The Impact of Telecom Operators' Fintech Quality on Customer Loyalty

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Abstract

The aim of this research is to investigate the relationship between Fintech Software-as-a-Service (SaaS) quality provided by telecommunication operators in Egypt and customer loyalty. A survey was conducted online, inviting customers from four major telecommunication companies to participate. The survey questionnaire consisted of items designed to measure Fintech SaaS quality and its impact on customer loyalty, utilizing established scales from previous studies. The collected data was analyzed using statistical techniques, including simple and multiple linear regression tests.

The findings of the study support the hypothesis that Fintech service quality is a significant predictor of customer loyalty. This implies that the quality of Fintech SaaS offerings provided by telecommunication operators directly influences the loyalty of their customers. The research suggests that telecommunication operators should consider strategic initiatives to enhance the quality of their Fintech services, with the aim of sustaining or increasing customer loyalty. However, it is important to note that this research is limited to the telecommunication industry in Egypt and relies on self-reported data, which may affect the generalizability of the findings. Future studies could explore this relationship in other industries and employ longitudinal designs to provide more robust insights.

Keyword: Fintech, Software-as-a-service (Saas), Customer Loyalty

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1. INTRODUCTION

Modern business structures and everyone's daily life have transformed as a result of recent technological advancements (Merlin, 2015). Internet, cloud computing, and internet of things concepts are posing brand-new complications. The telecoms industry is likewise being compelled to respond to these trends through cloud computing and service programmability (Lähteenmäki J., 2015). Cloud computing enables businesses to outsource data, electronic mail, folders, and other applications through virtual platforms using servers that are connected between them and that are accessible from anywhere at any time. The only prerequisite is having a working internet connection (Subhankar, 2012).

The impact of cloud computing results in changes to a company's internal structure as well as its overall performance. By introducing new tools and fresh perspectives for the firm employing it, cloud computing is changing the conventional techniques of data backup (Yass, 2017).

In IT and telecom, cloud computing has emerged as a revolutionary idea that is redefining business models, service offerings, and hardware/software provisioning, unleashing new revenue-generating activities. Telecom operators must be alert at all times and quick to adjust to disruptive changes. Many Operators are adjusting their working methods in response to this realization and the changing nature of society. Upon the introduction of the idea of cloud computing, a new business model known as "Software as a Service" was created (SaaS) (Aung et al., 2014. The SaaS model is used by telecom providers to offer non-telco services to their consumers, providing them the chance

to expand outside of the traditional telecommunications industry into areas like the financial sector, education and training, transportation, and more (Oljira, D.B. 2018; Soltanifar et al., 2020).

The tides will always favor Software as a Service in an industry, like the telecommunications industry, where businesses have their revenues significantly reduced as a result of third parties using their proprietary software without authorization, significantly because it is so difficult to trace the use of conventional packaged software (Jacobsson et al., 2022).

Finally, the usage of Fintech as a Saas by telecommunication firms is the main topic of this paper, along with how it affects customer loyalty to the business. The goal of this study is to better understand how a carrier may react strategically to cutting-edge developments brought about by cloud computing and how those changes impact the relationship between customers and the business.

1.1 Research problem statement

Globally, telecom operators are struggling to maintain the viability of their business models. Due to consumption patterns that are evolving at an exponential rate, their current activities are becoming exceedingly complex. The value is shifting to an entirely new market. Their current company strategies won't be effective in the future. The development of technology is opening up new market areas and opportunities. The need for mobile broadband is continually increasing, and new applications are being created as a result of technological advancements. Telecom operators must be alert at all times and quick to adjust to disruptive changes. In order to stay afloat and take advantage of the brand-new business prospects made possible by disruptive technology, they are striving to innovate their business models.

The telecom sector is researching cloud computing and its implementation in telecom-based applications in order to provide its clients with Quality-of-Service (QoS) and low-latency services (Gabrielsson, 2010).

Analyzing the amount of the cloud computing's impact on telecommunications is crucial since it represents a paradigm shift in the way services are provided. It is clear that telecommunications firms are integrating Saas in its services portfolio to learn more about this impact and after examining the current developments in cloud computing for telecoms, one of the most significant and extensively incorporated Saas is Fintech.

Given the lack of research on how cloud technology affects ICT service provider business models and calls for more research in this area from IS researchers (Morgan et al., 2013; Achtenhagen et al., 2013; Legner et al., 2013), Marston et al. (2011) recognize the significant role IS researchers will have to play in solving the aforementioned research conundrum, asserting that it is essential that Information researchers take the initiative to participate in every discussion on the technology right away.

1.2 Research objectives

The main purpose of this research is to examine the impact of Fintech SaaS quality offered by the telecommunication operators in Egypt on their customer loyalty.

1.3 Hypotheses of the study

This current research focus on Fintech Saas quality offered by Telecommunications companies in Egypt and its impact on customer loyalty. Therefore, the following hypothesis is offered:

- H1. Fintech Saas quality has a positive impact on customer loyalty in the Egyptian telecommunication companies.

The research will test one hypothesis, focusing Fintech service quality and its impact on customer loyalty.

