity. Content validity was already checked as indicated in section 4.9.3 and 4.9.4 With regard to convergent validity the internal consistency amongst the items were tested using item to item correlation. Criterion validity was tested using item to total correlation amongst the items measuring the constructs. Table 5.8 indicated that inter item correlations measured should be ≥ 0.3 (Convergent validity) while the item to total correlations measured should be ≥0.5. The output from

SPSS is reported in table 5.3. The table indicates that all inter-item correlation values exceed 0.3 (Convergent validity) and item-total correlation values all exceed 0.5 (Criterion validity), thus establishing the validity of the data collected. Similarly reference levels of correlations have also been suggested by some researchers in terms of a range of correlation like 0.1-0.29 as small correlation, 0.3-0.49 as medium correlation and 0.5-1.0 as large correlation (for both positive and negative values).

Accordingly, the research instrument is considering to have good sampling adequacy, valid and reliable as per the result. Discriminant and construct validity have been checked at the time of testing the model using SEM and reported later.

5.9 Correlation Matrix

A correlation matrix was performed to summarize the data into more advanced analyses through a table that shows the correlation coefficient between the constructs in the proposed conceptual framework and describes the degree to which two constructs could be related. Hence, each cell in the table indicates the correlation between the two constructs. The correlation is accepted if p-value of significance is found to be <0.05. Table 5.9 shows the correlation matrix results for both, the Pearson Correlation Coefficient (linear measure) and the Spearman Correlation Coefficient (nonparametric measure) test. The findings show that there is a significant correlation amongst the constructs with regard to both the correlation tests (Pearson & Spearman Correlation Coefficient).

Table 5. 9 Correlation Matrix test result (Pearson & Spearman Correlation Coefficient test

		1	2	3	4	5	6	7	8	9	10
1	INTADOP		.777**	.663**	.581**	-.260**	.621**	-.273**	.580**	.459**	.513**
2	PU	.720**		.715**	.642**	-.201**	.684**	-.225**	.689**	.504**	.590**
3	PEU	.612**	.676**		.758**	-.224**	.669**	-.216**	.680**	.634**	.645**
4	TRU	.536**	.593**	.686**		-.234**	.655**	-.173**	.702**	.591**	.667**
5	PRISK	-.306**	-.260**	-.249**	-.291**		-.155**	.686**	-.225**	-.104*	-.155**
6	RA	.615**	.679**	.634**	.625**	-.247**		-.172**	.710**	.522**	.629**
7	COMPLX	-.374**	-.330**	-.312**	-.295**	.651**	-.334**		-.234**	-0.092	-.216**
8	COMPAT	.537**	.632**	.619**	.695**	-.293**	.728**	-.380**		.625**	.731**
9	TRIABI	.414**	.460**	.616**	.553**	-.142**	.497**	-.173**	.604**		.599**
10	OBSERV	.496**	.539**	.606**	.653**	-.234**	.597**	-.349**	.703**	.583**	

*** Correlation is significant at the 0.01 level (2-tailed).*

** Correlation is significant at the 0.05 level (2-tailed).*

After discussing the reliability and validity of the various items used to measure the constructs and verifying the correlation amongst the different constructs the following sections move toward the main data analysis concerned with the research model (Figure 5.11) under testing in this research using SEM as mentioned in section (4.10).

5.10 Structural Equation Modelling (SEM)

This research utilizes Structural Equation Modeling (SEM) as a powerful multivariate statistical analysis technique that is employed to evaluate multivariate causal relationships. SEMs differ from other modeling techniques as it assesses the direct and the indirect effects on the pre-assumed causal relationships (i.e., hypothesis-testing) (Fan et al. 2016). Moreover, SEM analyses the structural

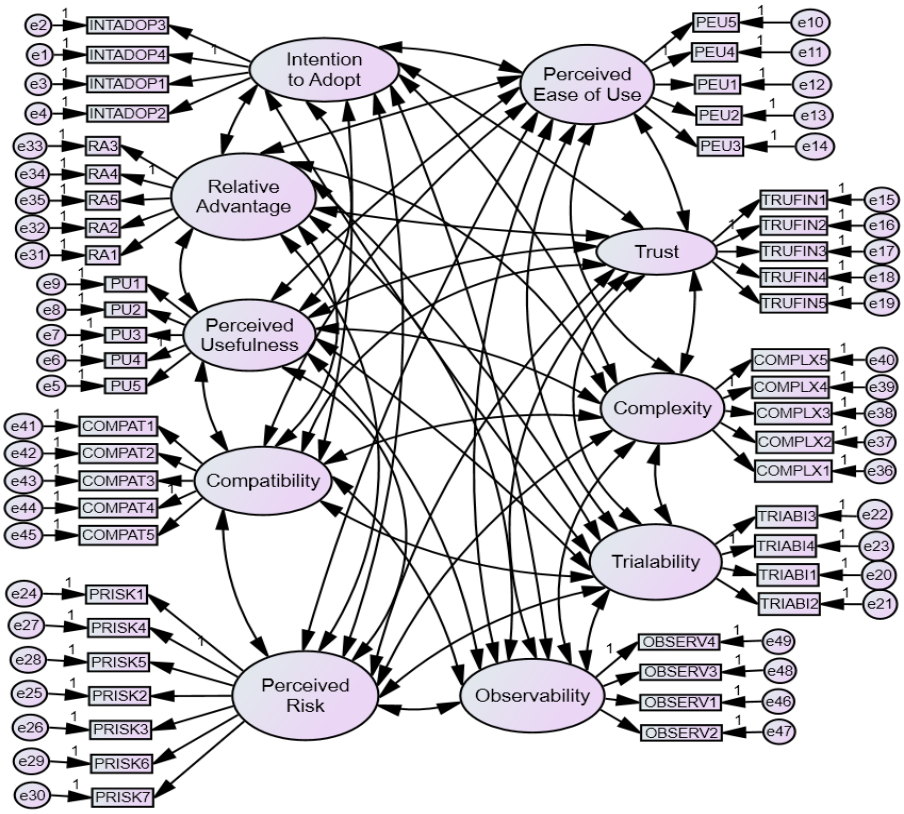
relationships between variables through performing CFA and path analysis (Fan et al. 2016). The proposed hypothesized model was tested statistically in the simultaneous analysis of the entire system of variables to examine the extent to which it is consistent with the collected data.

SEM has two steps, one is the confirmatory factor analysis (CFA) and the path analysis (Janssens et al. 2008). Thus the following sections will deal with CFA and path analysis for the model depicted in Figure 5.11.

5.10.1 The initial research model

The initial model provided in Figure 5.11 depicts the constructs under evaluation and items measuring them. The details of the constructs and the items used to measure them have been provided in Table 5.4.

Figure 5. 11 Initial research model



5.11 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is a step in SME that deals specifically with measurement models. The hypothesis-driven nature is the central feature of CFA. Thus, it is a special form of factor analysis that is widely used in social research to test whether the data fits the hypothesized measurement model (i.e. the relationships between observed measures or indicators) (Brown, 2015). CFA requires the researcher to form a prior sense, based on past evidence and theory, of the number of factors that exist

in the data, which indicators are related to which factors and so on so forth. For this reason, CFA should be conducted before the specification of SEM (Brown, 2015). The main steps that were used in CFA were testing the construct reliability, discriminant validity, multicollinearity and model fit (Janssens et al. 2008).

5.11.1 Construct Reliability

Construct reliability or what sometimes refers to as "Composite reliability" measures the internal consistency of a set of measures rather than the reliability of a single variable. It captures the total amount of the true score variance with the total scale score variance (Holmes-Smith et al. 2006). The benefit of construct reliability is that it is based on the estimates of model parameters. Construct reliability has wide suitability since it can be computed for the construct (s) in a model regardless of the researcher estimating the measurement model, path model, or confirmatory factor analysis (Holmes-Smith et al. 2006). Generally, the researchers could report at least one of the three model-based estimates of reliability; the squared multiple correlations (SMC); construct Reliability, or the variance extracted estimate (Holmes-Smith et al. 2006). Therefore, the SMC was used in this study to measure the construct reliability. Squared Multiple Correlations (SMC) also referred to as item reliability coefficient (R square) is the correlation between a single indicator variable and the constructs it measures which are the item to item and inter-item correlation that have already been tested in section 5.5. Further in line with the procedure adopted by other researchers, SMC was used as part of the CFA to measure construct reliability (Holmes-Smith et al. 2006; Abramson et al.2005).

The SMC of items should exceed 0.50, yet an SMC of 0.30 is considered as an acceptable indicator of a variable (Holmes-Smith et al. 2006). SMC was measured using AMOS version 18. Table 5.10 generated by AMOS shows that out of the 49 observed variables, 13 indicators were deleted from SEM analysis (namely: TRIABI1, OBSERV2, PRISK2, PRISK7, INTADOP1, INTADOP2, PEU2, PEU3, RA2, TRIABI2, PRISK3, PRISK6, and RA2) to improve the overall model fit of the data i.e. AMOS test of SMC was run on the model that was derived after deleting items. This led to the retention of 36 observed variables which showed acceptable construct reliability with the SMC for all observed variables exceeding 0.50.

Table 5. 10 Squared Multiple Correlations (SMC) of the 39 indicators variable

Indicator variable	SMC Estimate	Indicator variable	SMC Estimate
COMPLX5	0.685	**PRISK5**	0.777
OBSERV1	0.713	**PRISK1**	0.548
OBSERV3	0.773	**PRISK4**	0.798
OBSERV4	0.621	**TRUFIN1**	0.703
TRIABI4	0.789	**TRUFIN5**	0.643
TRIABI3	0.818	**TRUFIN4**	0.749
COMPAT5	0.711	**TRUFIN3**	0.789
COMPAT1	0.701	**TRUFIN2**	0.733
COMPAT2	0.728	**PEU5**	0.761
COMPAT3	0.66	**PEU1**	0.666
COMPAT4	0.71	**PEU4**	0.765
COMPLX1	0.651	**PU5**	0.807
COMPLX2	0.786	**PU1**	0.727
COMPLX3	0.794	**PU2**	0.765
COMPLX4	0.796	**PU3**	0.706
RA5	0.831	**PU4**	0.715
RA3	0.745	**INTADOP3**	0.713
RA4	0.573	**INTADOP4**	0.786

The above have indicated that the construct reliability for the instrument has been tested. The next section assesses the discriminant validity of the instrument.

5.11.2 Discriminant Validity

Discriminant validity exists when the measure is an accurate and perfect representation of the variables intended to measure (Holmes-Smith et al. 2006). It is representing the extent to which constructs in a model are different and whether the difference is significant (Janssens et al. 2008). A large correlation between the underlying constructs (i.e. greater than 0.80 or 0.90) suggests a lack of discriminant validity (Holmes-Smith et al. 2006). The discriminant validity in this research was assessed using CFA. discriminant validity assessments involved (1) examining the correlation amongst the latent constructs using the sample correlation (2) examining the residual covariance and the standardized residual covariance between two items measuring the constructs and (3) verifying whether the covariance model fits the data (Holmes-Smith et al. 2006; Jöreskog & Sörbom 1984). These tests were performed using AMOS version 18 software package and output discussions are provided on the upcoming subsections.

A sample correlation test was generated by AMOS among the latent constructs (see Appendix 4). According to Holmes-Smith et al. (2006), it is recommended to delete one of the items where the sample correlation between two indicators exceeds 0.80, to ensure that there is no multicollinearity presented (Holmes-Smith et al. 2006). The output on sample correlations for the research model indicates that no correlation is exceeding 0.8 except the one between TRIABI3 and TRIABI4 which stood at 0.83. The researcher decided to retain the items as it is very close to 0.80 and the excess of the correlation is considered very negligible (0.03). Thus, the correlations indicate no multicollinearity exists, meaning that all presented items measure the intended concepts they are expected to measure distinctly.

Then the residual covariance between two items in the model was tested using AMOS. The covariance between two items indicates the extent to which two items share variance. Residual covariance indicates the value by deducting the values of model-implied covariance from the values of the residual covariance matrix (Bedeian, 2007). The recommended values suggested by the researchers lie in the range of -0.1 to +0.1 (Bedeian, 2007) for most of the observed variables. The residual covariance test also can confirm that the items distinctly measure what they are intended to measure. Thus, value falling outside this range needs to be investigated and the corresponding item that contributes to this problem needs to be eliminated. Items that contributed to values lying outside were identified and one item (TRIABI1) was deleted to improve the residual covariance values. The resultant residual covariance output after deleting the items still showed seven values between items outside the range of -0.1 to +0.1. Those items are given in Table 5.11. The Table indicated that six values out of the seven values between items outside the range of -0.1 to +0.1 are very close to -0.1 and +0.1. Therefore, it can be concluded that the remaining items are measuring the concepts they are proposed to measure. The seventh item shown in Table 5.11 is considered to have a high value of residual covariance of 0.225 (between COMPLX1 - PRISK1). However, those items will be kept for further investigation. The residual covariance output from AMOS after deleting the items is given in Appendix 5.

Table 5. 11Pairs of items with Residual covariance measure exceeding the absolute value 0.1 and after deleting (TRIABI1, OBSERV2, PRISK2, PRISK7, INTADOP1, INTADOP2, PEU2, PEU3, RA2, TRIABI2, PRISK3, PRISK6, and RA2)

Items	Residual Covariance
OBSERV4 - COMPLX1	0.106
COMPLX5 - RA3	-0.115
COMPLX5 - PRISK5	-0.104
PU2 - COMPAT3	0.105
COMPLX2 - PRISK1	0.117
RA4 - PRISK1	-0.1
COMPLX1 - PRISK1	0.225

Subsequently, the standardized residual covariance between indicators was investigated using AMOS. The standardized residual covariance between two items is the ratio of the residual covariance to the estimate of its standard error (Jöreskog & Sörbom 1984). The standardized residual covariance between two indicators is equal to the residual covariance between these two indicators divided by an estimate of its standard error. While the residual covariance between two indicators is the difference between the sample covariance and the model-implied covariance (Jöreskog & Sörbom 1984). Literature recommended that most standardized residuals should have an absolute value of less than 2 in the correct model (Wang & Dean, 2005). Thus, this research has chosen an absolute standardized residual covariance 2 as the reference. Items that contributed to values lying outside the reference value were investigated and the corresponding item that contributes to this problem was identified and deleted to improve the standardized residual covariance values: OBSERV2, PRISK2, PRISK7, INTADOP1, INTADOP2, PEU2, PEU3, RA2, TRIABI2, PRISK3, PRISK6, and RA2. The standardized residual covariance after deleting the items is given in Appendix 6. The pairs of items that contributed to some

measures of the standardized residual covariance exceeding the absolute value of 2 are provided in Table 5.12

Table 5. 12 Pairs of items with standardized residual covariance measure exceeding the absolute value of 2 and after deleting (TRIABI1, OBSERV2, PRISK2, PRISK7, INTADOP1, INTADOP2, PEU2, PEU3, RA2, TRIABI2, PRISK3, PRISK6, and RA2)

Items	Standardized Residual Covariance
COMPLX5 - RA3	2.142
COMPLX1 - PRISK1	3.118

Table 5.12 indicates that two pairs of items were seen to have a standardized residual covariance exceeding the absolute value of 2. The two pairs of observed variables highlighted in Table 5.12, with a higher standardized residual covariance value then the absolute reference value of 2 were retained to test whether those items affect the model fitness tested later in section 5.11.3. It was decided that at that point if the items were to cause problems to data fitness, then those items could be deleted. Furthermore, Kline (2011) argues that the standardized residual covariance values that exceed the reference value are common in large data sets leading to the dependence on the unstandardized residual covariance values that fit the model. For this reason, this research considered both outputs of residuals covariance and standardized residuals covariance as acceptable and support the argument that the items are measuring the concepts they are believed to represent.

After conducting the sample correlation, residual covariance and standardized residual covariance tests between the indicators generated by AMOS, the data was considered to be ready to test the discriminant validity between the constructs using correlations amongst the constructs. The correlation between the latent constructs obtained for the model in Figure 5.13 is provided in Table 5.13. According to literature a large correlation between the latent variables should not exceed 0.8 or 0.9 suggested deficiency in discriminant validity (Holmes-Smith et al. 2006). From Table 5.13 it was found that no correlations between the constructs were beyond 0.9. This indicates that the constructs proposed in the research model were different and do not measure concepts other than the one they were excepted to measure. For instance, Trust does not measure Complexity as a concept instead measures the theoretical concept of trust only. Thus, discriminant validity exists. In fact, the maximum correlation value was found to be 0.873 between behavioural Intention to Adopt and Perceived Usefulness thus confirming that discriminant validity has been established for the research model (see Figure 5.13 and Table 5.13). It must be noted here that the pictorial representation in Figures 5.12 and 5.13 are given as a guide to understand the directions of the various covariance and variance within the model whereas the actual values concerning the variance and covariance must be read from tables Table 5.13. Further it must be noted that Figure 5.12 represents the model before deleting items based on the statistical values discussed in section 5.11.2 and hence the finally factored model in Figure 5.13 only should be considered significant for this research.

Table 5. 13 Correlation for Ten Constructs

			Correlation Estimate
Trust	<-->	Complexity	-0.191
Complexity	<-->	Trialability	-0.031
Complexity	<-->	Observability	-0.276
Perceived_Usefulness	<-->	Relative_Advantage	0.734
Trialability	<-->	Observability	0.509
Compatibility	<-->	Trialability	0.521
Perceived_Risk	<-->	Observability	-0.195
Perceived_Risk	<-->	Compatibility	-0.264
Perceived_Usefulness	<-->	Trialability	0.405
Perceived_Usefulness	<-->	Complexity	-0.243
Perceived_Usefulness	<-->	Observability	0.649
Complexity	<-->	Compatibility	-0.261
Perceived_Usefulness	<-->	Compatibility	0.739
Relative_Advantage	<-->	Trialability	0.451
Perceived_Risk	<-->	Relative_Advantage	-0.122
Relative_Advantage	<-->	Observability	0.704
Relative_Advantage	<-->	Complexity	-0.128
Trust	<-->	Relative_Advantage	0.686
Trust	<-->	Trialability	0.515
Intention_to Adopt	<-->	Perceived_Usefulness	0.873
Intention_to Adopt	<-->	Trust	0.651
Perceived_Ease of Use	<-->	Relative_Advantage	0.681
Perceived_Ease of Use	<-->	Complexity	-0.236
Intention_to Adopt	<-->	Complexity	-0.214
Perceived_Ease of Use	<-->	Trialability	0.538
Perceived_Ease of Use	<-->	Observability	0.65
Perceived_Usefulness	<-->	Perceived_Ease of Use	0.739
Perceived_Ease of Use	<-->	Compatibility	0.679
Perceived_Ease of Use	<-->	Trust	0.806
Intention_to Adopt	<-->	Perceived_Ease of Use	0.767
Intention_to Adopt	<-->	Relative_Advantage	0.719
Trust	<-->	Observability	0.733
Trust	<-->	Compatibility	0.747
Perceived_Usefulness	<-->	Trust	0.678
Compatibility	<-->	Observability	0.822
Perceived_Risk	<-->	Trialability	-0.128
Perceived_Risk	<-->	Complexity	0.7
Trust	<-->	Perceived_Risk	-0.258
Perceived_Usefulness	<-->	Perceived_Risk	-0.223
Perceived_Ease of Use	<-->	Perceived_Risk	-0.243
Intention_to Adopt	<-->	Compatibility	0.656
Intention_to Adopt	<-->	Perceived_Risk	-0.199
Intention_to Adopt	<-->	Observability	0.574

Intention_to Adopt	<-->	Trialability	0.435
Relative_Advantage	<-->	Compatibility	0.763

5.11.3 Measurement Model Fit

Before analyzing the structural model, fitting the data to the model was necessary to evaluate the models while employing CFA (Brown, 2014). The goal of the measurement model fit is to establish the number and the nature of factors that account for the variation and covariation among a set of indicators (Fan et al. 2016; Brown, 2014). The model of fit was measured using several fit indices, such as Chi-square test statistic, Goodness of Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residual (RMR), Degree of Freedom (DF), Comparative Fit Index (CFI), Normed Fit Index (NFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TLI) and Relative Fit Index (RFI).

Yet, like many other statistical techniques, there are several limitations associated with model evaluation (Gupta & Singh, 2015; Hair et al. 2010). Among those problems is the one related to the lack of consistency among researchers in the level of fit that needs to be achieved to consider the fit as adequate for the research model and the fact that there is no single statistical test that can best describes the level of the strength of the model's predictions (Gupta & Singh, 2015; Hair et al. 2010). It is important to note that researchers at least report one fitness index in their research and often times as many as possible. Thus this research reported indices listed in Table 5.14, which have been often reported in different studies (Iacobucci, 2010; Hooper et al. 2008).

Table 5. 14 Fit Indices reported by AMOS for the model in Figure 5.13.

No.	Fit Indices	Recommended Value	References	Structural Model
1	Goodness of Fit Index (GFI)	>0.80	Lee et al. (2015)	0.799
2	Root mean square error of app. (RMSEA)	<0.08	Lee et al. (2015)	0.076
3	Root mean squared residual (RMR)	<0.05	Lee et al. (2015)	0.038
4	Comparative Fit Index (CFI)	>0.90	Hu & Bentler (1999)	0.904
5	Incremental Fit Index (IFI)	>0.90	Hu & Bentler (1999)	0.905

Preforming CFA resulted in the following values for RMSEA, RMR, CFI, and IFI to be in line with the recommended values (Table 5.14). GFI (0.799) was very close to the recommended value (0.80). Therefore, CFA fit measures for the proposed model indicate the goodness of fit of the model to the data.

Figure 5. 12 Measurement Model for both exogenous and endogenous Constructs before deleting the 13 items

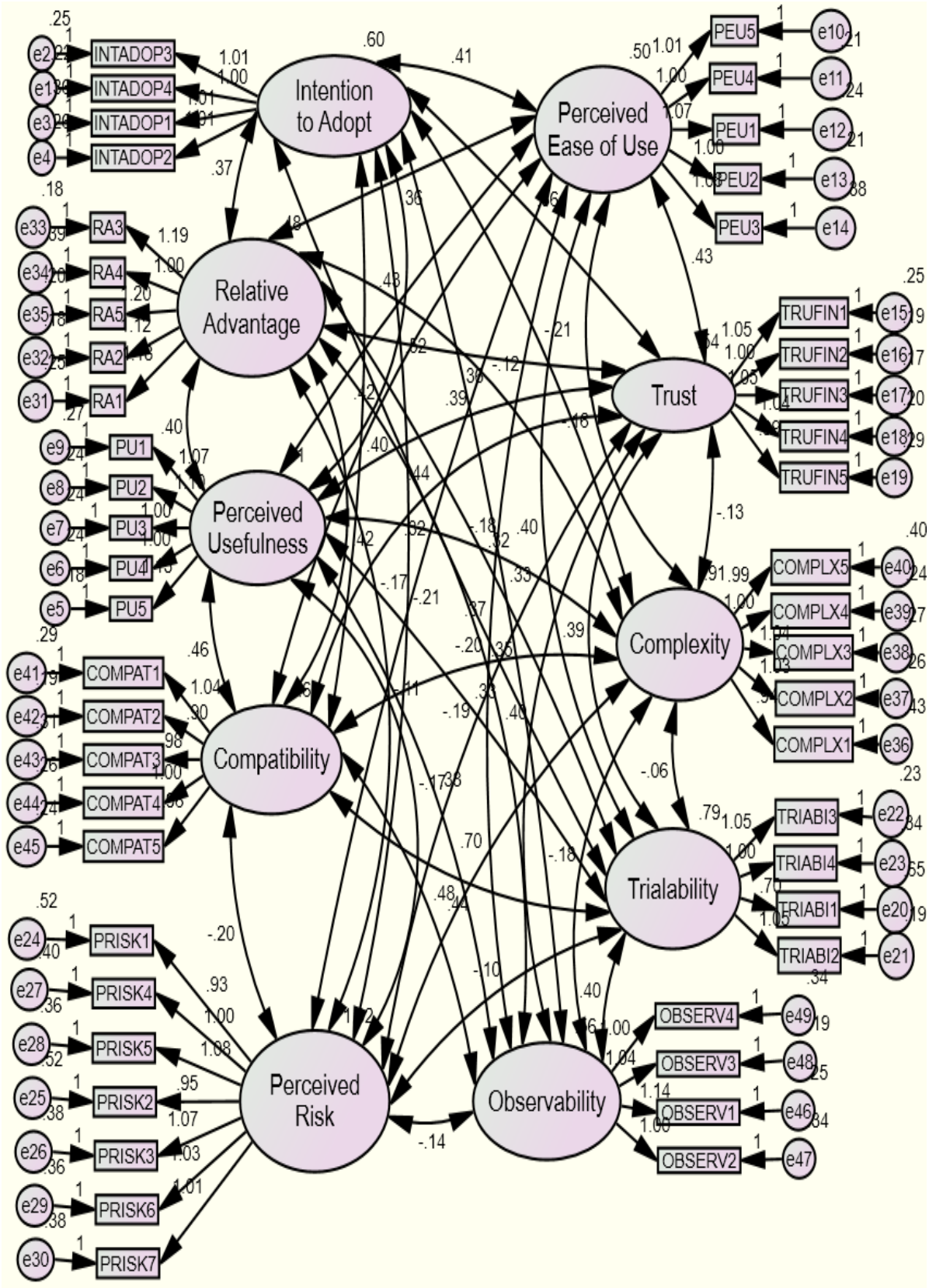
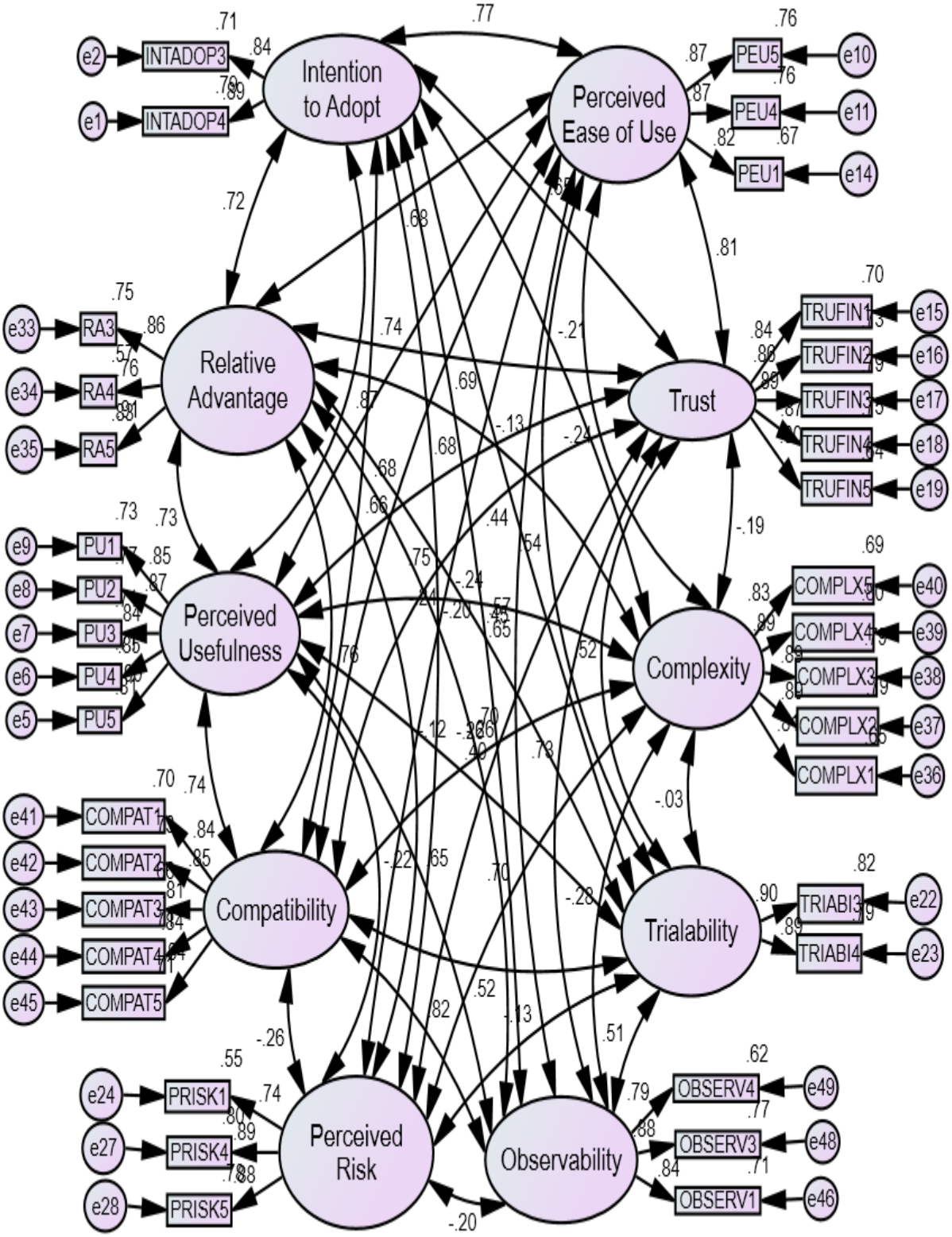


Figure 5. 13 Measurement Model for both exogenous and endogenous Constructs after deleting the 13items ((TRIABI1, OBSERV2, PRISK2, PRISK7, INTADOP1, INTADOP2, PEU2, PEU3, RA2, TRIABI2, PRISK3, PRISK6, and RA2)



5.11.4 Standardized Regression Weights (Standardized Loadings, Critical Ratios)

This section shows the result of the standardized loadings and Critical Ratios (CR). For all items of the above measurement model (Figure 5.13). The values for each items are illustrated in Table 5.16. Comparing the relative effect of each independent construct on the dependent variable using standardized regression weights provides measure helps in understanding the level to which the determinants account for the variance in the determined variables (Hair et al. 2006). C.R. is defined as the ratio of an estimate to its standard error (Hox, 2011). C.R. is used to test the statistical significance of all loadings (Hox, 2011). While Table 5.15 shows the recommended values for standardized loadings and CR, the actual value of the standardized loading and CR with regard to each item in the model is illustrated in Table 5.16.

Table 5. 15 Recommended Values for Standardized loadings and Critical Ratios (C.R.)

Parameters	Recommended Value	References
Standardized loadings	>0.5	Hair et al. (2010)
Critical Ratios (C.R.)	± 1.96 (p < 0.001)	Hox and Bechger (1998)

Below Table 5.16 indicated that all values of standardized loading i.e. the Standardized Regression Weights (S.R.W) are greater than 0.5. while the CR of all values are above ± 1.96 (p < 0.001)

Table 5. 16 Values of Standardized loadings and Critical Ratios (C.R.)

			R.W.	S.E.	C.R.	S.E.W.
INTADOP4	<---	Intention_to Adopt	1			0.887
INTADOP3	<---	Intention_to Adopt	0.977	0.047	20.606	0.844
PU4	<---	Perceived_Usefulness	1			0.846
PU3	<---	Perceived_Usefulness	0.996	0.047	21.191	0.84
PU2	<---	Perceived_Usefulness	1.113	0.05	22.302	0.875
PU1	<---	Perceived_Usefulness	1.077	0.05	21.585	0.853
PU5	<---	Perceived_Usefulness	1.132	0.048	23.588	0.898
PEU4	<---	Perceived_Ease of Use	1			0.874
PEU1	<---	Perceived_Ease of Use	0.998	0.051	19.767	0.816
PEU5	<---	Perceived_Ease of Use	1.019	0.044	23.193	0.872
TRUFIN2	<---	Trust	1			0.856
TRUFIN3	<---	Trust	1.063	0.045	23.429	0.888
TRUFIN4	<---	Trust	1.053	0.047	22.317	0.866
TRUFIN5	<---	Trust	0.992	0.051	19.622	0.802
TRUFIN1	<---	Trust	1.054	0.049	21.467	0.838
PRISK4	<---	Perceived_Risk	1			0.893
PRISK5	<---	Perceived_Risk	1.029	0.045	22.676	0.881
RA4	<---	Relative_Advantage	1			0.757
COMPLX4	<---	Complexity	1			0.892
COMPLX3	<---	Complexity	1.042	0.04	26.001	0.891
COMPLX2	<---	Complexity	1.027	0.04	25.432	0.887
COMPLX1	<---	Complexity	0.936	0.044	21.102	0.807
COMPAT4	<---	Compatibility	1			0.843
COMPAT3	<---	Compatibility	0.973	0.05	19.44	0.813
COMPAT2	<---	Compatibility	0.901	0.043	21.072	0.853
COMPAT1	<---	Compatibility	1.038	0.051	20.238	0.837
COMPAT5	<---	Compatibility	0.961	0.046	21.111	0.843
TRIABI3	<---	Trialability	1.003	0.064	15.734	0.904
TRIABI4	<---	Trialability	1			0.888

OBSERV4	<---	Observability	1			0.788
OBSERV3	<---	Observability	1.047	0.055	18.908	0.879
OBSERV1	<---	Observability	1.114	0.062	17.975	0.844
COMPLX5	<---	Complexity	0.981	0.044	22.387	0.828
PRISK1	<---	Perceived_Risk	0.822	0.048	17.193	0.74
RA3	<---	Relative_Advantage	1.139	0.064	17.741	0.863
RA5	<---	Relative_Advantage	1.216	0.065	18.661	0.912

Legend: R.W: Regression weight, S.E: Standard error, C.R: Critical ratio, S.R.W: Standardized regression Weights

Moreover, in analyzing the structural model, the number of latent constructs that are used in that model as exogenous constructs could be limited to reduce the complexity of analysis. For example, Holmes-Smith et al. (2006) say that in each round of validity analysis, there should be no more than five constructs under investigation. The interpretation of this statement is that when the structural model in Figure 5.13 is being analyzed then the analysis can be carried out in parts by restricting the number of exogenous latent constructs to five in each model if the total number of exogenous constructs being analyzed in the model exceeds 5. Besides, Holmes-Smith et al. (2006) indicate that to reduce difficulties in analyzing complex models involving more than 5 exogenous variables, it is suggested that the model could be split into parts for analysis by restricting independent variables to ≤5 in each part as has been depicted in the models in Figures 5.14 and 5.15. Thus, the first part was involving the five exogenous constructs of DOI (Figure 5.14). That is to say that in the first step, analysis was conducted using Model A in which latent constructs of DOI, TAM, and the intention to adopt fintech services of the consumers of the banks were used restricting the independent exogenous variables to five. In the second step, the analysis was conducted using Model B where the exogenous construct perceived risk was analyzed (igure 5.15).

5.12 Model Analysis

The analysis of the models involves the use of an estimation procedure through which the researcher analyzed if the research model fits the data or not. The researcher used the Maximum Likelihood (ML) as an estimation procedure as part of SEM since it is a commonly applied procedure followed by other researchers and applied this technique while analysing the paths (Kline, 1998). The Maximum likelihood (ML) procedure provides the researcher with a statistically robust result of the completeness of data and the normality of the data (Little & Rubin, 1987). ML procedure result is provided by AMOS' default model that provides computed parameter estimates on the image produced by AMOS.

Also, the steps involved in SEM include model specification; identification of a model, measure selection, data collection, preparation and clean-up, model analysis, evaluation and re-specification. (Kline, 1998). These are discussed next.

