



# “Modeling value co-creation in cloud-based mobile fintech services within the Islamic banking settings”

## AUTHORS

Hasan Alhanatleh   
Amineh Khaddam 

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Khaddam, 2025

Hasan Alhanatleh, Ph.D., Assistant  
Professor, Department of Management  
Information Systems, College of  
Administrative Sciences, Applied  
Science University, Kingdom of  
Bahrain. (Corresponding author)

Amineh Khaddam, Ph.D., Associate  
Professor, Faculty of Business,  
Management Information Systems  
department, Amman Arab University,  
Jordan.



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Hasan Alhanatleh (Kingdom of Bahrain), Amineh Khaddam (Jordan)

# MODELING VALUE CO-CREATION IN CLOUD-BASED MOBILE FINTECH SERVICES WITHIN THE ISLAMIC BANKING SETTINGS

## Abstract

This study seeks to empirically evaluate the critical role of cybersecurity awareness and cloud computing capabilities in shaping value co-creation using cloud-based mobile fintech services of Islamic banks in Jordan from clients' perspectives. By employing a quantitative methodology, 498 clients of Islamic banks completed the questionnaire for this study. The questionnaires were sent to clients who perform their financial activities by using cloud-based mobile fintech services from various Islamic banks in Jordan. Based on Structural Equation Model (SEM) analysis, the results uncover that social engineering threats, password security, and social factors have a significant direct effect on cybersecurity awareness among customers of cloud-based mobile fintech services of Islamic banks in Jordan at a significant value level ( $P < .05$ ,  $.01$ , and  $.001$ ). The findings also confirm that cybersecurity awareness asserts a positive direct influence on both cloud-computing capabilities and value co-creation among customers of cloud-based mobile fintech services of Islamic banks in Jordan ( $P < .001$ ). Finally, cloud-computing capabilities have a significant direct influence on value co-creation among customers of cloud-based mobile fintech services of Islamic banks in Jordan ( $P < .001$ ). The results of the developed model of this study could be used to enhance the financial services of Jordanian Islamic banks, assist in producing new services, reinforce the development process of cloud-based mobile fintech services, and aid in developing cybersecurity awareness algorithms in this field.

## Keywords

cybersecurity awareness, cloud-computing capabilities,  
value co-creation, mobile fintech services, Islamic banks,  
Jordan

## JEL Classification

D46, D53, O14, G2, E5

## INTRODUCTION

Mobile fintech services industries have been widely adopted in banking sectors, aiming at achieving various purposes such as reshaping the banking strategy regarding financial services, providing alternative approaches to present financial services for both employees and customers, restructuring financial services, and enhancing customer relationships (Wang et al., 2024). Allocating greater resources and information regarding financial services is considered a critical matter in terms of enhancing the mobile fintech services in the banking domain, especially for customers (Srinivasan et al., 2024). Recently, it has been noted that financial services industries seek to improve the fintech services application infrastructure by combining with other technologies, such as cloud computing platforms. Cloud-computing technology has provided various benefits for the banking and financial services industries, like reinforcing infrastructure, supporting financial services scalability, and presenting a new business model (Fang, 2024; Kaur & Sahni, 2024).

Cloud-based mobile fintech services have received considerable attention from specialists, providing a new style of presenting financial services and adding value for business and customers. Exploring custom-

ers' experience toward cloud-based mobile fintech services usage is expected to offer a new perspective for developing the mobile fintech services in the banking sector, especially in Islamic banks. However, recent development processes of cloud computing technology have concentrated on security issues for improving the usage of cloud computing-based applications. Cybersecurity threats have been considered a major key that affects the continuous use of cloud computing platforms, targeting to reinforce the adoption of cloud computing in several application models like fintech services (Ali et al., 2024). It has been indicated that users' cybersecurity awareness is considered a major player for ensuring the continued usage of cloud-based mobile fintech services, leading to maximizing benefits and value.