2. LITERATURE REVIEW

The rapid advancement of technology has transformed various industries, including the financial and telecommunications sectors. In particular, the emergence of cloud computing and financial technology (Fintech) has revolutionized the way businesses operate and provide services to their customers. Cloud computing offers on-demand access to IT applications and infrastructure, while Fintech leverages technology to deliver innovative financial services. Telecommunication operators in Egypt have recognized the potential of Fintech Software-as-a-Service (SaaS) and have introduced various Fintech solutions to enhance financial inclusion and improve access to financial services.

The quality of Fintech SaaS offerings provided by telecommunication operators is crucial for ensuring customer satisfaction and loyalty. Understanding the impact of Fintech SaaS quality on customer loyalty is essential for telecom operators to develop strategies that enhance their services and maintain a competitive advantage in the market. However, there is a gap in the existing literature regarding the relationship between Fintech SaaS quality and customer loyalty specifically in the context of the telecommunications industry in Egypt.

This research aims to fill this gap by examining the impact of Fintech SaaS quality on customer loyalty among telecommunication operators in Egypt. By investigating the relationship between these variables, this study intends to provide insights that can guide telecom operators in strengthening their Fintech services and improving customer loyalty. The findings of this research can inform strategic initiatives aimed at enhancing the quality of Fintech SaaS offerings and sustaining or increasing customer loyalty in the highly competitive telecommunications market in Egypt.

2.1 Cloud Computing

The growth of parallel, distributed, and grid computing, as well as the fusion of technologies like the Internet, distributed systems, virtualization, and multicore CPUs, have led to the emergence of cloud computing (Buyya et al. 2008). Internet-based applications and infrastructure for information technology are available to users on demand (Haji et al., 2020). Depending on how it is utilized by end users, cloud computing is categorized as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), or Software as a Service (SaaS) (Senyo et al. 2016).

Because of its technical advantages, organizations who adopt cloud computing can profit from it in a number of ways; offer a pay-as-you-go, reduce costs, outsourcing IT operations, (Azarnik et al., 2012; Dutta et al., 2013; Salleh et al., 2012). Beside, cloud computing's scalability (Aleem et al., 2013) and agility (Armbrust et al., 2010) allow users to swiftly grow their IT infrastructure in order to respond to consumer requests and improve their company operations' agility and efficiency (Nkhoma et al., 2013). Finally, cloud computing promotes collaboration and gives employees of a company the freedom to operate in a more flexible setting (Abdel-Basset et al., 2018).

There are three major categories into which cloud services can be divided (Zhang et al., 2010; Lian et al., 2014; Walz et al., 2010; Karadsheh, 2012): Cloud clients can establish a variety of configurations of computer systems, from servers to full clusters, as well as host their own services and even complete software systems, all without having to worry about the expense of hardware thanks to infrastructure as a service (IaaS) (Goscinski et al., 2010). Platform as a Service (PaaS) offers developers a platform with environments and systems that cover every stage of creating, testing, deploying, and hosting web applications (Rimal et al., 2009). Software as a service (SaaS) is the term used to describe the use of particular services and applications over the Internet (Goscinski et al., 2010; Zhang et al., 2010). SaaS enables customers to use the software without having to worry about the expenses and efforts required to keep software licenses up to date or the management of software updates (Goscinski et al., 2010).

The top layer of this classification, known as "Software as a Service" (SaaS), can be understood as the consumer accessing applications on the service provider's cloud infrastructure (Mell et al., 2011). Additionally, SaaS apps, which use a technology known as multi-tenancy technology to provide their services, provide software and data to numerous users concurrently on a single instance of the software (Bhardwaj et al., 2010). More significantly, SaaS services attracted the interest of researchers, practitioners, and IT companies and evolved into a functioning software entity that is primarily focused online (Tomás et al., 2018).

It is noteworthy that many services used in most of the organizations, especially telecommunications companies, are hybrid cloud-deployed on top of the SaaS cloud computing layer.

2.2 Software-as-a-Service

The globe is embracing cloud computing, and over the past few years, a flurry of new subscription services have emerged, ranging from streaming to different audio and e-book services (Schwab K. 2016). The services are classified as software-as-a-service (SaaS). It might be said that SaaS providers give computing utility as a consequence (Ma 2007). User interface, business logic, and data are the three main components of a SaaS, according to Sun et al. (2007). Additionally, Lee et al., (2009) assert that SaaS is defined by six essential characteristics; (1) Reusability, which allow users receive the application over the internet and it can be utilized for a variety of tasks, (2) Data maintained by provider which allow customers of SaaS providers acquire a license to use the software as a service, on demand, (3) Customizability of a service refers to its capacity to be modified to meet the needs of a particular client, (4) SaaS is accessible through the internet by service users since they only rent the software, rather than owning it, (5) Scalability is a highly desired characteristic of a system, network, or process that demonstrates its capacity to either manage a growing volume of work or to expand easily, (6) Pay-per-use.

A significant portion of the research on software as a service usage persistence aims to clarify the significance of service quality, trust, and satisfaction for sustained SaaS adoption (Benlian et al. 2010; 2011; Yang et al., 2015). A SaaS metric was created by Benlian et al. (2011) to record service quality assessments in SaaS systems. They found two new elements, namely security and flexibility, while validating previously recognised service quality dimensions (i.e., rapport, responsiveness, reliability, and features).