5.12.1 Model Specification

The initial models specified are provided in Figure 5.14 and Figure 5.15

Figure 5. 14 Initial Model A

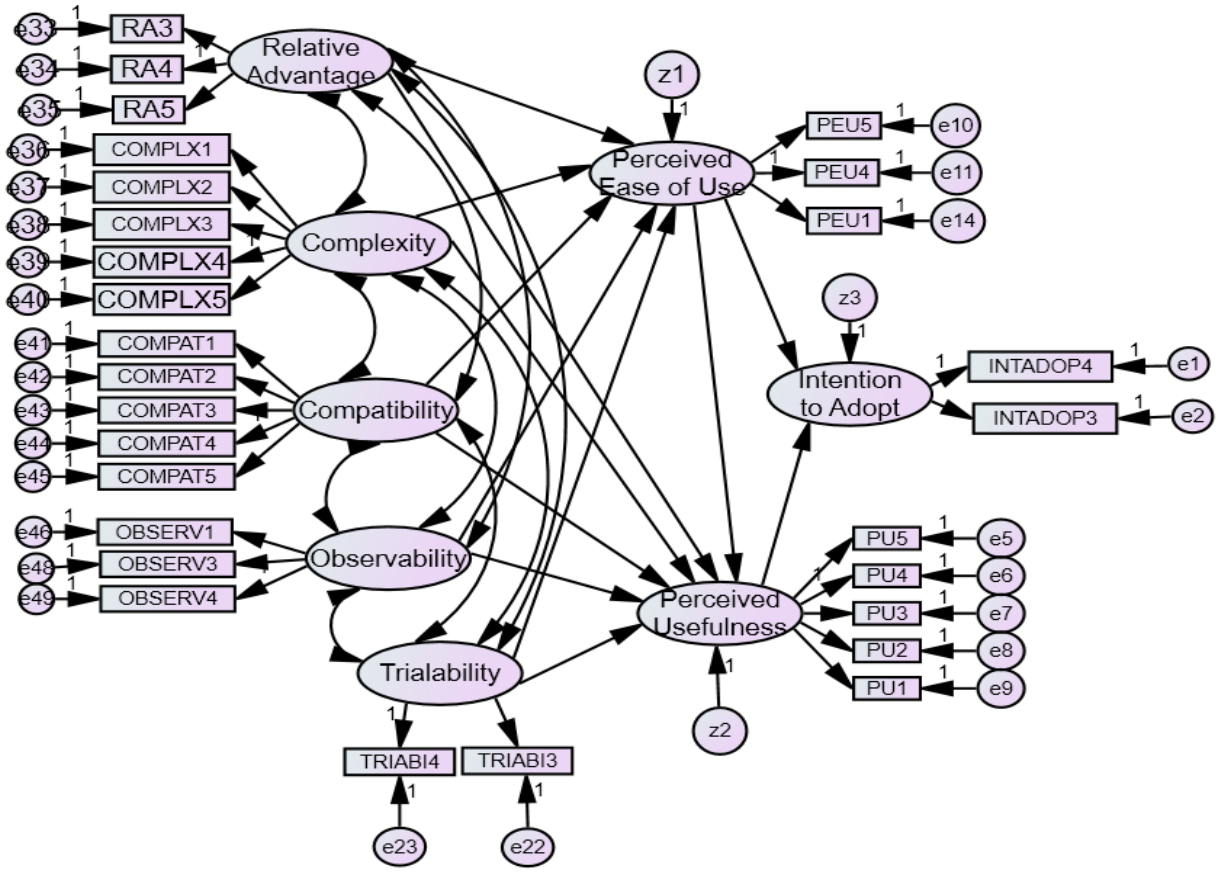
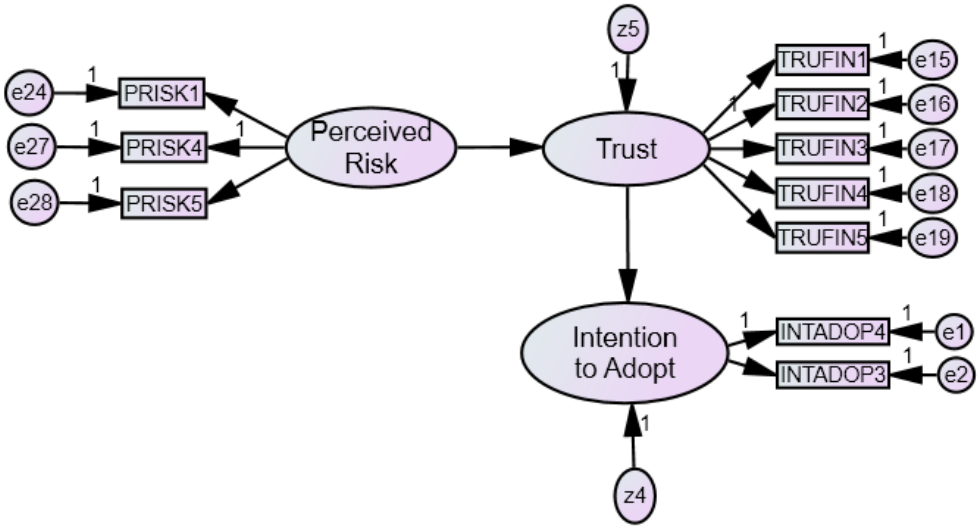


Figure 5. 15 Initial Model B



Model A comprises both endogenous and exogenous constructs. Exogenous constructs are relative advantage (RA), complexity (COMPLX), compatibility (COMPAT), trialability (TRIABI) and observability (OBSERV). Endogenous constructs are intention to adopt (INTADOP), Perceived usefulness (PU) and Perceived ease of use (PEU). In Model B the exogenous construct is Perceived Risk (PRISK) while the endogenous constructs are trust (TRU) and intention to adopt (INTADOP). All

these constructs are called latent constructs as those constructs are not directly measured. In Model A it is shown that the exogenous constructs influence the endogenous construct intention to adopt through mediating endogenous constructs perceived usefulness and perceived ease of use. This implies that in the context of consumers of banks are like to have an intention to adopt fintech services, if they perceive that the fintech services are useful and easy to use. However, usefulness and easiness to use fintech services are determined by relative advantage of fintech services as well as the complexity, compatibility, trialability and observability of fintech services.

Similarly, in Model B the exogenous construct perceived risk has been shown to influence the endogenous construct intention to adopt through the mediating endogenous construct trust of the consumers. In banking operations that involve online transactions, consumers have a natural feeling developed in their mind about possible risks that could be harm them. In such cases consumers could be cautious while intending to adopt fintech services. It is argued that trust could play a role in encouraging consumers' intention to adopt fintech services by intervening in the relationship perceived risk → intention to adopt and can act as a mediator. The relationships suggested in Models A and B will be tested in the following sections through statistical tests. The first of the tests is the model identification which is part of the SEM process.

5.12.2 Model identification

According to Abramson et al. (2005) it is essential to identify a model while applying an SEM software, otherwise the software could fail to converge. In addition, Abramson et al. (2005) argue that a model could be identified theoretically if there is possibility of finding a unique solution for its parameters. If there is no unique solution that could be produced by a model, it is necessary to re-specify the model (Ullman, 2001; Kline, 1998).

While testing the SEM using AMOS it is essential to check that the details on the number of parameters fitted in the model and the number of additional constraints that may be required. The reports generated by AMOS enable the researchers to determine whether model is just-identified (saturated), over-identified or under-identified and whether these models have bearing on the number of parameters fitted to the model. In over-identified models the number of parameters are fewer than the number of distinct variances and covariances in the corresponding covariance matrix; in the under-identified model there are higher number of parameters when compared to variances and covariances in the corresponding covariance matrix; and the just-identified model provides the maximum number of parameters possible in the model (Kline, 1998).

According to Kline (1998), a model considered to be identified if the following conditions are met:

- The model is recursive.
- The number of parameters identified in the model is more than required, adequate or less as

literature shows that there is a ceiling to the number of parameters fitted to in an SEM.

- Multicollinearity is present.

Recursive models have unidirectional "causal" relationships (Abramson et al. 2005; Arbuckle & Wothke, 1999; Kline, 1998).

Table 5. 17 Amos report on recursiveness for the initial Model A

Notes for Group (Group number 1)
The model is recursive.
Sample size = 390

Table 5. 18 Amos report on recursiveness for the initial Model B

Notes for Group (Group number 1)
The model is recursive.
Sample size = 390

AMOS provides results concerning the tests used to check whether a model is recursive of not. Results generated by AMOS are provided in Tables 5.17 and 5.18 which show that Models A and B are recursive.

5.12.3 Parameter Summary

In Model-identification the number of parameters required should be adequate when compared to the number of variables in the model (Kline, 1998). In Figure 5.14 the number of latent variables is found to be 8. The number of parameters which includes the number of unique variances and covariances was found to be 46. From the summary report produced it can be seen that the number of parameters calculated by AMOS is 118 parameters (see Table 5.19). While in Figure 5.15 the number of latent variables is found to be 3. The number of parameters of unique variances was found to be 13. From the summary report produced by AMOS, it can be seen that the number of parameters was calculated is 37 parameters. (see Table 5.20).

Table 5. 19 Parameter Summary for the initial Model A

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	39	0	0	0	0	39
Labeled	0	0	0	0	0	0
Unlabeled	33	10	36	0	0	79
Total	72	**10**	**36**	0	0	**118**

Table 5. 20 Parameter Summary for initial Model B

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	15	0	0	0	0	15
Labeled	0	0	0	0	0	0
Unlabeled	9	0	13	0	0	22
Total	24	**0**	**13**	0	0	**37**

Models containing the maximum number of parameters possible are assumed to be just-identified, or saturated models. Just-identified models fully reproduce the data (Abramson et al. 2005; Arbuckle & Wothke, 1999; Kline, 1998). Additionally, just-identified models (default model) (Figure 5.14 & Figure

5.15) should be recursive which is reported by AMOS (see Table 5.17 & Table 5.18). A default model is one in which all the latent variables are expected to correlate with each other and have an influence on the dependent variable (Singh et al. 2020). At this point, it can be seen that both models are just identified (also referred to as saturated model) (Abramson et al. 2005). Another test was used to confirm whether the models are identified or not using the CMIN outputs from AMOS. That is to say that the number of data points in a model should be greater than the number of parameters a measurement recommended by Ullman (2006). It can be seen from Table 5.21 that the number of data points for Model A is 406 which is greater than the number of parameters which is 79. Additionally, Table 5.22 shows that the number of data points for Model B is 55 and is greater than the number of parameters which is 22.

Table 5. 21 CMIN output from AMOS for the initial Model A

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	**79**	1064.909	**327**	0	3.257
Saturated model	**406**	0	0		
Independence model	28	10072.932	378	0	26.648

Table 5. 22 CMIN output from AMOS for the initial Model B

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	**22**	109.705	**33**	0	3.324
Saturated model	**55**	.000	0		
Independence model	10	2733.199	45	0	60.738

Finally, multicollinearity has already been tested in the earlier (see sections 5.11.2) and it was found that multicollinearity is absent. Therefore, it can be confirmed that the model is identified. Subsequent to model identification the next step taken was measure selection, data preparation. data collection, preparation and clean-up.

5.12.4 Measure selection, data collection, preparation and clean-up

Important measures selected for analysis have already been described in sections 4.10. This involves testing the reliability and validity of the data which have been addressed in sections 5.7 and 5.8. Regarding data collection, preparation, the researcher has already discussed the details in sections 4.7 and 5.4. Thus the next step that needed to be addressed was the model analysis.

5.12.5 Standardized and Unstandardized Analysis

Using the data collected for this research, the models in Figure 5.14 & Figure 5.15 were analyzed and the developed hypotheses were tested. In this section, the developed hypotheses for this research were tested as part of the model analysis process (i.e. model estimation). Moreover, model estimation in this research used both solutions generated by AMOS; standardized output, and unstandardized output (Abramson et al. 2005; Arbuckle and Wothke, 1999; Kline, 1998). The differences between both the model solutions generated by AMOS are given in Table 5.23.

Table 5. 23 Standardized or Unstandardized Solutions Output

Parameter Estimate	Standardized Output	Unstandardized Output
Unanalyzed associations between exogenous variables	Pearson's correlations	Covariance coefficients#
Direct effects on endogenous variables	Regression beta-weights	Unstandardized regression coefficients
Variances endogenous variables (and hence their converse, error variances)	Squared multiple correlations (i.e., R2).	Unreported
Variances of exogenous variables (and hence their converse, error variances)	Unreported	Variances

Adapted from Arbuckle and Wothke (1999) and Kline (1998)
 # The covariance is a correlation between two variables, multiplied by each variable's standard deviation.

Maximum likelihood was used to generate the default method on AMOS while computing the parameter estimates with the required properties (Arbuckle & Wothke, 1999). In the standardized model the standardized regression weight (i.e. mean=0, variance =1.0), squared multiple correlations (SMC) and correlation will be exhibited (Abramson et al. 2005). In the unstandardized model, the regression weights, covariance intercepts and variances will be exhibited in the path diagram (Abramson et al. 2005; Arbuckle & Wothke, 1999). Although this research uses standardized and unstandardized solutions generated by AMOS, the researcher has interpreted the results based on the standardized output only. After determining the type of solution (standardized) the two models were subjected to analysis and the first parameter tested was the SMC of the initial models.

5.12.6 Squared Multiple Correlation

According to Arbuckle (2010), squared multiple correlations (SMC) is independent of any units of measurement. AMOS provides the SMC output for both models (Model A and Model B). SMC report provides the foundation for testing the fitness of the initial models. Table 5.24 & Table 5.25 indicated constructs' reliability for both models (i.e. SMC should be ≥ 0.50).

Figure 5. 16 Structural Model A (Standardized regression coefficients)

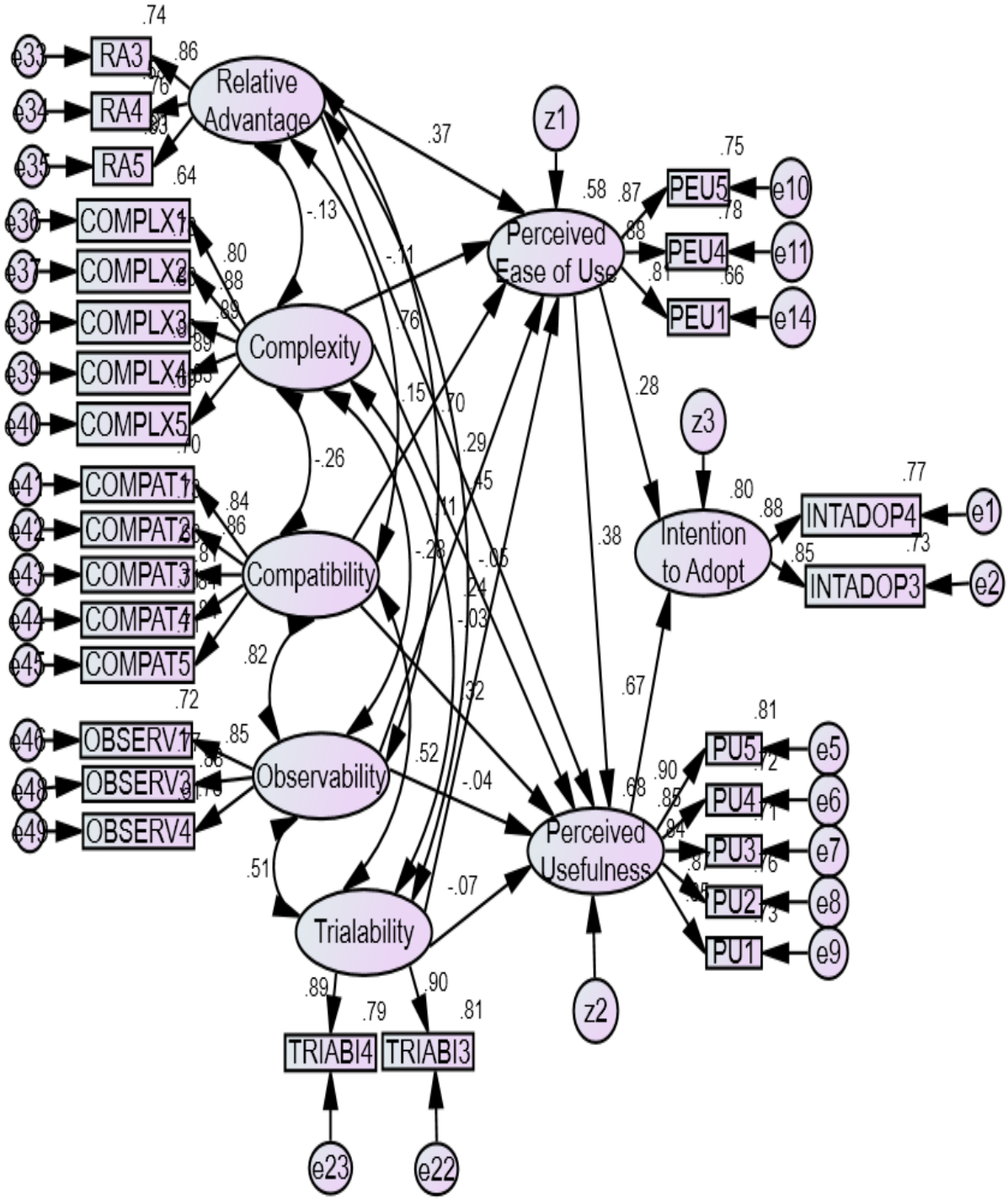


Table 5. 24 SMC of initial Model A

Squared Multiple Correlations: (Group number 1 - Default model)	
	Estimate
Perceived_Ease of Use	0.582
Perceived_Usefulness	0.683
Intention_to Adopt	0.8
TRIABI3	0.814
COMPLX5	0.69
OBSERV1	0.717
OBSERV3	0.775
OBSERV4	0.615
TRIABI4	0.793
COMPAT5	0.708
COMPAT1	0.699
COMPAT2	0.732
COMPAT3	0.661
COMPAT4	0.71
COMPLX1	0.64
COMPLX2	0.78
COMPLX3	0.798
COMPLX4	0.801

Squared Multiple Correlations: (Group number 1 - Default model)	
	Estimate
RA5	0.831
RA3	0.743
RA4	0.576
PEU5	0.749
PEU1	0.662
PEU4	0.779
PU5	0.806
PU1	0.727
PU2	0.765
PU3	0.706
PU4	0.716
INTADOP3	0.728
INTADOP4	0.77

Figure 5. 17 Structural Model B (Standardized)

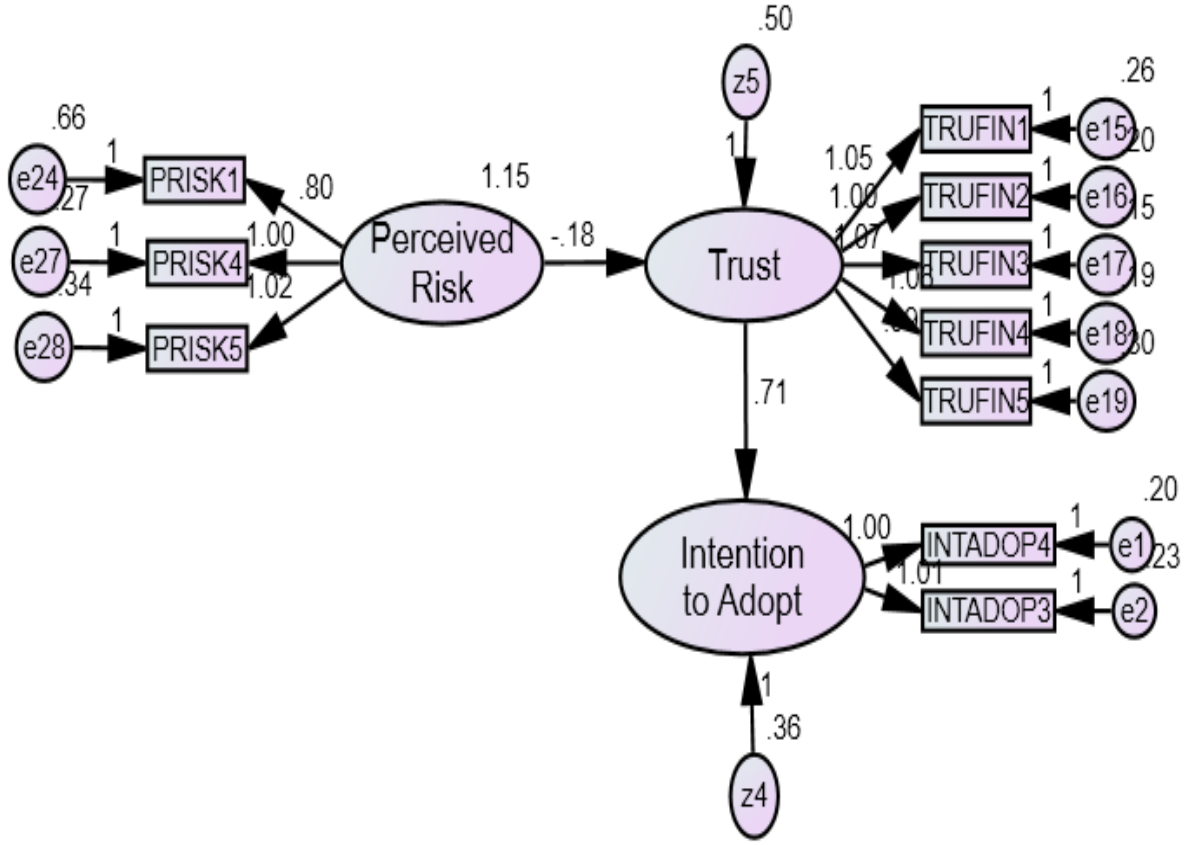


Table 5. 25 SMC for initial Model B

Squared Multiple Correlations: (Group number 1 - Default model)	
	Estimate
TRUFIN1	0.690
TRUFIN5	0.635
TRUFIN4	0.759
TRUFIN3	0.797
TRUFIN2	0.731
INTADOP3	0.737
INTADOP4	0.760

Squared Multiple Correlations: (Group number 1 - Default model)	
	Estimate
Trust	0.068
Intention_to Adopt	0.426
PRISK5	0.777
PRISK1	0.528
PRISK4	0.812

5.13 Model Fitness

After evaluating the identified model, AMOS was used by the researcher to assess the model fitness before conducting the path analysis (Abramson et al. 2005; Kline, 1998). Model fitness evaluation contains the following steps namely the measure of parsimony, comparing the identified model to a baseline model, goodness of fit and related measures, and testing the minimum sample and population discrepancy (Holmes-Smith et al. 2006; Abramson et al. 2005; Arbuckle and Wothke, 1999; Mulaik et al. 1989). The researcher applies the same evaluation steps in this research to evaluate the identified model fitness which is covered in the next sections.

5.13.1 Measure of parsimony

One of the objectives of SEM that goes beyond the multiple regression is to check the most parsimonious of the interrelationships between the variables in a model (Weston and Gore, 2006). Yet, Preacher (2008) argues that the parsimoniousness of a model might also lead to the absence of the model's goodness of fit. Moreover, parsimony of a model could be achieved by checking the degrees of freedom (DF) of the model and relating it to the number of parameters in the model, whereby it is argued that greater the degrees of the freedom with respect to the number of parameters in the model, the more parsimonious is the model (Weston and Gore, 2006; Mulaik et al. 1989). Thus, from the report generated by AMOS, the researcher compared the degrees of freedom (DF) with the number of parameters in the models (Table 5.26 and Table 5.27). Table 5.26 shows the CMIN output from AMOS for the initial Model A. Table 5.26 indicated that the degree of freedom (327) is much greater than the number of parameters (79) in the model, while Table 5.27 showed that the CMIN output from AMOS for the initial Model B indicated that the degree of freedom (33) is greater than the number of parameters (22) as well. This confirms that the models are parsimonious (simplicity).

The researcher also examined the goodness of fit of the models using AMSO. The output from AMOS provides below (Table 5.26 & Table 5.27) for Models A and B respectively, where it indicates that the default model in Figure 5.16 and Figure 5.17 meet the reference values cited in the literature. It must

be noted here that the pictorial representation in Figures 5.16 and 5.17 are given as a guide to understand the directions of the various covariance and variance within the model whereas the actual values concerning the variance and covariance must be read from Table 5.24 and Table 5.25.

Table 5. 26 Goodness fit measure output from AMOS for the initial Model A

CMIN					
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	79	1064.909	327	0	**3.257**
Saturated model	406	0	0		
Independence model	28	10072.932	378	0	26.648

Baseline Comparisons					
Model	NFI	RFI	IFI	TLI	CFI
Default model	**0.894**	**0.878**	**0.924**	**0.912**	**0.924**
Saturated model	1		1		1
Independence model	0	0	0	0	0

RMSEA				
Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	**0.076**	0.071	0.081	0
Independence model	0.257	0.252	0.261	0

RMR, GFI		
Model	RMR	GFI
Default model	**0.037**	**0.838**
Saturated model	0	1
Independence model	0.407	0.147

According to Brown (2015), CMIN/DF should be ≤ 3.84 at a 0.05 level of significance. NFI, RFI, IFI, TLI, CFI should be ≥ 0.9 (Hu & Bentler, 1999). Whereas the model of DOI and TAM constructs influence on the intention to adopt fintech services readings are found to be CMIN/DF=3.257 (i.e. less than 3.84). This confirms that the sample size is adequate. Baseline Comparisons readings are found to be NFI=0.894; RFI=0.878; IFI=0.924; TLI=0.912; CFI=0.924. Three significant indices (IFI, TLI, and CFI.) values measured were ≥ 0.9 which indicated that the model is fit to data.

Moreover, measures based on the population discrepancy (RMSEA) of about 0.08 or less were examined and according to the literature a close fit of the model and reasonable error of approximation are indicated by this measure (Lee et al. 2015). RMSEA value readings were found to be 0.076. This shows that the population error measurement indicates a good fit with the sample size. While root means squared residual (RMR) scale is dependent upon how complicated the model is, Lee et al. (2015) estimated an acceptable level of RMR could be <0.05. RMR value computed by AMOS was found to

be 0.037. These readings suggest that the default model fits the data.

Table 5. 27 Goodness fit measure output from AMOS for the Perceived of Risk and Trust influence on intention to adopt Fintech services model

CMIN					
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	22	109.705	33	0	**3.324**
Saturated model	55	.000	0		
Independence model	10	2733.199	45	0	60.738

Baseline Comparisons					
Model	NFI	RFI	IFI	TLI	CFI
Default model	**0.960**	**0.945**	**0.972**	**0.961**	**0.971**
Saturated model	1		1		1
Independence model	0	0	0	0	0

RMSEA				
Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	**0.077**	0.062	0.094	0.003
Independence model	.392	.379	.404	.000

RMR, GFI		
Model	RMR	GFI
Default model	**0.026**	**0.947**
Saturated model	0	1
Independence model	0.405	0.328

The default model of perceived of risk and trust influence on intention to adopt fintech services readings are found to be CMIN/DF=3.324 (i.e. less than 3.84). This confirms that the sample size is adequate. Baseline Comparisons readings are found to be NFI=0.960; RFI=0.945; IFI=0.972; TLI=0.961; CFI=0.971. All significant indices (NFI, RFI, IFI, TLI and CFI) were reported to be >0.90 which indicated that the model is fit. Moreover, RMSEA readings were found to be 0.077. This shows that the population error measurement indicates a good fit with the sample size, while the RMR value computed by AMOS was found to be 0.026 and the GFI value to be 0.947. This suggested that both default Models A and B were found to fit the data and could be chosen as the final model to perform the path analysis.

5.14 Path Analysis

The path analysis was carried out by testing the proposed hypotheses in the conceptual model. The proposed conceptual model for this research contains ten variables and fifteen hypotheses as pointed

out in Chapter 3. Tables 5.28 and 5.31 show the results of the path analysis conducted using path coefficients generated by AMOS for the structural Models A and B provided in Figures 5.16 and 5.17 respectively. Path analysis was conducted to check the statistical significance of the relationships between the latent constructs where the p-values were used to determine the validity of a relationship and hence the acceptability or rejection of the corresponding hypotheses. A relationship is statistically significant and considered as valid if the p-value of significance is found to be ≤0.05 else it is rejected.

5.14.1 Path analysis of structural Model A

Table 5. 28 Path analysis results of Model A

Regression Weights: (Group number 1 – Default model)							
			Estimate	S.E.	C.R.	P	Label
Perceived_Ease of Use	<---	Relative_Advantage	0.394	0.079	4.991	***	par_25
Perceived_Ease of Use	<---	Complexity	-0.085	0.033	-2.579	0.01*	par_27
Perceived_Ease of Use	<---	Compatibility	0.141	0.09	1.564	0.118	par_29
Perceived_Ease of Use	<---	Observability	0.109	0.088	1.231	0.218	par_32
Perceived_Ease of Use	<---	Trialability	0.185	0.041	4.537	***	par_37
Perceived_Usefulness	<---	Relative_Advantage	0.324	0.077	4.231	***	par_26
Perceived_Usefulness	<---	Complexity	-0.037	0.03	-1.221	0.222	par_28
Perceived_Usefulness	<---	Compatibility	0.311	0.083	3.771	***	par_30
Perceived_Usefulness	<---	Observability	-0.044	0.08	-0.548	0.584	par_33
Perceived_Usefulness	<---	Trialability	-0.061	0.038	-1.599	0.11	par_38
Perceived_Usefulness	<---	Perceived_Ease of Use	0.395	0.067	5.944	***	par_39
Intention_to Adopt	<---	Perceived_Usefulness	0.685	0.062	10.987	***	par_40
Intention_to Adopt	<---	Perceived_Ease of Use	0.297	0.06	4.91	***	par_41
**** P-value is statistically significant at the 0.01 level (two-tailed)*							
** P-value is statistically significant at the 0.05 level (two-tailed)*							

Thus, the above Table 5.28 shows that out of the thirteen paths in the structural Model A, five paths were not found to be statistically significant as p-values were found to be > 0.05 (see Table 5.29) while the remaining eight paths were found to be statistically significant as p-values were found to be < 0.05 (see Table 5.30).

Table 5. 29 Statistically invalid relationships of the structural Model A

Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Perceived_Ease of Use	<---	Compatibility	0.141	0.09	1.564	0.118	par_29
Perceived_Ease of Use	<---	Observability	0.109	0.088	1.231	0.218	par_32
Perceived_Usefulness	<---	Complexity	-0.037	0.03	-1.221	0.222	par_28
Perceived_Usefulness	<---	Observability	-0.044	0.08	-0.548	0.584	par_33
Perceived_Usefulness	<---	Trialability	-0.061	0.038	-1.599	0.11	par_38
**** P-value is statistically significant at the 0.01 level (two-tailed)*							
** P-value is statistically significant at the 0.05 level (two-tailed)*							

Table 5. 30 Statistically valid relationships of the structural Model A

Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Perceived_Ease of Use	<---	Relative_Advantage	0.394	0.079	4.991	***	par_25
Perceived_Ease of Use	<---	Complexity	-0.085	0.033	-2.579	0.01	par_27
Perceived_Ease of Use	<---	Trialability	0.185	0.041	4.537	***	par_37
Perceived_Usefulness	<---	Relative_Advantage	0.324	0.077	4.231	***	par_26
Perceived_Usefulness	<---	Compatibility	0.311	0.083	3.771	***	par_30

Perceived_Usefulness	<---	Perceived_Ease of Use	0.395	0.067	5.944	***	par_39
Intention_to Adopt	<---	Perceived_Usefulness	0.685	0.062	10.987	***	par_40
Intention_to Adopt	<---	Perceived_Ease of Use	0.297	0.06	4.91	***	par_41
*** *P-value is statistically significant at the 0.01 level (two-tailed)*							
* *P-value is statistically significant at the 0.05 level (two-tailed)*							

5.14.2 Path analysis of structural Model B

Table 5. 31 Path analysis results of the structural Model B

Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Trust	<---	Perceived_Risk	-.177	.037	-4.763	***	par_8
Intention_to Adopt	<---	Trust	.708	.058	12.132	***	par_9
*** *P-value is statistically significant at the 0.01 level (two-tailed)*							
* *P-value is statistically significant at the 0.05 level (two-tailed)*							

Table 5.31 shows the analysis of the two paths in the structural model B. Both the paths were found to be statistically significant with p-value of significance found to be < 0.05. After analysis of the paths between each pair of latent variables in Models A and B (Tables 5.28 & 5.31), the association between the independent variables in Model A, namely Compatibility, Observability, Complexity, Trialability and Relative Advantage was investigated. AMOS report was generated to test the association between the independent variables using the covariance matrix. Table 5.32 shows the covariance output from AMOS.

Table 5. 32 Covariance results

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Compatibility	<-->	Observability	.486	.048	10.215	***	par_19
Relative_Advantage	<-->	Complexity	-.087	.038	-2.296	.022*	par_21
Complexity	<-->	Compatibility	-.201	.044	-4.589	***	par_22
Observability	<-->	Trialability	.356	.048	7.495	***	par_23
Relative_Advantage	<-->	Compatibility	.428	.044	9.665	***	par_24
Complexity	<-->	Observability	-.198	.042	-4.717	***	par_31
Compatibility	<-->	Trialability	.392	.049	7.990	***	par_35
Complexity	<-->	Trialability	-.027	.051	-.532	0.595	par_36
Relative_Advantage	<-->	Trialability	.300	.043	6.959	***	par_42
Relative_Advantage	<-->	Observability	.368	.041	8.928	***	par_43
*** *P-value is statistically significant at the 0.01 level (two-tailed)*							
* *P-value is statistically significant at the 0.05 level (two-tailed)*							

Analysis of Table 5.32 shows that covariance between the five exogenous constructs in Figure 5.16 are seen to be significant with p-values lower than 0.05 with regard to all constructs, except for one covariance between Complexity <--> Trialability which was not found to be significant (p-value 0.595). The result might be considered logical and supported practical issues related to the complexity of using fintech services by the bank consumers, especially during early stage of diffusion. For instance, consumers of banks cannot try out complex technologies due to lack of training or accessibility issues.

But where such technologies are not complex, it may be easy for those customers to try out the technology. Moreover, fintech services might not be tried out by consumers. Especially since fintech services are still diffusing. Solutions to such problems may be a challenge for both the bank and the consumers. These arguments show that complex fintech services might not be associated with trialability and falsification of the association between complexity and trialability.

The other associations between the four DOI exogenous constructs in the conceptual model that were found to be statistically significant were considered to be logical, practical, and supported by theory (see Chapter 2). There was no covariance output generated from AMOS for the structural Model B, as there is only one exogenous construct namely perceived risk. Moreover, from Tables 5.28, 5.31 and 5.32 and as per the correlation classification in this research (section 5.8) it is possible to derive the following conclusions:

- The association between relative advantage and complexity is seen to be of small correlation but in the negative direction.
- The association between relative advantage and compatibility is seen to be of medium correlation but in the positive direction.
- The association between relative advantage and trialability is seen to be of medium correlation but in a positive direction.
- The association between relative advantage and observability is seen to be of medium correlation but in the positive direction.
- The association between complexity and compatibility is seen to be of small correlation but in the negative direction.
- The association between complexity and observability is seen to be of small correlation but in the negative direction.
- The association between compatibility and trialability is seen to be of medium correlation but in the positive direction.
- The association between compatibility and observability is seen to be of medium correlation but in a positive direction.
- The association between observability and trialability is seen to be of medium correlation but in the positive direction.
- There is no statistically significant association between complexity and trialability.
- The path Perceived usefulness→ Intention to adopt fintech services is significant. This indicates that the perceived usefulness of fintech services acts as a predictor of the intention to adopt fintech services. Thus hypothesis H1 is accepted.
- The path Perceived ease of use → Intention to adopt fintech services is significant. This indicates that perceived ease of use of fintech services acts as a predictor of the Intention to adopt fintech services. Thus hypothesis H2 is accepted.

- The path Perceived ease of use → Perceived usefulness is significant. This indicates that perceived ease of use of fintech services acts as a predictor of perceived usefulness. Thus hypothesis H3 is accepted.

- The path Relative advantage → Perceived usefulness is significant. This indicates that the relative advantage of fintech services acts as a predictor of perceived usefulness. Thus hypothesis H4a is accepted.

- The path Relative advantage → Perceived ease of use is significant. This indicates that the relative advantage of fintech services acts as a predictor of perceived ease of use. Thus hypothesis H4b is accepted.

- The path Complexity → Perceived usefulness is not significant. This indicates that the complexity of fintech services does not act as a predictor of perceived usefulness. Thus hypothesis H5a is rejected.

- The path Complexity → Perceived ease of use is significant. This indicates that the complexity of fintech services act as a predictor of perceived ease of use. Thus hypothesis H5b is accepted.

- The path Compatibility → Perceived usefulness is significant. This indicates that the Compatibility of fintech services acts as a predictor of perceived usefulness. Thus hypothesis H6a is accepted

- The path Compatibility → Perceived ease of use is not significant. This indicates that the Compatibility of fintech services does not act as a predictor of perceived ease of use. Thus hypothesis H6b is rejected.

- The path Trialability → Perceived usefulness is not significant. This indicates that the Trialability of fintech services does not act as a predictor of perceived usefulness. Thus hypothesis H7a is rejected

- The path Trialability → Perceived ease of use is significant. This indicates that the Trialability of fintech services act as a predictor of perceived ease of use. Thus hypothesis H7b is accepted.

- The path Observability → Perceived usefulness is not significant. This indicates that the Observability of fintech services does not act as a predictor of perceived usefulness. Thus hypothesis H8a is rejected.

- The path Observability → Perceived ease of use is not significant. This indicates that the Observability of fintech services does not act as a predictor of perceived ease of use. Thus hypothesis H8b is rejected.

- The path Trust → Intention to adopt fintech services is significant. This indicates that the Trust of fintech services acts as a predictor of the intention to adopt fintech services. Thus hypothesis H9 is accepted.

- The path Perceived risk → Trust is significant. This indicates that the Perceived risk of fintech services acts as a predictor of trust. Thus, hypothesis H10 is accepted.

It is important to derive inferences from the results obtained from the testing of the hypotheses and the relationships amongst the independent variables concerning Model A. The inferences are provided as

follows.

The association amongst the independent variables related to theory of diffusion clearly indicates that there is variance that can be observed amongst the independent variables except in the case of the relationship between complexity and trialability. This implies that behavioural intention of consumers of bank to adopt fintech services are not only influenced by each one of the five determinants in Model A, but also the interaction between those determinants represented by the covariance between them. For instance, it can be seen that relative advantage of fintech services is positively influencing perceived usefulness and perceived ease of use. This implies that if relative advantage of fintech services is enhanced, then perceived usefulness and perceived ease of use will be enhanced. As practical example, consumers by using fintech services on mobile application to do banking transactions makes fintech services perceived to be useful and easy to use without the need to personally visit to the bank. Thus, customer is saving time, effort and money.

In the case of compatibility, it is seen that compatibility of fintech services is influencing perceived usefulness significantly, but not significantly perceived ease of use. This indicates that compatibility may not be an important determinant of perceived ease of use. Although TAM explains that perceived usefulness and perceived ease of use are essential elements that usually act as the mediators between the determinants and behavioural intention to adopt. It is possible to argue that the lack of significant relationship between compatibility and perceived ease of use could be a contradicted. For example, from Model A it can be seen that compatibility is associated with relative advantage, and relative advantage is positively related to perceived ease of use. This implies that compatibility can correlate with relative advantage, which has been already shown to influence perceived ease of use. Practically it can be seen that compatibility of fintech services to the consumer's life style or banking can be linked to perceived usefulness. However, the interaction between relative advantage and compatibility shows that the correlation between relative advantage and compatibility is 0.428 which is a medium correlation in the positive direction. This implies that if relative advantage changes by one unit, compatibility will change by 0.428 unit and vice-versa. That is to say that when compatibility changes, relative advantage will change, which in turn influence perceived ease of use.