## 1. LITERATURE REVIEW

The realm of value co-creation has been established to reinforce cooperative interactions between organizations and consumers, bolstering their capabilities to determine the real demands of the recent market that can lead to gaining various benefits for business and customers. Value co-creation has emerged as an indispensable theory across several settings, including service management, digital marketing, financial services industries, and the platforms of business-to-business, business-to-customers, and customers-to-business (Sinkovics et al., 2018). Recently, it has been indicated that the establishment of value co-creation theory in mobile banking services can assist managers to re-allocate the resources during the development process of mobile banking services (Lember et al., 2019; Mostafa et al., 2020; Alhanatleh et al., 2024c). Banking management has realized that the current digital era has presented various alternatives to offer their electronic and digital services to customers in terms of earning a comparative advantage and adding value for itself and customers (Carranza et al., 2021; Kumar & Rani, 2024). Accordingly, adopting the novel of technology is considered a pivotal procedure to enhance the business process and involve consumers in the development process regarding their electronic and digital services, especially mobile fintech services (Kang et al., 2018; Harsono & Suprapti, 2024).

Cloud computing is an innovative digital technology that offers a new business model for organizations to enhance their practices. Cloud computing technology has offered various models and services for organizations and consumers, targeting to reshape the business process and add value (Butt et al., 2020; Mughaid et al., 2024; Hua & Huang, 2021). In terms of cloud computing models, there are three popular types of models (public, private,

and hybrid), providing alternative solutions for presenting their products and services for customers (Rosa et al., 2024). These models are presented based on services of cloud computing (infrastructure as a service, platform as a service, and software as a service), bringing various benefits such as reducing costs, maximizing the capabilities of business, and reinforcing the scalability of business (Chuang et al., 2015). The capabilities of cloud computing enable organizations and individuals to modularize their business through applying cloud-based virtualization, which leads to providing a significant influence on the value co-creation realm (Schrieck et al., 2021). Cloud computing architecture has introduced a new method for businesses to present their services and products for accessing customers via virtualization based on cloud computing providers' support (Bali & Anand, 2024). Through this context, recent literature has confirmed that cloud-based mobile fintech services are increasingly adopted by various types of business-like banking domains (He, 2024). Digital technologies have the ability to provide a value and competitive advantage for Islamic banks and their consumers through boosting banks' image based on digital transformation capabilities (Al-Sheikh et al., 2023; Oladele, 2024).

Cybersecurity awareness is considered a primary resource to enhance digital technology usage and generate significant value for business and customers. Recent empirical examinations have confirmed that security risk has a considerable influence on customers' attitude toward adopting fintech services, targeting at adding value during executing their financial transactions on the system (Alnsour et al., 2023; Asadi et al., 2017). Recently, Awamleh et al. (2024) asserted that deploying digital transformation technologies across Islamic bank environments is expected to enhance their internal processes, address matters of informa-

tion and data protection, and eventually generate value for their practices. Therefore, embracing the last trend of digital technologies benefits Islamic banks through matching customers' requirements, improving the flexibility of management, deploying and sharing the bank's resources, and protecting data and information of bank and customers. However, the existing fintech services literature has affirmed that enhancing cybersecurity awareness and algorithms can lead to expanding cloud-computing adoption, increasing effectiveness and efficiency, and maximizing the security rate among fintech services (Ahmad et al., 2022; Kaur et al., 2021a). The concept of cybersecurity awareness refers to the reinforcement of users' knowledge, experience, and understanding of potential cyber threats, crimes, and risks (Srivastava & Raj, 2024). Latterly, empirical studies have revealed that cybersecurity awareness confirmed an empirical influence on adopting technology or continuing usage (Ulven & Wangen, 2021). Cybersecurity awareness of customers has been considered a major element in determining the rate of use of a particular technology (Aljeaid et al., 2020). Modern empirical research has discovered that customers' cybersecurity awareness plays a fundamental role in the mobile fintech services setting, where a high rate of customers' awareness will increase the degree of mobile fintech services usage (Alhanatleh et al., 2024a). Consequently, increasing customers' cybersecurity awareness regarding mobile fintech services usage can minimize cyber threats and digital crimes in this digital era. The impact of consumers' cybersecurity awareness is modeled through deciding their acts and attitude regarding adopting mobile fintech services (Calderwood & Popova, 2019; Alnaser et al., 2023). Establishing customer cybersecurity awareness can assist in increasing the productivity of systems like mobile fintech services and support economic growth in non-developed and developing countries, such as Jordan (Chang & Coppel, 2020). To create cybersecurity awareness, previous investigations have employed various antecedents to discover the users' rate of cybersecurity awareness across mobile fintech services (Alqahtani, 2022).