The researcher decided on Fintech as a widely used Saas and provided by telecommunication companies in Egypt. Furthermore, the researcher decided to adopt Benlian et al. (2011) dimensions to measure Saas service quality.

2.3 Fintech in Egypt

Initially used as an umbrella term, the term FinTech, or financial technology, highlighted the growth of IT-induced revolution of the financial services industry. As of late, the term "FinTech" is frequently used to refer to businesses that provide financial services supported by IT and are frequently seen as disruptive to its established competitors (Zavolokina et al., 2016).

In addition to being a hot topic on the international agenda, how financial technology (Fin-Tech) can enhance financial inclusion is also crucial to Egypt's economic development. The Central Bank of Egypt (2018) acknowledges that the expansion of digital platform may significantly contribute to including individuals who are economically underprivileged and financially excluded in safer, transparent, and affordable financial services and products. By providing more inclusive possibilities and achieving other economic and social national goals, financial inclusion can maintain financial and social stability.

Egypt is one of the emerging and transitioning nations that requires crucial finance sector reform. However, as a developing nation, it still struggles with inadequate and frequently unsuitable governance structures, including inappropriate resource allocation and ineffective revenue system management that contribute to the fragility of the financial sector (Ismaail, 2020). Such governance has unfavorable effects, particularly for the poor, on their ability to use public services.

The Central Bank of Egypt is aware that by focusing on two main pillars, 1) a rigorous and powerful banking infrastructure backed by a suitable regulatory framework and operational measures, and 2) empowering new technologies to expand the Ban, financial excluded and underserved populations can be quickly, securely, transparently, and cost-effectively reached with a range of financial services that are suitable for their needs (Ghebrial, F., 2019).

By granting access to digital payments and the primary operational mechanism, increased cooperation among Egypt's ecosystem's key actors promotes financial inclusion in the nation. In 2013, MasterCard and Etisalat, a multinational telecommunications company located in the United Arab Emirates, introduced "Flous," a mobile payment wallet in collaboration with the National Bank of Egypt (NBE). This mobile payment network makes it

possible for Etisalat subscriber bases in Egypt to make transfers, including money transfers between users, and to deposit and withdraw cash from Etisalat and NBE branches. Additionally, Flous enables users to pay bills and purchase goods and services at various Egyptian businesses (Mastercard Newsroom). Additionally, various MNOs in Egypt provide additional mobile wallets. One Time Password (OTP) can be used to transfer, deposit, and withdraw money from ATMs connected to banks operating in Egypt utilizing the services supplied by Vodafone Cash, Orange Money, and WePay (Aziza Khalil 2018).

Even less academic study has focused on Egypt. Very little academic research has been done on the function of Fin-Tech. The goal of this paper is to advance this idea.

2.4 Fintech Saas Quality and Customer Loyalty

Prior to now, Zeithaml (1988) equated "quality of object" with "customer value," which refers to the customer's total assessment of the utility of a good or service based on their perception of what they receive and what they actually receive. Customer value depends on individual traits like past product knowledge and financial resources as well as environmental factors like time and place of consumption (Nyadzayo et al., 2016). In fact, Ramaseshan et al. (2013) claimed that, next to the interpersonal connection, service quality is one of the most crucial antecedents. Additionally, responsiveness and security are crucial for a service that is favorably evaluated, according to Benlian et al. (2011). According to Nyadzayo et al. (2016), client trust is also boosted by service providers' assurances of their products' dependability and quality.

In its significant report titled "A blueprint for telecom's critical reinvention," Mckinsey & Company (2021) discussed the process of reimagining and reverse engineering the telco future and mentioned that: operators must first define a detailed vision of what the reimagined telco will look like. Following that, leaders must adopt a future-back strategy that fundamentally alter the organization's DNA.

Chee et al. (2020) investigated how service quality, customer satisfaction, and loyalty affected customer retention in the Malaysian telecommunications sector. Customer loyalty has been demonstrated to have a strong correlation with customer satisfaction. Customer satisfaction has been found to be strongly correlated with service quality, which was assessed using the network, customer service, and price structure.

This current research focus on Fintech Saas quality offered by Telecommunications companies in Egypt and its impact on customer loyalty.

3. DATA AND METHODOLOGY

The previous sections served as an introduction to the subject, a discussion of its relevant goals, and a review of past works of literature. This assisted in forming the framework for the current research. The study paradigm, research design, sample strategies used, data collection procedures and methodologies for data interpretation are explained in this section.

3.1 Research questions

The research problem can be summarized in the following question:

- Does Fintech services quality offered by telecom providers as Saas has an impact on customer loyalty?

3.2 Research method

Depending on the factors and topics of the research, a composite questionnaire is used as the data collection tool. Results from earlier studies attested to the validity and dependability of the tools (Benlian et al., 2011; Alam et al., 2012).

The research of Benlian et al. (2011) was used to develop the dimensional scale to rate SaaS quality. The 28 items on the scale SaaS-Qual instrument, which addressed the six SaaS-Qual factors (5 items measure rapport dimension,

5 measure responsibility, 4 measure reliability, 4 measure flexibility, 5 measure features, and 5 items measure security). Researchers used LISREL to examine the uni-dimensionality/convergent validity and composite reliability of the six SaaS-Qual criteria using the final 28-item instrument. The findings imply that all six SaaS-Qual criteria showed sufficient levels of model fit. Participants are asked to rate items on a Likert-type scale with a range of 1 to 5, where 1 equals "My minimum service level is..." and 5 equals "My maximum service level is..."