The inference is that the association between all the independent variables is able to explain how the variance in a particular independent variable could influence the mediating variable, through its association with another independent variable. In practical terms, it implies that when there is a statistically significant association between independent variables then even if there is no statistically significant relationship between any particular independent variable (e.g. compatibility) and the mediating variable (e.g. Perceived ease of use), still the impact of that particular independent variable (e.g. compatibility) could be shown to affect the mediating variable (e.g. perceived ease of use) by its association with another independent variable (e.g. relative advantage).

This is a new finding that enables the service providers to improve the compatibility of fintech services

to have a greater correlation with relative advantage. Thus enhancing the perceived ease of use of fintech services. The inference here is that compatibility on the one hand directly influences perceived usefulness and hence behavioural intention to adopt fintech services while on the other it is able to influence perceived ease of use by supporting relative advantage of fintechas an associate of relative advantage and enhancing its influence on perceived ease of use. Similar arguments could be extended to the association between all the independent variables and their relationship with mediator variables, with or without statistically significant relationship with any of the mediator variables. The argument is that during the process of diffusion it can be seen that all the five DOI factors regardless of the statistical significance of their relationship to the mediating variables, strengthen each other and influence both perceived usefulness and perceived ease of use, which influence the behavioural intention to adopt fintech services. It is difficult to rule out the role of any single independent DOI variable in explaining the results obtained through the statistical analysis. A detailed explanation about the actual operation of the association between the independent variables as well as their direct, indirect and total influence on the mediating and dependent variables are provided in Chapter 6.

Accordingly, the final conceptual model which indicates the significant paths and the insignificant paths is provided below (Figure 5. 18 and Figure 5.19). The solid lines in the Figures 5.18 and 5.19 specify the significant paths, while the thin lines specify the paths that are not significant.

Figure 5. 18 Final Integrated Model A

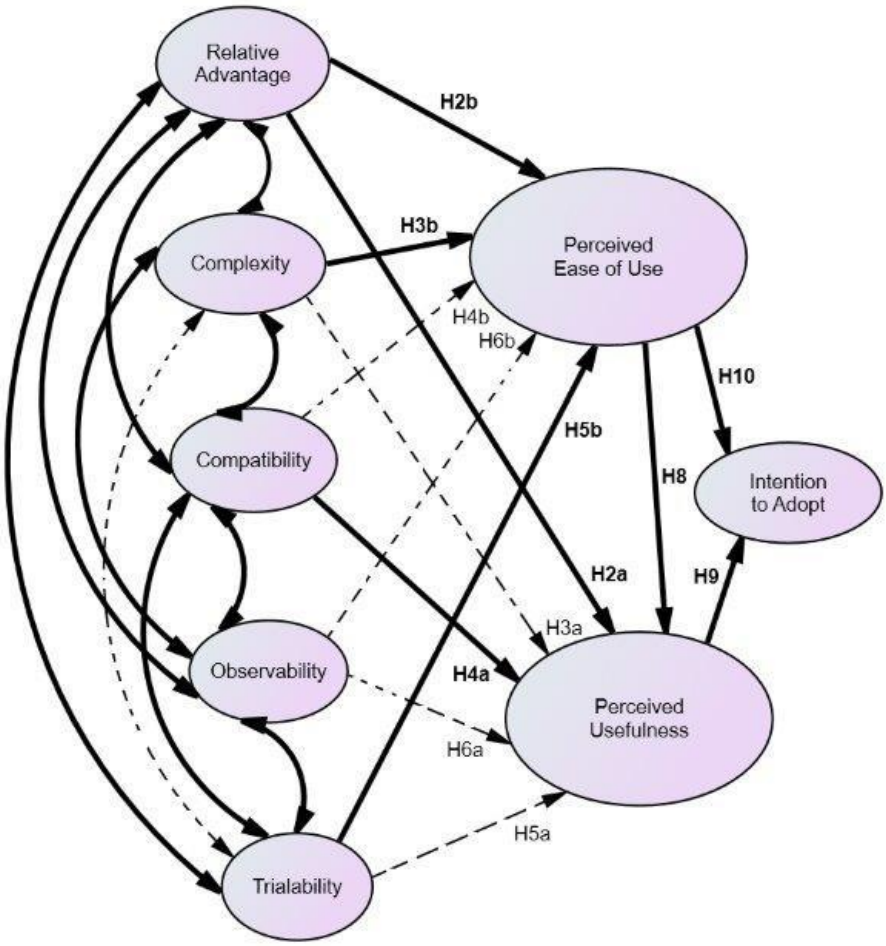
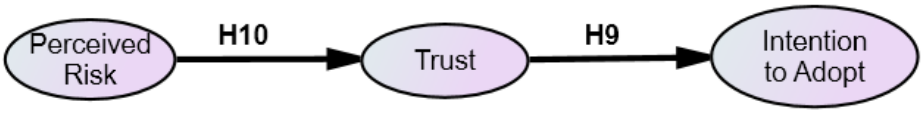


Figure 5. 19 Final Integrated Model B



An important aspect that needs to be noted here is that in the CFA model (Figure 5.13) the five independent variables of Model A have a statistically significant relationship with the lone independent variable in Model B. The following results can be derived. The covariance tabulation of the relationship between the independent variables of Models A and B derived from the CFA is provided in Table 5.33

Table 5. 33 Covariance results generated by AMOS

			Estimate	S.E.	C.R.	P	Label
Perceived_Risk	<-->	Relative_Advantage	-.091	.043	-2.135	.033	par_37
Perceived_Risk	<-->	Trialability	-.128	.057	-2.236	.025	par_58
Perceived_Risk	<-->	Complexity	.712	.070	10.099	***	par_59
Perceived_Risk	<-->	Observability	-.155	.046	-3.341	***	par_68
Perceived_Risk	<-->	Compatibility	-.223	.049	-4.522	***	par_69

- The association between relative advantage and perceived risk is seen to be of small correlation but in the negative direction.
- The association between complexity and perceived risk is seen to be of large correlation but in the positive direction.
- The association between compatibility and perceived risk is seen to be of small correlation but in the negative direction.
- The association between trialability and perceived risk is seen to be of small correlation but in the negative direction.
- The association between observability and perceived risk is seen to be of small correlation but in the negative direction.

This results of the testing of Models A and B imply that the association between the independent variables in both Models A and B is statistically significant with p-value of significance seen to be less than 0.05. The finding is that during diffusion of fintech services, there is an element risk attached with every factor of diffusion. Surprisingly, it can be seen from Table 5.33 that the association between complexity and perceived risk is statistically significant with a large correlation in the positive direction. This implies that higher the complexity in using fintech, higher will be the perceived risk. Similarly, lower the complexity in using fintech, lower will be the perceived risk. This situation is to be expected with the diffusion of any new technology including fintech services as this is a natural phenomenon that can be observed in practice.

5.15 Unidimensionality

Unidimensionality test provides an idea on whether the relationship between the observed and latent variables is unidirectional or bidirectional (Abramson et al.2005). This is measured by the p-value of significance, the critical ratio and standardized regression weight estimate generated by AMOS. Typical acceptable values of the observed variables are: p-value of significance < 0.05, standardized regressions weights estimate > 0.5 and C.R. values > ±1.96. It can be seen from Table 5.34 and Table 5.35 that all the readings satisfy the unidimensionality criteria of p-value of significance, C.R. value and standardized regression estimate. Thus, it can be established that the models are unidimensional.

Table 5. 34 Regression Weights Output of Model A

			Estimate	S.E.	C.R.	P	Label
PU4	<---	Perceived_Usefulness	1.000				
PU3	<---	Perceived_Usefulness	.996	.047	21.235	***	par_1
PU2	<---	Perceived_Usefulness	1.112	.050	22.352	***	par_2
PU1	<---	Perceived_Usefulness	1.076	.050	21.607	***	par_3
PU5	<---	Perceived_Usefulness	1.130	.048	23.617	***	par_4
PEU1	<---	Perceived_Ease of Use	.987	.050	19.576	***	par_5
PEU5	<---	Perceived_Ease of Use	1.002	.044	22.998	***	par_6
RA5	<---	Relative_Advantage	1.213	.065	18.681	***	par_7
COMPLX4	<---	Complexity	1.000				

			Estimate	S.E.	C.R.	P	Label
COMPLX3	<---	Complexity	1.042	.040	26.128	***	par_8
COMPLX2	<---	Complexity	1.020	.040	25.277	***	par_9
COMPLX1	<---	Complexity	.925	.044	20.820	***	par_10
COMPAT4	<---	Compatibility	1.000				
COMPAT3	<---	Compatibility	.974	.050	19.450	***	par_11
COMPAT2	<---	Compatibility	.904	.043	21.128	***	par_12
COMPAT1	<---	Compatibility	1.036	.051	20.167	***	par_13
COMPAT5	<---	Compatibility	.959	.046	21.029	***	par_14
OBSERV4	<---	Observability	1.000				
OBSERV3	<---	Observability	1.053	.056	18.740	***	par_15
OBSERV1	<---	Observability	1.123	.063	17.853	***	par_16
COMPLX5	<---	Complexity	.982	.043	22.587	***	par_17
PEU4	<---	Perceived_Ease of Use	1.000				
INTADOP4	<---	Intention_to Adopt	1.000				
RA4	<---	Relative_Advantage	1.000				
RA3	<---	Relative_Advantage	1.135	.064	17.764	***	par_18
INTADOP3	<---	Intention_to Adopt	.998	.048	20.940	***	par_20
TRIABI3	<---	Trialability	.998	.065	15.461	***	par_34
TRIABI4	<---	Trialability	1.000				
*** P value is statistically significant at the 0.01 level (two-tailed)							

Table 5. 35 Regression Weights Output of Model B

			Estimate	S.E.	C.R.	P	Label
INTADOP4	<---	Intention_to Adopt	1.000				
INTADOP3	<---	Intention_to Adopt	1.011	.067	15.129	***	par_1
TRUFIN2	<---	Trust	1.000				
TRUFIN3	<---	Trust	1.070	.046	23.278	***	par_2
TRUFIN4	<---	Trust	1.061	.048	22.238	***	par_3
TRUFIN5	<---	Trust	.987	.051	19.274	***	par_4
TRUFIN1	<---	Trust	1.046	.050	21.049	***	par_5
PRISK4	<---	Perceived_Risk	1.000				
PRISK5	<---	Perceived_Risk	1.021	.051	20.161	***	par_6
PRISK1	<---	Perceived_Risk	.800	.049	16.437	***	par_7
*** P value is statistically significant at the 0.01 level (two-tailed)							

5.16 Method bias

The average variance extracted (AVE) was considered by the researcher to check the existence of the method bias (Table 5.36). The average variance extracted is the extent to which the amount of variance that is captured by items compared to the amount of variance due to measurement error. According to Janssens et al. (2008), the AVE value of each item should be less than 0.05 and no SMC value between the construct and other constructs should be higher than the SMC of the construct.

Table 5. 36 AVE of constructs in Models A and B

	Estimate	Squared Multiple Correlations (SMC)	Average Variance
COMPAT1	0.814	0.699	(0.699+0.732+0.661+0.71+0.708)÷5= 0.702
COMPAT2	0.847	0.732	
COMPAT3	0.88	0.661	
COMPAT4	0.784	0.71	

COMPAT5	0.866	0.708	
COMPLX1	0.853	0.64	(0.64+0.78+0.798+0.801+0.69)÷5= 0.7418
COMPLX2	0.877	0.78	
COMPLX3	0.831	0.798	
COMPLX4	0.8	0.801	
COMPLX5	0.875	0.69	
INTADOP3	0.862	0.728	(0.728+0.77)÷2= 0.749
INTADOP4	0.898	0.77	
OBSERV1	0.84	0.717	(0.717+0.775+0.615)÷3= 0.702
OBSERV3	0.846	0.775	
OBSERV4	0.883	0.615	
PEU1	0.895	0.662	(0.662+0.779+0.749)÷3= 0.73
PEU4	0.852	0.779	
PEU5	0.893	0.749	
PU1	0.836	0.727	(0.727+0.765+0.706+0.716+0.806)÷5 = 0.744
PU2	0.856	0.765	
PU3	0.813	0.706	
PU4	0.842	0.716	
PU5	0.841	0.806	
RA3	0.759	0.743	(0.743+0.576+0.831)÷3= 0.717
RA4	0.912	0.576	
RA5	0.883	0.831	
TRIABI3	0.902	0.814	(0.814+0.793)÷2= 0.803
TRIABI4	0.89	0.793	

While Table 5.37 shows the two steps for extracted to AVE of the constructs. (1) calculation of the average of SMC of the items under each construct. (2) SMC of the correlation between the latent variables which eventually resultant of the AVE for all Constructs.

Table 5. 37 AVE of Models A and B

(1) Correlations of Model A

Constructs	RA	Complexity	Compatibility	Observability	Trialability
RA	1.000				
Complexity	-0.129	1.000			
Compatibility	0.762	-0.262	1.000		
Observability	0.703	-0.278	0.823	1.000	
Trialability	0.450	-0.030	0.520	0.508	1.000

Correlations of Model B

Constructs	PEU	PU
PEU	1.000	
PU	0.426	1.000

(2) SMC of Correlations of Model A

Constructs	RA	Complexity	Compatibility	Observability	Trialability
RA	**0.717**				
Complexity	0.017	**0.742**			
Compatibility	0.580	0.069	**0.702**		
Observability	0.494	0.077	0.677	**0.702**	
Trialability	0.203	0.001	0.270	0.258	**0.804**

SMC of Correlations of Model B

Constructs	PEU	PU
PEU	**0.804**	
PU	0.181	**0.744**

Table 5.37 shows that the AVE of all the constructs should be >0.5 (given by the number in bold). Also, Table 5.37 indicates that no SMC between a construct and the other constructs in the models was found to be higher than the SMC of that construct for all constructs in Models A and B. For example, the SMC of RA is 0.717 but the SMC of the remaining constructs with reference to RA is lower than 0.717 in the column of RA. This applies to both Models A and B. Thus, it can be concluded that no method of bias was found in the data with regard to both Models A and B.

5.17 Chapter Summary

Chapter 5 presents the data analysis for the research relationship model. The collected data has been analyzed using the respondent's rate and the respondents of the profile. Followed by the descriptive statistics conducted by the researcher to provide a simple summarization of the collected sample by using the mean and standard deviation for all items in the research instrument. The reliability, content validity, criterion validity, convergent validity, discriminant validity and construct validity have been tested to ensure the accuracy and consistency of the research and found to be acceptable. Correlation test amongst exogenous and endogenous constructs was tested which showed the correlation between the constructs was statistically significant.

Lastly, the preformed statistical tests confirmed that out of the fifteen hypotheses suggested for this research, ten hypotheses are found to be statistically significantly supported. Thus, could be accepted. The outcome of Chapter 5 provided the findings from the analysis of the data which formed the basis

to discuss the findings in Chapter 6.

Chapter 6: Discussion

6.1 Introduction

The findings derived from the data analysis in Chapter 5 will be discussed in this Chapter. The previous Chapter outline the outcome of the data analysis for the data collected from the customers of the bank in the Kingdom of Bahrain. Several tests performed using CFA and path analysis. The outcome of the tests resulted in ten hypotheses that were suggested for this research and supported by the empirical findings. Chapter 6 provides a comprehensive discussion on the statistical analysis findings presented in Chapter 5 include answering research questions, addressing the identified gaps, interpreting the findings, and comparing the research outcomes with the research outcomes found in the literature. In addition, the proposed hypotheses are thoroughly discussed, justified, and explained by using the outcome from the path analysis.

Thus, Chapter 6 is structured as follows. Section 6.2 provides an overview of the hypotheses' findings. Section 6.3 provides the answer to the three questions agreed upon for this research as well as discussing the outcomes of the hypotheses testing. While the last section 6.4, summarises the Chapter.

6.2 Overview of the hypotheses findings

Following the literature review in Chapter 2 and to achieve the aim and objectives for this research, the developed conceptual model proposed in Chapter 3 was validated. As per the above discussion and Table 5.28 & 5.31, the path analysis of the fifteen hypotheses was conducted and the results are demonstrated in Table 6.1 below. It should be noted that all answers represent consumers' perceptions of the ten defined constructs and the relationship within the conceptual model.

Table 6. 1 Path Analysis Results

Hypotheses #	Path	P	Hypotheses Result
H1	PU → Intention to Adopt	***	Supported
H2	PEU → Intention to Adopt	***	Supported
H3	PEU → PU	***	Supported
H4a	Relative advantage → PU	***	Supported
H4b	Relative advantage → PEU	***	Supported
H5a	Complexity → PU	0.222	Not Supported
H5b	Complexity → PEU	***	Supported
H6a	Compatibility → PU	***	Supported
H6b	Compatibility → PEU	0.118	Not Supported
H7a	Trialability → PU	0.11	Not Supported
H7b	Trialability → PEU	***	Supported
H8a	Observability → PU	0.584	Not Supported
H8b	Observability → PEU	0.218	Not Supported
H9	Trust → Intention to Adopt	***	Supported
H10	Perceived risk → Trust	***	Supported
****** P-value is statistically significant at the 0.01 level (two-tailed)***			
**** P-value is statistically significant at the 0.05 level (two-tailed)***			

The results of the path analysis indicate that out of the fifteen hypotheses suggested for this research, ten hypotheses are found to be statistically significantly supported. While the remaining five hypotheses

are found to be statistically not significant (Rejected) (Table 6.1). In details, from Figures 5.18 and 5.19 it can be concluded that PU and PEU have a significant positive effect on Intention to Adopt, which is supported by H1 and H2. PEU as well as a significant positive effect on PU, thus providing support for H3. Relative advantage also shows a significant positive effect on PU and PEU which is supported by H4a and H4b. Complexity shows a significant negative effect on PEU (supported by H5b). Yet, shows no significant effect on PU, so H5a is not supported. Compatibility shows no significant effect on PEU (not supported by H6b), but shows a significant positive effect on PU (supported by H6a). Similarly, Trialability shows a significant positive effect on PEU (supported by H7b), however, Trialability shows no significant effect on PU, so H7a is not supported. Observability shows no significant effect on both PU and PEU, thus not providing support for H8a and H8b. Trust shows a significant positive effect on Intention to Adopt, so H9 is supported. Finally, perceived risk has a significant negative effect on the consumers' trust, thus providing support for H10. Based on the discussion above the next section discusses the extent to which the research questions have been achieved.

6.3 Answers to the Research Questions

The research problem identified for this research was that there is a lack of research on fintech services adoption by the consumers of the bank. Although literature supported the view that it is a critical topic. Yet, the existing researches outcomes are mainly focused on the technical side of fintech strategy, from the supply side (i.e. Bank) and not focused on the demand side of fintech services utilization (i.e. consumer) (Gozman, et al. 2018). Accordingly, two questions were set for this research and will be discussed in this section, which were: (1) What are the factors that affect the behavioral intention of consumers of banks to adopt fintech services when fintech is still diffusing? (2) To what extent the predictor factors influence the predicted factor in an environment in which fintech is still diffusing? and (3) Which are the more influential factors that affect the customer behavioral intention to adopt fintech services when fintech is still diffusing?

6.3.1 Research Question Q1

From the literature review, it can be ascertained that over time related literature continue to investigate the factors that contribute to the adoption of fintech services. Yet, it is clear that there is no unique set of factors that affect the adoption of fintech services. This research investigates the potential factors for the adoption and the use of fintech services by bank consumers, and how fintech services affect the interaction and behavior between the consumers and the services provider (Banks in this case). The literature review (Section 2.2.2) identified ten factors influencing consumers' behavioural intention to adopt fintech services namely intention to adopt (Stewart and Jujens, 2018; Raza et al. 2017; Mutahar et al. 2017; Chuang et al. 2016; Kim et al. 2015; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010), perceived usefulness (Lee, 2018; Stewart and Jujens, 2018; Raza et al. 2017; Kim et al. 2015; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010), perceived ease of use (Meyliana et al. 2019; Hu et al. 2019; Lee, 2018; Stewart and Jujens, 2018; Raza et al. 2017), relative advantage (Lou and Li, 2017; Chitungo and Munongo, 2013), Complexity (Lou and Li, 2017; Mutahar et al. 2017), Compatibility

(Lou and Li, 2017; Raza et al. 2017; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010), Trialability (Moghaddam and Salehi, 2010; Mutahar et al. 2017; Chen, 2013), Observability (Moghaddam and Salehi, 2010), Trust (Meyliana et al. 2019; Hu et al. 2019; Muñoz-Leiva, et al. 2017; Stewart and Jujens, 2018; Hanafizadeh et al. 2014), perceived risk (Meyliana et al. 2019; Raza et al. 2017; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014).

For this purpose, the developed conceptual model (Chapter3) investigates the relationship among the identified factors. The ten factors supported by the literature were hypothesized to influence consumers' behavioral intention to adopt fintech services which were intended to adopt (Hu et al. 2019; Meyliana et al. 2019), perceived usefulness (PU) (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017, Hanafizadeh et al. 2014), perceived ease of use (PEU) (Hu et al. 2019; Meyliana et al. 2019, Mutahar et al. 2017, Hanafizadeh et al. 2014), Relative advantage (Al-rahmi et al. 2019), Complexity (Al-rahmi et al. 2019; Hubert et al. 2018), Compatibility (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017), Trialability (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017), Observability (Al-rahmi et al. 2019; Hubert et al. 2018; Mutahar et al. 2017), Trust (Nkoyi et al. 2019; Hu et al. 2019; Wong & Mo, 2019; Rodrigo et al. 2019) and Perceived Risk (Boz & Özen 2019; OECD 2019; Muñoz-Leiva et al. 2017). The findings of the research support the relationships between the nine factors mentioned above and the behavioral intention to adopt fintech services. Moreover, out of the fifteen hypotheses, the findings of the research support ten hypotheses (Table 6.12)

The above means consumers perceive that in order to have intention, which defined as the degree to which consumers have formulated conscious plans to adopt fintech services, nine factors should be considered by the Bank which are (1) Intention to adopt fintech services, (2) Perceived usefulness of adopting fintech services which measure of consumers' subjective assessment of the utility offered by the fintech services, (3) Perceived ease of use of fintech services which is the degree to which consumers' expect fintech services to be free of effort, (4) Trust in fintech services which defined as consumers' willingness or desire to follow a particular pattern of behavior, which determines the success rate of acceptance of fintech services, (5) Perceived risk of using fintech services which indicated by the potential for loss in the pursuit of getting benefits while using fintech services, (6) Relative advantage of using fintech services which is defined as the degree to which consumers perceived using fintech services are as being better than using its traditional banking methods, (7) Complexity in using fintech services where consumers perceived difficulty of learning to use and understand fintech services, (8) Compatibility to work with fintech services, which is defined as the degree to which consumers perceived using fintech services as being consistent with the existing values, needs, and past experiences of the user of fintech, and (9) finally Trialability of fintech services which is the degree to which fintech services may be experimented by consumers before you adopt the Fintech services.

Moreover, from the discussions above, it can be seen that five exogenous variables influence customer

behavioral intention to adopt fintech services in the context of banks. They are relative advantage, complexity, compatibility, trialability, and perceived risk. This argument confirms by the hypotheses H1, H2, H3, H4a, H4b, H5b, H6a, H7b, H9, and H10. However, five hypotheses were rejected namely H5a, H6b, H7a, H8a, and H8b. Moreover, the influence of those exogenous factors on behavioral intention to adopt fintech services is found to be mediated by three factors. DOI factors relative advantage, complexity, compatibility, and trialability influence behavioral intention to adopt fintech services through the mediators perceived usefulness of fintech services and perceived ease of use of fintech services. Similarly, perceived risk was found to influence behavioral intention to adopt fintech services through the mediator trust. This research has been able to provide new knowledge about the factors that influence consumers of banks in Bahrain, during the diffusion of fintech services and the way those factors behavioral influence intention to adopt with the help of mediators. While past research efforts (Senyo & Osabutey, 2020; Hu et al. 2019; Meyliana et al. 2019; Mutahar et al. 2017) have tried to understand how fintech services in the financial sector have been accepted by consumers, such research efforts did not consider the influence of DOI factors and perceived risk in a single research.

The above explanation shows the various factors that influence the behavioral intention to adopt fintech in the context of banks in Bahrain and how those factors are related to each other and intention to adopt fintech services. In summary, it can be said that relative advantage, complexity, compatibility, trialability, and perceived risk are found to be the main predictors (factors) of customer intention to adopt fintech services while perceived usefulness, perceived ease of use, and trust act as mediating factors. While observability is acting as an associate factor to the four DOI factors and hence could be conceived to be a moderating factor. The discussions also show that DOI, TAM, PMT, and TRA provide a solid base to explain the relationship amongst the DOI, TAM, perceived risk, trust, and intention to adopt. Thus it can be concluded that research question RQ1 has been addressed.

6.3.2 Research Question Q2

The association between independent variables provides knowledge on the extent of the covariance found between two latent independent variables, and whether such an association can have bearing on the dependent variable and the model as a whole (Schumacker & Lomax, 2010). Although the aim of this research was not to hypothesize the covariance between the exogenous variables. However, there is a need to acknowledge the influence of the covariance on the variables as well as the practical implications of the relationships.

According to the DOI model, the diffusion of any innovation that is perceived as new by the potential adopters can be explained by five attributes of that innovation. The five attributes of that innovation cause or explain the adoption at different levels. The five perceived attributes of the innovation are namely relative advantage, compatibility, complexity, trialability, and observability (Roger, 2002). Hence, a corollary that could be thought is that the innovation attributes must be interrelated for innovation to successfully diffuse into the market. However, the data analysis in section 5.14.1 found

that there is no interrelationship between two DOI attributes, namely Complexity <--> Trialability.

Fintech services could be considered as a complex intricate technology. Hence, it is possible to argue that out of the five attributes any single attribute could cause concern affecting fintech services adoption. Such a situation is also implied by Roger who argues that adoption could be sometimes incomplete due to many reasons including lack of trialability or relative advantage (Roger, 2002). For instance, Yoon and Lim (2020) studied factors affecting customers' acceptance of internet-only banks in Korea in the context of fintech services using diffusion of innovation theory. The study employed only four attributes namely relative advantage, complexity, compatibility, and trialability. The study results showed that only relative advantage influenced the perceived usefulness of banking online. This implies that the remaining three diffusions of innovation attributes did not indicate any statistically significant influence on perceived usefulness. Similarly, Mutahar et al. (2017) studied mobile banking acceptance in Yemen in the context of fintech services and used only three attributes of DOI namely compatibility, observability, and trialability. Mutahar et al. (2017) results showed that observability as a construct was not found to be a predictor of perceived usefulness or perceived ease of use. While both compatibility and trialability were found to predict perceived usefulness or perceived ease of use. Although Yoon and Lim (2020) and Mutahar et al. (2017) used SEM, yet the association between the exogenous diffusion of innovation attributes was not discussed, indicating that the effect of the association between the DOI constructs has been ignored.

If the association between the exogenous variables had been hypothesized, then it could have been possible to have a better understanding of the influence of the DOI exogenous variables on the mediating variables. The result of those studies has deprived the users and service providers of the knowledge on how to manipulate every attribute of the innovation that could have led to a better understanding of the behavioral intention to adopt fintech services during diffusion. In this research, this gap has been addressed. In section 5.14.1 it can be seen that among the 10 covering relationships concerning the DOI factors, 9 relationships were found to be statistically significant (Table 5.32) (Figure 5.18). The effect of the presence or the absence of a statistically significant relationship between the exogenous variables in Model A has been dealt with broadly in the data analysis (section 5.14.1). Thus, this section discusses the results of the data analysis conducted on the association between the latent independent variables in Model A. through the discussion in the following sections.

6.3.3 Interaction between relative advantage, compatibility, complexity, and trialability

This section discusses the association of the exogenous variables that have at least one statistically significant path to the mediating variables in Model A. Four exogenous variables have at least one significant path related to the mediating variables. Those are relative advantage (H4a is supported: relative advantage →perceived usefulness; H4b is supported: relative advantage →perceived ease of use), complexity (H5b is supported: complexity → perceived ease of use), compatibility (H6a is supported: compatibility → perceived usefulness) and trialability (H7b is supported: trialability

→perceived ease of use). This implies that observability will not be discussed here as it has no significant path influencing the mediating constructs (Table 5.28). The presence of a statistically significant association between the exogenous variables indicates that the consumer's behavioral intentions to adopt fintech services are strengthened by the DOI theory.

From Table 6.2 it can be seen that the association between relative advantage and complexity (Relative_Advantage <--> Complexity) is negative. This indicates that change in complexity in the negative direction results in relative advantage change in the positive direction. Also, it can be seen that reduction in the complexity of fintech services could improve the relative advantage, compatibility (e.g. Relative_Advantage <--> Complexity, and Complexity <--> Compatibility) of fintech services (Table 6.1). This result could be practically applicable giving the fact that fintech services could be a complex technology. Thus, a reduction in its complexity is expected to improve the diffusion of fintech services and lead to a greater chance of adoption of fintech services.

With regard to the association between relative advantage, compatibility and trialability (Relative_Advantage <--> Compatibility, Compatibility <--> Trialability, and Relative_Advantage <--> Trialability). It can be seen from Table 6.2 that the association between them is in the positive direction. As a corollary, it can be stated that the higher the correlation between the above exogenous variables higher will be the diffusion of fintech services, and hence greater will be chances of adoption of fintech services. These findings can also be interpreted from different dimensions. For example, when relative advantage changes by improving the performance of fintech services in comparison to traditional banking (change in the positive direction), then the compatibility and the comfort of conducting banking transacting through fintech services is expected to improve. Similarly, the consumers could have a better trialability meaning that consumers could try out fintech services before adoption indicating a change in the positive direction. These arguments indicate that the higher the relative advantage, the higher will be the chances of the consumers adopting fintech services due to higher compatibility and trialability.

However, it can be seen that there is no significant association between complexity and trialability (Complexity <--> Trialability) with a p-value of significance found to be higher than 0.05. This finding can reflect the fact that if innovation is complex, users may not try it out. The most common example is the Android operating system. Installing and using an Android operating system is difficult. Thus, while a consumer wants to use a fintech services application on a mobile phone having an android operating system, the complexity of installing the application could force the consumers to seek the support of experts or technicians who could assist in setting the system. Hence, consumers might not be encouraged to try complex operations. This example could explain the lack of significant association between complexity and trialability.

Moreover, service providers of fintech services should enhance the relative advantage, compatibility, and trialability of fintech services and reduce their complexity for a greater number of consumers are

to be attracted to adopt fintech services. The finding indicates that there is an association amongst the level of relative advantage, compatibility, complexity, and trialability built into fintech services (medium correlation). Yet, it may not be strong enough to encourage the consumers to adopt fintech services completely. Thus, service providers need to enhance the association of DOI factors that would lead to an increase in the number of consumers who would adopt fintech services.

Table 6. 2 Covariance results between relative advantage, compatibility, complexity, and trialability

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Relative_Advantage	<-->	Complexity	-.087	.038	-2.296	.022*	par_21
Complexity	<-->	Compatibility	-.201	.044	-4.589	***	par_22
Relative_Advantage	<-->	Compatibility	.428	.044	9.665	***	par_24
Compatibility	<-->	Trialability	.392	.049	7.990	***	par_35
Complexity	<-->	Trialability	-.027	.051	-.532	0.595	par_36
Relative_Advantage	<-->	Trialability	.300	.043	6.959	***	par_42
**** P-value is statistically significant at the 0.01 level (two-tailed)* ** P-value is statistically significant at the 0.05 level (two-tailed)*							

6.3.4 Interaction between observability and relative advantage, compatibility, complexity, and trialability

This section focus on analyzing the finding of the association between observability and the remaining four DOI exogenous variables (i.e. relative advantage, compatibility, complexity, and trialability). This is because this research does not find a statistically significant path (p-value < 0.05) between observability and the mediating variables (H8a is not supported; Observability → perceived usefulness (PU); H8b is not supported; Observability → perceived ease of use (PEU)).

Observability is considered an important factor of DOI (Rogers, 2002). According to Rogers (2002) observability is the degree to which the results of an innovation are visible to others. Concerning the observability of fintech services, it can be seen that observability is defined as the degree to which fintech services are visible to other customers. However, this research shows that observability is not having any significant relationship with either perceived ease of use or perceived usefulness. Nevertheless, the researcher finds that the association between observability and the remaining four DOI exogenous variables is significant (Table 6.3). This implies that the effect of observability is reflected in its association with the remaining four DOI exogenous variables which have significant relationships with at least one of the two mediating variables (perceived usefulness or perceived ease of use). Therefore, observability is exerting to influence the mediating variables through its association with the other four exogenous variables.

For instance, taking into account the association between observability and relative advantage, it can be seen that the correlation between the two is 0.368 (Table 6.3) which indicates a medium correlation. Hence, if observability changes in the positive direction, then relative advantage changes in the same direction, and could impact both perceived ease of use and perceived usefulness. In practical terms,

when a customer can see other peer customers of a bank using fintech services, then this customer could start perceiving that fintech services would have better relative advantages compared to traditional banking and hence start adopting fintech services. This in turn could encourage those customers to try out fintech services leading to a perception of ease of use of fintech services and perception of its usefulness. In the same instance, those customers could also form an opinion about the compatibility and the complexity associated with fintech services.

In a nutshell, the medium association between observability and relative advantage can have an impact on the overall adoption of fintech services. Therefore, it can be concluded that the association between observability and relative advantage or the three remaining DOI exogenous variables has the potential to encourage more consumers to adopt fintech services by enhancing their perception about ease of use and usefulness of fintech services during diffusion. Increasing the visibility of consumers who have successfully adopted fintech services could be posted on the association between observability on the one hand and relative advantage, compatibility, complexity, and trialability on the other.

Table 6. 3 Covariance results between observability and relative advantage, compatibility, complexity, and trialability

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Compatibility	<-->	Observability	.486	.048	10.215	***	par_19
Observability	<-->	Trialability	.356	.048	7.495	***	par_23
Complexity	<-->	Observability	-.198	.042	-4.717	***	par_31
Relative_Advantage	<-->	Observability	.368	.041	8.928	***	par_43
**** P-value is statistically significant at the 0.01 level (two-tailed)* ** P-value is statistically significant at the 0.05 level (two-tailed)*							

6.3.5 Interaction between perceived risk and DOI exogenous factors

From Figure 5.12 and Table 6.4, it can be seen that the CFA model shows that there is a negative correlation between perceived risk and DOI factors namely relative advantage, compatibility, observability, and trialability, implying the lower the level of relative advantage, compatibility, observability, and trialability higher will be the perceived risk. This implies that the service providers need to ensure that relative advantage, compatibility, observability, and trialability of fintech services are high leading to a perception of lower risk in the minds of the consumers using fintech services.

Significantly, it can also see that perceived risk is positively correlated to complexity which indicates that the higher the complexity of fintech services, the higher will be the perceived risk in the minds of the consumers of fintech services. This is an important finding of this research.

Table 6. 4 Correlation results between perceived risk and DOI factors

			Correlation Estimate
Perceived_Risk	<-->	Observability	-0.195
Perceived_Risk	<-->	Compatibility	-0.264
Perceived_Risk	<-->	Relative_Advantage	-0.122
Perceived_Risk	<-->	Trialability	-0.128

Perceived_Risk	<-->	Complexity	0.7

After discussing and interpreting the association between the exogenous constructs, the next sections discuss the result of the path analysis between the exogenous and endogenous constructs.

6.3.6 Direct, indirect, and total relationship amongst the latent variables

As mentioned previously, this research proposed fifteen hypotheses amongst the ten latent variables defined within the conceptual model. Understanding the meaning of the various relationships amongst the ten latent variables required interpreting the linkage amongst the variables using the path coefficient derived through the statistical analysis provided in Chapter 5. Accordingly, direct, indirect, and total effects of all paths in the proposed conceptual model are presented in two separate sub-sections below. The first sub-section discussing the path related to Model A (Figure 5.18) concerning DOI and TAM constructs, while the second sub-section deals with Model B (Figure 5.19) concerning perceived risk, trust, and behavioral intention to adopt fintech services which uses PMT and TRA.

6.3.7 Discussions on Model A

This section examines the outcome of the analysis of the various relationships and derives meanings based on the regression equations in the proposed conceptual model ①, ②, and ③ (see Chapter 3 section 3.7). To derive the regression coefficients, the direct, indirect, and total effect of the independent variables on the behavioral intention to adopt fintech services is discussed next. From AMOS reports Table 6.5 is extracted

Table 6. 5 Direct effects of exogenous variables on mediating variables

Direct Effects (Group number 1 - Default model)					
	Trialability	Observability	Compatibility	Complexity	Relative_Advantage
Perceived_Ease of Use	.185	.109	.141	-.085	.394
Perceived_Usefulness	-.061	-.044	.311	-.037	.324
Intention_to Adopt	.000	.000	.000	.000	.000

From Table 6.1 it can be seen that the relationships complexity → perceived usefulness (H5a), compatibility → perceived ease of use (H6b), observability → perceived usefulness (H8a), observability → perceived ease of use (H8b), and trialability → perceived usefulness (H7a) were not found significant as the p-value was found to be higher than 0.05 (i.e. not supported). While the valid relationships are relative advantage → perceived usefulness (H4a), relative advantage → perceived ease of use (H4b), complexity → perceived ease of use (H5b), compatibility → perceived usefulness (H6a), and trialability → perceived ease of use (H7b) (i.e. supported). The following interpretations can be provided.