In terms of the first prior regarding cybersecurity awareness of mobile fintech services, social engineering threats are defined as any behavior that may affect a customer to probably take an action

in terms of his best interest (Hadnagy, 2010). The attacks of social engineering threats can occur in various methods, like electronic mail or fraudulent phone calls. Nevertheless, the current empirical outcomes in the literature review have uncovered that top managements of the banking sector have realized to take serious actions toward increasing customers' awareness of social engineering threats, aiming at maximizing their customers' cybersecurity awareness of using any kind of technology (Pósa & Grossklags, 2022). Moreover, the second predictor is password security, defined as an amalgamation of serial words, characters, numbers, and special symbols, used to offer permission to access mobile fintech services (Wash et al., 2016). Therefore, consumers can protect themselves based on their behavior in forming strong and complex passwords while accessing mobile fintech services. Depending on empirical confirmations in recent literature, Alqahtani (2022) discovered that frequent changes of users' passwords based on a complicated method will provide a high degree of security when using information systems, resulting in achieving a high rate of cybersecurity awareness. As a final predictor, social media is considered a significant factor influencing customers' cybersecurity awareness of using mobile fintech services (Alhanatleh et al., 2023). Social media platforms enable users to share, access, and distribute their personal information with others through direct and indirect interactions (Creevey et al., 2022). As a result, information about users on social media applications could be readily accessed by unauthorized people due to the inadmissible behavior of users, like sharing their personal photos, location, and private information. However, Alqahtani (2022) confirmed that dealing with social media platforms poses cyber threats and attacks, while carefully behaving on those platforms provides a significant rate of cybersecurity awareness.

The influence of cybersecurity on cloud computing technology has gained considerable attention, aiming at developing the architecture of cloud computing and determining the future trends of adopting cloud-based virtualization across various businesses. It has been discovered that advancements in cybersecurity algorithms play a significant role in increasing the adoption of cloud computing solutions for both businesses and in-

dividuals (Alsolami, 2018; Mughaid et al., 2024; Zureigat et al., 2025). In addition, recent statistical results have supported that cybersecurity awareness of customers confirms a positive effect of adopting mobile fintech services (Alhanatleh et al., 2024a). A weak knowledge and understanding of customers regarding cybersecurity threats and crimes leads to a negative effect on the usage rate of mobile fintech services in different settings, like the banking domain (Dang et al., 2023). In contrast, a high rate of aware customers will increase the degree of cloud-based mobile fintech services adoption in the banking setting and decrease the potential risk. However, there has been agreement in the relevant literature that positive customers' cybersecurity awareness will enhance cloud-computing capabilities in the financial services industry (Alhanatleh et al., 2024a). Cybersecurity awareness enhances cloud-based mobile fintech services usage, providing multiple advantages for consumers (AlBenJasim et al., 2023; Kaur et al., 2021b). Additionally, cybersecurity awareness is considered a primary determinant that is expected to provide a new insight regarding the value co-creation idiom (Awad et al., 2023; Reddick & Zheng, 2017). The current endeavors of organizations seek to build a strong relationship with customers to achieve their satisfaction, trust, loyalty, and value (Al\_Kasasbeh et al., 2023). However, the current empirical examinations have been uncovered that cybersecurity awareness has a significant role in creating value among customers through enhancing mobile fintech services, participating customers in the development process of financial services, and making them more active with organizations' products and services (Kaur et al., 2021a). In the context of Islamic banks and institutions, enhancing the deal with digital transformation technologies provides benefits for Islamic banks, such as increasing the effectiveness of fintech services, improving customer experience and knowledge, gaining a competitive advantage, and creating value (Shehadeh et al., 2024).

Adopting cloud-based mobile fintech services is expected to benefit customers by enhancing the effectiveness and efficiency of financial services, matching their needs and customization, saving costs in terms of performing their financial services practices, and supporting the scalability of financial services. Modern investigations on value co-creation the-