While the customer loyalty measure was taken from Alam et al. (2012). The scale was evaluated in a telecommunications context, and results showed that the Cronbach Alpha coefficient was 0.85 (> 0.7) and that all items have positive correlations with one another and with overall customer loyalty at the 0.01 level. The scale has six items and is scored using a 5-point Likert-type scale, with 1 being strongly agree or disagree. 5 = Strongly Agree, from 1 = Disagree.

Since the variables under investigation have been identified and previously validated, and constructs to measure them exist, a quantitative study with a self-administered online questionnaire was deemed the best way to test the hypothesis (Sekaran et al., 2013). The context for the research population, as well as specifics about the research sample, techniques, and measures used in this research, are provided in the next section.

3.3 Research Population and Sample

Individual customers who subscribe to internet services from Egyptian telecommunications firms, whether through an ADSL subscription or a mobile internet subscription, serve as the unit of analysis in this study. Consequently, the study's population in accordance with the ICT Indicators Bulletin for March 2022 is 74.92 million subscribers, 526 questionnaires responses were collected.

3.4 Measures

The questionnaire responses were imported into a data file for analysis once the data had been cleaned. The Statistical Package for the Social Sciences (SPSS) software ver. 23 was used to import the participant data from Excel. As methods for analyzing the data includes correlational analysis, simple and multiple linear regression were used.

To check the validity of the scales employed, the researcher performs Exploratory Factor Analysis (EFA) on the instruments adopted. EFA assists us in eliminating the survey's troublesome issues. In this instance, 34 items are loaded appropriately across 7 questionnaire dimensions and variables. The factor analysis of all variables scales were examined. Since the factor loadings were higher than 0.5 and communalities higher than 0.3, then the Scale is an expressive and valid instrument for the purpose of this research (Fabrigar et al., 1999).

To check the reliability of the questionnaire, the researcher used Cronbach's alpha coefficient and the following the reliability coefficients of Fintech Saas Quality dimensions range from 78.2% in Security dimension to 89.0% in Features dimension, while Customer Loyalty Cronbach's alpha is 89.4%. Finally, the whole instrument scale Cronbach's alpha is 97.6%. As shown above all Cronbach alpha's coefficients are above 70%. Consequently, reliability coefficients indicate the stability and reliability of variables scale (Cortina, 1993).

4. EMPIRICAL FINDINGS AND DISCUSSIONS

4.1 Empirical findings

To determine the existence and level of association, the researcher used bivariate correlation. Pearson's correlation coefficient falls between -1.0 and +1.0, indicates the strength and direction of association between the two variables (Field, 2005).

The results of Pearson correlation coefficient provided in table (4.1) show that there is positive significant relation at level correlation 0.01 between Saas quality and customer loyalty which indicated by (R=0.795, pvalue ≤ 0.01). There is positive significant relation at level correlation 0.01 between Rapport, Responsiveness, Reliability,

Flexibility, Features, Security and customer loyalty which indicated by (R=0.733, 0.644, 0.736, 0.717, 0.677, 0.652 respectively, pvalue ≤ 0.01).

Table-4.1: Pearson correlation coefficient

		Rapport	Responsiveness	Reliability	Flexibility	Features	Security	Customer Loyalty
Rapport	Pearson Correlation	1	.811**	.773**	.711**	.627**	.648**	.733**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
Responsiveness	Pearson Correlation		1	.818**	.695**	.622**	.689**	.644**
	Sig. (2-tailed)			0.000	0.000	0.000	0.000	0.000
Reliability	Pearson Correlation			1	.736**	.694**	.677**	.736**
	Sig. (2-tailed)				0.000	0.000	0.000	0.000
Flexibility	Pearson Correlation				1	.784**	.693**	.717**
	Sig. (2-tailed)					0.000	0.000	0.000
Features	Pearson Correlation					1	.674**	.677**
	Sig. (2-tailed)						0.000	0.000
Security	Pearson Correlation						1	.652**
	Sig. (2-tailed)							0.000
FINTECH SAAS Quality	Pearson Correlation							.795**
	Sig. (2-tailed)							0.000

The simple linear regression test used to measure the impact of Fintech Saas quality on Customer Loyalty. Below table (4.2) presents the simple linear regression results for the impact of Fintech Saas quality on Customer Loyalty.

Table-4.2: Simple linear regression results for relationship between Fintech Saas Quality and Customer Loyalty

Model	Unstandardized		Standardized	t	P $_{value}$	R	R Squared	F	p $_{value}$
	B	Std.	Beta						
(Constant)	3.097	0.710		4.365	3.097	.795	0.631	815.062	.000
Fintech Saas Quality	0.197	0.007	0.795	28.549	0.197				

The results of simple linear regression provided in the above table show that Fintech Saas quality has a significant positive impact on Customer Loyalty at level 0.01, with R^2 = 63.1%, F amounted to 815.062 was significant at level 0.01, and t is 28.549 significant at level 0.01

From the above table the regression equation $Y = B0 + B1X1$

Customer Loyalty = 3.097 + 0.197 * Fintech Saas Quality

The results of multiple linear regression provided below in table (4.3) show that Fintech Saas Quality dimensions (Rapport, Responsiveness, Reliability, Flexibility, Features, and Security) have a positive significantly impact on Customer Loyalty at level 0.01. f=156.23, p-value< 0.01 level, with R-squared 66.6%.