The relationship relative advantage → perceived usefulness when regressed yielded a coefficient of 0.324 (Table 6.5) which implies that a one-unit change in relative advantage in the positive direction changes the perceived usefulness by 0.324 units in the positive direction. That is to say that any change in relative advantage can explain a corresponding change in perceived usefulness to the extent of 34.2%. This shows that relative advantage has a medium influence on perceived usefulness. In practical terms,

it can be seen that when fintech services provide a relative advantage to the consumer, it could imply that the consumer perceives the usefulness of fintech services. For instance, when a consumer deals with traditional banking, there is a need for the consumer to go to the bank, wait for his or her turn to come, deal with the banking officials before the transaction is done. However, while using fintech services, the technology offers many advantages including that the consumer can conduct banking transactions through the internet from any place, any time, using a mobile device. Conducting banking transactions unlike the traditional method is a useful way for conducting banking transactions as it saves time, money, and effort on the part of the consumer. Similarly, about the relationship relative advantage → perceived ease of use, it can be seen from Table 6.5 that the coefficient of regression is found to be 0.394 which indicates medium influence. Here again, it can be seen that the relative advantage of fintech services influences the perceived ease of use of fintech services. This means that a one-unit change in relative advantage in the positive direction results in a 0.394 unit change in perceived ease of use in the positive direction. This clearly shows that respondents participating in this research have clearly expressed that fintech services are relatively advantageous with regard to their perceived usefulness and perceived ease of use.

Similar arguments could be extended to the relationships compatibility → perceived ease of use and trialability → perceived usefulness which exerts influence on perceived usefulness and perceived ease of use respectively in the positive direction. This implies that a one-unit change in the compatibility in the positive direction results in a 0.311 unit change (medium change) in perceived ease of use of fintech services. Likewise, one unit change in trialability in the positive direction results in a 0.185 unit change (small change) in the perceived usefulness of fintech services.

However, it can be seen that the relationship between complexity → perceived ease of use is showing a negative influence of complexity of fintech services on perceived ease of use which implies that when complexity increases, then perceived ease of use reduces. From Table 6.4 it can be seen that the coefficient of regression of the relationship between complexity and perceived ease of use is (-0.085) which is lower than the category small. This implies that a one-unit change in the complexity of fintech services in the negative direction results in a change of 0.085 unit change in perceived ease of use in the positive direction. Alternatively, it can be said that a one-unit change in complexity in the positive direction results in a 0.085 unit change in perceived ease of use in the negative direction. The interpretation is that when the complexity of fintech services is high, perceived ease of use of fintech services is low and vice-versa. In practical terms, using fintech applications could be complex on mobile phones due to some limitations such as inflexibility or system behaves in unexpected ways. In such cases, the consumer may find that it is complex to use fintech services and hence would perceive that traditional methods were easier to use. This implies that the service providers should take into consideration the operation of fintech services is easy to use in leading to lower complexity. Statistically, it can be said that a one-unit change in complexity in the positive direction can explain a change in the perceived ease of use to the extent of 8.5% in the negative direction.

An important aspect of the above discussion is that the outcomes achieved in this research when compared to the outcomes of other researchers, it was found that the comparison produced mixed results. For instance, using the five DOI factors have been found in the fintech literature (e.g. Iluba & Phiri, 2021; Bijloll et al. 2016; Al-Jabri & Sohail 2012). However, these research efforts have not combined DOI with TAM. The necessity to integrate DOI factors with TAM has been explained before (see section 2.3.4). The five DOI factors have been directly shown to influence behavioral intention to adopt technology (fintech services). However, the research results show that in the research conducted by Iluba and Phiri (2021) only one DOI factor namely complexity was shown to lack a statistically significant relationship with behavioral intention to adopt fintech services. Whereas in the research result produced by Bijloll et al. (2016) it was shown that only three out of the five DOI factors (i.e. relative advantage, compatibility, and observability) were able to influence the adoption intention of users of mobile banking. These results point out that all the five factors of DOI do not necessarily determine intention to adopt and there is a variation concerning the predictors of intention to adopt technology (fintech services). Compared to the current research three things could be identified as new findings for the research outcomes found in the literature. First, including TAM constructs as mediators provide better control of behavioral intention to adopt fintech services unlike the other models found in the literature (e.g. Iluba & Phiri, 2021; Bijloll et al. 2016; Al-Jabri & Sohail 2012). Second, the predictive power of the model increases with mediators and the five DOI constructs, which has been overlooked by other researchers. For instance, Mutahar (2017) used only three DOI constructs (i.e. compatibility, observability, and trialability) in his research to investigate the integration of DOI and TAM to understand mobile banking acceptance. Third, it is hardly found in the literature that researchers have attempted to explain the association between the exogenous variables which provide a deeper understanding of the diffusion of fintech services. For instance, in this research, it was found that the five DOI factors have a statistically significant association with each other with the sole exception of the association between complexity and trialability. According to Rogers (2002), the early stage of diffusion is decided by the five factors and the rate of change of adoption of the innovation might not be guaranteed even after the innovation has diffused fully. This is confirmed by the findings of this research which shows that diffusion factors significantly influence the mediators, and hence the dependent variable either by their association with each other or individual influence on the mediator or both.

This finding implies that consumers of banks can be encouraged to adopt fintech from the time fintech services have started to diffuse into the market and such an effort can be focused on specific diffusion factors and mediating factors to enhance adoption. For instance, the association between relative advantage and compatibility of fintech services can be explained practically by highlighting how customers can operate fintech services using mobile devices from anywhere they want without going to the bank (as in the case of traditional banking) which signifies relative advantage. At the same time using mobile phones is also compatible with the lifestyle of consumers to conduct mobile banking. That is to say, relative advantage and compatibility are associated with each other. Further, the relative

advantage of fintech services enables a better perception of its usefulness and easiness to use of fintech services in the minds of the consumer. Whereas compatibility as per the findings shows that it influences the perception of the usefulness of fintech services. Thus taking into account the association between relative advantage and compatibility and their direct influence on the perceived usefulness of fintech services indicates that the consumers are more likely to be strongly influenced to adopt fintech services in comparison to other types of banking during diffusion. Additionally, the perception of easy-to-use fintech services influenced by relative advantage is likely to be stronger with the association of compatibility of fintech. These arguments clearly show that during diffusion, consumers are more likely to adopt fintech services when they find it is relatively advantageous, compatible, useful, and easy to use. This finding is new and could not be corroborated with any other research finding related to fintech services in the behavioral adoption literature. However, the lack of statistically significant association between complexity and trialability is offset with the direct influence of both the constructs on the mediators. That is to say that the total effect on the dependent variable due to the influence exerted by complexity and trialability, makes the model to be more versatile in predicting the changes occurring in the dependent variable due to the endogenous variables, despite the absence of an association between them.

The above argument shows that during diffusion when consumers of fintech services perceive that fintech services are complex may have some influence on the consumers and could discourage them from trying out fintech services. This is a kind of natural behavior that is seen in everyday life concerning any phenomenon or new technology that is perceived to be complex. Thus lack of association between complexity and trialability does not, in any case, affect the influence of those variables on behavioral intention to adopt fintech services, an argument that could not be corroborated in literature. However, considering the direct influence of both complexity and trialability on perceived ease of use of fintech services, it can be said that both complexity and trialability could be controlled separately to improve the perception of easiness of fintech services to use and hence the adoption of fintech services. In practical terms, it can be seen that when consumers find that using mobile phone application of fintech services is complex to adopt then if the service providers facilitate consumers to try out the operation of fintech services, then it is possible behavioral intention to adopt fintech is enhanced.

Similar arguments could be provided with regard to each one of the associations between the exogenous variables which are provided in Table 6.6 below. From Table 6.6 it can be seen that association between exogenous variables impact the diffusion of fintech services and also influence the TAM factors and eventually behavioral intention to adopt fintech services.

Table 6. 6 Direct statistically significant relationship between exogenous variables and mediating

#	**Direct relationship between exogenous variables and mediating variables ($p < 0.05$)**	**Associations between exogenous variables ($p < 0.05$)**	**Interpretation**	**Confirming with findings of other researchers**	**Remarks**
1	RA → PU	RA ↔ COMPA RA ↔ CPMPLX RA ↔ OBSER RA ↔ TRIAB	Predicting PU is stronger as all the five DOI factors can be controlled to influence PU.	Yoon and Lim (2020) (fintech services); Alrahmi et al. (2019) (E-Learning Systems); Min et al. (2018) (mobile application)	Impact of all associated relationships on the path RA → PU. Improves predictive power and enables control of the DOI factors during diffusion.
2	COMPA → PU	COMPA ↔ RA COMPA ↔ CPMPLX COMPA ↔ OBS COMPA ↔ TRIAB	Predicting PU is stronger as all the five DOI factors can be controlled to influence PU.	Min et al. (2018) (mobile application); Alrahmi et al. (2019) (E-Learning Systems); Hubert et al. (2019) (smart home) Mutahar et al. (2017) (fintech services)	Impact of all associated relationships on the path COMPA → PU, improves predictive power of the model and enables better control of the DOI factors during diffusion.
3	RA → PEU	RA ↔ COMPA RA ↔ CPMPLX RA ↔ OBSER RA ↔ TRIAB	Predicting PEU is stronger as all the five DOI factors can be controlled to influence PEU.	Min et al. (2018) (mobile application); Alrahmi et al. (2019) (E-Learning Systems)	Impact of all associated relationships on the path RA → PEU, improves predictive power of the model and enables better control of the DOI factors during diffusion.
4	COMPLX → PEU	COMPLX ↔ RA COMPLX → COMPA COMPLX ↔ OBS	Predicting PEU is strong as only four of the five DOI factors can be controlled to influence PEU.	Alrahmi et al. (2019) (E-Learning Systems); Min et al. (2018) (mobile application)	Impact of three associated relationships on the path COMPLX → PEU, improves predictive power of the model and enables better control of the DOI factors during diffusion.
5	TRIAB → PEU	TRIAB ↔ RA TRIAB → COMPA TRIAB ↔ OBS	Predicting PEU is strong as only four of the five DOI factors can be controlled to influence PEU.	Mutahar et al. (2017) (fintech services)	The impact of three associated relationships on the path TRIAB → PEU improves the predictive power of the model and enables better control of the DOI factors during diffusion.

6.3.8 Direct relationship between the exogenous variables on the mediating variables

From Table 6.7 it can be seen that there is a direct effect of the exogenous variables on the mediating variables and an indirect effect on the dependent variable. In addition, there is a direct effect of the mediating variables on the dependent variable as well as an indirect effect of perceived ease of use on the dependent variable. Finally, there is a total effect (combined effect) of exogenous and mediating variables on the dependent variable. By understanding these aspects, it could be possible to enhance the adoption of fintech services. Moreover, it must be noted that standardized direct, indirect, and total

effects have been computed based on standardized AMOS reports while the unstandardized report of AMOS is used for computing regression equations. The difference between standardized and unstandardized reports is already covered under section 5.12.5

Table 6. 7 Standardized direct effects between exogenous variables and mediating

Standardized Direct Effects (Group number 1 - Default model)							
	Trialability	Observability	Compatibility	Complexity	Relative Advantage	Perceived Ease of Use	Perceived Usefulness
Perceived Ease of Use	0.235	0.109	0.151	-0.111	0.374	0	0
Perceived Usefulness	-0.075	-0.042	0.319	-0.046	0.293	0.377	0
Intention to Adopt	0	0	0	0	0	0.277	0.67

Relationship between relative advantage, compatibility, and perceived usefulness of fintech services

From Table 5.28 it can be seen that there are only two statistically significant paths between the exogenous variables and perceived usefulness. Those are (H4a: relative advantage → perceived usefulness) and (H6a: compatibility → perceived usefulness). The direct effect of relative advantage and compatibility as reported by AMOS is in Table 6.7.

The following explanation can be provided concerning the effect of relative advantage and compatibility on perceived usefulness. From Table 6.7 it can be seen that relative advantage and compatibility positively influence the perceived usefulness of fintech services. This indicates that when the relative advantage and compatibility of fintech services are high, the perception of consumers of fintech services concerning the usefulness of fintech services (perceived usefulness of fintech services) is high. Hence, if the relative advantage and compatibility of fintech services change by one unit in the positive direction then the perceived usefulness of fintech services also changes by 0.293 and 0.319 (almost 0.3) units respectively in the positive direction. The interpretation is that relative advantage can explain 29.3% of the change in perceived usefulness of fintech services when it changes by one unit, while compatibility can explain 31.9% of the change in perceived usefulness of fintech services when it changes by one unit. Additionally, the correlation amongst the relationships is found to be medium. It implies that if the consumers' perception of the usefulness of fintech services has to be increased, the relative advantage and compatibility of fintech need to be enhanced. These results are in line with the findings of other researchers in the literature. (e.g. Yoon and Lim, 2020; Alrahmi et al. 2019; Min et al. 2018)

Relationship between relative advantage, complexity, trialability, and perceived ease of use of fintech

Also, From Table 6.7 it can be seen that there are only three statistically significant paths between the exogenous variables and perceived ease of use. Those are (H4b: relative advantage → perceived ease of use), (H5b: complexity → perceived ease of use), and (H7b: trialability → perceived ease of use). The direct effect of relative advantage, complexity, and trialability as reported by AMOS in Table 6.7.

The following explanation can be provided concerning the effect of relative advantage, complexity, and trialability on perceived ease of use. From Table 6.7 it can be seen that relative advantage and trialability positively influence perceived ease of use of fintech services, while complexity influences the perceived ease of fintech services negatively. Thus, when relative advantage and trialability are change in the positive direction, the perceived ease of use also of fintech services changes in the positive direction. However, when complexity changes in the positive direction, then perceived ease of use of fintech services changes in the negative direction. The change of relative advantage and trialability of fintech services by one unit in the positive direction changes perceived ease of use of fintech services by 0.374 and 0.235 units respectively in the positive direction. However, in the case of complexity, it can be seen that a one-unit change in complexity in the positive direction makes perceived ease of use change (-0.111) units in the negative direction. The research results are in line with the findings of other researchers (e.g. Alrahmi et al. 2019; Min et al. 2018; Mutahar et al. 2017) but contradict the finding of Hubert et al. (2019). The following explanation can be provided based on the above discussion.

The relationship between relative advantage and perceived ease of use is a medium correlation. One unit change in relative advantage explains 37.4% of the change in perceived ease of use of fintech services in the positive direction. However, the correlation between trialability and perceived ease of use is small. This indicates that a one-unit change in trialability of fintech services can only explain a 23.5% change in perceived ease of use of fintech services. This indicates that the trialability of fintech services exerts only a small influence on the perceived ease of use of fintech services. In the case of the complexity of fintech services, it can be seen that not only the relationship with perceived ease of is inverse but also has a small correlation. This implies that a one-unit change in the positive direction of complexity explains a change of only 11.1% in perceived ease of use of fintech services in the negative direction. This shows that complexity in fintech services has a small effect on the perception of ease of use of fintech services in the minds of the consumers. This is a significant finding and confirms that the complexity involved in fintech services does not greatly affect the consumers' perceptions about ease of use. Taking this finding with the other finding given in Table 5.28, it is showing that complexity does not have any statistically significant relationship with the perceived usefulness of fintech services. Hence, it can be concluded that the complexity of fintech services could be understood to have a very low impact on the behavioral intention to adopt fintech services.

6.3.9 Direct relationship between perceived ease of use and perceived usefulness

From Table 5.28 and Table 6.7 it can be seen that perceived ease of use of fintech services has a direct effect on the perceived usefulness of fintech services in the positive direction (H3: PEU → PU). Hence, perceived ease of use explains 37.7% of the change in perceived usefulness when it changes by one unit. The relationship is having a medium correlation. This implies that when the perceived ease of use of fintech services is high then the perceived usefulness of fintech services will be high in the positive direction. In practical terms, it indicates that when the perceived ease of use of fintech is greater (e.g. perceived easiness to learn how to operate fintech services is greater) then it is likely that the perceived

usefulness of fintech services (e.g. more efficient transactions using online fintech services) is greater in the positive direction. This result is consistent with the results achieved by other researchers (Hu et al.2019; Meyliana et al.2019; Mutahar et al. 2017) who investigated topics fintech services adoption by applying TAM, thus confirming the direct influence of perceived ease of use on perceived usefulness.

6.3.10 Direct relationship between perceived usefulness, perceived ease of use, and behavioral intention to adopt

From Table 5.28 it can be seen that both the perceived usefulness of fintech services (H1) and ease of use of fintech services (H2) have a direct effect on the intention to adopt fintech services in the positive direction. From Table 6.7 it can be seen that the perceived usefulness of fintech services explains 67% of the change in intention to adopt fintech while perceived ease of use of fintech services can explain 27.7% of the change in intention to adopt fintech services

This implies that perceived usefulness is having a large correlation with the intention to adopt fintech services, while perceived ease of use has a small correlation yet approaching medium correlation. The interpretation is that when perceived usefulness changes by one unit then intention to adopt fintech services changes by 0.67 unit in the positive direction. For instance, when the consumers perceive that it is easy to learn how to operate using fintech services then the intention of consumers to adopt fintech services may be higher and in the positive direction. Similarly, when perceived ease of use of fintech services changes by one unit, then intention to adopt fintech services changes by 0.277 unit. This implies that when consumers perceive that it is easy to use fintech services (e.g. Interface of fintech services is user-friendliness) then it is more likely that the consumers will adopt fintech services. These results are consistent with the findings of other researchers (Lien et al. 2020, Hu et al.2019; Mina et al.2018; Mutahar et al. 2017) implying that this research confirms that perceived usefulness and ease of use have a direct impact on the intention to adopt fintech services.

6.3.11 Indirect effect caused by the latent variables on the dependent variable intention to adopt

The indirect effect of the exogenous and other latent variables on the dependent variable (behavioral intention to adopt) is an important measure that helps in understanding the influence of the exogenous variables exert on the dependent variable individually. For instance, relative advantage exerts influence on intention to adopt through the path (relative advantage→ perceived ease of use → perceived usefulness → intention to adopt). From Table 6.6, the indirect effect of relative advantage on intention to adopt through this path is calculated as (0.374x0.377x0.67) = 0.095. Similarly, relative advantage exerts influence on intention to adopt through two other paths namely (relative advantage → perceived usefulness → intention to adopt) and (relative advantage→ perceived ease of use → intention to adopt). The corresponding values of correlation are (0.293x0.67) = 0.196 and (0.374x0.277) = 0.104. The correlation values are extracted from the standardized direct effects Table 6.6 given above. Thus the cumulative indirect effect of relative advantage on intention to adopt is equal to (0.095) + (0.196) + (0.104) = 0.395. This is reflected in Table 6.8 below for the indirect effect caused by the latent variables

on the dependent variable's intention to adopt.

Table 6. 8 Standardized indirect effect caused by the latent variables on the dependent variable.

Standardized Indirect Effects (Group number 1 - Default model)							
	Trialability	Observability	Compatibility	Complexity	Relative Advantage	Perceived Ease of Use	Perceived Usefulness
Perceived Ease of Use	0	0	0	0	0	0	0
Perceived Usefulness	0.089	0.041	0.057	-0.042	0.141	0	0
Intention to Adopt	0.075	0.03	0.293	-0.089	0.395	0.253	0

From the above discussion, it can be seen that the relative advantage of fintech services correlates 0.395 to adopt fintech services. That is to say that when relative advantages of fintech services change then such a change explains a change of 39.5% in intention to adopt fintech services in the positive direction. This implies that when the relative advantage of fintech services increases in the positive direction by one unit, then the intention to adopt fintech services changes by 0.395 units in the positive direction. Hence, relative advantage plays an important role in encouraging and enhancing consumer intention to adopt fintech services, by enhancing their perceived usefulness and ease of use of fintech services.

Similar arguments can be applied to the other exogenous variables. It can be seen that the compatibility of fintech services explains a change of 29.3% in the intention to adopt fintech services in the positive direction but only through perceived usefulness. Whereas trialability can explain a change of 7.5% in intention to adopt in the positive direction. That is to say that when compatibility and trialability of fintech change by one unit each in the positive direction, then intention to adopt fintech services changes by 0.293 and 0.075 units respectively in the positive direction. In practical terms, it can be seen that compatibility also plays a significant role in encouraging and enhancing the intention to adopt fintech services (almost medium effect). while trialability has a small effect on the intention to adopt fintech services. However, complexity is seen to have an indirect effect of 8.9% in the negative direction on intention to adopt fintech services indicating that a one-unit change in complexity in the positive direction induces a 0.089 unit change in the negative direction in intention to adopt fintech services. In practical terms, it can be seen that when the complexity of fintech services increases in the positive direction, the intention to adopt fintech services decreases indicating that customers are unlikely to adopt fintech services if it is complex. However, the correlation between complexity and intention to adopt is less than a small effect which implies that even if fintech is complex, consumers would hesitate to adopt fintech services as the correlation between the two variables is seen to be less than small in effect.

An important observation that needs to be made here is that observability as an exogenous variable affecting diffusion of fintech services does not have any statistically significant relationship with the TAM constructs (H8a: Observability → PU and H8b: Observability → PEU). This result contradicts the findings of other researchers (e.g. AL-Rahmi et al. 2019; Min et al. 2018) who found at least one statistically significant relationship between observability and TAM constructs. But similar to the findings of other researchers such as Mutahar et al. (2017) who also did not found any statistically significant relationship between observability and TAM constructs.

Such a contradiction could be explained using the following practical example. Fintech services are based on mobile phones as well other computing devices including laptop computers, desktop computers, and tablets. However, when one considers the perceived easiness of operation of fintech services on mobile phones using mobile applications, then it is expected that customers would automatically try it out without observing other people who use fintech services or take the help of banks to observe how it works. The reason behind this is most mobile users are very familiar with downloading and using such applications without much assistance. This argument is also supported by Mutahar et al. (2017).

6.3.12 Total effect of the statistically significant paths on the intention to adopt fintech services

At this point, it is important to understand the total effect of the combination of the exogenous variables and the statistically valid relationships in the research model is on intention to adopt fintech. This provides an idea of the combined influence of the variables on the dependent variable. The total effect of the latent variables on the intention to adopt fintech can be computed based on the AMOS report given in Table 6.9 below.

Table 6. 9 Standardized total effects caused by the latent variables on the dependent variable.

Standardized Total Effects (Group number 1 - Default model)								
	Trialability	Observability	Compatibility	Complexity	Relative Advantage	Perceived Ease of Use	Perceived Usefulness	Intention to Adopt
Perceived Ease of Use	0.235	0.109	0.151	-0.111	0.374	0	0	0
Perceived Usefulness	0.014	-0.001	0.376	-0.087	0.435	0.377	0	0
Intention to Adopt	0.075	0.03	0.293	-0.089	0.395	0.53	0.67	0

It can be seen from Table 6.9 that the total effect of the exogenous variables on intention to adopt fintech services through the mediating variable perceived usefulness is found to be 0.67. This implies that collectively the exogenous variables can explain 67% of the variance in intention to adopt fintech services. However, the corresponding figure for the paths through the other mediating variable namely perceived ease of use is 53%. The interpretation is that during the diffusion of fintech services, it is seen that the DOI variables can significantly influence intention to adopt fintech services by directly affecting both perceived usefulness and perceived ease of use of fintech services except for observability. Moreover, it must be noted that the influence of the exogenous variables on the mediating and dependent variables are different from each other. As relative advantage is found to be the only DOI variable that is having statistically significant paths to both the mediating variables. While, the others DOI variables (trialability, compatibility, complexity) have only one path that is found to be statistically significant on the mediating variables. Yet, the total effect on the intention to adopt fintech services is large through both the mediating variables. The research outcome has established that during diffusion it is possible to enhance the rate of consumers of banks who would intend to adopt fintech services by controlling the DOI variables supported intervening TAM variables. As far as the researcher's knowledge, this research is the first of its type that fully integrated DOI and TAM theories to

investigates the behavioral intention to adopt fintech services.

6.3.13 The regression analysis for Model A

The mathematical regression equations provided in Chapter 3 on Model A are reproduced here for convenience.

1) Intention to adopt fintech services = $k_1 + \beta_1$ Perceived usefulness + β_2 Perceived ease of use + $e_1 \rightarrow$ ①

2) Perceived usefulness = $k_2 + \beta_3$ Perceived ease of use + β_4 Relative advantage + β_5 Complexity + β_6 Compatibility + β_7 Trialability + β_8 Observability + $e_2 \rightarrow$ ②

3) Perceived ease of use = $k_3 + \beta_9$ Relative advantage + β_{10} Complexity + β_{11} Compatibility + β_{12} Trialability + β_{13} Observability + $e_3 \rightarrow$ ③

From table 5.28 and equations ①, ②, and ③ can be rewritten as:

Intention to adopt fintech services = k_1 + 0.685 Perceived usefulness + 0.297 Perceived ease of use + $e_1 \rightarrow$ ①

* Perceived usefulness = k_2 + 0.395 Perceived ease of use + 0.324 Relative advantage + 0.311 Compatibility + $e_2 \rightarrow$ ②

* [*Note*: Complexity, Trialability and observability were not included in this equation as the relationships H5a: Complexity → Perceived usefulness, H7a: Trialability → Perceived usefulness and H8a: Observability → Perceived usefulness were not found to be statistically significant (Table 5.28)]

**Perceived ease of use = k_3 + 0.394 Relative advantage + (-0.085) Complexity + 0.185 Trialability + $e_3 \rightarrow$ ③

** [*Note*: Compatibility and observability were not included in this equation as the relationships H6b: Compatibility → PEU and H8b: Observability → PEU were not found to be statistically significant (Table 5.28)]

The above equations provide a complete view of the mathematical regression equation of Model A that could be used to control the independent and mediating variables to enhance the behavioral intention to adopt fintech services during diffusion. From equation ① it can be seen that both perceived usefulness and perceived ease of use of fintech have a direct relationship to the intention of the consumers to adopt. Also, from equations ② and ③ it is evident that amongst the exogenous variables, it is the relative advantage of fintech that affects both perceived usefulness and perceived ease of use indicated by the regression coefficients 0.324 and 0.394 respectively. This implies that during diffusion consumers are concerned more about the relative advantage of fintech services over traditional banking. The outcomes

provide a clear view of the relationship between the independent and dependent variables After discussing the findings of Model A, the next section discusses Model B.

6.3.14 Discussions on Model B

Model B is depicted in Figure 5.19. Model B represents the relationship between the perceived risk of fintech services and the intention to adopt fintech services, mediated by the trust of consumers. According to Rogers (2002), any innovation is considered to be initially risky to adopt by users during the diffusion of that innovation. Thus, when an innovation like fintech is diffusing, it is important to understand the role played by risk in the perception of the consumers of banks (Senyo & Osabutey, 2020; Hu et al. 2019; Meyliana et al. 2019; Mutahar et al. 2017). As per the covariance test conducted using AMOS (Table 5.33), the report showed that perceived risk has a significant relationship with all the five DOI factors. Moreover, the results found that except for the relationship with complexity, perceived risk was having an inverse covariance with relative advantage, compatibility, trialability, and observability. While the perceived risk of fintech services and complexity of fintech services have a positive covariance indicating that any increase in complexity of fintech services will be associated with a proportionate increase in the perceived risk in the mind of consumers. The interpretation is that during diffusion, when DOI factors relative advantage, compatibility, trialability, and observability change in the positive direction then perceived risk changes in the negative direction indicating that perceived risk is lower. Similarly, during diffusion when the when DOI factors relative advantage, compatibility, trialability, and observability change in the negative direction then perceived risk changes in the positive direction indicating that perceived risk is higher. As far as complexity is concerned, the higher the complexity, the higher will be the perceived risk and vice versa. Thus, it can be concluded that including perceived risk in the research is validated by the test of association between DOI factors and perceived risk. However, the actual relationship between perceived risk and the intention to adopt fintech services was tested separately to understand what influence is exerted by perceived risk on the behavioral intention of consumers to adopt fintech services (Figure 5.19) so that it is clear for the service provider on how to control perceived of risk and enhance adoption of fintech services.

From the literature review (Section 2.6.1) it can be seen that perceived risk is indirectly linked to intention to adopt fintech services through the mediation of trust. This is supported by TRA and PMT. This conceptualization is supported by the literature. The structural model in Figure 5.19 shows that perceived risk influences trust directly which in turn influences intention to adopt fintech services directly. The results obtained from AMOS show that the relationship H10: perceived risk → trust is the statistically significant but negative direction. Similarly, the path analysis of the relationship H9: trust → intention to adopt is the statistically significant but positive direction (Table 5.31). The direct effect of perceived risk and trust on the intention to adopt fintech services can be computed based on the AMOS report given in Table 6.10 below.

Table 6. 10 Direct effect of perceived risk and trust on the intention to adopt fintech services

Standardized Direct Effects (Group number 1 - Default model)		
	Perceived_Risk	Trust
Trust	-.260	.000
Intention_to Adopt	.000	.653

From Table 6.10 it can be seen that when a change occurs in perceived risk in the positive direction it will introduce a change in trust of fintech services in the negative direction. This implies that a one-unit change in perceived risk in the positive direction will yield a 0.26 unit change in trusts in the negative direction. This implies that consumers' trust in fintech services during diffusion of fintech services will be reduced if the consumers perceive higher risk and vice versa. Also, Table 5.10 indicates that trust exerts an influence of 0.653 unit on intention to adopt in the positive direction. This implies that a one-unit change in the trust will introduce a change of 0.653 units in intention to adopt in the positive direction. The influence of perceived risk on trust is small while that of trust on intention to adopt is large. This result is consistent with the research findings of Hu et al. (2019) who investigated the adoption intention of fintech services for Bank Users. The indirect effect of perceived risk and trust on the intention to adopt fintech services can be computed based on the AMOS report given in Table 6.11 below.

Table 6. 11 Indirect effect of perceived risk and trust on the intention to adopt fintech services

Standardized Indirect Effects (Group number 1 - Default model)	
	Perceived_Risk
Trust	.000
Intention_to Adopt	-.170

From Table 6.11 it can be seen that perceived risk explains a (-0.17) unit change in intention to adopt when it changes by one unit. The results imply that when the perceived risk of adopting fintech services is lower in the minds of consumers, then the intention to adopt fintech services is higher and vice-versa. While the total of perceived risk and trust on the intention to adopt fintech services can be computed based on the AMOS report given in Table 6.12 below.

Table 6. 12 Total effect of perceived risk and trust on the intention to adopt fintech services

Standardized Total Effects (Group number 1 - Default model)		
	Perceived_Risk	Trust
Trust	-.260	.000
Intention_to Adopt	-.170	.653

From Table 6.11 it can be seen that the indirect effect of perceived risk on intention to adopt is the same as the total effect of perceived risk on intention to adopt (Table 6.12). Also, From Table 6.10 it can be seen that the direct effect of perceived risk on trust is the same as the total effect (Table 6.12).

The mathematical regression equations provided in Chapter 3 on Model B are reproduced here for convenience.

1) Intention to adopt fintech services = $k_4 + \beta_{14}$ Trust + $e_4 \rightarrow$ ④

2) Trust = $K_5 + \beta_{15}$ Perceived risk + $e_5 \rightarrow$ ⑤

From Table 5.31 and equations ④ and ⑤can be rewritten as:

1) Intention to adopt fintech services = k_4 + 0.708 Trust+ 0.058 → ④

2) Trust = K_5 – 0.177 Perceived risk + 0.037 → ⑤

From equations ④ and ⑤, it can be seen that in Model B perceived risk indirectly influences intention to adopt fintech services through the trust of fintech services. The regression coefficient 0.708 indicates the extent to which trust is related to intention to adopt. Moreover, the coefficient – (0.177) indicates the extent to which perceived risk is related to trust inversely. This implies that the resulting influence perceived risk on intention to adopt could be in the negative direction. That is to say higher the risk lowers the intention to adopt which is consistent with the research results achieved by other researchers (e.g. Senyo & Osabutey, 2020; Hu et al. 2019). Thus the findings of this research confirm the current knowledge in the literature.

Overall, it can be concluded that perceived risk is having an association with the DOI factors. Also, perceived risk influences intention to adopt fintech services in a negative direction. The total impact on intention to adopt fintech services influence by the five DOI factors and perceived risk during diffusion. The main discovery in this research is that while fintech services as an innovation that is still diffusing, the four DOI factors (relative advantage, complexity, compatibility, and trialability) and perceived risk could be controlled to improve the adoption rate of fintech services. In addition, observability can be controlled to enhance the adoption of fintech services during diffusion, as it has a positive and direct association with DOI factors. Thus, observability offsets its lack of significant and direct relationship of conclusion to the mediating variables. Thus it can be concluded that research question RQ2 has been addressed.

6.3.15 Research Question Q3

From the discussion provided to answer RQ1, it can be seen that relative advantage is the only predictor that has a direct influence on two of the mediating variables. The direct effect of relative advantage on perceived ease of use is 0.374, which indicates a 37.4% explanation of the variance in perceived ease of use caused by relative advantage during diffusion. While the direct effect of relative advantage on perceived usefulness is 0.293 which indicates a 29.3% explanation of the variance in perceived usefulness caused by relative advantage during diffusion (Table 6.7). Also, it is seen that the total effect of relative advantage on perceived usefulness is 0.435 which explains 43.5% of variance occurring in perceived usefulness due to relative advantage during diffusion (Table 6.9). Finally, the total effect of relative advantage on customer intention to adopt fintech services is found to be 0.395 which means that relative advantage can explain 39.5% of change occurring in customer intention to adopt fintech services during diffusion (Table 6.9). This indicates that relative advantage is the most influential factor that affects the customer decision of adopting fintech services.

This result is in line with those of Yoon and Lim (2020) who argued that relative advantage strongly

affects perceived usefulness (correlation 0.254; small effect) (i.e. 25.4% of the change in perceived usefulness is explained by relative advantage of innovation during diffusion) and perceived usefulness is shown to affect intention to use internet of banking to the extent of 0.466 (medium effect) (46.6% of the change in intention to use internet of banking is explained by perceived usefulness during diffusion). The total effect of relative advantage achieved by Yoon and Lim (2020) on intention to use the internet of banking is (0.254 * 0.466) = 0.119 (that is 11.9% of the change in intention to use the internet of banking is explained by relative advantage. Comparing the results achieved by Yoon and Lim (2020) to the results achieved in this research, this research found a higher influence of relative advantage on intention to adopt (total effect of 0.395) during diffusion. Moreover, other researchers (e.g. Min et al. 2018; Kim, 2016; Morosan & DeFranco, 2014; Lee et al., 2011; Kim et al., 2010; Yang, 2005) have achieved similar results and their research included both perceived usefulness and perceived ease of use unlike the research efforts of Yoon and Lim (2020). However, Min et al. (2018) contend that fewer studies have examined the predictors of people's perception of new technology adoption, in particular in areas concerning mobile applications. This argument fits the fintech services. Thus, this research provides one of the early research outcomes for future comparison of the performance of relative advantage and its influence on customer behavioral intention to adopt fintech services or similar innovation.

Following relative advantage, compatibility is the second influential factor that affects the customer decision of adopting fintech services. It can be seen that compatibility influences consumer intention to adopt fintech services through the perceived usefulness of fintech services only. While compatibility has a total effect on perceived usefulness (correlation 0.376; medium effect) (that explains 37.6% of the variance in perceived usefulness of fintech during diffusion) (Table 6.9). Also, compatibility has a total effect on the intention to adopt (0.293; almost medium effect) (that explains 29.3% of the variance in consumer intention to adopt fintech during diffusion) on consumer intention to adopt fintech during diffusion. The finding of this research indicates that compatibility does not influence the perceived ease of use of fintech services. This argument contradicting the findings of other researchers (e.g. Min et al. 2018; Mutahar et al. 2017) who found a significant relationship between compatibility and two TAM mediators (perceived ease of use and perceived usefulness.) While supporting the findings of Yoon and Lim (2020). Also, the results of this research showed a stronger performance of compatibility about its influence on perceived usefulness during diffusion (medium correlation 0.376) when compared the results achieved by other researchers (e.g. 0.27 achieved by Min et al. 2018 and 0.32 in the research conducted by Mutahar et al. 2017) which show the lower performance of compatibility as a predictor of perceived usefulness. Further, it is seen that the total effect of compatibility of intention to adopt fintech is found to be 0.293, while the results of Mutahar et al. (2017) showed that the total effect of compatibility on intention to use mobile banking was (0.32 * 0.69) = 0.22 (small correlation and explains 22% of the variance in intention to use mobile banking). Thus it can be seen that the results achieved in this research show a higher performance of compatibility in influencing intention to adopt fintech through perceived usefulness. This implies that the results of this research are in line with the

findings of the other researchers, but can improve the performance of compatibility as a predictor of intention to adopt fintech only through perceived usefulness.

In practical terms, it implies that the needs of the consumer must be taken into account by the service providers so that intention to adopt fintech services is enhanced amongst the customers. In addition, it can be seen that the predictive power of compatibility is found to lower than the one achieved by other researchers who have established a statistically significant relationship between compatibility on the one hand and perceived usefulness and ease of use on the other. This weakness could be explained as perceived usefulness indicates the perception of the consumer concerning the convenience of adopting fintech services while carrying out the banking operation and the accuracy of data that is available to the consumer while using fintech services. Because in this research a clear relationship between perceived usefulness and perceived ease of use has been established through statistical tests, it can be argued that any absence of a direct relationship between compatibility and perceived ease of use could be compensated by the association between compatibility and other predictors that have a direct relationship to perceived ease of use. Similar arguments could be extended to the association of compatibility with complexity and trialability. In summary, it can be said that after relative advantage, it is compatibility that is the most influential predictor of consumer intention to adopt fintech services.