ory have been focused on the role of cloud computing technology and its capabilities to generate value among organizations and their customers (Jyoti & Efraxia, 2023; Lähteenmäki et al., 2022; Obeidat, 2022). Recently, the cloud-computing realm has allowed businesses to implement their own applications using cloud-based virtualization for establishing the service's effectiveness, efficiency, and value (Alhanatleh, 2024b; Novani, 2016). Digitalization capabilities (including cloud computing) have become new trends for organizations to interact and generate value along with their consumers (Lenka et al., 2017). Empirical outcomes have confirmed that studying the users' behavior when using digital services is considered a primary key to deciding how value can be generated (Heidenreich et al., 2024). As recently affirmed, cloud computing technology in the banking sector has an influence on operational effectiveness and efficiency, cost reduction, and customer value (Bodemer, 2024). Both commercial and Islamic banks have leveraged digital technology capabilities to provide a comprehensive understanding and predict customers' behavior and acts, providing various personalized services, including financial services, in terms of meeting customers' requirements (Alhanatleh, 2021; Allen et al., 2022; Shaikh et al., 2024). Nowadays, cloud-based mobile fintech services in the banking sector have been employed to serve customer demands, achieving customers' convenience and customization (Bodemer, 2024; Luo et al., 2022).

To sum up, unlike the prior investigations in existing literature which focused on the adoption of cloud mobile fintech services in Islamic sectors, this study harnesses value co-creation as a significant resource to achieve the strategic objectives of Islamic banks based on integrating cybersecurity awareness and cloud computing technology, where customers are considered a primary key in developing processes of cloud mobile fintech services in Jordan. In more specific terms, work is scarce in the existing literature that explores the influence of customers' cybersecurity awareness and cloud computing capabilities on customers' value co-creation in the Islamic banking setting, particularly in developing nations such as Jordan.

Accordingly, Figure 1 shows the developed theoretical framework, connecting cybersecurity awareness rely on its antecedents and cloud com-



**Figure 1.** Conceptualized model of this study

puting capabilities with value co-creation of using cloud-based mobile fintech services among customers of Islamic banks in Jordan. The model of the present study suggests providing novel insight for creating value in terms of enhancing the mobile fintech services development process in the Islamic banking sector of Jordan. The main goal of this research is to empirically explain the role of cybersecurity awareness based on its priors and cloud-computing capabilities in driving value co-creation of using mobile fintech services among Jordanians, especially in Islamic bank settings. As a result, the following hypotheses have been theorized:

- H1: Social engineering threats have a positive influence on the cybersecurity awareness of using cloud-based mobile fintech services among customers in the Islamic banking of Jordan.*
- H2: Password security has a positive influence on the cybersecurity awareness of using cloud-based mobile fintech services among customers in Islamic banking in Jordan.*
- H3: Social media have a positive influence on cybersecurity awareness of using cloud-based mobile fintech services among customers in Islamic banking in Jordan.*
- H4: Cybersecurity awareness has a positive influence on the cloud computing capabilities of using cloud-based mobile fintech services among customers in Islamic banking in Jordan.*
- H5: Cybersecurity awareness has a positive influence on the value co-creation of cloud-based services using mobile fintech services among customers in Islamic banking in Jordan.*

- H6: Cloud-computing capabilities have a positive influence on the value co-creation of using mobile fintech services among customers in Islamic banking in Jordan.*

## 2. METHOD

This study employs a quantitative methodology to accomplish its objectives. The instrument for this research was a developed questionnaire based on relevant studies in cloud-based mobile fintech services, cybersecurity awareness, and the value co-creation realm. Firstly, social engineering threats with 6 items, password security with 8 items, and social media with 5 items as antecedents of cybersecurity awareness have been developed based on (Mai & Tick, 2021). Secondly, cybersecurity awareness with 4 items was measured based on Alhanatleh (2023a). Thirdly, cloud-computing capabilities with 7 items have been adapted and measured based on Luo et al. (2018). Lastly, value co-creation with 8 items has been adapted and measured based on Aboalqanem et al. (2024) and Daabseh and Aljarah (2021). For data analysis purposes, a five-point Likert scale was used to represent the respondents of the dataset, gradually encoding from “1” as strongly disagree to “5” as strongly agree.