Table-4.3: standard multiple linear regression results for relationship between Fintech Saas Quality and Customer Loyalty

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R Square	F	Sig.
	B	Std. Error	Beta					
(Constant)	2.995	0.734		4.083	0.000	0.666	156.23	.000
Rapport	0.450	0.062	0.360	7.219	0.000			
Responsiveness	-0.227	0.064	-0.193	-3.534	0.000			
Reliability	0.410	0.072	0.303	5.702	0.000			
Flexibility	0.246	0.072	0.171	3.402	0.001			
Features	0.164	0.056	0.133	2.897	0.004			
Security	0.193	0.058	0.139	3.328	0.001			

From the above table the standard multiple linear regression model equation $Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3$ could be obtained as follows:

Customer Loyalty = 2.995 + (0.450 * Rapport) - (0.227* Responsiveness) + (0. 410 * Reliability) + (0. 246 * Flexibility) + (0. 164 * Features) + (0. 193 * Security)

The simple and multiple linear regression results shown above supports the acceptance of hypothesis H1. Fintech Saas quality has a positive impact on customer loyalty in the Egyptian telecommunication companies.

4.2 Discussions

The aim of this current research is to examine the impact of Fintech Saas quality offered by Egyptian telecommunication companies on customer loyalty. This research findings confirm the positive impact of Fintech Saas quality on customer loyalty in the Egyptian telecommunication companies. This result is consistent with Gremler et al. (2000); Yang et al. (2015); Colgate et al., (2007); Rauyruen et al. (2007); Čater et al. (2010); Benlian et al. (2011); Ramaseshan et al. (2013); Chou et al., (2014); Nyadzayo et al. (2016); Dempsey et al. (2018); Chee et al. (2020) results.

This current research how Fintech SaaS customers are driven by service quality to foster loyalty, drawing on the literature on online services and the usage of IS. Our attention is on six aspects of SaaS service quality. Our findings demonstrate that customers are motivated to develop loyalty toward both the service quality and the provider, demonstrating commitment and acting as a restraint on customers' exploration and continuation. Our findings are in line with earlier SaaS studies that show service quality is one of the most important factors in resolving clients' concerns about multi-tenant architecture (such as limited customization), which in turn affects customers' loyalty and post-adoption intention.

5.   CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The current study, which is based on online services and the use of IS, examines how Fintech SaaS customers are motivated by service quality to promote loyalty. Six factors of SaaS service quality are the focus of our attention. Our research shows that customers are driven to form loyalties to the service quality and the supplier, indicating commitment and serving as a deterrent to customers' exploration and continuing.

Telecom operators should consider strategic measures to maintain and develop the relevant service quality features in order to continue or even increase their customer loyalty, as the study indicated that the quality of Fintech SaaS has a direct positive impact on customer loyalty.

In reality, it is highly expensive to start and maintain a communications company. Telecom operators often invest substantially throughout the entire value chain to uphold and increase client loyalty. This requires a variety of commercial operations, such as efficient network deployment, sufficient customer service channels, competent product development, aggressive pricing, and continual promotions. SaaS production, like Fintech, has a comparatively low capital expenditure to establish and run. It follows that SaaS with such cheap costs would have a high return on investment (ROI) if it influences customer loyalty; as a result, telecom operators are encouraged to spend as much as possible in such services as Fintech.

5.2 Research limitations and future studies

When evaluating the findings of this study, it's important to keep in mind the limitations. To begin, the current study used a self-administered questionnaire in a cross-sectional sample. As a result, there's a chance that common procedure bias will affect our results; nonetheless, studies have shown that this is unlikely. Future studies could reduce this potential influence by gathering data from many sources and/or over time periods. Second, because we chose a single instance industry, the findings should not be seen as necessarily typical of the entire workforce. Future research might look into a variety of businesses and contexts to see how generalizable the findings are. Finally, while the study was planned as quantitative research, the complexities of the interconnected aspects lend itself to additional qualitative and quantitative inquiries.

5.3 Empirical Implications

Software as a Service (SaaS) is revolutionizing all related businesses, with the telecom sector being one of the most significant. This significant development is mostly due to SaaS's capacity to help users and telecoms companies operate more productively and efficiently.

Because of the remote access that SaaS by its very nature presupposes, operators can do away with the requirement to offer the software through their telecom retail locations. The SaaS needs to be downloaded and installed on the consumers' electronic devices. With SaaS, users have complete access to the features of the product. Through the software, the telecom operator, clients, and any other parties involved may simply communicate and remain completely informed of what is happening, as long as they have access to the internet.

As the study demonstrated, there is a clear relationship between the reliability of SaaS products and the loyalty of telecom customers. As a result, telecom operators should take the necessary precautions to ensure the quality of such unrelated SaaS products (particularly in Fintech Products) to increase customer loyalty and strengthen their competitiveness.

Additionally, as the study found that the quality of Fintech SaaS has a direct beneficial impact on customer loyalty, telecom operators should think about strategic initiatives to preserve and strengthen the related service quality aspects in order to sustain or even increase their customer loyalty.