Furthermore, perceived risk plays an important role inversely in influencing consumers' intention to adopt fintech services. From Table 6.12 it can be seen that the total effect of perceived risk on intention to adopt through trust is (-0.170) (increase in perceived risk decreases intention to adopt). This simply means that if consumers feel that using fintech services is risky. For instance, if there is a perception amongst the consumers that using fintech services could lead to leaking personal information, then as this perception increases the number of consumers adopting fintech services could reduce and vice-versa. Thus the service providers need to reduce the perception of risk of consumers while adopting fintech services. This result is in line with the findings Hu, et al. (2019) and thus confirms the current knowledge in the literature.

Finally, concerning the other predictors, it can be seen that trialability and complexity have less than small effects concerning their total effect on the intention to adopt through perceived ease of use (0.075 and -0.089 respectively) (Table 6.9). Hence, both trialability and complexity could be considered to have negligible influence on intention to adopt fintech services. Similar research findings are found in the literature (e.g. Yoon & Lim, 2020). Thus this research confirms current knowledge existing in the body of literature concerning the diffusion of innovation.

From the above discussion, it can be seen that the influential factors that can significantly influence intention to adopt happen to be a relative advantage, compatibility, and perceived risk, while fintech is still diffusing. Thus it can be concluded that RQ3 has been addressed.

6.4 Chapter summary

From the discussions in this Chapter, it can be concluded that ten significant relationships determine the consumers' behavioral intention to adopt fintech services. The practical meanings of the significance show that the relationships can be controlled to improve consumers' behavioral intention to adopt fintech services. Relative advantage, compatibility, and perceived risk were found to be significant predictors of consumers' behavioral intention to adopt fintech services. Thus, if service providers can enhance the relative advantage and compatibility of fintech services and reduce the perceived risk, then the predictive of the research model shows that consumers' behavioral intention to adopt fintech services will be enhanced. Observability was found to be an insignificant predictor of consumers' behavioral intention to adopt fintech services. Trialability and complexity have a negligible total effect on consumers' behavioral intention to adopt fintech services.

In addition, the statistically significant association between the predictors showed that complexity, observability, and trialability can have a significant effect as moderators of the relationships affected by relative advantage, compatibility, and risk. Trust has an important role in enhancing the consumers' behavioral intention to adopt fintech services by mediating between perceived risk and consumers' behavioral intention to adopt fintech services. Similarly perceived usefulness and ease of use have an important role in predicting consumers' behavioral intention to adopt fintech services as mediators between DOI constructs and consumers' behavioral intention to adopt fintech services. The discussions show that the research has been able to support the integration of DOI and TAM theories and increase the predictive power of DOI constructs. Thus this Chapter provides the basis to conclude this research which is discussed in the next Chapter.

Chapter 7: Conclusion

7.1 Introduction

Chapter 7 draws conclusions based on the data analysis, comprehensive discussion, and findings derived from the research. Based on the discussions provided in Chapter 6. This Chapter assesses whether the aim and objectives set for this research have been validated and achieved. In additions, this Chapter provided conclusive evidence on the contribution of this research to the body of knowledge, contribution to the theory, contribution to the practice, and contribution to the method concerning consumers' behavioral intention to adopt fintech services, the core concept that has been investigated in the context of banks in Bahrain. Moreover, the limitations and future research are highlighted as well.

The Chapter is laid out as follows. Section 7.2 and section 7.3 revisited and validated the aim and objectives set out for this. In section 7.4, the contribution to the body of knowledge is discussed. This is followed by providing the contribution to the theory and contribution to the methodology in section 7.5 and section 7.6, respectively. While the contribution to the practice is provided in section 7.7. Then, section 7.8 highlighted the limitation of the current research. Finally, recommendations for future research are provided in section 7.9.

7.2 Achievement of the aim of this research

This research aims to investigate the factors that influence the behavior of consumers of banks in Bahrain, concerning adopting fintech services which is an innovation that is still argued to be diffusing (section 1.5).

The central concept of the investigation was the customer's behavior to adopt fintech services when fintech is still diffusing in the context of banks. This factor was investigated as the dependent variable. The banking sector was chosen to be investigated because fintech services are directly related to financial institutions and their business operations (Hu et al. 2019; Meyliana et al. 2019; Gomber et al., 2018; Chuang et al. 2016; Hanafizadeh et al. 2014). Banks have already introduced fintech services but the adoption rate of fintech was found to be low (Hu et al. 2019; Gomber et al., 2018; Mutahar et al. 2017). The dominant theory applied to investigate customer's behavior to adopt fintech services was Rogers' (2002) diffusion of innovation which provided the basis to understand how fintech services as innovation will lead to its adoption during its diffusion (section 2.4). Roger (2002) postulated that the diffusion of innovation can be linked to the rate of adoption. However, this theory has been applied to understand the actual adoption of an innovation by many (Iluba & Phiri, 2021; Bijloll et al. 2016; Al-Jabri & Sohail 2012). From section 2.4 it can be seen that five exogenous factors namely relative advantage, complexity, compatibility, trialability, and observability were investigated to understand their influence on customer's behavior to adopt fintech services by applying DOI theory.

Furthermore, while investigating the diffusion of fintech services and their adoption, it was argued in

section (2.3.4) that DOI lacks the predictive power to explain the actual adoption of fintech services because DOI deals with rate adoption rather than actual adoption and there is no guarantee that all diffusing innovations end up in adoption. Thus investigations were conducted to link the diffusion of fintech to the actual adoption of fintech services. This led to examining the use of the technology acceptance model for its ability to explain the actual fintech adoption intention of consumers of banks. Further investigations showed that if TAM constructs could be integrated with DOI constructs then it was possible to understand both the diffusion of fintech and its actual adoption. Literature showed that integration of DOI and TAM constructs applying the two theories is still a major challenge in the literature (Yoon & Lim, 2020; Al-Rahmi et al. 2019; Sepasgozar et al. 2019; Ozen et al. 2018). This aspect was further investigated by developing a theoretical framework that applied the two theories to bring out a composite model that showed a possible way to integrate DOI and TAM constructs (Section 2.3.4). Thus perceived usefulness and ease of use of fintech were investigated as part of the integrated model.

Further, the integrated model could not be tested in isolation as fintech was found to be complex. Moreover, the literature showed that complexities associated with innovation are usually perceived to be risky during its diffusion by users leading to questions related to trust in the minds of users (Section 2.5.4). Therefore, the concepts of perceived risk and trust had to be investigated alongside the integrated model by applying two theories namely PMT and TRA. The investigations thus carried out in this research investigated the five DOI factors and their relationship to intention to adopt fintech services through the mediators' perceived usefulness and perceived ease of use of fintech services. As well as, perceived risk of fintech services and its linkage to intention to adopt fintech services through the mediator trust in the minds of consumers of banks in Bahrain. Thus it can be concluded that the aim has been achieved.

7.3 Achievement of objectives of this research

The section (1.5) it can be seen that the first objective is:

1. *To identify the various factors including factors affecting diffusion and technology acceptance that determine the intention to adopt fintech services by consumers of banks during the process of diffusion of fintech and study those factors to find out possible linkages amongst them.*

A thorough and critical literature review yielded gaps in the literature which indicated that in the context of fintech services there is a major challenge of consumers not adopting the new services offered by banks that are based on the latest technology called fintech. Through the review of the literature, it was found out that fintech as a technology is still diffusing and evolving. This pointed out the problem of lack of predictability of the behavioral intention consumers of banks to adopt fintech. Three things were identified. They are:

1) The diffusion of fintech is still not fully understood.

2) Research outcomes that have linked diffusion of fintech services as an innovation to adoption behavior of consumers about the diffusing technology have been rarely found in the context of banks in particular Bahrain. This led to a lack of understanding of how to predict the behavioral intention of consumers of banks to adopt fintech services when it is still diffusing.

3) The theoretical support to explain this phenomenon of the behavioral intention of the consumer of banks to adopt fintech has not been investigated which led to a lack of knowledge on the factors that could be used to predict the behavioral intention of consumers of banks to adopt fintech services when it is still diffusing.

Foremost as for as adoption behavior of technology was concerned the technology acceptance model provided support and pointed towards the possibility of understanding the central issue of intention to adopt fintech services. Thus this factor became the predicted factor. Followed by this the two main constructs of TAM namely perceived usefulness and perceived ease of use were brought in to support and explain their influence on the behavioral intention of consumers of banks to adopt fintech services as predictors. However, it was possible to understand the perceived usefulness and perceived ease of use of fintech services at an early stage of the adoption of fintech services as TAM could not explain beyond one time. Hence the adoption of fintech services could not explain the multiple stages of diffusion and its adoption. This lack of support by TAM was compensated when DOI was brought in to explain the diffusion of fintech services through the channel of diffusion defined by DOI. This brought the attention of the researcher to the need to include DOI factors and link those factors to the adoption behavior of consumers when fintech is still diffusing. There were five factors of innovation that were described by DOI and those five factors became necessary to be included in the process of understanding the predictability of fintech services adoption of the behavior of consumers of banks. Those factors were a relative advantage, complexity, compatibility, trialability, and observability. These factors were identified and posited to be the predictors of perceived ease of use and perceived usefulness of fintech services (Yoon & Lim, 2020; Lou & Li, 2017; Mutahar et al. 2017; Raza et al. 2017; Hanafizadeh et al. 2014; Koenig-Lewis et al. 2010). Interestingly the complete integrating TAM and DOI concepts in the literature concerning fintech was not found in the extant literature (Yoon & Lim, 2020; Lou & Li, 2017; Mutahar et al. 2017). This is new knowledge not known and reported in the relevant literature.

Furthermore, the literature review showed that when a new technology is diffusing users couldn't adopt, accept or use that technology without associating their perception of risk. The literature review highlighted the perceived risk of adopting fintech services as an important construct that needs to be included in any research that deals with the diffusion of such a technology (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Raza et al. 2017; Muñoz-Leiva, et al. 2017; Hanafizadeh et al. 2014). This concept

was completely neglected in the literature. Thus to complete the understanding of the predictability of the behavioral intention of consumers of banks to adopt fintech services, the influence of perceived risk of adopting fintech services on the fintech services adoption behavior of consumers of banks had to be brought in (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019). This in turn necessitated by the need to address the concept of trust of consumers as to when risk is perceived by consumers, it was important to ensure the trust is built an argument supported by Senyoa and Osabuteyb (2020). Thus perceived risk and trust were identified as two other constructs into this research to completely predict the behavioral intention of consumers of banks to adopt fintech services. Combining perceived risk, trust, TAM, and DOI factors in one model to understand the predictability of the behavioral intention of consumers of banks to adopt fintech services was not attempted by other researchers. This left a gap in the literature regarding the total understanding of the predictability of the behavioral intention of consumers of banks to adopt fintech services when fintech is still diffusing. This research has filled up this gap. Thus it can be concluded that the first objective has been achieved.

2. *To examine the relationship amongst those factors concerning diffusion and technology acceptance using appropriate theories and conceptualize a theoretical framework that could be used to predict the fintech services adoption behavior of consumers of banks.*

It can be seen from the conclusions provided in the previous paragraphs that the TAM and DOI constructs need to integrate to predict the behavioral intention of consumers of banks to adopt fintech services. However, integrating the two theories posed problems at the construct level. That is to say that the predicted variable in the research model (Figure 3.1) that applied DOI was the rate of adoption. However, the predictors of intention to adopt were perceived ease of use and perceived usefulness of fintech services. The interpretations provided by Rogers (2003) about the result of adoption indicated by the rate of adoption can be represented by the usage or adoption of that innovation. This provided the basis to construe the rate of adoption to be represented as a combination of the relations PU→INTADOP, PEU→ INTADOP, and PEU→PU. Thus while integrating the TAM and DOI constructs the five factors of DOI namely relative advantage, complexity, compatibility, trialability, and observability were thought to be driving and influencing the perceived ease of use and perceived usefulness of fintech services which in turn determined the behavioral intention of consumers to adopt fintech services (Figure 3.1). That is to say that when TAM and DOI constructs were integrated the independent variables were deemed to be the five factors of DOI while the dependent variable was construed to be behavioral intention to adopt fintech services. Evidence to support this type of integration although available in different fields, in the field of fintech, there is hardly any complete integration of TAM and DOI in one model can be found in the literature. This integration has enhanced the predictive power of the DOI constructs as well as TAM constructs which is a new finding and contribution to the body of knowledge relevant to the field of the behavioral intention of consumers to adopt fintech services, especially in the context when fintech is still diffusing.

In continuation to the above, to bring in the concept of the perceived risk of using fintech services as influencing the behavioral intention of consumers to adopt fintech services the researcher relied upon the theory of PMT. In the literature PMT is argued to help predict the adoption of protective technologies that focused on helping consumers to avoid harmful, negative technologies that are growing in number (Bae, 2018; Chen, 2013; Pahnila et al., 2007). This implies explaining how to avoid risky situations. Thus with the support of PMT, the concept of perceived and its linkage to the behavioral intention of consumers to adopt fintech services was posited. However, prior research shows that perceived risk invariably is linked to trust without which consumers are unlikely to adopt an innovation (Senyoa & Osabuteyb, 2020; Meyliana et al. 2019; Hu et al. 2019). Thus it was argued with the support of TRA that perceived risk influences trust which in turn influences the behavioral intention of consumers to adopt fintech services. TRA provided the linkage between perceived risk, trust, and behavioral intention of consumers to adopt fintech services. This is explained in section 2.5.4. Linking perceived risk to the behavioral intention of consumers to adopt fintech services indirectly through trust and predicting the behavioral intention of consumers to adopt fintech services in one conceptual model where DOI and TAM factors have been integrated is a unique conception.

The foregoing discussions point out the theoretical support used by the researcher to determine the predictability of behavioral intention of consumers to adopt fintech services using six exogenous factors and four endogenous factors (Figure 3.1) when fintech is still diffusing. Using appropriate examination of the various factors using the theories mentioned above, it was possible to draw a theoretical framework (Chapter 3) which was tested to answer the research questions set in chapter 1. Thus it can be concluded that this objective has been achieved.

3. *To test the relationships developed in the conceptual framework to understand the nature of the relationship amongst the variables using the primary data collected for the purpose.*

An understanding of how the various factors identified in this research have been related to each other during diffusion, using appropriate theories to predict the behavioral intention of consumers to adopt fintech services has been provided in Chapter 3. The conceptual model drawn in Chapter 3 was tested using the methodology described in Chapter 4. The quantitative research method adopted in this research and explained in Chapter 4 clearly shows that the direction of the research has been set to understand the nature of the relationship amongst the variables using the primary data collected for this research. The actual nature of the relationships was then revealed through the data analysis that has been explained in detail in chapter 5 in the context when fintech is still diffusing. Thus it can be concluded that this objective has been achieved.

4. *To understand the empirical findings derived from analyzing the various relationships in the model and answer the research question set for this research.*

Chapter 5 presents the data analysis for the research relationship model. The performed statistical tests confirmed that out of the fifteen hypotheses suggested for this research, ten hypotheses were supported, thus, could be accepted. The outcome of Chapter 5 provided the findings from the analysis of the data which formed the basis to discuss the findings in Chapter 6. The results provided (section 6.2) a clear understanding of the nature of relationships between the exogenous and endogenous variables. It can be seen that out of the five DOI factors only relative advantage was seen to affect the behavioral intention of consumers to adopt fintech services indirectly through both perceived usefulness and perceived ease of use. Observability was not found to affect the behavioral intention of consumers to adopt fintech services. The remaining three constructs affected the behavioral intention of consumers to adopt fintech services either through perceived usefulness or perceived ease of use but not both. This implies that during the diffusion of fintech services as an innovation relative advantage as a factor matters most. Thus this research has brought out a unique idea using which bankers can focus more strongly on the relative advantage of fintech services to enhance its adoption. Similar results are not reported in the literature. As far as the perceived risk of using fintech services is concerned it was found it is affecting the behavioral intention of consumers to adopt fintech services indirectly. The research also brought out the importance of the latent variables namely perceived usefulness, perceived ease of use, and trust as mediators between the independent and dependent variables during diffusion of fintech services. This is another important finding that contributes to the body of knowledge concerning the behavioral intention of consumers to adopt fintech services. Thus it can be concluded that this objective has been achieved.

5. *To identify key findings concerning the research with regard to the published literature, outlining the main theoretical, practical, methodical implications of the study and offering suggestions for future research.*

Discussions in this Chapter provide the findings concerning the research with regard to the published literature. Conclusive evidence on the contribution of this research to the body of knowledge, contribution to the theory, contribution to the practice, and contribution to the method concerning consumers' behavioral intention to adopt fintech services, the core concept that has been investigated in the context of banks in Bahrain. Moreover, the limitations and future research are highlighted as well. Thus it can be concluded that the fifth objective has been achieved.

7.4 Contribution to body of knowledge

This research contributes to the body of knowledge in several areas by filling the research gaps found in the literature. The main gap found in fintech services adoption rate among customers of Bank is still low (Hu et al. 2019; Meyliana et al. 2019; Gomber et al. 2018). Despite the numbers of projects that have been implemented around the world, very few banks have achieved the real fintech transformations (i.e., fundamental changes to the way core functions of banks are performed to achieve efficiency and enhance end-user experience toward using banking services) (Wenyu, et al. 2019: Priem

& Carr, 2012) there are concerns on the investments made and the return on the investment. Studying the factors that influence bank users to adopt fintech can help the bank to provide better services and strengthen the contact between banks and consumers due to enhanced performance. Currently, in the literature, there is hardly any model, theory, or knowledge that could be used effectively by banks to tackle this problem (Gomber et al., 2018). Lack of knowledge to overcome this issue has been a challenge for researchers (Gomber et al. 2018). There was a need to plug this gap. As such, the aim agreed for this research was in line with the identified gap.

A conceptual model has been developed that could be used to anticipate the fintech services adoption behavior of consumers of banks. This model has been tested empirically and the various factors that affect the behavioral intention of consumers of banks have been identified. This research indicates that those identified factors could be controlled to enhance the number of consumers who would adopt fintech services (Figure 3.1). The model is based on DOI, TAM, PMT, and TRA. The results of testing the model show that if relative advantage, compatibility, and perceived risk of fintech services are adjusted, then the rate of adoption of fintech services could improve and the number of consumers of banks adopting fintech services would improve. As far as the researcher's knowledge, this research is the first of its type that demonstrated from the consumers' perspective the combined effect of the DOI factors, TAM factors, perceived risk, and trust on intention to adopt fintech services. The new conceptual model is an important innovation as it provides new knowledge that could enable the practitioners and service providers to implement to increase the diffusion of fintech services and their adoption. The new model enables organizations to develop strategies to encourage customers to adopt fintech services. Therefore, this research is considered a novel contribution to the body of existing knowledge.

Examining the factors involved in the process of adoption of fintech services by consumers is becoming fundamental to the banking industry to ensure the success of its adoption (Meyliana et al. 2019; Hu et al. 2019; Gomber et al. 2018). Factors related to the adoption of fintech services have been discussed in the literature to understand the phenomena of the adoption of fintech services. However, no common set of factors have been identified comprehensively in the literature. The current research overcomes show that this limitation has been addressed to some extent and can provide a better understanding of fintech as a diffusing innovation. The results of the discussion in Chapter 6 clearly show that relative advantage, complexity, compatibility, and trialability can be used to anticipate behavioral intention to adopt through perceived usefulness and perceived ease of use, alongside risk and trust. Additionally, this research provides a complete knowledge on which of the five factors have a greater influence on intention to adopt fintech services with a higher predictive power. For instance, the relative advantage of fintech has been identified as the most influential predictor amongst the exogenous variables while observability is an insignificant predictor. This is new knowledge and provides the service providers a method to enhance the adoption of fintech services by manoeuvring the appropriate predictor to enhance behavioral intention to adopt.

7.5 Contribution to the theory

Primarily this research builds on the research outcomes of Yoon and Lim (2020), Al-Rahmi et al. (2019), Hu et al. (2019), Meyliana et al. (2019), Bae (2018), Min et al. (2018) and Mutahar et al. (2017), Rogers (2003), Davis (1989) and Fishbein and Ajzen (1975). The important contributions are as follow:

This research has contributed to the theories of diffusion of innovation (DOI), technology acceptance model (TAM), reasoned action (TRA), and protection motivation (PMT). As far as diffusion of innovation theory is concerned this theory has enhanced the explanatory power of the theory by integrating it with the TAM. This expands the conceptualization of both DOI and TAM into a new composite model. The successful testing of the composite model demonstrates that TAM in conjunction with DOI can be used in research concerning the diffusion of an innovation like fintech. Until now DOI was used to understand the rate of adoption only, whereas the new composite model developed in this research can be used to anticipate not only the rate of adoption during diffusion but also consumers' behavioral intention to adopt innovation. Thus it can be concluded that this research has brought out a new theoretical model that can be applied in multiple contexts where innovation diffusion and technology adoption are investigated in a single research. As far as the researcher's knowledge, this concept was not found in fintech services research so far in the literature.

Further, Rogers (1983) defined perceived attributes of users that have bearing on the diffusion of the technology and lead to the adoption of that technology. These attributes of innovation were relative advantage, compatibility, complexity, trialability, and observability (Seeger & Wilson, 2019; Stieninger et al. 2017; Rogers 1983). Rogers (1983) argued that if an innovation has these five constructs, the innovation is more likely to succeed and be adopted by users. Most often researchers do not use all the five attributes in research to explain the adoption intention of fintech services by consumers, and outcomes produced by those researchers are not comprehensive or generalizable (e.g. Yoon and Lim, 2020; Lin et al. 2019; Lou and Li, 2017; Stieninger et al. 2017; Mutahar et al. 2017). This research has theoretically contributed by investigating the five attributes of DOI thoroughly in the context of fintech. Moreover, this research showed that four of the five factors namely relative advantage, complexity, compatibility, and trialability are only useful in predicting behavioral intention to adopt fintech servcies. Observability was not found to be useful. This implies that Rogers (2002) model could be reshaped to be more parsimonious than what it is now and that the outcome of applying such a parsimonious model could lead to a less complex understanding of the relationships that could be conceived in the future.

Next, according to PMT, a person is likely to protect himself or herself when that person anticipates negative consequences, has the desire to avoid those consequences and feels that he or she can initiate preventive measures (Inouye, 2014). The use of PMT in understanding risk perception while new technology is diffusing has been found in the literature (Bae, 2018; Chen, 2013; Pahnila et al., 2007). These examples provide support to the argument that PMT could be used to explain the behavioral intention of people when they perceive risk in the contexts of innovation diffusion of new technology.

However, as far as the researcher's knowledge goes, applying PMT alongside an integrated model of DOI and TAM was not found in fintech services research so far. The combined effect of applying PMT and the integrated model of DOI shows that it is possible to explain the extent to which perceived risk can be associated with the DOI factors and hence role played by perceived risk in determining the intention to adopt behavior of consumers of banks. This makes the current model more versatile as it can anticipate the intention to adopt behavior under three different phenomena namely diffusion of innovation, technology acceptance, and perceived risk in adopting an innovation. Combining the three theories in one research expands the application of PMT.

Finally, this research adds to the current theoretical knowledge concerning TRA. According to TRA, actual behavior can be anticipated and explained through three main cognitive components, attitude subjective norms, and intentions. However, the usefulness of TRA is limited since TRA does not specify practical behavioral beliefs that could affect an attitude (Jian et al., 2017; Bhattacherjee & Lin 2015). Also, TRA cannot address the role of habit. Yet, applying TRA to explain the influence of trust on the intention to adopt fintech services could extend TRA to the area of fintech services adoption. The use of TRA to address how trust as a habit affects intention to adopt when influenced by perceived risk provides an idea on how to understand the trusting behavior of consumers of banks while intending to adopt fintech services. The application of TRA provides a new way of explaining trust as a phenomenon when an innovation associated is perceived to be risky by users during the process of diffusion. This is new knowledge and overcomes the limitation associated with TRA concerning the habits of people in their behavioral intention to adopt the technology.

7.6 Contribution to methodology

An important aspect is the integration of the principles of perceived risk and trust of consumers (explained by PMT and TRA) alongside the integrated model mentioned above. The method employed to test the influence of perceived risk on intention to adopt through trust again synthesizes the relevant literature and brought out a way to have a better prediction of behavioral intention to adopt taking into account the fundamental factors that concern DOI theory. This method is unique as there appears to no publication that has attempted to explain the central concept of the behavioral intention of the consumer to adopt fintech services through four theories namely DOI, TAM, PMT, and TRA. The method used in this research splits the paths that concern DOI, TAM, PMT, and TRA based on the suggestion of Holmes-Smith et al. (2006). According to Holmes-Smith et al. (2006) to reduce difficulties in analyzing complex models concerning the validity, it is suggested that the model could be split into parts for analysis by restricting independent variables to ≤ 5 in each part. Thus, the research method employed in this research has brought out a new contribution to research methodology in terms of integrating two differing concepts through literature synthesis and splitting a complex model which led to a reduction in difficulties while analysing the data and interpreting the results. As per the researcher's knowledge, comparable research efforts that have adopted integration, synthesis, and splitting of a complex model are not found in the literature of fintech services.

In addition, this research analyzed the structural relationships between the variable and validate the fitness of the developed conceptual model by using a multivariate statistical analysis tool such as structural equation modeling (SEM). Also, utilized the Moment Structure (AMOS) test to analyses the hypotheses through performing confirmatory factor analysis (CFA) and path analysis. This is considered as a contribution. This research has been able to provide an understanding of the effect of the association between the six exogenous variables used in the model as well as an understanding of the impact of those associations on the central concept under investigation. Treating the association between exogenous variables using covariance between each pair of exogenous variables provides a a better prediction of the dependent variable, which is usually not found in most research efforts concerning DOI, TAM, PMT, and TRA (e.g. Yoon & Lim, 2020; Al-Rahmi et al. 2019; Hu et al. 2019; Sepasgozar et al. 2019; Min et al. 2018; Mutahar, 2017). This is an important contribution to methodology. Furthermore, conducting an online survey involving consumers of banks in the Kingdom of Bahrain through a hyperlink, which was distributed through emails and social media channels such as WhatsApp, LinkedIn, Twitter, and Facebook is considered as a contribution since this could be the first study of its type within Bahrain.

In addition, the output from AMOS and the regression equations provide a comprehensive view of the direct, indirect, and total effects of the predictors which enable the service providers and users alike to understand the role of mediators in the process of diffusion of fintech and its adoption. As per the researcher's knowledge, no research paper seems to have discussed the direct and indirect effect of predictors of behavioral intention to adopt in the presence of mediators that are not found in the literature of fintech services. Lack of knowledge on the direct influence of predictors on the mediating variables as well as indirect influence on the dependent variable could curtail the explanatory power of a model.

7.7 Contribution to practice

This research contributes significantly to practice. The service providers can practically implement the research model in banks wherein, the service providers can focus more on enhancing the relative advantage, compatibility of fintech services on the one hand and reducing the risk perception of fintech services on the other. This is expected to enhance the perceived usefulness and perceived ease of use of fintech services, which in turn is expected to encourage more consumers to adopt fintech services. An example of this could be that bankers should enable the transfer of more and more traditional services under fintech and enhance the relative advantage of using fintech services. It can still be seen that people flock to the bank to obtain loans in person while the same could be done using fintech services. This implies that banks should understand the strength of the relative advantage fintech services offers to the consumers and helping them switch them over to fintech services. An example enhancing the strength of relative advantage could be to improve the quality of banking services in terms of achieving better consumer satisfaction derived as a result of using fintech services over traditional banking. In addition, banks could derive a competitive advantage by making their fintech operations more customer-friendly

in terms of improving the compatibility of fintech services to the needs of the consumers including ensuring easy access to the information and better support to conduct more efficient banking transactions.

Secondly, the model has demonstrated that the total effect of complexity and trialability of fintech services on behavioral intention to adopt fintech services is negligible, while the effect of observability is insignificant. This indicates that during the diffusion of fintech services, the service providers could focus less on these aspects but more on relative advantage, compatibility, and perceived risk. One example of reducing perceived risk could be to regularly inform consumers about the security and safety of using fintech services, thereby reducing any threat to their private data and attempted hacking.

Finally, the model is parsimonious and could be used as a basis by the service provider while implementing any new fintech service strategies. For example, any upgrade on fintech technology could be effectively implemented by a strategy of focusing on the relative advantage, compatibility, and perceived risk which will enable a seamless integration of the upgrades without causing any inconvenience to the consumers. The research outcomes produced in this research have shown that all the statistically significant correlations amongst the valid relationships were found to lie between the medium and large categories, making the model parsimonious, reliable, valid, and practically implementable.

7.8 Limitations of the current research

Although this research promises to improve the services provider decision-making to enhance the effectiveness of fintech services adoption by consumers of the bank, still the research has some limitations include the following.

The results of this research showed that the DOI factor observability is not statistically significant to either of the TAM constructs, namely perceived usefulness and perceived ease of use. This research is in line with the research outcomes of other researchers (e.g. Mutahar, 2017). However rarely some research efforts that have integrated DOI and TAM have found observability to be significantly predicting the behavioral intention to adopt. For instance, Min et al. (2018) found observability to significantly influence perceived usefulness (correlation 0.11) and perceived ease of use (correlation 0.24) in their research on mobile applications. Lack of significance of observability of fintech service might be a problem when in future fintech services undergoes modifications when the results of this research may have to be reconsidered.

Next, the research also indicates that the significance and influence of complexity and trialability of fintech services on the central issue are seen to have less than a small effect. This could be because some of the applications offered by fintech services might not have been that much useful to the consumers. For instance, in fintech services, there are facilities to operate virtual currencies (e.g. bitcoin) which is complex and needs trials to understand how to operate through fintech. However, not

many individuals may be interested in such special banking operations which might have resulted in the negligible influence of complexity and trialability of fintech services.

Further, perceived risk has been treated as a single quantity in this research. However, as per the recommendations of Hu et al. (2019), it is worthwhile to study the intention to adopt fintech services from multiple perspectives of risk. This includes financial, privacy risk, and cybersecurity risks, which could enable a better understanding of the adoption model developed in this research.

Finally, this research was conducted in Bahrain which is one of the high ranked countries in the list published by the UN about internet infrastructure and other electronic services (United Nations survey, 2018). Results might not be the same if the research is conducted in any other country with similar or better or inferior facilities.

7.9 Recommendations for future research

From the discussions provided above related to the limitations of this research, it can be seen that new areas of research could be attempted by researchers to enhance the findings of this current research as well expand the integrated model. For instance, future studies could investigate the validity of complexity, trialability, and observability of fintech services in other contexts including other territories as developed and developing countries. The results that emerge might be different from that of this research.

Furthermore, the research findings could be extended to compare the findings against countries and the level of education of respondents. This could provide a wider knowledge on the operationalization of the integrated model under different contexts thereby enhancing the generalisability of the model.

In addition, researchers could add more predictors alongside DOI factors involved in this research leading to a more comprehensive understanding of the diffusion fintech service and consumer behavior concerning the behavioral intention to adopt fintech service. Next, researchers could add moderating variables such as age and novelty-seeking behaviors to study the effect the integrated could perform about predictive power. Expanding the findings of this research including other predictors alongside DOI factors or other moderating variables could add to the current body of knowledge.

Finally, this research opens up a new branch to investigate such concepts as actual usage of fintech services, continuous intention to use fintech services, and acceptable behavior. Thus expand the integrated model to cover more behavioral attributes that are found in the real-life behavior of consumers.

References

Abderrahman, J., Delphine, H. and Pierre, L. (2012) 'The Intention for Voluntary Departure of Staff: A Quantitative Study for a Scale Measuring', *International Journal of Business and Management Tomorrow,* 2(6), pp. 1-10.

Abdulkarim, M. (2021) 'Bank Users Motivation for Adoption of Fintech Services: Empirical Evidence with TAM in Kingdom of Bahrain', *IKSP Journal of Innovative Writings,* 1(2).

Abramson, R., Rahman, S. and Buckley, P. (2005) 'Tricks and Traps in Structural Equation. Modelling: a GEM Australia Example Using AMOS Graphics'.

Abubakar, A., Behravesh, E., Rezapouraghdam, H. and Yildiz., S. (2019) 'Applying artificial intelligence technique to predict knowledge hiding behavior', *International Journal of Information Management,* 49(3), pp. 45-57.

Agarwal, R. and Prasad, J. (1999) 'Are individual differences germane to the acceptance of new information technologies?', *Decision Sciences,* 30, pp. 361-391.

Ajibade, P. (2018) 'Technology Acceptance Model Limitations and Criticisms: Exploring the Practical Applications and Use in Technology-related Studies, Mixed-method, and Qualitative Researches', *Library Philosophy and Practice,* 48(6), pp.1-13.

Ajzen, I. and Fishbein, M. (1980) 'Understanding Attitudes and Predicting Social Behavior', Englewood Cliffs, NJ: Prentice-Hall.

Akoglu, H. (2018) 'User's guide to correlation coefficients'. *Turkish Journal of Emergency Medicine,* 18(3), pp. 91-93.

Akturan, U. and Tezcan, N. (2012) 'Mobile banking adoption of the youth market: Perceptions and intentions', *Marketing Intelligence & Planning*, 30(4), pp. 444-459.

Al nawayseh, M. (2020). 'FinTech in COVID-19 and Beyond: What Factors Are Affecting Customers' Choice of FinTech Applications?', *Journal of Open Innovation Technology Market and Complexity*, 6(10).

Al-Ajam, A. and Nor, M. (2013) 'Adoption of internet banking consumers: An empirical investigation', *Australian Journal of Basic and Applied Sciences*, 7(2), pp.182 – 189.

Alessandro, S., Girardi, A. and Tiangsoongnern, L. (2012) 'Perceived risk and trust as antecedents of online purchasing behavior in the USA gemstone industry', *Asia Pacific Journal of Marketing and Logistics*, 24(3), pp. 433 – 460.

Al-Jabri, I. and Sohail. M. (2012) 'MOBILE BANKING ADOPTION: APPLICATION OF DIFFUSION OF INNOVATION THEORY', *Journal of electronic commerce research,* 13(4), pp. 379.

Al-Jabri, M. and Sohail, M. (2012) 'Mobile Banking Adoption: Application of Diffusion of Innovation Theory'. *Journal of Electronic Commerce Research,* 13(4), pp. 379-391

Allen, F. and Santomero, M. (1998). 'Theory of Financial Intermediation', *Journal of Banking and Finance,* 21 (10-11), pp. 1461-1485.

References

Al-Rahmi, M., Yahaya, N., Aldraiweesh, A., Alamri, M., Aljarboa, A., Alturki, U. and Aljeraiwi, A. (2019) 'Integrating Technology Acceptance Model with Innovation Diffusion Theory: An Empirical Investigation on Students Intention to Use E-Learning Systems', *IEEE Access*, 7, pp. 26797-26809.

Alt, R., Beck, R. and Smits, T. (2018) 'Fintech and the Transformation of the Financial Industry'. *Electron Markets*, 28(3), pp. 235–243.

Alwi, S., Salleh, M., Razak, A. and Naim, N. (2019) 'Consumer Acceptance and Adoption towards Payment-Type Fintech Services from Malaysian Perspective', *International Journal of Advanced Science and Technology*, 28(15), pp.148 – 163.

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002) 'Quantitative and qualitative research in the built environment application of 'mixed' research approach', *Work Study*, 51(1), pp. 17-13.

André, N. and Laurencelle, L. (2020) 'Where do the conceptual models for behaviour change come from, and how are they used? A critical and constructive appraisal', *The Quantitative Methods for Psychology*, 16(10). pp.1-8.

Arbuckle, L. (2010) 'IBM SPSS Amos™ 19 User's Guide: Amos Development Corporation'.

Arbuckle, L. and Wothke, W. (1999) 'Amos 4.0 User's Guide'. Chicago, IL: SPSS Inc.

Ardis, M. and Marcolin, B. (2017) 'Erratum to: Diffusing Software Product and Process Innovations', (Eds.)

Arias-Oliva, M., Pelegrín-Borondo, J. and Matías-Clavero, G. (2019) 'Variables Influencing Cryptocurrency Use: A Technology Acceptance Model in Spain', *Frontiers in Psychology*, 10.

Arner, W., Barberis, J. and Buckley P. (2016) 'The evolution of Fintech: A new post-crisis paradigm?' *Georgetown Journal of International Law*, 47(4), pp.1271–1319.

Arner, W., Barberis, J. and Buckley, P. (2015) 'The evolution of Fintech: A New Post-Crisis Paradigm?', *University of Hong Kong Faculty of Law Research Paper; UNSW Law Research*, 35 (1) pp. 47-62.

Ashurov, S. and Othman, A. (2019) 'The effects of trust mediator and education level moderator on adoption of Islamic banking system in Tajikistan', *Russian Journal of Economics*, ARPHA Platform, 5(3), pp. 277-296.

Ayo, K., Mbarika, W. and Oni, A. (2015) 'The Influence of Trust and Risk on Intention to Use E-Democracy in Nigeria', *Mediterranean Journal of Social Sciences*, 6(6), pp. 477–486.

Aziz, S. and Dowling, M. (2019) 'Machine Learning and AI for Risk Management'. In: Lynn T., Mooney J., Rosati P., Cummins, M. (eds) Disrupting Finance. Palgrave Studies in Digital Business & Enabling Technologies. Palgrave Pivot, Cham. Retrieved from https://doi.org/10.1007/978-3-030-02330-0_3

Bae, J. (2018) 'A study on the determinant factors of innovation resistance and innovation acceptance on internet primary bank services: Combining the theories of innovation diffusion and innovation resistance', *The e-Business Association*, 19(2), pp. 91-104.

References

Bahrain Economic Development Board (EDB). (2021) 'Manama listed in the top 5 globally for FDI strategy in latest FDI Magazine ranking'. Available from: https://www.bahrainedb.com/latest-news/manama-listed-in-the-top-5-globally-for-fdi-strategy-in-latest-fdi-magazine-ranking/ .Accessed: 13 March 2021.

Bahrain Fintech Bay. (2020) 'Bahrain FinTech Bay Manifesto 2020 report'. Retrieved from: https://docs.wixstatic.com/ugd/304023_edcec280389e43a1ad0593c76b559fd6.pdf . Accessed: 30 August 2020.

Bansal, K., Bansal, A. and Blake, B. (2010) 'Trust-Based Dynamic Web Service Composition Using Social Network Analysis'. *In Proceedings of the IEEE International Workshop on Business Applications of Social Network Analysis*, Bangalore, India.

Bauer, A. (1960) 'Consumer behavior as risk taking', in Hancock, R.S. (ed.), Dynamic marketing for a changing world, *Proceedings of the 43rd American Marketing Association Conference*, Chicago, IL; pp. 389–398.

Bedeian, G. (2007) 'Even if the Tower Is "Ivory," It Isn't "White:" Understanding the Consequences of Faculty Cynicism', *Academy of Management Learning and Education*, 16(1), pp. 9–32.

Belanche, D., Casaló, L. V. and Flavián, C. (2019) 'Artificial Intelligence in FinTech: understanding robo-advisors adoption among customers', *Industrial Management and Data Systems*, 119(7), pp. 1411-1430.

Bertsch, C. and Rosenvinge, J. (2019) 'FinTech credit: Online lending platforms in Sweden and beyond', *Sveriges Riksbank Economic Review*, 2, pp. 42-70.

Bettinger, A. (1972) 'Fintech: A Series of 40 Time Shared Models Used at Manufacturers Hanover Trust Company', *Interfaces*, 2(4), pp. 62-63.

Bhattacherjee, A. and Lin, P. (2015). 'A Unified Model of IT Continuance: Three Complementary Perspectives and Crossover Effects', *European Journal of Information Systems*, (24), pp. 364-373.

Bhowmik, S. (2017) Cloud computing. Cambridge, UK: *Cambridge University Press*.

Bijloll, S., Manual, V. and Chen, N. (2016) 'Factors Affecting the Adoption of Mobile Banking in Klang Valley, Malaysia'. *European Academic Research (EAR)*, 4(5), pp.4905 - 4926

Blumberg, B., Copper, R. and Schindler, S. (2011) 'Business Research Methods'. London: McGraw-Hill.

Bodemer, N. and Gaissmaier, W. (2015) 'Risk Perception', In H. Cho, T. Reimer, & K. A. McComas (Eds.), *The SAGE handbook of risk communication*, pp. 10–23. Los Angeles, Calif: Sage.

Bogdan, N., Madalina-Elena, S., Ioan-Florentin, T., Smaranda-Elena, T. and Alin, V. (2015) 'Cloud Computing and its Challenges and Benefits in the Bank System', *Database Systems Journal*, 4 (1), pp. 44-58.

Bohliqa, A. (2015) 'A study of the US intrastate crowdfunding exemptions'. In Management of Engineering and Technology (PICMET), *Portland International Conference*, pp. 961-967. IEEE.

References

Boomsma, A., Hoyle, R. and Panter, A. (2012) 'The structural equation modeling research report'. In book: In R.Hoyle (Ed.), Handbook of structural equation modeling, pp. 341-358. New York: The Guilford Press. Edition: 1. Chapter: 21. Publisher: New York: The Guilford Press.

Boss, R., Galletta, F., Lowry, B., Moody, D. and Polak, P. (2015) 'What do systems users have to fear? Using fear appeals to engender threats and fear that motivate protective security behaviors', *MIS Quarterly*, 39(4), pp837–864.

Bouranta, N., Chitiris, L. and Paravantis, J. (2009) 'The relationship between internal and external service quality', *International Journal of Contemporary Hospitality Management*, 21(3), pp.275- 293

Boz H. and Özen E. (2019) 'The relationship between customers' tendency to risk avoidance and preferring online banking services', *Gümüşhane Üniversitesi Sosyal Bilimler Enstitüsü Elektronik Dergisi*, 10(1), pp. 220-230.

Brandt, S., Cazzaniga, A. and Hann, M. (2011) 'Cosmeceuticals current trends and market analysis', *Seminars in Cutaneous Medicine and Surgery*, pp. 141-143.

Brase C. and Brase C. (2016), Understandable Statistics: Conceptsand Methods. Cengage Learning. 12th Edition.

Bridge, S. (2020) 'Why Bahrain can become major hub for finance and technology'. Arabian Business Global. Available from: https://www.arabianbusiness.com/politics-economics/438151-why-bahrain-can-become-major-hub-for-finance-technology , Accessed: 13 March 2021.

Bronner, E. (2011) 'Critical Theory: A Very Short Introduction'. New York, NY: Oxford University Press.

Brown, I., Cajee, Z., Davies, D. and Stroebel, S. (2003). 'Cell Phone Banking: Predictors of Adoption in South Africa an Exploratory Study', *International Journal of Information Management*, 23, pp. 381-394.

Brown, T. (2015) 'Confirmatory Factor Analysis for Applied Research'. *Methodology in the Social Sciences*. 2nd Edition. Guilford Publications.

Bryman, A. and Bell, E. (2011) 'Business Research Methods' (3rd Edition), Oxford: Oxford University Press.

Buchak, G., Matvos, G., Piskorski, T. and Seru, A. (2018) 'Fintech, Regulatory Arbitrage, and The Rise of Shadow Banks ', *Journal of Financial Economics*, 130(3), pp. 453-483.

Bunjaku, F., Trajkovska, O. and Kacarski, E. (2017) Cryptocurrencies – advantages and disadvantages Faculty of Economics, Goce Delcev University-Stip.

Burdick, D., Das, S., Hernandez, A., Ho, H., Koutrika, G., Krishnamurthy, R., Popa, L., Stanoi, R., Vaithyanathan, S. and Das, Sanjiv. (2011) 'Extracting, linking and integrating data from public sources: A financial case study', *IEEE Data Engineering Bulletin*, 34(3), pp.60–67.

Cabrera-Nguyen, P. (2010) 'Author guidelines for reporting scale development and validation results', *Journal of the Society for Social Work and Research*, 1(2), pp. 99-103.

Caldwell, C. and Holloway, C. (2017). 'Trust, Faith, and Commitment: A Reasoned Action Approach', *Business and Management Research*. 6(51).

References

Cao, L., Yuan, G., Leung, T. and Zhang, W. (2020) 'Special Issue on AI and FinTech: The Challenge Ahead', *IEEE intelligent systems*, 35(2), pp. 3-6.

Carter, L. and Be´langer, F. (2005). 'The utilization of e-government services: Citizen trust, innovation and acceptance factors', *Information Systems Journal*, 15(1), pp. 5-25.

Carter, L. and Campbell, R. (2011). 'The Impact of Trust and Relative Advantage on Internet Voting Diffusion', *Journal of Theoretical and Applied Electronic Commerce Research*, 6(3), pp. 28 – 42.

Central Bank of Bahrain (CBB). (2019) 'Annual Report of 2019'. Retrieved from: https://www.cbb.gov.bh/wp-content/uploads/2020/06/Annual-Report-2019-englishCBB-Accounts.pdf . Accessed: 11 November, 2021.

Chang, Y., Wong, F., Lee, H. and Jeong, P. (2016) 'What motivates Chinese consumers to adopt FinTech services: A regulatory focus theory', *In Proceedings of the 18th Annual International Conference on Electronic Commerce: E-Commerce in Smart Connected World*, Suwon, Korea, pp. 1–3.

Chang, Y., Wong, S., Lee, H. and Jeong, S. (2016) 'What Motivates Chinese Consumers to Adopt Fintech Services: A Regulatory Focus Theory', *ACM*: New York, NY, USA.

Chen, B. and Pearl, J. (2015) 'Graphical Tools for Linear Structural Equation Modeling', *Technical reports*.

Chen, C. (2013) 'Perceived risk, usage frequency of mobile banking service', *Managing Service Quality: An International Journal*, 23(5), pp. 410 – 436.

Chen, F. (2007) 'Consumer attitudes and purchase intentions in relation to organic foods in Taiwan: Moderating effects of food-related personality traits', *Food Quality and Preference*, 18(7), pp. 1008–1021.

Chen, L., Gillenson, M. and Sherrell, D. (2002) 'Enticing On-line Consumers: An Extended Technology Perspective', *Information and Management*, 39(8), pp: 705-719.

Chen, W., and Hirschheim, R. (2004) 'A paradigmatic and methodological examination of information systems research from 1991 to 2001', *Information systems journal*, 14(3), pp. 197-235.

Cheng, E., Lam, C. and Yeung, L. (2006) 'Adoption of internet banking: An empirical study in Hong Kong', *Decision Support Systems*, 42(3), pp. 1558-1572.

Chenoweth, T., Minch, R. and Gattiker, T. (2009) 'Application of protection motivation theory to adoption of protective technologies', *Proceedings of the 42nd Hawaii International Conference on System Sciences*, pp. 1–10.

Chitungo, K. and Munongo, S. (2013) 'Extending the technology acceptance model to mobile banking adoption in rural Zimbabwe', Journal of Business Administration and Education, (3)1, p.51.

Cho, H. and Lai, W. (2021) 'Analyzing the Influential Factors of O2O Business Using the Technology Acceptance Model', *Review of Integrative Business and Economics Research*, 10(4), pp. 1-17.

References

Choshin, M. and Ghaffari, A. (2017) 'An investigation of the impact of effective factors on the success of e-commerce in small- and medium-sized companies', *Computers in Human Behavior*, 66, pp.67-74.

Chuang, M., Liu, C. and Kao, K. (2016) 'The adoption of fintech service: TAM perspective', *International Journal of Management and Administrative Sciences*, 3(7), pp.1–15.

Clark-Carter, D. (2004) 'Quantitative Psychological Research: A Student‟s Handbook', 1st edition, Psychological Press, Hove and New York.

Cochran, M. (1977) 'A comparison of group day and family child-rearing patterns in Sweden', *Child development*, 48(2), pp.702-707.

Colman, M., and Norris, E. (1997) 'Comparing rating scales of different lengths: equivalence of scores from 5-point and 7-point scales', *Psychological Report*, 80 , pp.355-362.

Consultative Group to Assist the Poor (CGAP). (2019) 'FinTech Landscaping in the Arab World Regional Report'. Retrieved from: https://www.findevgateway.org/sites/default/files/users/user331/CGAP-EY_FintechRegionalReport_ArabWorld_2020.pdf . Accessed: 11 November, 2021.

Cohen, J. (1988) 'Statistical power analysis for the behavioral sciences', (2nd ed.) Hillsdale, NJ: Lawrence Erlbaum Associates.

Coleman, Phil. (2020) 'An Examination of Positivist and Critical Realist Philosophical Approaches to Nursing Research'. 2-1218.

Collis, J. and Hussey, R. (2003) 'Business research: a practical guide for undergraduate and postgraduate students'. 2nd ed. Palgrave macmillan.

Cooper, B. and Zmud, W. (1990) 'Information technology implementation research: a technological diffusion approach', *Management Science*, 36(2), pp. 123-139.

Corporate Finance Institute (CFI). (2021) 'Overview of Banks in Bahrain'. Corporate Finance Institute. Available from: https://corporatefinanceinstitute.com/resources/careers/companies/top-banks-bahrain/ , Accessed: 23 October 2020.

Corritore, L., Kracher, B. and Wiedenbeck, S. (2003) 'On-line trust: concepts, evolving themes, a model', *International Journal of Human - Computer Studies*, 58(6), pp. 737-758.

Creswell, J. and Poth, N. (2017) 'Qualitative inquiry and research design: Choosing among five approaches'. Sage publications.

Creswell, W. (2003) 'Research design: Quantitative, qualitative, and mixed methods approaches', Thousand Oaks, California, Sage Publication, Inc.

Creswell, W. (2007) 'Five Qualitative Approaches to Inquiry'. In J. W. Creswell (Eds.), Qualitative Inquiry and Research Design: Choosing among five Approaches (pp. 53-84). Thousands of Oaks: Sage Publications.

Creswell, W. (2009) 'Research Design Qualitative, Quantitative, and Mixed Methods Approaches' (3rd ed.), Thousand Oaks, CA Sage Publications.

Creswell, W., Ebersohn, L., Eloff, I., Ferreira, R., Ivankova, V., Jansen, D., Nieuwenhuis, J., Pietersen, J. and Clark, P. (2016) 'First steps in research'. 2nd ed. Pretoria: Van Schaik Publishers.

Damanpour, F. and Gopalakrishnan, S. (1998) 'Theories of Organizational Structure and Innovation Adoption: The Role of the Environmental Change', *Journal of Engineering and Technology Management*, 15 (1), pp. 1-24.

Damanpour, F. and Gopalakrishnan, S. (2001) 'The Dynamics of the Adoption of Product and Process Innovations in Organizations', *Journal of Management Studies*, 38 (1), pp. 45-65.

Damanpour, F. and Schneider, M. (2006) 'Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers', *British Journal of Management*, 17 (3), pp. 215-236.

Dan, V. (2018) 'Empirical and non-empirical methods'. *Hoboken*, NJ: Wiley.

Das, R (2019) 'The future of fintech', Financial Management, 48, pp.981-1007.

Daud, A., Farida, A. and Razak, M. (2018) 'Impact of customer trust toward loyalty: the mediating role of perceived usefulness and satisfaction', *Journal of business & retail management research*, 13(2).

Daud, A., Farida, N., Andriyansah. and Razak, M. (2018) 'Impact of customer trust toward loyalty: the mediating role of perceived usefulness and satisfaction', *Journal of Business & Retail Management Research (JBRMR),*13(2), pp. 235-242.

Davis, D. (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of technology', *Management Information Systems Quarterly*, 13(3), pp.319-340.

Davis, D., Bagozzi, P. and Warshaw, R. (1989) 'User acceptance of computer technology; a comparison of two theoretical models', *Management Science*, 35(8), pp. 982-1003.

Dayan, N. and Kromidas, L. (2011) 'Formulating, Packaging, and Marketing of Natural Cosmetic Product'. NY: Wiley.

DePoy, E. and Gitlin, L. N. (2011) 'Introduction to Research: Understanding and Applying Multiple Strategies'. 4th edition, Elsevier Mosby, Missouri.

DePoy, E. and Gitlin, N. (2016) 'Introduction to Research: Understanding and Applying Multiple Strategies'. 5th edition, Elsevier Mosby, Missouri.

Dickerson D. and Gentry W. (1983) 'Characteristics of adopters and non-adopters of home computers', *Journal of Consumer Research*, 10(2), pp.225-235.

Downs, W. and Mohr, B. (1976) 'Conceptual issues in the study of innovation'. *Administrative Science Quarterly*, 21, pp. 700-714.

Du, H. and Tang, C. (2014) 'Study on the Development of O2O E-commerce Platform of China from the Perspective of Offline Service Quality', *International Journal of Business and Social Science*, 5(4), pp. 308-312.

References

Du, W., Pan, S., Leidner, D. and Ying, W. (2019) ‘Affordances, experimentation and actualization of FinTech: A blockchain implementation study’, *Journal of Strategic Information Systems*, 24(4), pp. 55-65.

El-Masri, M., Al-Yafi, K. and Sherif, K. (2019) ‘The Digital Transformation of FinTech: Disruptions and Value Paths', *Electronic Markets*, 28(3), pp. 235-243.

Fan, Y., Chen, J., Shirkey, G., John, R., Wu, S., Park, H. and Shao, C. (2016) ‘Applications of structural equation modeling (SEM) in ecological studies: an updated review’, *Ecological Processes*, 19(5), pp. 110-122.

Featherman, S. and Pavlou, A. (2003) ‘Predicting e-services adoption: A perceived risk facets perspective’, *International Journal of Human-Computer Studies*, 59(4), pp.451-474.

Fishbein, M and Ajzen, I. (1975) ‘Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Reading’, MA: Addison-Wesley.

Finstad, K. (2010) ‘Response Interpolation and Scale Sensitivity: Evidence Against 5-Point Scales’, *Usability Metric for User Experience*, 5(3), pp.104-110.

Fox, M., Martin, P. and Green, G. (2007) ‘Doing Practical Research’. Sage Publication, London.

Freedman, S. and Jin, Z. (2017) ‘The information value of online social networks: Lessons from peer-to-peer lending’, *International Journal of Industrial Organization*, Elsevier B.V., (51), pp. 185–222.

Fry, A., Ryley, T., Thring, R. (2018) ‘The influence of knowledge and persuasion on the decision to adopt or reject alternative fuel vehicles’, *Sustainability*, 10(9), pp. 2997.

Gefen, D., Karahanna, E., and Straub, W. (2003), ‘Inexperience and experience with online Stores: The importance of TAM and Trust’, *IEE Transactions on Engineering Management*, 50(3), pp. 307-321.

Gimpel, H., Rau, D., and Röglinger, M. (2018) 'Understanding FinTech start-ups – a taxonomy of consumer-oriented service offerings', *Electronic Markets*, 28(3), pp. 245-264.

Glass, V., McGaw, B., & Smith, L. (1981) ‘Meta-Analysis in Social Research’, Beverly Hills, CA Sage Publications.

Goel, D. and Jain, K. (2018) ‘Mobile phishing attacks and defence mechanisms: State of art and open research challenges’, *Computers & Security*, (73), pp. 519-544.

Gomber, P., Kauffman, R., Parker, C. and Weber, B. (2018) ‘On the Fintech Revolution: Interpreting the Forces of Innovation’, Disruption, and Transformation in Financial Services', *Journal of management information systems*, 35(1), pp. 220-265.

Gomber, P., Kauffman, R., Parker, C. and Weber, B. (2018) 'Special Issue: Financial Information Systems and the Fintech Revolution', *Journal of Management Information Systems*, 35(1), pp. 12-18.

Govender, I., and Sihlali, W. (2014) ‘A Study of Mobile Banking Adoption among University Students Using an Extended TAM’. *Mediterranean Journal of Social Sciences*, 5(7), pp. 451.

References

Gozman, D., Liebenau, J. and Mangan, J. (2018) 'The Innovation Mechanisms of Fintech Start-Ups: Insights from SWIFT's Innotribe Competition', *Journal of Management Information Systems*, 35(1), pp. 145-179.

Gray, E. (2017) 'Doing Research in the Real World'. 4th edition, Sage Publication. London.

Greenhalgh, T., Robert, G., Bate, P., Macfarlane, F. and Kyriakidou, O. (2005) 'Diffusion of Innovations in Health Service Organisations: A Systematic Literature Review'. Malden, MA: Blackwell Publishing, 82(4), pp. 581–629.

Gregor, S. (2006) 'The Nature of Theory in Information Systems', *MIS Quarterly*, 30 (3), pp. 611-642.

Gregory, D., Paul, B., and Dennis, F. (2017) 'It's complicated: explaining the relationship between trust, distrust, and ambivalence in online transaction relationships using polynomial regression analysis and response surface analysis', *European Journal of Information Systems*, 26(4), pp.379-413.

Guo, J., Pan, J., Guo, J., Gu, F., and Kuusisto, J. (2019) 'Measurement framework for assessing disruptive innovations', *Technological Forecasting & Social Change, Elsevier*,139, pp. 250-265.

Gupta, K. and Singh, N. (2015), 'Fit Estimation in Structural Equation Modeling – A Synthesis of Related Statistics', *HSB Research Review*, 8(2), pp. 20-27

Hai, H. (1998) 'Organizational Predisposition toward and Information Technology Innovation: The Roles of Three Theoretical Perspectives in the Case of Financial Electronic Data Interchange. Singapore: Department of Computer Science and Information Systems', National University of Singapore.

Hair, F., Anderson, E., Babin, J., and Black, C. (2010) 'Multivariate data analysis: A global perspective'. *Upper Saddle River*, NJ: Pearson.

Hall, P. (1986). On the bootstrap and confidence intervals. *Annals of Statistics*, 14, pp. 1431–1452.

Hallikainen, H. and Laukkanen, T. (2018) 'National culture and consumer trust in e-commerce'. *International Journal of Information Management*. 38. pp. 97-106.

Hanafizadeh, P., Behboudi, M., Abedini, A. and Jalilvand, M. (2014) 'Mobile-banking adoption by Iranian bank clients', *Telematics and Informatics*, 31(1), pp. 62-78.

Hanafizadeh, P., Keating, W. and Khedmatgozar, R. (2014) 'A systematic review of Internet banking adoption', *Telematics and Informatics*, 31, (3), pp.492–510.

Hofstede, G. (1989) 'Organising for cultural diversity'. *The European Management Journal*, 7, pp.390–397.

Hardgrave, B., Davis, F., and Riemenschneider, C. (2003). Investigating Determinants of Software Developers' Intentions to Follow Methodologies. *Journal of Management Information Systems*, 20(1), pp.123-151.

Harper, A., Mustafee, N. and Yearworth, M. (2021) 'Facets of trust in simulation studies', *European journal of operational research*, 289(1), pp.197-213.

Herath, T. and Rao, R. (2009) 'Protection motivation and deterrence: a framework for security policy compliance in organisations', *European Journal of Information Systems*, 18 (2), pp. 106–125.

Hernand, B., Jiménez, J. and Martín, J. (2009) 'Customer behavior in electronic commerce: The moderating effect of e-purchasing experience', *Journal of Business Research,* 63, pp. 964–971.

Hernandez, M. and Mazzon J. (2006) 'Adoption of Internet Banking: proposition and implementation of an integrated methodology approach', *International Journal of Bank Marketing*, 25 (2), pp.72-88.

Holden, T. and Lynch, P. (2004) 'Choosing the appropriate methodology: Understanding research philosophy', *The Marketing Review*, 4(4), pp:397- 409.

Holmes-Smith, P., Cunningham, E., and Coote, L (2006) 'Structural Equation Modelling: From the fundamentals to advanced topics', *School Research*, Evaluation and Measurement Services, Education and Statistics Consultancy, Statsline.

Honolulu, H. (2014) 'The Institute for Business and Finance Research', *Global Conference on Business and Finance Proceedings*, 9 (1), pp.1-392

Hooper, D., Coughlan, J. and Mullen, M. (2008) 'Structural Equation Modeling: Guidelines for Determining Model Fit', *The Electronic Journal of Business Research Methods*, 6(1), pp.53-60.

Hornbæk, K., and Hertzum, M. (2017) 'Technology Acceptance and User Experience: A Review of the Experiential *Component in HCI'. A C M Transactions on Computer - Human Interaction*, 24(5).

Hourahine, B. and Howard, M. (2004) 'Money on the move: Opportunities for financial service providers in the third space', *Journal of Financial Services Marketing*, 9, pp. 57-67

Hox, J. (2011) 'Structural Equation Modelling in Marketing – Part 1: Introduction and Basic Concepts', The SAGE Dictionary of Quantitative Management Research London: SAGE Publications Ltd.

Hox, J., and Bechger, T. (1998) 'An introduction to structural equation modelling', *Family Science Review*, (11), pp: 354-373.

Hsu, L. and Lin, C. (2015) 'What drives purchase intention for paid mobile app?: An expectation confirmation model with perceived value'. *Electronic Commerce Research and Applications*, 14(1), pp.46 – 57.

Hsun-Kan, C. and Wen-Hsiang, L. (2021) 'Analyzing the Influential Factors of O2O Business Using the Technology Acceptance Model', *Review of Integrative Business and Economics Research*, 10(4), pp. 1-17.

Hu, L. and Bentler, P. (1999) 'Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives', *Structural Equation Modelling*, (6), pp.1–55.

Hu, Z., Ding, S., Li, S., Chen, L. and Yang, S. (2019) 'Adoption Intention of Fintech Services for Bank Users: An Empirical Examination with an Extended Technology Acceptance Model', *Symmetry*, 11(3), pp. 1–16.

Huang, K., Qiu, X., Shen, P. and Wang, Y. (2020) 'Reconciling enumerative and deductive program synthesis', *In Proceedings of the 41st ACM SIGPLAN Conference on Programming Language Design and Implementation*, pp.1159-1174.

Hubert, M., Blut, M., Brock, C., Zhang, W., Koch, V. and Riedl, R. (2019) 'The influence of acceptance and adoption drivers on smart home usage', *European Journal of Marketing*, 53(6), pp. 1073-1098.

References

Hübner, J., Vuckovac, D., Fleisch, E. and Ilic, A. (2019) 'Fintechs and the New Wave of Financail Intermediaries' *Pacific Asia Conference on Information Systems (PACIS).* China.

Hutahaean, R., Cristine, R., Sitompul, P., Situmeang, F. and Situmeang, R. (2019) 'The Influence of Prestige in Innovation Adoption', *Journal of Physics: Conference Series.*

Hyde, K. (2000) 'Recognizing deductive processes in qualitative research', *Qualitative Market Research: An International Journal*, 3(2), pp. 82-90.

Iacobucci, D. (2010) 'Structural equations modeling: Fit indices, sample size, and advanced topics'. Sample Size, and Advanced Topics. *Journal of Consumer Psychology,* 20(1), pp.90–98.

Ifinedo, P (2012). 'Understanding information systems security policy compliance: An integration of the theory of planned behavior and the protection motivation theory', *Computers & Security,* 31(1), pp. 83–95.

Igbaria, M. and Iivari, J. (1995) 'The effects of self-efficacy on computer usage', Omega, 23 (6), pp.587–605.

Iluba, E. and Phiri,J. (2021) 'The FinTech Evolution and Its Effect on Traditional Banking in Africa—A Case of Zambia'. *Open Journal of Business and Management*, 9, pp.838-850.

Im, S., Bayus, L. and Mason, C. (2003) 'An Empirical Study of Innate Consumer Innovativeness, Personal Characteristics, and New-Product Adoption Behavior'. *Journal of the Academy of Marketing Science*, 31(1), pp. 61–73.

Inglehart, R. and Norris, P. (2016) 'Trump, Brexit, and the rise of populism: Economic have-nots and cultural backlash', *HKS Working*, pp.16-26

Inouye, J. (2014) 'Risk perception: theories, strategies, and next steps', *Campbell Institute National Safety Council:* Itasca, IL, USA.

International Data Corporation (IDC). (2020) 'Fintech Rankings Top 100'. Retrieved from: https://www.idc.com/prodserv/insights/#financial-fintech_rankings , Accessed: 23 October 2020.
Jain, A., Parashar, S., Katare, P. and Sharma, I. (2020) 'A Content based Approach to Escape Phishing Attacks', *Procedia computer science,* 171, pp. 1102-1109.

Jansen, J. and Schaik, P. (2017) 'Comparing three models to explain precautionary online behavioural intentions', *Information and Computer Security*, 25(2), pp. 165-180.

Janssens, W., Wijnen, K., Pelsmacker, D. and Kenhove, V. (2008) 'Marketing Research with SPSS'. Essex: Pearson Education.

Jian, M., Dong-Hee, S. and Jason, C. (2017) 'Understanding trust and perceived usefulness in the consumer acceptance of an e-service: a longitudinal investigation', *Behaviour and Information Technology*, 36(2), pp.125-139

Jin, X., Fiore, M., Civerolo, K., Bi, J., Liu, Y., Van Donkelaar, A., Martin, V., Al-Hamdan, M., Zhang, Y., Insaf, Z., Kioumourtzoglou, M., He, Z. and Kinney, L. (2019) 'Comparison of multiple PM 2.5 exposure products for estimating health benefits of emission controls over New York State', USA IOP. *Publishing. Environmental Research Letters*. (14)

References

John, E. and Nwekemezie, O. (2019). 'Effect of Financial Intermediation on Economic Development of Nigeria', *Journal of Economics and Finance*, 10 (1), pp. 23- 32.

Johnston, C. and Warkentin, M. (2010). 'Fear appeals and information security behaviors: an empirical study'. *MIS Quarterly*. 34 (3), pp. 549–566.

Jolita, V. (2018) 'Philosophy and Paradigm of Scientific Research,' Chapters, in: Pranas, Z., Jolita, V. and Regina, A. (ed.), Management Culture and Corporate Social Responsibility, IntechOpen.

Joo, J. (2016) 'Understanding Acceptance of Fintech Service in Korea: Focused on Decomposed TPB into TAM', *Journal of Digital Convergence*, 15(4), pp. 171-179

Jöreskog, K. and Sörbom, D. (1984) 'LISREL-VI user's guide'. 3rd Edition, IN: Scientific Software, Mooresville.

Kaplan, R. and Mikes, A. (2016) 'Risk Management—the Revealing Hand', *Working Paper*, 16(102). pp. 1-26.

Kowalewski, O., Jackowicz, K.. and Kozłowski, L. (2021) 'Foreign Bank Lending: The Role of Home Country Culture During Prosperous and Crisis Periods', *SSRN Electronic Journal*.

Kelley, H. (1973) 'The processes of causal attribution', *American Psychologist*, 28(2), pp. 107-128.

Kerényi, Á., Molnár, J. and Müller, J. (2018) 'Bank and Fintechs. Economy and Finance: English Language Edition of Gazasag', 5(1), pp. 86-97.

Kesharwani, A. and Singh, S. (2012) 'The Impact of Trust and Perceived Risk on Internet Banking Adoption in India', *The International Journal of Bank Marketing*, 30(4), pp. 303-322.

Khedmatgozar, R. and Shahnazi, A. (2018) 'The Role of Dimensions of Perceived Risk in Adoption of Corporate Internet Banking by Customers in Iran'. *Electronic Commerce*, 18(2), pp. 389–412.

Khwaja, G. and Zaman, U. (2020) 'Configuring the Evolving Role of eWOM on the Consumers Information Adoption', *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 125.

Kim, C., Mirusmonov, M., and Lee, I. (2010) 'An empirical exam- ination of factors influencing the intention to use mobile payment'. *Computers in Human Behavior*, 26(3), pp.310–322.

Kim, G., Shin, B. and Lee, G. (2009) 'Understanding dynamics between initial trust and usage intentions of mobile banking', *Information Systems Journal*, 19(3), pp. 283- 311.

Kim, J. (2016) 'An extended technology acceptance model in behavioral intention toward hotel tablet apps with moder- ating effects of gender and age'. *International Journal of Contemporary Hospitality Management*, 28(8), pp.1535–1553.

Kim, K. and Prabhakar, B. (2000) 'Initial trust, perceived risk, and the adoption of internet banking'. In Proceedings of the 21st International Conference on Information Systems, Brisbane, QLD, Australia, pp: 537-543.

Kim, Y. (2013) 'Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis', *Restorative dentistry and endodontics*, 38(1), pp: 52–54.

Kim, Y., Park, J., Choi, J. and Yeon, J. (2015) 'An Empirical Study on the Adoption of 'Fintech' Service: Focused on Mobile Payment Services', *Advanced Science and Technology Letters*, 114 (26), pp. 136-140.

Kline, B. (1998) 'Principles and Practice of Structural Equation Modelling'. New York: The Guilford Press.

Kline, B. (2011) 'Convergence of structural equation modelling and multilevel modelling'. In: M. Williams & W. P. vogt, eds. Handbook of methodological innovation. Thousand Oaks: Sage, pp. 562-589.

Koening-Lewis, N., Plamer, A. and Moll, A. (2010) 'Predicting young consumers' take up of mobile banking services', *International Journal of Bank Marketing*, 28(5), pp. 410-432.

Koksal, H. (2016) 'The Intentions of Lebanese Consumers to Adopt Mobile Banking', *International Journal of Bank Marketing*, 34 (3), pp. 327–346.

Kolesova, V. and Girzheva S. (2018) 'Impact of Financial Technologies on the Banking Sector', *KnE Social Sciences*, 3(2), pp. 215- 220.

Kotarba, M. (2016) 'New Factors Inducing Changes in the Retail Banking Customer Relationship Management (CRM) and Their Exploration by the Fintech Industry', *Foundations of Management*, 8(1), pp. 69-78.

Kowalski, M. (2020) 'Towards an Asian Model of Clusters and Cluster Policy: The Super Cluster Strategy', *Journal of Competitiveness*, 12(4), pp.74–90

KPMG (2019) 'Regulation and supervision of fintech', *KPMG International*

Kuhn, S. (1970) 'The Structure of Scientific Revolutions'. 2nd edition, University of Chicago Press, Chicago.

Kuo, C., Roldan-Bau, A. and Lowinger, R. (2015) 'Psychological Help-Seeking among Latin American Immigrants in Canada: Testing a Culturally-Expanded Model of the Theory of Reasoned Action Using Path Analysis', *International Journal for the Advancement of Counselling*. 37(2), pp. 179-197

Kutler, J. (1993) 'Citibank is shedding individualistic image'. *Am Bank*, Available at: https://www.americanbanker.com/opinion/friday-flashback-did- citi-coin-the-term-fintech Accessed: 30 0ctober, 2020

Laukkanen, T. and Kiviniemi, V. (2010) 'The role of information in mobile banking resistance', *International Journal of Bank Marketing*, 28(5), pp. 372-388.

Lawson-Body, A., Illia, A., Willoughby, L. and Lee, S. (2014) 'Innovation characteristics influencing veterans' adoption of e-government services', *Journal of Computer Information Systems*, 54(3), pp. 34-44.

Lee, C. (2009) 'Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefits', *Electronic Commerce Research and Applications*, 8(3), pp. 130-141.

References

Lee, H., Hsieh, C. and Hsu, N. (2011) ‘Adding innovation diffusion theory to the technology acceptance model. Supporting employees’ intentions to use e-learning systems’, *Educational Technology and Society*, 14(4), pp. 124-137.

Lee, H., Hsieh, C., and Hsu, N. (2011) ‘Adding Innovation Diffusion Theory to the Technology Acceptance Model: Supporting Employees' Intentions to use E-Learning Systems’. *Educational Technology & Society*, 14 (4), pp.124–137.

Lee, H., Hsieh, C., and Hsu, N. (2011) ‘Adding innovation diffusion theory to the technology acceptance model: Supporting employees’ intentions to use e-learning systems’. *Journal of Educational Technology & Society*, 14(4), pp.124–137

Lee, I. and Shin, J. (2018) 'Fintech: Ecosystem, business models, investment decisions, and challenges', 1(61), pp. 35-46.
Lee, J., Lee, N., and Tan, C. (2015) ‘Antecedents of cognitive trust and affective distrust and their mediating roles in building customer loyalty’, *Information Systems Frontiers*, 17(1), pp. 159-175.

Lee, O. and Turban, A. (2001) ‘Trust Model for Consumer Internet Shopping’, *International Journal of Electronic Commerce*, 6(1), pp.75–91.

Lee, W. (2018) ‘Understanding Consumer Acceptance of Fintech Service: An Extension of the TAM Model to Understand Bitcoin’, *Journal of Business and Management*, 20 (7), pp: 34-37

Legris, P., Ingham, J., and Collerette, P. (2003) ‘Why do people use information technology? A critical review of the technology acceptance model’, *Information and Management*, 40(3), pp. 191–204.

Leong, C., Tan, B., Tan, C., Xiao, X. and Sun, Y. (2017) 'Nurturing a FinTech ecosystem: The case of a youth microloan startup in China', *International Journal of Information Management*, 37(2), pp. 92-97.

Lewis, D., and Weigert, A. (1985) ‘Trust as a Social Reality’, *Social Forces*, 63(4), pp: 967–985.

Li, Y., Spigt, R. and Swinkels, L. (2017) ’The impact of FinTech start-ups on incumbent retail banks’ share prices’, *Financial Innovations*, 3(26).

Liébana-Cabanillas, F., Sánchez-Fernández, J. and Muñoz-Leiva, F. (2014) ‘Antecedents of the adoption of the new mobile payment systems: The moderating effect of age’. *Computers in Human Behavior*. 35. pp. 464-478.

Liébana-Cabanillas, F., Sánchez-Fernández, J., and Munoz-Leiva, F. (2014) ‘The moderating effect of experience in the adoption of mobile payment tools in Virtual Social Networks: The m-Payment Acceptance Model in Virtual Social Networks’, *International Journal of Information Management*, 34(2), pp. 151-166.

Lien, K., Doan, T., and Bui, N. (2020) ‘Fintech and Banking: Evidence from Vietnam’. The Journal of Asian Finance, *Economics and Business*, 7(9), pp. 419–426.

Li-Jun, J. and Megan, K. (2013) 'Judgement and Decision Making across Cultures', *Advances in Psychological Science*, 21(3), pp. 381-388.

Lim, H., Sia, L., Lee, K., and Benbasat, I. (2006) 'Do I Trust You Online, and If So, Will I Buy? An Empirical Study of Two Trust-Building Strategies', *Journal of Management Information Systems*, 23(2), pp.233-266.

Lin, F., Fofanah, S. and Liang, D. (2011) 'Assessing citizenadoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success'. *Government Information Quarterly*, 28(2), pp. 271-279.

Lin, H., Wang, M. and Chen, H. (2019) 'Determinants for Consumer Adoption of Mobile Payment Technology', *International Journal of e-Education, e-Business, e-Management and e-Learning*. 9. pp. 146-159.

Lin, J., Wang, B., Wang, N. and Lu, Y. (2014) 'Understanding the evolution of consumer trust in mobile commerce: A longitudinal study', *Information Technology and Management*, 15(1), pp. 37-49.

Lindell, K. and Whitney, J. (2001) 'Accounting for common method variance in cross-sectional research designs', *Journal of Applied Psychology*, 86 (1), pp. 114-121

Lishomwa, L. and Phiri, J. (2020) 'Adoption of Internet Banking Services by Corporate Customers for Forex Transactions Based on the TRA Model'. *Open Journal of Business and Management*, 8, pp. 329-345.