In practice, the cost to create and run a telecommunications corporation is quite significant. To maintain and grow customer loyalty, telecom operators typically invest heavily across the entire value chain. This involves many aspects of the business, including the effective network deployment, adequate customer service channels, good product development, competitive pricing, and ongoing promotions. However, the production of SaaS that is related to other market vertical like Fintech, as being a software, has a relatively small investment to build and operate. It follows that if SaaS with such low costs affects consumer loyalty, it will have a significant return on investment (ROI), therefore it is advised for telecom operators to invest as much as possible in such services like Fintech.

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STATEMENTS AND DECLARATIONS

The authors declare that they have no conflicts of interest related to this research paper and that there are no financial or non-financial interests that are directly or indirectly related to this research work submitted for publication. In addition, we declare that this research paper is an original work of our research, has been written by us and has not been submitted for any previous degree nor journal.

The methodology and experimental work are entirely our own work; the previous studies and contributions have been indicated clearly and acknowledged. References resources were used have been provided using international recognized references and citation style.
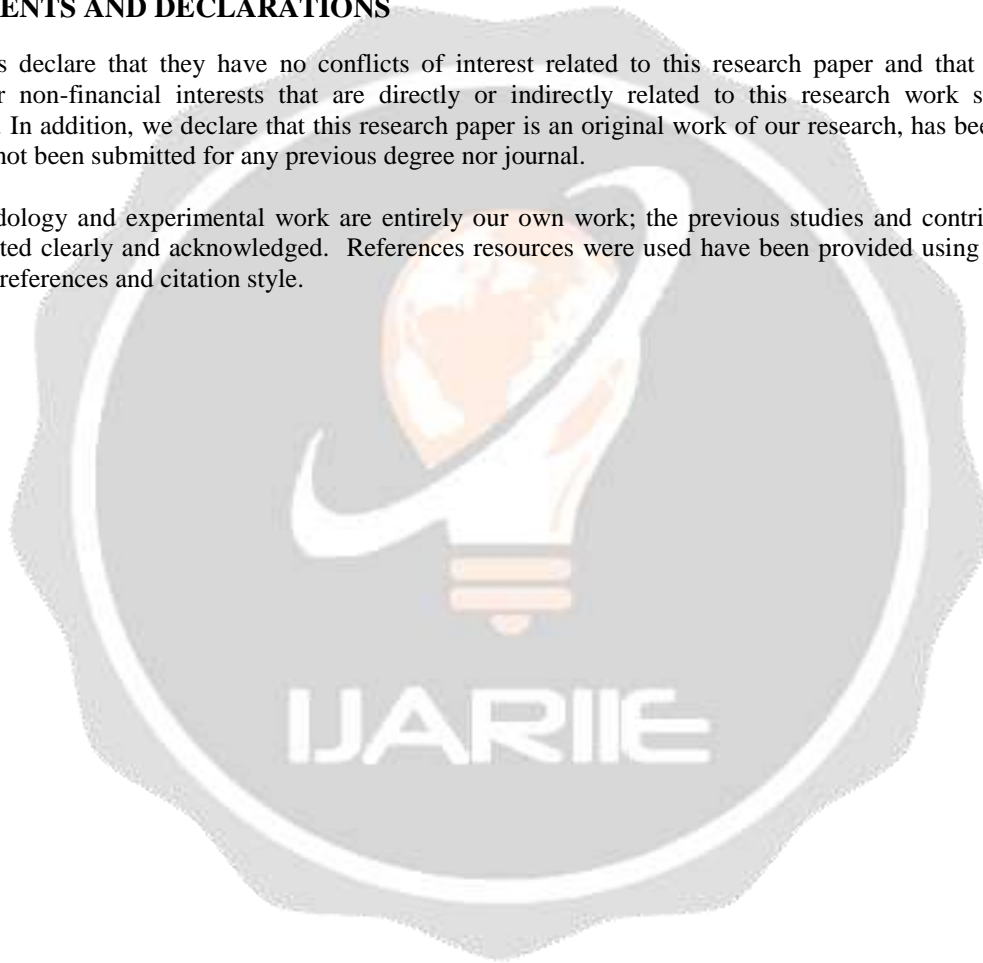
REFERENCES

[1]   Aleem and C. R. Sprott (2013). "Let me in the cloud: analysis of the benefit and risk assessment of cloud platform," Journal of Financial Crime, vol. 20, no. 1, pp. 6–24,.

[2]   Azarnik, J. Shayan, and M. Alizadeh. (2012). "Associated risks of cloud computing for SMEs," Open International Journal of Informatics, vol. 1, no. 1, pp. 37–45.

[3]   Dutta, G. C. A. Peng, and A. Choudhary. (2013). "Risks in enterprise cloud computing: the perspective of IT experts," Journal of Computer Information Systems, vol. 53, no. 4, pp. 39–48.

[4]   Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models–strategizing, critical capabilities and activities for sustained value creation. Long range planning, 46(6), 427-442.

[5]   Ai, Yuan; Peng, Mugen; Zhang, Kecheng (2017). Edge cloud computing technologies for internet of things: A primer. Digital Communications and Networks, (), S2352864817301335–. doi:10.1016/j.dcan.2017.07.001

[6]   Alam, A., Salim, M. (2012). Impact of Customer Winning Attitude on Customer Loyalty within KSA Mobile Telecommunication Industry. International Conference on Industrial Engineering and Operations Management Istanbul.

[7]   Aung, Than Htaik. (2014). SaaS in Business: Exploring Strategic Benefits and Considerations of Software as a Service (SaaS) Model in Business Organizations. 10.13140/2.1.3130.3043.

[8]   Awang, Z. (2015). SEM Made Simple: A Gentle Approach to Learning Structural Equation Modelling. Bandar Baru Bangi, MPWS Rich Resources.

[9]   Benlian, A., Koufaris, M., & Hess, T. (2011). Service Quality in Software-as-aService:Developing the SaaS-Qual Measure and Examining Its Role in Usage Continuance. Journal of Management Information Systems, 28(3), 85-126.

[10]   Benlian, A., Koufaris, M., Hess, T. (2010). The Role of SAAS service quality for continued SAAS use: Empirical insights from SAAS using firms. ICIS 2010 Proceedings.

[11]   Bhardwaj, S., Jain, L., & Jain, S. (2010). An approach for investigating perspective of cloud Software-as-a-Service (SaaS). International Journal of Computer Applications, 10(2), 44-47. https://doi.org/10.5120/1450-1962

[12]   Central Bank of Egypt, report 2018. "Financial Inclusion through Digital Financial Services and Fin Tech: the Case of Egypt". Alliance for financial inclusion, Malaysia, p.3-9.

[13]   Chua, Y. P. (2014). Statistik Penyelidikan Lanjutan: Ujian Regresi, Analisis Faktor dan Analisis Sem. Malaysia: McGraw Hill (Malaysia) Sdn Bhd.

[14]   Colgate, M., Tong, V. T. U., Lee, C. K. C., & Farley, J. U. (2007). Back from the brink: Why customers stay. Journal of Service Research, 9(3), 211-228.

[15]   D. Ma, (2007). "The Business Model of "Software-As-A-Service"," IEEE International Conference on Services Computing (SCC 2007), pp. 701-702, doi: 10.1109/SCC.2007.118.

[16]   Dhar, Subhankar. (2012). From outsourcing to Cloud computing: Evolution of IT services. Management Research Review. 35. 664-675. 10.1108/01409171211247677.

[17]   G. Zhang, Y. Chen, and G. Li, (2020). "The evolution and emerging trends of cloud computing adoption research: visual analysis of CiteSpace based on WOS papers," in Proceedings of the 2020 3rd International Conference on Signal Processing and Machine Learning, pp. 40–47, Beijing, China.

[18]   Goscinski, A., & Brock, M. (2010). Toward dynamic and attribute based publication, discovery and selection for cloud computing. Future generation computer systems, 26(7), 947-970.

[19]   H. Yang and M. Tate. (2012). "A descriptive literature review and classification of cloud computing research," Communications of the Association for Information Systems, vol. 31, no. 1, p. 2.

[20]   Haji, Lailan & Ahmed, Omar & Zeebaree, Subhi & Dino, Hivi & Zebari, Rizgar & Shukur, Hanan. (2020). Impact of Cloud Computing and Internet of Things on the Future Internet. Technology Reports of Kansai University. 62. 2179-2190.

[21]   Ismaail, Hossam. (2020). The Impact of Financial Technology on Financial Inclusion: The Case of Egypt. 10.9790/5933-1106023551.

[22]   Jacobsson, M., & Rickhammar, O. (2022). Recent M&A in the Telecom Industry : Industrial Wireless Networks (Dissertation). Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-317992

[23]   Jan Gabrielsson, ola hubertsson, iGnaCio Más and robert skoG (2010). Cloud computing in telecommunications. National Institute of Standards and Technology http://csrc.nist.gov/groups/SNS/cloud-computing

[24]   Karadsheh, L. (2012). Applying security policies and service level agreement to IaaS service model to enhance security and transition. computers & security, 31(3), 315-326.

[25]   Khalil A., 2018 ―Digital Financial Inclusion in Egypt‖, International Telecommunication Union, Regional Development Forum 12- 13 Feb., Algeria.

[26]   Lähteenmäki, J. (2015). Emergence of a Telco Cloud platform: paradigm, cost structure and strategic implications (Master's thesis).

[27]   Lee, J. Y., Lee, J. W., & Kim, S. D. (2009, December). A quality model for evaluating softwareas-a-service in cloud computing. In 2009 seventh ACIS international conference on softwareengineering research, management and applications (pp. 261-266). IEEE.

[28]   Legner, C., Estier, T., Avdiji, H., & Boillat, T. (2013, December). Designing Capstone Courses in Management Education: Knowledge Activation and Integration Using an ERP-based Simulation Game. Paper presented at the Thirty Fourth International Conference on Information Systems (ICIS), Milan, Italy.

[29]   M. Abdel-Basset, M. Mohamed, and V. Chang. (2018). "NMCDA: a framework for evaluating cloud computing services," Future Generation Computer Systems, vol. 86, pp. 12–29.

[30]   M. Armbrust, A. Fox, R. Griffith (2010). "A view of cloud computing," Communications of the ACM, vol. 53, no. 4, pp. 50–58.