Little, A. and Rubin, B. (1987) 'Statistical Analysis with Missing Data'. New York: John Wiley and Sons.

Liu, G., Huang, S. and Zhu, X. (2008) 'User acceptance of internet banking in an uncertain and risky environment', *Proceedings of the 2008 International Conference on Risk management and Engineering Management*, IEEE, pp. 381-386.

Lou, F. and Li, Y. (2017) 'Integrating innovation diffusion theory and the technology acceptance model: The adoption of blockchain technology from business managers' perspective. *In Proceedings of The 17th International Conference on Electronic Business*, pp. 293-296.

Lu, Y., Zhao, L., and Wang, B. (2010) 'From virtual community members to C2C e-commerce buyers: Trust in virtual communities and its effect on consumers' purchase intention'. *Electronic*

Luo, X. Li, H. Zhang, J and Shim, J.P. (2010) 'Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services', *Decision Support Systems*, pp.1-14.

Lynn T., Mooney J., Rosati P., Cummins, M. (eds) Disrupting Finance. Palgrave Studies in Digital Business & Enabling Technologies. Palgrave Pivot, Cham.

Lyytinen, K. and Damsgaard, J. (2001) 'What's wrong with the diffusion of innovation theory: The case of a complex and networked technology. M. A. Ardis, B. L. Marcolin, eds. *Diffusing Software*.

Mahajan, V., Muller, E., and Bass, M. (1990) 'New Products Diffusion Models in Marketing: A review and Directions for Research.' *Journal of Marketing*, 54, pp. 1-26.

Malaquias, F. and Hwang, Y. (2016) An Empirical Study on Trust in Mobile Banking: A Developing Country Perspective. *Computers in Human Behavior*, 54, pp: 453–461.

References

Malaquias, F. and Hwang, Y. (2019) 'Mobile banking use: A comparative study with Brazilian and U.S. participants', *International journal of information management*, 44, pp.132-140.

Malaquias, F. and Hwang, Y. (2019) 'Mobile banking use: A comparative study with Brazilian and U.S. participants', *International journal of information management*, 44, pp. 132-140.

Malaquias, O. and Hwang, Y. (2018) 'An Empirical Investigation on Disclosure about Mobile Banking on Bank Websites', *Online Information Review*, 42(5), pp.615–629.

Malaquiasa, R. and Hwang, Y. (2019) 'Mobile banking use: A comparative study with Brazilian and U.S. participants', *International Journal of Information Management*, 44, pp. 132-140.

Malhotra, N. and Peterson, M. (2006) 'Basic Marketing Research: A Decision-Making Approach' (2nd edn). New Jersey: Prentice Hall.

Malle, F., and Ullman, D. (2021) 'A multi-dimensional conception and measure of human-robot trust'. In C. S. Nam and J. B. Lyons (eds.), Trust in human-robot interaction: research and applications. *Elsevier*. pp: 3-25.

Marija H., Marina, J and Anita F. (2015) 'The role of subjective norms in forming the intention to purchase green food', Economic Research-Ekonomska Istraživanja, 28(1), pp.738-748

Markus, L. and Robey, D. (1988) 'Information Technology and Organizational change: Causal Structure in Theory and Research' *Management Science*, 34(5), pp. 583–598.

Martínez, P. and Bosque, I. (2013). 'CSR and customer loyalty: The roles of trust, customer identification with the company and satisfaction', *International Journal of Hospitality Management*, 35, pp. 89-99.

Matthews, B. and Ross, L. (2010) 'Research Methods: A Practical Guide for the Social Science'. Pearson's Educational Limited, Harlow.

Matell, S. and Jacoby, J. (1971) 'Is there an optimal number of alternatives for Likert scale items? Study 1: reliability and validity', *Educational and Psychological Measurement*, 31, pp. 657-674

Mcknight, H. and Chervany, L. (2001) 'What Trust Means in E-Commerce Customer Relationships: An Interdisciplinary Conceptual Typology', *International Journal of Electronic Commerce*, 6(2), pp. 35–59.

Merolli, M., Sanchez, M. and Gray, K. (2014) 'Social media and online survey: tools for knowledge management in health research', *In Proceedings of the Seventh Australasian Workshop on Health Informatics and Knowledge Management, Australian Computer Society*, Inc.,153(4), pp. 21-29.

Meyliana, M., Fernando, E. and Surjandy, S. (2019) 'The Influence of Perceived Risk and Trust in Adoption of FinTech Services in Indonesia', *Communication and Information Technology Journal*, 13(1), pp. 31–37

Micu, I., and Micu, A. (2016) 'Financial Technology (Fintech) And Its Implementation On The Romanian Non-Banking Capital Market'. *SEA-Practical Application of Science*, (11), pp.379-384.

Mihardjo, L., Sasmoko, S., Alamsjah, F. and Djap, E. (2019) 'The influence of digital leadership on innovation management based on dynamic capability: Market orientation as a moderator', *Management Science Letters*, 9(10), pp.1059-1070.

Milian, E., Spinola, M. and Carvalho, M. (2019) ‘Fintechs: A Literature Review and Research Agenda’, *Journal of Electronic Commerce Research and Applications*. 34.

Milne, S., Sheeran, P., Orbell, S. (2000) ‘Prediction and intervention in health-related behavior: A meta-analytic review of protection motivation theory’, *Journal of Applied Social Psychology*, 30(1), pp. 106–143.

Min, S., So, F. and Jeong, M. (2019) 'Consumer adoption of the Uber mobile application: Insights from diffusion of innovation theory and technology acceptance model', *Journal of travel and tourism marketing*, 36(7), pp. 770-783.

Mingers, J. (2003) ‘The paucity of multi-method research: A review of the information systems literature’, *Information Systems Journal*, 13(3), pp. 233-249.

Moghaddam, R. and Salehi, S. (2010) ‘Agricultural specialists’ intention toward precision agriculture technologies: Integrating innovation characteristics to technology acceptance model’, *African Journal of Agricultural Research*, 5(11), pp. 1191-1199.

Mohamed, Y. and Jokonya, O. (2021) 'Factors affecting the adoption of technologies to improve fleet safety management', *Procedia computer science*, 181, pp. 1011-1017.

Moody, D., Lowry, B. and Galletta. F. (2017) ‘It’s complicated: explaining the relationship between trust, distrust, and ambivalence in online transaction relationships using polynomial regression analysis and response surface analysis’, *European Journal of Information Systems*, 26, pp. 379–413.

Moore, C. and Benbasat, I. (1991) 'Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation', *Information Systems Research*, 2(3), pp. 192-222.

Morgan, J., Huang, B., and Trinh, Q. (2019) ‘The need to promote digital financial literacy for the digital age’, In Realizing education for all: In the digital age’, Tokyo, Japan: JICA and ADBI, pp. 40-46.

Morgan, M., and Hunt, D. (1994). ‘The commitment-trust theory of relationship Marketing’, *Journal of Marketing*, 58(3), pp. 20-38.

Morosan, C. and DeFranco, A. (2014) ‘When tradition meets the new technology: An examination of the antecedents of attitudes and intentions to use mobile devices in private clubs’. *International Journal of Hospitality Management*, 42, pp.126–136

Mou, J. and Cohen, J. (2014). ‘A longitudinal study of trust and perceived usefulness in consumer acceptance of an eservice: The case of online health services’. *Proceedings - Pacific Asia Conference on Information Systems, PACIS*.

Mou, J., Shin D. and Cohen, J. (2017) ‘Understanding trust and perceived usefulness in the consumer acceptance of an e-service: a longitudinal investigation, Behaviour & Information Technology’, *Journal of Behaviour and Information Technology*, 36(2), pp. 125-139.

Muk, A. and Chung, C. (2015). ‘Applying the technology acceptance model in a two-country study of SMS advertising’, *Journal of Business Research*, 68(1), pp.1-6.

Mulaik, A., James, R., Van Alstine, J., Bennett, N., Lind, S. and Stilwell, D. (1989). ‘Evaluation of goodness-of-fit indices for structural equation models’, *Psychological Bulletin*, 105(3), pp. 430–445.

Mundra, N. and Mishra, R. (2020) 'Impediments to Lean Six Sigma and Agile Implementation: An interpretive structural modeling', *Materials Today*, 28 (4), pp. 2156-2160.

Muñoz-Leiva, F., Climent-Climent, S. and Liébana-Cabanillas, F. (2017) 'Determinants of intention to use the mobile banking apps: An extension of the classic TAM model', *Spanish Journal of Marketing - ESIC*, 21(1), pp. 25-38.

Mutahar, A., Daud, N., Ramayah, T., Isaac, O. and Alrajawy, A. (2017) 'Examining the Intention to Use Mobile Banking Services in Yemen: An Integration Perspective of Technology Acceptance Model (TAM) with Perceived Risk and Self-Efficacy - The Moderating Effect of Income', *Asian Journal of Information Technology*, 16 (5), pp. 298-311.

Mutahar, A., Daud,N., Ramayah,T., Isaac, O. and Alrajawy, A. (2017) 'Integration of Innovation Diffusion Theory (IDT) and Technology Acceptance Model (TAM) to Understand Mobile Banking Acceptance in Yemen: The Moderating Effect of Income', *International Journal of Soft Computing*, 12 (3), pp. 164-177.

Mutuku, R. (2019) 'Relative Advantage, Perceived Usefulness and Social Influence are the main precursors that drive adoption of e-government among the Youth in Kenya', *International Journal of Humanities & Social Science Studies*, 4(2), pp. 94-121.

Namahoot, K. and Laohavichien, T. (2018) 'Assessing the intentions to use internet banking: The role of perceived risk and trust as mediating factors', *The International Journal of Bank Marketing*. 36. pp. 256–276.

Neumann, J. (1955) 'The impact of recent developments in science on Economy and on Economics'. Speech to the National Planning Association. Washington DC: Pergamonn Press.

Nguyen, A., Gardner, L. and Sheridan, D. (2019) 'Towards Ontology-Based Design Science Research for Knowledge Accumulation and Evolution', *Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS)*, 2(6), pp.5755 – 5764.

Nicolaou, I. and McKnight, H. (2006) 'Perceived information quality in data exchanges: E_ects on risk, trust, and intention to use. Information Systems Research', 17, pp. 332–351.

Niehaves, B. and Bernd, C. (2006) 'Criticality, epistemology and behaviour vs. Design –information systems research across different sets of paradigms', *ECIS Proceedings*, 166.

Nkoyi, A., Tait, M. and der Walt, F. (2019) 'Predicting the attitude towards electronic banking continued usage intentions among rural banking customers in South Africa', *South African Journal of Information Management*, 21(1), pp. e1-e8.

Nolan, L. (1973) 'Managing the Computer Resource: A Stage Hypothesis.' *Communications of the ACM*, 16(7), pp. 399-405.

Nolan, L. (1979) 'Managing the crisis in data processing.' Harvard Business Review, pp: 115-126.

Nunnally, J. (1967) 'Psychometric theory', New York: McGraw-Hill.

Olushola, T. and Abiola, J. (2017) 'The Efficacy of Technology Acceptance Model: A Review of Applicable Theoretical Models in Information Technology Researches' *Journal of Research in Business and Management*, 4(11), pp. 70-83.

Orlikowski, J. and Baroudi, J. (1991) 'Studying information technology in organizations: research approaches and assumptions', *Information Systems Research*, 2(1), pp. 1-28.

Osborne, W. (2015) 'What is Rotating in Exploratory Factor Analysis?' *Practical Assessment, Research, and Evaluation*, 20(2).

Oshodin, O., Molla, A., Karanasios, S. and Ong, C. (2019) 'How do FinTechs Develop Capabilities? Towards a Model of FinTech Capability Development', *Twenty-Third Pacific Asia Conference on Information Systems*, China.

Oxford Business Group (OBG). (2021) 'Banking reforms and technology boosts financial inclusion in Bahrain'. Available from: https://oxfordbusinessgroup.com/overview/bright-future-new-regulatory-reforms-and-advancing-financial-technologies-encourage-growth-and; Accessed: 13 March 2021.

Ozen, O. (2018) 'Investigation of the critical factors affecting e-government acceptance: a systematic review and conceptual model', *Innovative journal of business and management, IJBM*, 7(3), pp. 77-84.

Pahnila, S., Siponen, M., and Mahmood, A. (2007) 'Which factors explain employees' adherence to information security policies? An empirical study', *Proceedings of the PACIS*, Auckland, New Zealand.

Pahnila, S., Siponen, M., Mahmood, A. (2007) 'Employees' Behavior Towards IS Security Policy Compliance', *Proceedings of 2007 Hawaii International Conference on System Sciences*.

Pallant, J. (2010) 'SPSS survival manual: A step by step guide to data analysis using SPSS', Maidenhead: Open University Press/McGraw-Hill.

Pallant, J. (2016) 'SPSS survival manual: A step by step guide to data analysis using SPSS program' (6th ed.). London, UK: McGraw-Hill Education.

Pankaj, P., Hyde, M. and A. Rodger, J. (2012) 'P2P Business Applications: Future and Directions', *Communications and Network*, 4(3), pp. 248-260.

Park, Y. and Chen, J. (2007) 'Acceptance and Adoption of the innovation use of the smartphone.' Ind Manage. Data Syst., 107, pp. 1349- 1365.

Pauwels, K., Imran, C., Marnik G., Dekimpe, E., Ghysels, D., Hanssens, M., Natalie M. and Prasad N. (2004) 'Modeling Marketing Dynamics by Time Series Econometrics', *Marketing Letters*, 15(4), pp. 167–83.

Pechmann, C., Goldberg, M., Reibling, E. (2003) 'What to convey in antismoking advertisements for adolescents: The Use of protection motivation theory to identify effective message themes', *Journal of Marketing*, 67(2), pp. 1–18.

Pişkin, M. and Kuş, M. (2019) 'Islamic Online P2P Lending Platform', *Procedia Computer Science*, 158, pp. 415-419.

Pope, G. and Sydnor, R. (2011) 'What's in a Picture? Evidence of Discrimination from Prosper.com', *The Journal of Human Resource*, 46(1), pp. 53–92.

Porter, E and Donthu, N. (2006) 'Using the technology acceptance model to explain how attitudes determine internet usage: The role of perceived access barriers and demographics', *Journal of Business Research*, 59(9), pp. 999-1007.

Preacher, J., Wichman, L., MacCallum, C. and Briggs, E. (2008) 'Latent growth curve modelling', Thousand Oaks, California: Sage.

Premkumar, G., Ramamurthy, K. and Nilakanta, S. (1994) 'Implementation of Electronic Data Interchange: An Innovation Diffusion Perspective', *Journal of Management Information Systems*, 11(2), pp. 157-187.

Prentice-Dunn, S., Mcmath, B., and Cramer, R. (2009) 'Protection motivation theory and stages of change in sun protective behavior', *Journal of Health Psychology*, 14.

Priem, S., and Carr, C. (2012) 'Insights and New Directions from Demand-Side Approaches to Technology Innovation, Entrepreneurship, and Strategic Management Research', *Journal of Management*, 38(1), pp. 346–374.

Punch, F. (2000) 'Developing Effective Research Proposals'. Sage Publication, Thousand Oaks, CA.
Puschmann, T. (2017) 'Fintech," Business & Information Systems Engineering', *The International Journal of WIRTSCHAFTSINFORMATIK*, Springer, 59(1), pp 69-76.

Qasem M., Abdullah, R., Yaha, Y. and Atana R. (2020) 'Continuance Use of Cloud Computing in Higher Education Institutions: A Conceptual Model', *Applied Sciences*. 10(19), pp.6628.

Rajesh, S. and Rajhans, M. 'A Review of Evolution of Theories and Models of Technology Adoption' The Indore Management Journal, 6 (2), pp:17-29.

Raza, A., Urner, A. and Shah, N. (2017) 'New determinants of ease of use and perceived usefulness for mobile banking adoption', *International Journal of Electronic Customer Relationship Management*, 11(1), pp.44-65.

Razzaque, A., Cummings, R., Karolak, M. and Hamdan, A. (2020) 'The Propensity to Use FinTech: Input from Bankers in the Kingdom of Bahrain', *Journal of Information & Knowledge Management (JIKM)*, 19(0), pp. 1-22.

Renaud, K. and Van Biljon, J. (2008) 'Predicting technology acceptance and adoption by the elderly: a qualitative study', *Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists*, Wilderness, South Africa, 6(8), pp. 210-219.

Richardson H. and Robinson B. (2007) 'The mysterious case of the missing paradigm: A review of critical information systems research 1991-2001', *Information Systems Journal*, 17(3), pp: 251- 270.

Rindfleisch, A., Malter, J., Ganesan, S. and Moorman, C. (2008) 'Cross-sectional versus longitudinal survey research: Concepts, findings, and guidelines', *Journal of marketing research*. 45(3), pp.261-279.

Robbins, B. (2016) 'What is Trust? A Multidisciplinary Review, Critique, and Synthesis', *Sociology Compass*. 10(10), pp: 972-986.

Robson, C. (2002) Real word research. Oxford: Blackwell.

Rogers, E. M. and Shoemaker, F. (1971). Communication of Innovations. The Free Press, New York.

Rogers, M. (1983). Diffusion of Innovations. 3rd edition, The Free Press, New York.

Rogers, M. (1995). Diffusion of Innovations. 4th edition, The Free Press, New York.

Rogers, M. (2002) 'Diffusion of preventive innovations'. *Addictive Behaviors*, 27(6), pp. 989 – 993.

Rogers, M. (2003), 'Diffusion of Innovations'. 5th ed. New York, NY: Free Press.

Rogers, W. (1975) ‘A protection motivation theory of fear appeals and attitude change’, *Journal of Psychology*, 91(1), pp: 93–114.

Rosenthal, R. (1991) ‘Meta-analytic Procedures for Social Research’, Revised edition, Sage Publication.

Ryan, G. (2018) ‘Introduction to positivism, interpretivism and critical theory’, *Nurse Researcher*, 25(4), pp. 41–49.

Ryu, H. (2018) ‘Understanding Benefit and Risk Framework of Fintech Adoption: Comparison of Early Adopters and Late Adopters’, *Proceedings of the 51st Hawaii International Conference on System Sciences*, pp. 3864 -3873.

Ryu, H. and Ko, S. (2020) 'Sustainable Development of Fintech: Focused on Uncertainty and Perceived Quality Issues', *Sustainability (Basel, Switzerland)*, 12(18), pp. 7669.

Salehi, S. and Rezaei-Moghaddam, K. (2009) ‘Application of Structural Equation Modeling to Analysis Attitude and Intention to Use of Variable Rate Technologies in Tillage’, *Journal of. Development and Agricultural Economics*, 40(2), pp. 51-64.

Salunke, S., Weerawardena, J. and McColl-Kennedy, R. (2011) ‘Towards a model of dynamic capabilities in innovation-based competitive strategy: Insights from project-oriented service firms’, *Industrial Marketing Management*, 40(8), pp.1251–1263.

Sandoval, C., Aleman, I., Navarro, P., Matamala, C. and Corsini, G. (2020) 'Statistical Testing Methods for Data Analysis in Dental Morphology/Pruebas Estadisticas para el Analisis de Datos en Morfologia Dental', *International journal of morphology*, 38(5), pp. 1317.

San-Martín, S., Jimenez, N., Camarero, C. and San-José, R. (2020) ‘The Path between Personality, Self-Efficacy, and Shopping Regarding Games Apps’, *Journal of Theoretical and Applied Electronic Commerce Research*, 15(2), pp. 59-75.

Santoso, W., Trinugroho, I. and Risfandy, T. (2019) ‘What Determine Loan Rate and Default Status in Financial Technology Online Direct Lending? Evidence from Indonesia’, *Emerging Markets Finance and Trade*, 1(19), pp. 370-391.

Saunders, M. Lewis, P. and Thornhill, A. (2007) ‘Research Methods for Business Students’. 4th edition. London: Financial Times Prentice Hall.

Saunders, M., Lewis, P., and Thornhill, A. (2012) ‘Research Methods for Business Students’. 6th edition. Harlow: FT Prentice Hall.

Saunders, M., Philip, L. and Thornhill, A. (2006) ‘Research Methods for Business Students’. 4th edition, Prentice Hall.

Saunders, N. (2011) ‘Research methods for business students’. 5th edition. Pearson Education India

Saunders, N., Bristow, A., Thornhill, A. and Lewis, P. (2019) ‘Understanding research philosophy and approaches to theory development’. In: Saunders, N., Lewis, P. and Thornhill, A. eds. Research Methods for Business Students, 8th edition. Harlow: Pearson Education, pp. 128–171.

Saunders, N., Saunders, M., Lewis, P. and Thornhill, A. (2011) ‘Research Methods for Business Students’. 5th Edition, Pearson Education, Essex.

Schlegel, D. (2015) ‘Research Philosophy and Ethics’. In: Cost-of-Capital in Managerial Finance. Contributions to Management Science. Springer, Cham.

Schoemaker, H., Heaton, S., and Teece, D. (2018) ‘Innovation, dynamic capabilities, and leadership. California Management Review’, 61, pp.15–42.

Scholtens, B. and Wensveen, D. (2003). ‘The Theory of Financial Intermediation: An Essay On What It Does (Not) Explain’, *Vienna: SUERF - The European Money and Finance Forum*.

Schumacker, R. and Lomax, R. (2016) ‘A Beginner's Guide to Structural Equation Modeling’. 4th Edition. Routledge Publications. pp. 394

Seeger, H. and Wilson, R. (2019) ‘Diffusion of Innovations and Public Communication Campaigns: An Examination of The 4R Nutrient Stewardship Program’, Journal of Applied Communications, 103(2), pp. 130.

Sek, Y., Lau, S., Teoh, K., and Law, C. (2010) ‘Prediction of User Acceptance and Adoption of Smart Phone for Learning with Technology Acceptance Model’, *Journal of Applied Sciences*, 10(20), pp: 2395-2402.

Sekaran, U. (2000) ‘Research Methods for Business: A Skill-building Approach’. USA: John Willey & Sons.

Sekaran, U. and Bougie, R. (2013) ‘Research Methods for Business—A Skill Building Approach’. 6th Edition, John Wiley and Sons, West Sussex.

Sekaran, U. and Bougie, R. (2016) ‘Research Methods for Business: A Skill-Building Approach’ .7th Edition. Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Sekaran, U. and Bougie, R. (2019) ‘Research Methods for Business—A Skill Building Approach’. 8th Edition, John Wiley and Sons, West Sussex.

Senyo, P. and Osabutey, C. (2020) 'Unearthing antecedents to financial inclusion through FinTech innovations', *Technovation, Elsevier*, 98, pp. 102155.

Sepasgozar, E., Hawken, S., Sargolzaei, S. and Foroozanfa, M. (2019) 'Implementing citizen centric technology in developing smart cities: A model for predicting the acceptance of urban technologies', *Technological Forecasting and Social Change*, 142, pp. 105-116.

Sharma, R. and Mishra, R. (2014) ‘A Review of Evolution of Theories and Models of Technology Adoption’, 6(2).

Sharmin, F., Sultan,T., Wang, D., Badulescu, A. and Li, B. (2021) ‘Cultural Dimensions and Social Media Empowerment in Digital Era: Travel-Related Continuance Usage Intention’, *Sustainability*, 13.

Shatta, N., Shayo, A. and Layaa, N. (2020) ‘Determinants of eprocurement adoption model for green procurement in developing countries: Experience from Tanzania’, *International Academic Journal of Procurement and Supply Chain Management*, 3(2), pp. 1-18.

Sheeran, P., Harris, R., and Epton, T. (2014) ‘Does heightening risk appraisals change people’s intentions and behavior? A meta-analysis of experimental studies’, *Psychological Bulletin*, 140(2), pp.511–543.

Shiau, S., Huang, C., Yang, C. and Juang, J. (2018) 'A Derivation of Factors Influencing the Innovation Diffusion of the Open Street Map in STEM Education', *Sustainability*, 10(10). pp. 1-29.

Shin, J. and Choi, Y. (2019) 'Feasibility of the Fintech Industry as an Innovation Platform for Sustainable Economic Growth in Korea', *Sustainability*, 11(19), pp.5351.

Shin. J., Kim, H., Shin, K., Sung, S., Cha, H., Lee, J., Son, H. and Ahn, H. (2016) 'Prediction of low-risk breast cancer using perfusion parameters and apparent diffusion coefficient', *Magnetic Resonance Imaging*, 34(2), pp.67-74.

Siddik, M., Sun, G., Yanjuan, C., Kabiraj, S. (2014) 'Financial Inclusion through Mobile Banking: A Case of Bangladesh', *Journal of Applied Finance & Banking*, 4(6), pp.109-136.

Siddiqui, J. and Adams, R. (2013) 'The Challenge of Change in Engineering Education: Is it the Diffusion of Innovations or Transformative Learning?' *Proceedings of the annual American Society for Engineering Education conference*, Atlanta.

Sikdar, P., Kumar, A., Makkad, M. (2015) 'Online Banking Adoption: A Factor Validation and Satisfaction Causation Study in the Context of Indian Banking Customers', *The International Journal of Bank Marketing*, 33, pp.760–778.

Singh, K., Mall, M. and Parida, P. (2020) 'Measuring the Effectiveness of HRIS in the Indian IT Industry using Structural Equation Modelling'.

Singh, S., Sahni, M. and Kovid, K. (2020) 'What drives FinTech adoption? A multi-method evaluation using an adapted technology acceptance model', *Management Decision*, 58(8), pp. 1675-1697

Sobehart, J. (2016) 'The FinTech revolution: Quantifying earnings uncertainty and credit risk in competitive business environments with disruptive technologies', *Journal of Risk Management in Financial Institutions*. 9. pp. 163–174.

Song, L. (2010) 'Customer adoption of Internet banking: An integration of TAM with trust, perceived risk, and quality', *In Proceedings of the 2010 International Conference on Multimedia Information Networking and Security*, Nanjing, Jiangsu, China, 4(6). pp.264–268.

Sonnenwald, H., Maglaughlin, L. and Whitton, C. (2001) 'Using innovation diffusion theory to guide collaboration technology evaluation: work in progress'. *IEEE*, pp. 114.

Statistics and Data Directorate (2019) 'Secretary-General's Report to Ministers 2019 Paris', *OECD Publishing*, pp. 110-111.

Steenis, H. (2019) 'Future of Finance: Review on the outlook for the UK Financial system'. Available from: https://www.bankofengland.co.uk/-/media/boe/files/report/2019/future-of-finance-report Accessed: 20 November 2019.

Stewart, H. and Jürjens, J. (2018) 'Data security and consumer trust in FinTech innovation in Germany', *Information and Computer Security*, 26 (1), pp. 109-128.

Stieninger, M., Nedbal, D., Wetzlinger, W., Wagner, G. and Erskine, A. (2018) 'Factors influencing the organizational adoption of cloud computing: a survey among cloud workers', *International Journal of Information Systems and Project Management*, 6(10), pp. 5-23.

Straub, T. (2009). 'Understanding Technology Adoption: Theory and Future Directions for Informal Learning', *Review of Educational Research*, 79(2), pp. 625–649.

Subramanian, R. and Chino, T. (2016) 'The state of cryptocurrencies: Their issues and policy interactions', *Journal of International Technology & Information Management*, 24(3), p. 25-40.

Sumroy, R., Kingsley, B. and May, S. (2019) 'The International Comparative Legal Guide to: Fintech 2019'. 3rd Edition. London: Rory Smith Publisher. (eBook) Systems, 23(2), pp. 233-266.

Tabachnick, B. and Fidell, L. (2018) 'Using Multivariate Statistics' (7th ed.). New York: Person Education Inc. pp. 1–848.

Taherdoost, H. (2018) 'A review of technology acceptance and adoption models and theories', *Procedia Manufacturing*. 22. 960-967.

Taherdoost, H. and Masrom, M. (2009). 'An Examination of Smart Card Technology Acceptance Using Adoption Model', *31st International Conference on information technology interfaces*, Cavtat, Croatia: IEEE.

Taherdoost, H., Zamani, M. and Namayandeh. M. (2009) 'Study of Smart Card Technology and Probe User Awareness about It: A Case Study of Middle Eastern Students'. *in International Conference on Management Technology and Applications*. Beijing, China: IEEE

Tang, T. and Huang, R. (2015) 'The Relationships among Trust, E-satisfaction, E-loyalty, and Customer Online Behaviors'. *International Journal of Business and Industrial Marketing*, 1(2), pp.16-25.

Tang, T., Lin, H., Wang, Y. and Wang, Y. (2005) 'Toward an understanding of the behavioral intention to use mobile banking', *PACIS 2004 Proceedings Computers in Human Behavior*, 21(6), pp. 873-891.

Teigland, R., Siri, S., Larsson, A., Puertas, M. and Bogusz, I. (2018) 'Introduction' The Rise and Development of FinTech. 1st edn. Routledge, pp. 1-18.

Teo, T. and Liu, J. (2007) 'Consumer trust in e-commerce in the United States, Singapore and China', *Omega* ,35(1), pp.22-38.

Thakor, V. (2019) 'Fintech and Banking: What do we know?' *Journal of Financial Intermediation*, forthcoming.

Thakur, R. and M. Srivastava, (2013) 'Customer usage intention of mobile commerce in India: An empirical study', *Journal of Indian Business Research*, 5, pp.52-72.

The Economist (2017) 'Finance disrupted 2017: Fintech comes of age'. Interview with Arthur Levitt, Board Member. New York: Bloomberg, September 28, 2017.

Thirtle, G. and Ruttan, W. (1987) 'The Role of Demand and Supply in the Generation and Diffusion of Technical Change', Switzerland: Harwood Academic Publishers GmbH.

Thomas, E., Zeron, A. and O'Rourke, J. (2017) 'Samsung Electronics Company, Ltd.: Galaxy Note 7 Crisis'.

Thompson, B. (2004) 'Exploratory and confirmatory factor analysis: understanding concepts and applications', Washington, DC, American Psychological Association.

Thong, L. and Yap, S. (1995) 'CEO Characteristics, Organizational Characteristics and Information Technology Adoption in Small Businesses', *Omega, International Journal of Management Science*, 23(4), pp. 429-442.

Thota, N., Makam, P., Rajbongshi, K., Nagiah, S., Abdul, S., Chuturgoon, A., Kaushik, A., Lamichhane G., Somboro, M., Kruger, G., Govender, T., Naicker, T. and Arvidsson, P. (2019) 'Anti-microbial, Anti-mycobacterial, and Cytotoxic Activity', *ACS Medicinal Chemistry Letters*, 10(10), pp.1457-1461.

Tornatzky, G. and Katherine, K. (1982) 'Innovation characteristics and innovation adoption-implementation: a Meta- analysis of findings', *IEEE Transactions on Engineering Management*, 29(1), pp. 28-45.

Torraco, J. (2005) 'Writing integrative literature reviews: guidelines and examples', *Human Resource Development Review*, 4(3), pp:356- 367

Tse, K., Vertinsky, I., Lee, K. and Wehrung, A. (1988) 'Does culture matter? A cross-cultural study of executives choice, decisiveness, and risk adjustment in international marketing', 52, pp.81-95.

Tymoigne (2015) 'Do Cryptocurrencies Such as Bitcoin Have a Future? No: As a Currency, Bitcoin Violates All The Rules of Finance', *Wall street journal – Eastern edition*, 265(49), p.1-2.

Ubaydli, U. and Hussain, S. (2020) 'The Bahrain Banking Sector 100 Years of Challenges and Achievements'. 1st edition. Awal Press. ISBN: 978-99901-37-60-6

United Nations Development Program report (UNDP), (2016) 'Bahrain's Third National Communication Under the United Nations Framework Convention on Climate Change'. Available from: https://www.bahrainedb.com/latest-news/manama-listed-in-the-top-5-globally-for-fdi-strategy-in-latest-fdi-magazine-ranking/. Accessed: 13 March 2021.

United Nations survey. (2018) 'United Nations E-Government knowledgebase; United nation E-government Survey', *Economic and social affairs*. Available from: https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2018 Accessed: 13 March 2021.

Vaishnavi, V. and Kuechler, B. (2005). 'Design science research in information systems', *Association for Information Systems*.

Vaishnavi, V. and Kuechler, W. (2015) 'Design Science Research Methods and Patterns: Innovating Information and Communication Technology'. 2nd edition. New York, CRC Press.

Vance, A., Siponen, M. and Pahnila, S. (2012) 'Motivating IS security compliance: Insights from habit and protection motivation theory', *Information & Management*, 49, pp.190– 198.

Varga, D. (2017) 'Fintech, the new era of financial services', *Budapest Management Review*, 48(11), pp. 22-32.

Venkatesh, V. and Davis, D. (2000) 'A theoretical extension of the technology acceptance model: four longitudinal field studies', *Management Science*, 46(2), pp. 186-204.

Venkatesh, V., Morris, G., Davis, B. and Davis, D. (2003) 'User acceptance of information technology: toward a unified view', *MIS Quarterly*, 27(3), pp.425–478.

Venkatesh, V., Sykes, A., and Venkatraman, S. (2014) 'Understanding E-government Portal Use in Rural India: Role of Demographic and Personality Characteristics', *Information Systems Journal*, 24 (3), pp. 249-269.

Wang, G., Dou, W., and Zhou, N. (2008) 'Consumption attitudes and adoption of new consumer products: a contingency approach'. *European Journal of Marketing*, 42(1/2), pp. 238–254.

Wang, W., Zhang, S., Su, Y., Deng, X. (2019) 'An Empirical Analysis of the Factors Affecting the Adoption and Diffusion of GBTS in the Construction Market', *Sustainability,* 11, pp:1795.

Wang, Y., Meister, D. and Wang, Y. (2008) 'Relative Advantage and Perceived Usefulness: The Adoption of Competing ICTs'. *DIGIT 2008 Proceedings*. 6.

Ward, R. (2013) 'The application of technology acceptance and diffusion of innovation models in healthcare informatics', *Health Policy and Technology*, 2(4), pp:222-228.

Weber, G. (2004) 'The Rhetoric of Positivism Versus Interpretivism: A Personal View', *MIS Quarterly: Management Information Systems*, 28(1).

Westfall, P. (2014) 'Kurtosis as Peakedness, 1905–2014. R.I.P', *The American Statistician*, 68(3), pp. 191-195.

Weston, R. and Gore A. (2006). 'A Brief Guide to Structural Equation Modeling', *The Counseling Psychologist*, 34(5), pp. 719-751.

Williams, B., Brown, T. and Onsman, A. (2010) 'Exploratory factor analysis: A five-step guide for novices', *Australasian Journal of Paramedicine*, 8(3).

Winit-Watjana, W. (2016) 'Research philosophy in pharmacy practice: necessity and relevance' *International Journal of Pharmacy Practice*. 24(6), pp: 428-436.

Wong, A. & Dean, A. (2005) 'The Effects of Store and Customer Characteristics on Value and Loyalty', ANZMAC 2005 Conference. Paper presented at the ANZMAC Conference; broadening the boundaries, Fremantle Western Australia.

Wong, W. and Mo, W. (2019) 'A Study of Consumer Intention of Mobile Payment in Hong Kong, Based on Perceived Risk, Perceived Trust, Perceived Security and Technological Acceptance Model', *Journal of Advanced Management Science*, 7(2), pp. 33-38.

Wu, F. (2009) 'User Acceptance of Emergency Alert Technology: A Case Study', *in Proceedings of the 6th International ISCRAM Conference 2009*, Gothenburg, Sweden.

Wu, H. and Wang, C. (2005) 'What drives mobile commerce? An empirical evaluation of the revised technology acceptance model', *Information and Management*, 42(5), pp.719- 729.

Wu, T., Rh, o. and Sy, T. (2015) 'An empirical research of consumer adoption behavior on catering transformation to mobile O2O', *Journal of Interdisciplinary Mathematics*, 18(6), pp. 769-788.

Yang, C. (2005) 'Exploring factors affecting the adoption of mobile commerce in Singapore'. *Telematics and Informatics*, 22(3), pp.257–277.

Yang, Q., Pang, C., Lui., L., Yen., D. and Tarn., M. (2015) 'Exploring consumer perceived risk and trust for online payments: An empirical study in China's younger generation'. *Computers in Human Behavior*, (50), pp: 9-24.

Yang, X., Zhao, K., Tao, X. and Shiu, E. (2019) 'Developing and Validating a Theory-Based Model of Crowdfunding Investment Intention—Perspectives from Social Exchange Theory and Customer Value Perspective', *Sustainability*, 11(9), pp. 2525.

Yin, K. (2009). Case Study Research Design and Methods. (4th edition.). Thousand Oaks, CA Sage Publications.

Yin, K. (2013) ‘Case study research: Design and methods’. Sage publications.

Yoon, B., Kim, J., You, Y. and Kim, S. (2016) 'A study on User Behaviors for Consulting of Fintech Companies', *Indian Journal of Science and Technology*, 9(26).

Yoon, C. and Lim, D. (2020) 'An empirical study on factors affecting customers' acceptance of internet-only banks in Korea', *Cogent business & management*, 7(1), pp. 179225

Yousafzai, S., Foxall, G. and Pallister, J. (2010). ‘Explaining Internet Banking Behavior: Theory of Reasoned Action, Theory of Planned Behavior, or Technology Acceptance Model?', Journal of Applied Social *Psychology*, 40(5), pp.1172 - 1202.

Yu, C. (2012) ‘Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model’, *Journal electronic commerce research*, 13, pp.104-121.

Zaltman, G., Duncan, R. and Holbek, J. (1973) ‘Innovations and Organizations’, Wiley, New York.
Zhong, J., Dhir, A., Nienminen, M., Hamalainen, M. and Laine, J. (2013). ‘Exploring consumer adoption of mobile payments in China’, *Proceedings of the international Conference on Making Sense of Converging Media*, ACM, New York, USA, pp. 318-325.