[31]   M. Z. Nkhoma, D. Dang, and A. De Souza-Daw, (2013). "Contributing factors of cloud computing adoption: a technologyorganisation-environment framework approach," in Proceedings of the European Conference on Information Management & Evaluation, pp. 180–188, Sopot, Poland.

[32]   Mckinsey &company (2021) A blueprint for telecom's critical reinvention https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/a-blueprint-for-telecoms-critical-reinvention.

[33]   Mell, P. and Grance, T. (2011), The NIST Definition of Cloud Computing, Special Publication (NIST SP), National Institute of Standards and Technology, Gaithersburg, MD, [online], https://doi.org/10.6028/NIST.SP.800-145 (Accessed December 14, 2022)

[34]   Morgan, Lorraine and Conboy, Kieran, (2013). "Factors Affecting The Adoption Of Cloud Computing: An Exploratory Study". ECIS 2013 Completed Research. 124.

[35]   Nyadzayo, M. W., & Khajehzadeh, S. (2016). The antecedents of customer loyalty: A moderated mediation model of customer relationship management quality and brand image. Journal of Retailing and Consumer Services, 30, 262-270.

[36]   O. Al-Hujran, E. M. Al-Lozi, M. M. Al-Debei, and M. Maqableh. (2018). "Challenges of cloud computing adoption from the TOE framework perspective," International Journal of E-Business Research, vol. 14, no. 3, pp. 77–94.

[37]   R. Buyya, C. S. Yeo, and S. Venugopal. (2008). "Market-oriented cloud computing: vision, hype, and reality for delivering it services as computing utilities," in Proceedings of the 2008 10th IEEE International Conference on High Performance Computing and Communications, pp. 5–13, Dalian, China.

[38]   Ramaseshan, B., Rabbanee, F. K., & Tan Hsin Hui, L. (2013). Effects of customer equity drivers on customer loyalty in B2B context. Journal of Business & Industrial Marketing, 28(4), 335 346.

[39]   Rimal, B. P., Choi, E., & Lumb, I. (2009, August). A taxonomy and survey of cloud computing systems. In 2009 Fifth International Joint Conference on INC, IMS and IDC (pp. 44-51). Ieee.

[40]   S. M. Salleh, S. Y. Teoh, and C. Chan (2012). Cloud Enterprise Systems: A Review of Literature and its AdoptionPACIS, Nakuru, Kenya.

[41]   S. Marston, Z. Li, S. Bandyopadhyay, J. Zhang, and A. Ghalsasi. (2011). "Cloud computing - the business perspective," Decision Support Systems, vol. 51, no. 1, pp. 176–189.

[42]   Schwab K. & World Economic Forum. (2016). The fourth industrial revolution. World Economic Forum.

[43]   Sekaran, U. and Bougie, R. (2013) Research Methods for Business: A Skill-Building Approach. 6th Edition, Wiley, New York.

[44]   Soltanifar, Mariusz & Hughes, Mathew & Göcke, Lutz. (2020). Digital Entrepreneurship. Impact on Business and Society. 10.1007/978-3-030-53914-6.

[45]   Sun, W., Zhang, K., Chen, S. K., Zhang, X., & Liang, H. (2007, September). Software as aservice: An integration perspective. In International Conference on Service-Oriented Computing (pp. 558-569). Springer, Berlin, Heidelberg.

[46]   Sze Chee, V., & Md Husin, M. (2020). The Effect of Service Quality, Satisfaction and Loyalty toward Customer Retention in the Telecommunication Industry. The International Journal of Academic Research in Business and Social Sciences, 10.

[47]   Tomás, S., Thomas, M., & Oliveira, T. (2018). Evaluating the impact of virtualization characteristics on SaaS   adoption.   Enterprise   Information   Systems,   12(3),   259-278. https://doi.org/10.1080/17517575.2017.1355484

[48]   Walz, J., & Grier, D. A. (2010). Time to push the cloud. IT professional, 12(5), 14-16.

[49]   Yahaya, T., Idris, K., Suandi, T., Ismail, I. (2018), Adapting instruments and modifying statements: The confirmation method for the inventory and model for information sharing behavior using social media. Management Science Letters, 8(5), 271-282.

[50]   Yang, C.-C., & Chou, S.-W. (2015). Understanding the success of software-as-a-service (saas):the perspective of post-adoption use, PACIS 2015 Proceedings.

[51]   Yass, Ahmed. (2017). The Impact of Cloud Based Information Systems on Organization's Performance. IOSR Journal of Computer Engineering. 19. 42-46. 10.9790/0661-1902024246.

[52]   Zavolokina, L., Dolata, M. & Schwabe, G. 16 (2016). The FinTech phenomenon: antecedents of financial innovation perceived by the popular press. Financ Innov 2, https://doi.org/10.1186/s40854-016-0036-7

[53]   Zeithaml, Valarie. (1988). Consumer Perceptions of Price, Quality and Value: A Means-End Model and Synthesis of Evidence. Journal of Marketing. 52. 2-22. 10.1177/002224298805200302.

[54]   Zhang, Q., Cheng, L., & Boutaba, R. (2010). Cloud computing: state-of-the-art and research challenges. Journal of internet services and applications, 1(1), 7-18.