Zhou, Y. (2008) ‘Voluntary adopters versus forced adopters: integrating the diffusion of innovation theory and the technology acceptance model to study intra-organizational adoption’, *New Media and Society*, 10(3), pp. 475-496.

Zhou,T., Lu,Y. and Wang, B. (2010) ‘Integrating Ttf and Utaut to Explain Mobile Banking User Adoption’, *Computers in Human Behavior*, 26(4), pp.760–767.

Zolkepli, I. and Kamarulzaman, Y. (2015) 'Social media adoption: The role of media needs and innovation characteristics', *Computers in Human Behavior*, 43, pp. 189-209.

Zveryakov, M., Kovalenko, V., Sheludko, S., and Sharah, E. (2019) ‘FinTech sector and banking business: competition or symbiosis?’, *Economic annals*, 175(1—2), pp. 53-57.

Appendices

Appendix 1 – Survey questionnaire

Dear Sir or Madam,

I am a PhD student at Brunel University London, UK. The area of my research is Fintech services in banking sector. The title of my research is "Investigation into Factors Enabling the Diffusion and Adoption Intention of Fintech Services for Bank Consumers". The research aims at understanding the various factors that enable the diffusion of Fintech services, a new innovation that is expected to have a significant impact on both consumers and banks. There is a lack of knowledge about those factors that enable diffusion of Fintech services (e.g. Mobile Payments, Internet Banking, Open Banking, Payment gateways, crowdfunding and Cryptocurrency) and its adoption by consumers in the banking sector and this research aims to plug this gap. An important part of addressing the gap is to test a conceptual model using data to be collected through a survey questionnaire. Thus, data is required to be collected through the survey questionnaire developed for this purpose and enclosed with this note.

The survey is self-administered and has been developed, using a predefined (single response) scale that facilitates easiness in completing the questions. Since the study plans to evaluate the extent to which the factors that enable fintech services diffusion influence the adoption behaviour of banks consumers, I am sending this questionnaire to you with a request to complete it. I will therefore be very grateful to you if you would participate in the survey to enable me to complete this important research. Participation in this research is entirely voluntary. Hence, I request you to spare a few moments of your valuable time to participate in this study. If you decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. Even after deciding to take part in the research you are still free to withdraw at any time and without giving any reason. I assure you that the information provided by you, will only be used for the purpose of this research, and will be treated in the strictest confidence possible and your identity will be kept anonymous. I also guarantee you that all the information provided by you will not be used by a third party or entity. The study has obtained ethical approval from Brunel University, London, UK. Accordingly, please confirm the following:

	Yes	No
• I have read the Participant Information Sheet included with this questionnaire;		
• I am over the age of 18;		
• I understand that no personal identifying data is collected in this study, therefore I know that once I have submitted my answers I am unable to withdraw my data from the study;		
• I agree that my data can be anonymised, stored and used in future research in line with Brunel University's data retention policies;		
• I agree to take part in this study		

If you require any clarification, please do not hesitate to contact me on the telephone and/ or e-mail details provided below. Thanking you for your kind cooperation and support for this important study.

Yours sincerely,
PhD student, Brunel University, UK
Email: Noofa.bureshaid@brunel.ac.uk
Mobile: 33663634
Kingdom of Bahrain.

Research instruments

Section A: Demographic

Please indicate your gender:

○ Male ○ Female

Please indicate the age group you belong:

○ 18-24 ○ 25-34 ○ 35-44 ○ 45-54 ○ 55-64 ○ 65 or Above

Please indicate your employment status:

○ Employed ○ Not employed ○ Retired ○ Student ○ Housewife ○ Self employed

Please indicate your income category:

○ ≤ BD 300 ○ BD301-BD600 ○ BD601-BD900 ○ BD901-BD1200 ○ BD1201-BD1500 ○ >BD1500

Please choose the most appropriate statement that applies to you:

○ Fintech services user ○ Aware of fintech services ○ Intend to use fintech services in future ○ Not familiar with fintech services

Section B

This section is about your intention to adopt fintech services offered by the bank in which you conduct banking transactions.
Please rate with an "X" each item on the five-point Likert scale shown, to indicate your level of agreement with the statement.

1-Strongly Disagree, 2- Disagree, 3-Neutral, 4-Agree, 5-Strongly agree

Please note: Fintech services are technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services.

Intention to adopt fintech services: It is defined as the degree to which you have formulated conscious plans to adopt or not adopt fintech services.

Code	Item
	Intention to adopt fintech services
1	Given a chance to access fintech services while banking, I expect I would use it
2	Assuming there is access to fintech services while banking, I intend to use it
3	Whenever I get a chance, I will use fintech services in my banking activity
4	To the extent possible, I would take advantage of fintech services in my banking activity

Perceived usefulness of adopting fintech services: It is a measure of your subjective assessment of the utility offered by the fintech services.

Perceived Usefulness	
5	I can do transaction better with my bank using fintech services
6	My online banking transactions are more efficient through fintech services
7	I can easily log in and log out online while using fintech services while banking
8	I feel using fintech services will be more convenient while banking
9	Using fintech services is perceived by me to be more useful in my banking activities

Perceived ease of use of fintech services: It is the degree to which you expect fintech services to be free of effort.

Perceived Ease of Use	
10	While banking I can learn the operation of the fintech services easily
11	While banking I became adept at using fintech services fast
12	I get clear information about fintech services easily for my banking activity
13	While banking I would find fintech services easy to use
14	While banking I would find fintech services flexible to interact with

Trust in fintech services: It is defined as your willingness or desire to follow a particular pattern of behavior, which determines the success rate of acceptance of fintech services.

Trust	
15	I think that my bank will maintain the terms and commitments made in relation to offering fintech services
16	I think the fintech service offered by my bank is reliable
17	In general, I trust the fintech services offered by my bank
18	I trust the information provided by my bank on fintech services
19	I would trust my bank to offer secure fintech services

Perceived risk using fintech services: It is defined as the potential for loss in the pursuit of getting benefits while using fintech services.

Perceived risk	
20	While banking online I think using fintech services could endanger my privacy by utilizing my personal information without my knowledge
21	While using the fintech services of my bank, I cannot keep my personal data private
22	While using fintech services of my bank, personal information could be stolen
23	Financial risk exists if I use fintech services of my bank
24	While banking using fintech services, there is a threat of losing money due to hacking
25	I would not feel completely safe while providing personal information through online fintech services of my bank
26	While conducting banking transactions online I would not find fintech services of my bank secure

Relative advantage of using fintech services: It is defined as the degree to which using fintech services are perceived as being better than using its traditional banking methods.

Relative advantage	
27	Adopting fintech services in my banking activity will allow me to conduct banking transactions more efficiently.
28	Using fintech services improves the quality of the banking activities I do.
29	Using fintech services makes my banking activities easier.
30	The advantages of my using fintech services far outweigh the disadvantages
31	Using fintech enhances my access to my banking information.

Complexity in using fintech services: It is the perceived difficulty of learning to use and understand fintech services.

Complexity	
32	Interacting with fintech services could be frustrating in banking transactions.
33	Banking transactions conducted on fintech services are inflexible.
34	While banking, I find it difficult to get fintech services to do what I want it to do.
35	While using banking services, fintech system often behaves in unexpected ways.
36	Overall, for conducting banking transactions, I find the fintech services not easy to use.

Compatibility to work with fintech: It is defined as the degree to which fintech is perceived as being consistent with the existing values, needs, and past experiences of the user of fintech.

Compatibility	
37	Using fintech services in banking would be compatible with most activities of banking.
38	Using fintech services while banking would fit well with how I like to do my banking
39	Fintech services would be compatible with my banking needs.
40	Using fintech services while banking fits into my lifestyle
41	Fintech services fit with other technologies while banking.

Trialability of fintech services: the degree to which fintech services may be experimented before you adopt the Fintech services.

Trialability	
42	I am more likely to use fintech services for my banking purposes if I could test it on online banking
43	I've had a great deal of opportunity to try various fintech service features.
44	I know where I can go to satisfactorily try out various uses of fintech services while banking.
45	Fintech services were available to me to adequately test various features required for banking.

Observability of fintech services: It is the degree to which the results of using fintech services are observable to others.

Observability	
46	The usefulness of fintech services while banking is highly observable.
47	The advantages of using fintech services while banking can be noticed by others.
48	Fintech services are recommendable in banking activities
49	I've had a great deal of opportunity to see various fintech service features being used by others in banking activities.

Thank you

Appendix 2 – Research Instruments (Pilot Survey)

Construct	No.	Item
INTADOP	Q1	Given a chance to access fintech services while banking, I expect I would use it
	Q2	Assuming there is access to fintech services while banking, I intend to use it
	Q3	Whenever I get a chance, I will use fintech services in my banking activity
	Q4	To the extent possible, I would take advantage of fintech services in my banking activity
PU	Q5	I can do transaction better with my bank using fintech services
	Q6	My online banking transactions are more efficient through fintech services
	Q7	I can easily login and log out online while using fintech services while banking
	Q8	I feel using fintech services will be more convenient while banking
	Q9	Using fintech services is perceived by me to be more useful in my banking activities
PEU	Q10	While banking I can learn the operation of the fintech services easily
	Q11	While banking I became adept at using fintech services fast
	Q12	I get clear information about fintech services easily for may banking activity
	Q13	While banking I would find fintech services easy to use
	Q14	While banking I would find fintech services flexible to interact with
TRU	Q15	I think that my bank will maintain the terms and commitments made in relation to offering fintech services
	Q16	I think the fintech service offered by my bank is reliable
	Q17	In general, I trust the fintech services offered by my bank
	Q18	I trust the information provided by my bank on fintech services
	Q19	I would trust my bank to offer secure fintech services
PRISK	Q20	While banking online I think using fintech services could endanger my privacy by utilising my personal information without my knowledge
	Q21	While using fintech services of my bank, I cannot keep my personal data private
	Q22	While using fintech services of my bank, personal information could be stolen
	Q23	Financial risk exists if I use fintech services of my bank
	Q24	While banking using fintech services, there is threat of losing money due to hacking
	Q25	I would not feel completely safe while providing personal information through online fintech services of my bank
	Q26	While conducting banking transactions online I would not find fintech services of my bank secure
RA	Q27	Adopting fintech services in my banking activity will allow me to conduct banking transactions more efficiently.
	Q28	Using a fintech services improves the quality of the banking activities I do.
	Q29	Using fintech services makes my banking activities easier.
	Q30	The disadvantages of my using fintech services far outweigh the advantages (reverse coded)
	Q31	Using fintech enhances my access to my banking information.
COMPLX	Q32	Interacting with the fintech services could be frustrating in banking transactions
	Q33	Banking transaction conducted on fintech services is rigid and inflexible.
	Q34	While banking, I find it easy to get fintech services to do what I want it to do. (reverse coded).
	Q35	While using banking services, fintech system often behaves in unexpected ways.
	Q36	Overall, for conducting banking transactions, I find the fintech services easy to use. (reverse coded).
COMPAT	Q37	Using fintech services in banking would be compatible with most activities of banking.
	Q38	Using fintech services while banking would fit well with how I like to do my banking
	Q39	Fintech services would be compatible with my banking needs.
	Q40	Using fintech services while banking fits into my lifestyle
	Q41	Fintech services fits with other technologies while banking.
TRIABI	Q42	I am more likely to use fintech services for my banking purposes if I could test it on online banking
	Q43	A trial could convince me that using fintech services is better than traditional banking means.
	Q44	I've had a great deal of opportunity to try various fintech service features.

	Q45	I know where I can go to satisfactorily try out various uses of fintech services while banking.
	Q46	Fintech services was available to me to adequately test various features required for banking.
OBSERV	Q47	The usefulness of fintech services while banking is highly observable.
	Q48	The advantages of using fintech services while banking can be noticed by others.
	Q49	Fintech services are recommendable in banking activities
	Q50	I've had a great deal of opportunity to see various fintech service features being used by others in banking activities.

Appendix 3 – Research Ethics Approval

College of Business, Arts and Social Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
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6 January 2020

LETTER OF APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 10/01/2020 AND 30/06/2020

Applicant (s): Ms Noofa Bureshaid

Project Title: Research questionnaire instrument

Reference: 19193-LR-Dec/2019- 22913-2

Dear Ms Noofa Bureshaid

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to receipt by the Committee of satisfactory responses to any conditions that may appear above, in addition to any subsequent changes to the protocol.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study.
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.

Professor David Gallear

Chair of the College of Business, Arts and Social Sciences Research Ethics Committee

Brunel University London

Appendix 4 AMOS output: Sample correlations of indicators for all ten latent construct

Sample Correlations (Group number 1)																																				
	COMPLX5	OBSERV1	OBSERV3	OBSERV4	TRIABI4	TRIABI3	COMPAT5	COMPAT1	COMPAT2	COMPAT3	COMPAT4	COMPLX1	COMPLX2	COMPLX3	COMPLX4	RA5	RA3	RA4	PRISK5	PRISK1	PRISK4	TRUFIN1	TRUFIN5	TRUFIN4	TRUFIN3	TRUFIN2	PEU5	PEU1	PEU4	PU5	PU1	PU2	PU3	PU4	INTADOP 3	INTADOP 4
COMPLX5	1																																			
OBSERV1	-0.191	1																																		
OBSERV3	-0.208	0.744	1																																	
OBSERV4	-0.202	0.657	0.696	1																																
TRIABI4	0.02	0.386	0.316	0.423	1																															
TRIABI3	-0.042	0.427	0.368	0.443	0.803	1																														
COMPAT5	-0.113	0.622	0.584	0.504	0.391	0.476	1																													
COMPAT1	-0.185	0.653	0.592	0.569	0.324	0.4	0.683	1																												
COMPAT2	-0.241	0.589	0.616	0.526	0.355	0.408	0.688	0.773	1																											
COMPAT3	-0.151	0.603	0.598	0.511	0.324	0.325	0.678	0.675	0.703	1																										
COMPAT4	-0.105	0.57	0.625	0.47	0.409	0.463	0.777	0.659	0.715	0.661	1																									
COMPLX1	0.616	-0.146	-0.107	-0.075	-0.053	-0.055	-0.103	-0.163	-0.183	-0.099	-0.187	1																								
COMPLX2	0.754	-0.201	-0.197	-0.17	-0.024	-0.053	-0.119	-0.162	-0.217	-0.167	-0.13	0.726	1																							
COMPLX3	0.726	-0.184	-0.236	-0.142	0.016	-0.017	-0.114	-0.207	-0.232	-0.176	-0.205	0.737	0.788	1																						
COMPLX4	0.765	-0.291	-0.304	-0.177	0.02	-0.057	-0.22	-0.284	-0.292	-0.25	-0.264	0.712	0.774	0.798	1																					
RA5	-0.102	0.507	0.588	0.548	0.347	0.391	0.59	0.571	0.565	0.597	0.601	-0.06	-0.052	-0.046	-0.12	1																				
RA3	-0.201	0.445	0.539	0.501	0.334	0.378	0.568	0.528	0.525	0.53	0.568	-0.053	-0.129	-0.079	-0.12	0.781	1																			
RA4	-0.148	0.439	0.464	0.461	0.251	0.31	0.498	0.481	0.517	0.477	0.506	-0.136	-0.13	-0.089	-0.15	0.697	0.662	1																		
PRISK5	0.436	-0.148	-0.188	-0.054	-0.077	-0.116	-0.169	-0.191	-0.274	-0.147	-0.209	0.53	0.571	0.529	0.528	-0.066	-0.083	-0.114	1																	
PRISK1	0.47	-0.089	-0.123	-0.087	-0.078	-0.07	-0.1	-0.084	-0.145	-0.105	-0.154	0.589	0.548	0.509	0.475	-0.107	-0.137	-0.16	0.641	1																
PRISK4	0.496	-0.159	-0.171	-0.126	-0.091	-0.126	-0.18	-0.222	-0.228	-0.182	-0.226	0.543	0.545	0.528	0.532	-0.089	-0.09	-0.093	0.794	0.654	1															
TRUFIN1	-0.186	0.53	0.588	0.509	0.369	0.403	0.546	0.576	0.51	0.525	0.599	-0.115	-0.182	-0.169	-0.188	0.511	0.542	0.45	-0.142	-0.132	-0.176	1														
TRUFIN5	-0.133	0.562	0.613	0.55	0.34	0.398	0.59	0.589	0.543	0.572	0.491	-0.03	-0.151	-0.108	-0.163	0.527	0.483	0.431	-0.206	-0.115	-0.197	0.602	1													
TRUFIN4	-0.118	0.462	0.535	0.471	0.418	0.379	0.496	0.515	0.522	0.519	0.547	-0.096	-0.156	-0.169	-0.185	0.492	0.501	0.429	-0.2	-0.179	-0.202	0.696	0.736	1												
TRUFIN3	-0.148	0.52	0.572	0.513	0.377	0.374	0.493	0.563	0.554	0.496	0.547	-0.076	-0.16	-0.158	-0.166	0.522	0.546	0.46	-0.229	-0.159	-0.232	0.74	0.72	0.791	1											
TRUFIN2	-0.1	0.47	0.525	0.501	0.441	0.448	0.592	0.518	0.49	0.492	0.57	-0.077	-0.128	-0.111	-0.105	0.547	0.582	0.427	-0.186	-0.177	-0.177	0.77	0.682	0.724	0.747	1										
PEU5	-0.18	0.442	0.511	0.412	0.416	0.399	0.419	0.463	0.525	0.466	0.527	-0.145	-0.156	-0.181	-0.167	0.469	0.515	0.417	-0.228	-0.193	-0.191	0.649	0.517	0.613	0.618	0.628	1									
PEU1	-0.196	0.471	0.531	0.484	0.444	0.403	0.452	0.488	0.511	0.535	0.522	-0.14	-0.168	-0.163	-0.171	0.526	0.558	0.435	-0.122	-0.142	-0.131	0.625	0.508	0.63	0.582	0.548	0.686	1								
PEU4	-0.237	0.444	0.481	0.451	0.448	0.393	0.441	0.461	0.553	0.483	0.502	-0.198	-0.176	-0.175	-0.19	0.525	0.555	0.528	-0.171	-0.226	-0.192	0.611	0.481	0.593	0.626	0.556	0.792	0.695	1							
PU5	-0.253	0.502	0.505	0.42	0.338	0.31	0.537	0.562	0.519	0.639	0.573	-0.128	-0.157	-0.189	-0.227	0.605	0.58	0.425	-0.133	-0.134	-0.217	0.62	0.431	0.463	0.49	0.536	0.568	0.625	0.531	1						
PU1	-0.14	0.469	0.486	0.407	0.293	0.301	0.5	0.521	0.488	0.598	0.486	-0.091	-0.131	-0.147	-0.169	0.553	0.5	0.374	-0.126	-0.13	-0.185	0.535	0.466	0.495	0.423	0.486	0.557	0.55	0.499	0.778	1					
PU2	-0.246	0.528	0.542	0.453	0.313	0.309	0.609	0.578	0.546	0.637	0.586	-0.129	-0.218	-0.202	-0.248	0.608	0.587	0.455	-0.185	-0.142	-0.223	0.575	0.452	0.465	0.474	0.468	0.524	0.562	0.543	0.792	0.763	1				
PU3	-0.26	0.466	0.516	0.506	0.337	0.344	0.491	0.545	0.517	0.516	0.489	-0.117	-0.206	-0.145	-0.179	0.581	0.623	0.445	-0.146	-0.143	-0.169	0.546	0.516	0.506	0.534	0.531	0.542	0.587	0.527	0.756	0.686	0.719	1			
PU4	-0.238	0.389	0.43	0.385	0.302	0.296	0.451	0.466	0.493	0.518	0.48	-0.13	-0.159	-0.18	-0.175	0.58	0.526	0.422	-0.132	-0.161	-0.164	0.566	0.435	0.542	0.525	0.499	0.523	0.623	0.539	0.753	0.731	0.698	0.756	1		
INTADOP 3	-0.159	0.448	0.508	0.422	0.378	0.374	0.474	0.463	0.508	0.493	0.544	-0.164	-0.173	-0.171	-0.193	0.555	0.497	0.42	-0.13	-0.189	-0.154	0.525	0.425	0.512	0.484	0.438	0.555	0.577	0.612	0.597	0.648	0.671	0.61	0.671	1	
INTADOP 4	-0.186	0.385	0.416	0.35	0.321	0.308	0.459	0.467	0.45	0.454	0.497	-0.134	-0.165	-0.152	-0.132	0.588	0.602	0.429	-0.135	-0.138	-0.166	0.538	0.415	0.462	0.494	0.513	0.545	0.622	0.55	0.709	0.636	0.676	0.648	0.673	0.749	1
Condition number = 171.660																																				
Eigenvalues																																				
15.775 4.894 1.914 1.602 1.245 1.082 1.028 .794 .689 .555 .519 .468 .413 .393 .370 .364 .337 .324 .291 .285 .272 .251 .224 .220 .197 .184 .179 .161 .153 .142 .128 .122 .118 .112 .101 .092																																				

Appendix 5 Residual Covariances (Default model)

Residual Covariances (Group number 1 - Default model)

	COMPLX5	OBSERV1	OBSERV3	OBSERV4	TRIABI4	TRIABI3	COMPAT5	COMPAT1	COMPAT2	COMPAT3	COMPAT4	COMPLX1	COMPLX2	COMPLX3	COMPLX4	RA5	RA3	RA4	PRISK5	PRISK1	PRISK4	TRUFIN1	TRUFIN5	TRUFIN4	TRUFIN3	TRUFIN2	PEU5	PEU1	PEU4	PU5	PU1	PU2	PU3	PU4	INTADOP3	INTADOP4
COMPLX5	0																																			
OBSERV1	0.002	0																																		
OBSERV3	-0.007	0.002	0																																	
OBSERV4	-0.023	-0.007	0.003	0																																
TRIABI4	0.051	0.004	-0.077	0.067	0																															
TRIABI3	-0.022	0.04	-0.034	0.08	0	0																														
COMPAT5	0.072	0.033	-0.021	-0.036	0.001	0.075	0																													
COMPAT1	-0.004	0.069	-0.012	0.025	-0.067	0.005	-0.02	0																												
COMPAT2	-0.054	-0.003	-0.001	-0.022	-0.036	0.005	-0.024	0.048	0																											
COMPAT3	0.027	0.036	0.009	-0.014	-0.053	-0.058	-0.006	-0.005	0.007	0																										
COMPAT4	0.083	-0.014	0.013	-0.068	0.019	0.065	0.058	-0.044	-0.003	-0.022	0																									
COMPLX1	-0.065	0.046	0.088	0.106	-0.036	-0.038	0.075	0.015	-0.003	0.077	-0.01	0																								
COMPLX2	0.026	0.007	0.018	0.025	0	-0.033	0.076	0.035	-0.018	0.022	0.068	0.013	0																							
COMPLX3	-0.014	0.026	-0.02	0.055	0.048	0.01	0.083	-0.013	-0.032	0.014	-0.01	0.022	-0.003	0																						
COMPLX4	0.032	-0.088	-0.083	0.017	0.05	-0.036	-0.023	-0.095	-0.084	-0.062	-0.069	-0.008	-0.02	0.004	0																					
RA5	-0.005	-0.032	0.019	0.038	-0.018	0.019	0.003	-0.01	-0.022	0.029	0.014	0.035	0.054	0.061	-0.015	0																				
RA3	-0.115	-0.062	0.003	0.02	-0.011	0.025	0.011	-0.021	-0.028	-0.004	0.012	0.038	-0.032	0.02	-0.021	-0.005	0																			
RA4	-0.072	-0.01	-0.004	0.036	-0.052	0.001	0.009	-0.002	0.019	0.006	0.017	-0.059	-0.045	-0.002	-0.063	0.006	0.007	0																		
PRISK5	-0.104	-0.003	-0.04	0.096	0.031	-0.018	0.031	0.005	-0.079	0.049	-0.015	0.045	0.034	-0.029	-0.03	0.037	0.011	-0.037	0																	
PRISK1	0.056	0.039	0.004	0.03	0.008	0.02	0.07	0.092	0.021	0.061	0.012	0.225	0.117	0.063	0.016	-0.027	-0.064		-0.017	0																
PRISK4	-0.028	-0.013	-0.019	0.013	0.014	-0.028	0.02	-0.029	-0.027	0.01	-0.031	0.052	-0.012	-0.039	-0.032	0.011	0.005	-0.012	0.011	-0.01	0															
TRUFIN1	-0.056	0.01	0.039	0.022	-0.014	0.011	0.015	0.046	-0.019	0.014	0.062	0.014	-0.041	-0.028	-0.044	-0.011	0.039	0.012	0.055	0.031	0.019	0														
TRUFIN5	-0.007	0.059	0.077	0.074	-0.026	0.023	0.069	0.078	0.024	0.073	-0.012	0.094	-0.015	0.029	-0.025	0.022	0.007	0.012	-0.027	0.041	-0.013	-0.058	0													
TRUFIN4	0.019	-0.064	-0.018	-0.024	0.021	-0.022	-0.039	-0.023	-0.022	-0.005	0.002	0.037	-0.01	-0.021	-0.036	-0.041	-0.01	-0.017	-0.003	-0.014	-0.003	-0.024	0.034	0												
TRUFIN3	-0.008	-0.025	0	0	-0.027	-0.036	-0.053	0.006	-0.009	-0.036	-0.01	0.059	-0.009	-0.006	-0.014	-0.028	0.016	-0.001	-0.029	0.012	-0.028	-0.004	0.006	0.017	0											
TRUFIN2	0.034	-0.05	-0.02	0.006	0.045	0.044	0.041	-0.014	-0.04	-0.023	0.025	0.052	0.015	0.033	0.037	0.01	0.059	-0.014	0.009	-0.014	0.021	0.041	-0.003	-0.013	-0.01	0										
PEU5	-0.009	-0.031	0.009	-0.028	-0.001	-0.023	-0.063	-0.028	0.014	-0.013	0.023	0.02	0.025	0.002	0.015	-0.059	0.002	-0.026	-0.044	-0.037	-0.001	0.047	-0.036	0.004	-0.005	0.019	0									
PEU1	-0.038	0.021	0.052	0.056	0.051	0.005	-0.012	0.022	0.029	0.073	0.047	0.015	0.002	0.009	0.001	0.016	0.065	0.011	0.06	0.005	0.049	0.061	-0.016	0.049	-0.002	-0.011	-0.02	0								
PEU4	-0.063	-0.029	-0.014	0.002	0.027	-0.029	-0.045	-0.03	0.033	0.001	0.001	-0.029	0.007	0.009	-0.005	-0.014	0.031	0.06	0.017	-0.068	-0.002	0.015	-0.064	-0.013	0	-0.034	0.021	-0.014	0							
PU5	-0.081	0.01	-0.006	-0.036	0.016	-0.02	-0.02	0.006	-0.039	0.093	0.013	0.052	0.04	0.005	-0.034	0.004	0.01	-0.067	0.053	0.016	-0.045	0.099	-0.051	-0.056	-0.044	0.013	-0.009	0.074	-0.041	0						
PU1	0.035	0.001	-0.001	-0.027	-0.014	-0.011	-0.028	-0.006	-0.041	0.081	-0.042	0.083	0.057	0.041	0.017	-0.016	-0.037	-0.091	0.051	0.012	-0.018	0.046	0.002	-0.004	-0.078	-0.007	0.006	0.032	-0.043	0.011	0					
PU2	-0.078	0.048	0.038	0.005	-0.001	-0.012	0.058	0.035	-0.005	0.105	0.038	0.046	-0.033	-0.014	-0.062	0.021	0.03	-0.029	-0.017	0.003	-0.058	0.071	-0.021	-0.042	-0.045	-0.033	-0.034	0.031	-0.019	0.006	0.017	0				
PU3	-0.096	0.005	0.03	0.067	0.034	0.035	-0.027	0.023	-0.01	0.01	-0.03	0.048	-0.025	0.038	0.003	0.017	0.078	-0.018	0.022	-0.005	-0.002	0.058	0.049	0.011	0.023	0.035	0.001	0.067	-0.012	0.001	-0.028	-0.014	0			
PU4	-0.071	-0.067	-0.043	-0.041	-0.002	-0.013	-0.064	-0.052	-0.031	0.009	-0.04	0.037	0.024	0.003	0.008	0.012	-0.008	-0.041	0.039	-0.024	0.005	0.072	-0.02	0.038	0.013	0.006	-0.017	0.094	-0.006	-0.006	0.009	-0.037	0.039	0		
INTADOP3	-0.01	0.035	0.068	0.035	0.051	0.04	0.006	-0.001	0.027	0.038	0.068	-0.019	-0.014	-0.011	-0.032	0.001	-0.024	-0.035	0.021	-0.07	-0.004	0.055	-0.013	0.03	-0.004	-0.026	-0.008	0.041	0.036	-0.06	0.017	0.023	-0.008	0.04	0	
INTADOP4	-0.03	-0.04	-0.026	-0.044	-0.021	-0.039	-0.026	-0.018	-0.036	-0.016	0.006	0.019	0.003	0.017	0.036	0.005	0.043	-0.046	0.024	-0.008	-0.009	0.045	-0.039	-0.03	-0.015	0.015	-0.038	0.055	-0.034	0.012	-0.021	-0.001	-0.002	0.015	0	0

Appendix 6 Standardized Residual Covariances

Standardized Residual Covariances (Group number 1 - Default model)																																				
	COMPLX5	OBSERV1	OBSERV3	OBSERV4	TRIABI4	TRIABI3	COMPAT5	COMPAT1	COMPAT2	COMPAT3	COMPAT4	COMPLX1	COMPLX2	COMPLX3	COMPLX4	RA5	RA3	RA4	PRISK5	PRISK1	PRISK4	TRUFIN1	TRUFIN5	TRUFIN4	TRUFIN3	TRUFIN2	PEU5	PEU1	PEU4	PU5	PU1	PU2	PU3	PU4	INTADOP3	INTADOP4
COMPLX5	0																																			
OBSERV1	0.035	0																																		
OBSERV3	-0.13	0.029	0																																	
OBSERV4	-0.419	-0.132	0.057	0																																
TRIABI4	0.84	0.079	-1.488	1.238	0																															
TRIABI3	-0.373	0.705	-0.667	1.499	0	0																														
COMPAT5	1.349	0.623	-0.439	-0.726	0.012	1.446	0																													
COMPAT1	-0.071	1.219	-0.231	0.457	-1.176	0.098	-0.369	0																												
COMPAT2	-1.1	-0.065	-0.026	-0.47	-0.741	0.114	-0.508	0.931	0																											
COMPAT3	0.485	0.659	0.177	-0.279	-0.958	-1.067	-0.119	-0.087	0.148	0																										
COMPAT4	1.5	-0.262	0.265	-1.32	0.353	1.201	1.078	-0.755	-0.059	-0.393	0																									
COMPLX1	-0.844	0.821	1.724	1.96	-0.601	-0.638	1.439	0.267	-0.056	1.409	-0.178	0																								
COMPLX2	0.325	0.117	0.346	0.453	-0.003	-0.559	1.467	0.615	-0.38	0.411	1.263	0.173	0																							
COMPLX3	-0.18	0.458	-0.386	1	0.791	0.16	1.582	-0.233	-0.652	0.256	-0.182	0.286	-0.037	0																						
COMPLX4	0.421	-1.606	-1.682	0.331	0.871	-0.627	-0.451	-1.731	-1.806	-1.172	-1.308	-0.114	-0.264	0.046	0																					
RA5	-0.101	-0.607	0.4	0.746	-0.34	0.361	0.064	-0.183	-0.482	0.554	0.265	0.667	1.023	1.142	-0.301	0																				
RA3	2.142	-1.19	0.071	0.4	-0.217	0.488	0.228	-0.404	-0.627	-0.085	0.23	0.724	-0.605	0.387	-0.415	-0.091	0																			
RA4	-1.335	-0.202	-0.091	0.744	-0.989	0.02	0.199	-0.039	0.425	0.129	0.347	-1.123	-0.853	-0.043	-1.241	0.103	0.128	0																		
PRISK5	-1.298	-0.052	-0.712	1.59	0.462	-0.271	0.53	0.071	-1.47	0.808	-0.25	0.572	0.426	-0.363	-0.386	0.631	0.188	-0.632	0																	
PRISK1	0.751	0.655	0.077	0.527	0.126	0.314	1.266	1.54	0.416	1.048	0.213	3.118	1.598	0.855	0.226	-0.485	-1.153	-1.796	-0.193	0																
PRISK4	-0.364	-0.223	-0.352	0.222	0.211	-0.442	0.366	-0.48	-0.529	0.175	-0.54	0.687	-0.154	-0.504	-0.432	0.198	0.089	-0.214	0.111	-0.112	0															
TRUFIN1	-1.043	0.202	0.832	0.443	-0.263	0.218	0.315	0.896	-0.428	0.276	1.245	0.266	-0.791	-0.524	-0.88	-0.224	0.811	0.259	0.94	0.55	0.331	0														
TRUFIN5	-0.133	1.172	1.686	1.55	-0.507	0.441	1.493	1.545	0.561	1.505	-0.251	1.831	-0.297	0.563	-0.514	0.449	0.145	0.26	-0.46	0.755	-0.242	-1.149	0													
TRUFIN4	0.362	-1.268	-0.395	-0.498	0.407	-0.44	-0.847	-0.465	-0.508	-0.11	0.032	0.724	-0.196	-0.422	-0.74	-0.85	-0.207	-0.375	-0.051	-0.257	-0.048	-0.475	0.681	0												
TRUFIN3	-0.149	-0.512	-0.004	0.01	-0.54	-0.722	-1.151	0.128	-0.205	-0.748	-0.212	1.181	-0.182	-0.128	-0.287	-0.582	0.349	-0.026	-0.518	0.221	-0.517	-0.079	0.126	0.35	0											
TRUFIN2	0.682	-1.035	-0.45	0.128	0.906	0.893	0.912	-0.297	-0.958	-0.492	0.546	1.077	0.319	0.679	0.784	0.214	1.321	-0.313	0.162	-0.264	0.393	0.835	-0.073	-0.274	-0.208	0										
PEU5	-0.181	-0.652	0.211	-0.626	-0.021	-0.461	-1.416	-0.579	0.35	-0.274	0.501	0.403	0.513	0.048	0.311	-1.261	0.037	-0.594	-0.797	-0.702	-0.023	1.021	-0.798	0.078	-0.111	0.437	0								
PEU1	-0.718	0.423	1.159	1.205	0.987	0.099	-0.272	0.435	0.687	1.522	0.993	0.297	0.044	0.17	0.015	0.343	1.393	0.248	1.035	0.09	0.895	1.268	-0.336	1.051	-0.042	-0.257	-0.417	0							
PEU4	-1.281	-0.63	-0.325	0.051	0.546	-0.598	-1.038	-0.636	0.812	0.013	0.031	-0.611	0.138	0.177	-0.114	-0.311	0.706	1.383	0.324	-1.328	-0.038	0.336	-1.438	-0.282	-0.006	-0.791	0.464	-0.302	0						
PU5	-1.41	0.178	-0.127	-0.696	0.291	-0.36	-0.382	0.101	-0.815	1.733	0.243	0.924	0.704	0.095	-0.629	0.071	0.187	-1.305	0.842	0.273	-0.745	1.937	-1.02	-1.117	-0.884	0.266	-0.19	1.449	-0.852	0					
PU1	0.606	0.024	-0.011	-0.529	-0.255	-0.203	-0.542	-0.115	-0.871	1.509	-0.79	1.476	1.016	0.726	0.305	-0.296	-0.697	-1.787	0.811	0.201	-0.297	0.903	0.041	-0.089	-1.594	-0.157	0.131	0.625	-0.899	0.186	0				
PU2	-1.357	0.868	0.756	0.096	-0.021	-0.22	1.115	0.627	-0.096	1.941	0.712	0.814	-0.584	-0.249	-1.134	0.387	0.569	-0.555	-0.262	0.052	-0.959	1.38	-0.41	-0.841	-0.913	-0.694	-0.687	0.606	-0.391	0.099	0.272	0			
PU3	-1.779	0.098	0.658	1.39	0.653	0.688	-0.564	0.439	-0.218	0.206	-0.602	0.919	-0.483	0.723	0.064	0.331	1.577	-0.382	0.366	-0.081	-0.035	1.226	1.062	0.229	0.506	0.779	0.015	1.415	-0.275	0.017	-0.488	-0.243	0		
PU4	-1.319	-1.333	-0.941	-0.862	-0.031	-0.246	-1.33	-1.002	-0.708	0.173	-0.808	0.695	0.448	0.064	0.159	0.241	-0.165	-0.858	0.658	-0.424	0.092	1.526	-0.441	0.817	0.279	0.146	-0.378	1.983	-0.137	-0.099	0.16	-0.652	0.731	0	
INTADOP3	-0.184	0.701	1.481	0.74	0.967	0.774	0.127	-0.012	0.619	0.761	1.376	-0.366	-0.26	-0.2	-0.618	0.025	-0.48	-0.722	0.353	-1.255	-0.07	1.152	-0.28	0.65	-0.084	-0.587	-0.163	0.849	0.779	-1.075	0.32	0.423	-0.158	0.791	0
INTADOP4	-0.576	-0.817	-0.577	-0.939	-0.415	-0.771	-0.553	-0.364	-0.823	-0.34	0.121	0.375	0.067	0.335	0.719	0.102	0.891	-0.961	0.407	-0.14	-0.157	0.961	-0.854	-0.664	-0.336	0.336	-0.823	1.163	-0.76	0.21	-0.396	-0.023	-0.042	0.294	0	0