The population of this study was customers who use cloud-based mobile fintech services in Islamic banks of Jordan; thus, the population size is unknown. To determine the qualified sample size for collecting data in the case of this study, Sitthipon et al. (2022) confirmed that at least 385 customers are sufficient to perform the data collection process. Before embarking on the data collection, the electronic (e) questionnaire was generated using the Google Drive platform. In terms of providing a high level of construct item validity, the

pilot study was conducted by sending an e-questionnaire to 20 customers of cloud-based mobile fintech services in Islamic banks of Jordan. The main outcome of this work is to reduce language mistakes and syntax errors of construct items. To gather customer knowledge toward using cloud-based mobile fintech services in Islamic banks of Jordan, the convenience sampling technique has been selected due to its ability to conduct the data collection process readily, saving the cost of the data collection process, accessing respondents easily, and retrieving responses quickly, as confirmed by Mou et al. (2017). In terms of the data collection stage, the link to the e-questionnaire was submitted to 600 customers of cloud-based mobile fintech services in Islamic banks of Jordan through several methods, like WhatsApp, Facebook, and various others. Just 526 questionnaires were returned. Just 498 valid questionnaires were used for analysis purposes because of the execution of multiple statistical mechanisms, like missing value and outlier techniques. Nonetheless, Hair et al. (2019) asserted that 498 customers of cloud-based mobile fintech services are eligible to perform the analysis stage. The data collection processes were conducted on September 20, 2023, and took four weeks to complete.

To serve the analysis processes, SPSS and AMOS-22 software were allocated to measure the results of the developed hypotheses of the recent research to achieve its objectives. As confirmed by Ringle et al. (2018), SPSS-AMOS-22 has an intense capacity to provide reliable and accurate findings. Byrne (2013) indicates that scientific statistical steps are required to obtain the results of this study. To do so, the following steps have been approached: using SPSS to prepare the collected data for analysis based on statistical mechanisms (encode the dataset, handle unengaged responses, proceeding outlier, and treat the missing values of responses), employing Confirmatory Factor Analysis (CFA) approach to estimate the model reliability and validity, and harnessing SEM to retrieve the hypotheses results.

Table 1 shows full information on respondents' demographic variables, including gender, age, income, education, and frequency of using cloud-based mobile fintech services. Regarding the gender category, 65% of clients were men, and the re-

maining percentage were female. Regarding age category, 14% of clients were under 20 years, 17% were between 20 to 30 years, 34% were between 31 to 40 years, 21% were between 41 to 50, and the rest of the population were over 50 years. Regarding income category, 33% of clients earn less than 500 Jordanian Dinars (JOD) per/month, 36% of clients earn between 501 to 1,000 JOD per/month, 21% of clients earn between 1001 to 1500 JOD per/month, and the remaining clients earn more than 1,500 JOD per/month. Regarding the education category, 60% of clients have a bachelor's degree or less, 30% of clients have a master's degree, and 10% of clients have a Ph. D. degree. Regarding the usage frequency category, 23% of clients use cloud-based mobile fintech services once per/month, 38% of clients use cloud-based mobile fintech services two times per/month, and 39% of clients use cloud-based mobile fintech services once a month.

**Table 1.** Profile of respondents to this study

Features	Category	Frequency	Percentage
Gender	Male	311	62
	Female	187	78
Age	Under 20	70	14
	20-30	86	17
	31-40	167	34
	41-50	106	21
	Above 50	69	14
	Income/ Per month	Less than 500	164
501-1,000		177	36
1,001-1,500		103	21
More than 1,500		54	10
Education	Bachelor's or less	297	60
	Master	148	30
	Ph.D.	53	10
Usage frequency	One time	115	23
	Two times	187	38
	Three or more	196	39

### 3. RESULTS

Initially, all items of the contracts' model were entailed in one-pool CFA assessments to confirm the validity and reliability measurements of the developed model as asserted by Awang (2014) and Rex (2011). To affirm that, CFA assessments provide three major types of validity and reliability measurements, which are convergent validity, composite reliability, and discriminant validity, as emphasized by Hair et al. (2007). At the beginning,

**Table 2.** Summary of model fit construct assessment results

Indices	CMIN/DF	GFI	NFI	CFI	AGFI	TLI	RMSEA
One-Pool results	2.501	0.868	0.856	0.938	0.854	0.913	0.063
Cut-off value	< 5 or < 3	≥ .85 or ≥.9	≥ .85 or ≥.9	≥ .85 or ≥.9	≥ .85 or ≥.9	≥ .85 or ≥.9	< 0.08

executing one-pool CFA affirms two fundamental evaluations in terms of their threshold values: items' constructs factor loading ( $\geq .50$ ) and covariance correlation between all model constructs ( $\leq .85$ ) as proposed by Raza & Awang (2021). Therefore, the outcomes of these examinations have revealed that some items' constructs were deleted because the low value of factors loading or exceeded the cut-off value of covariance correlations (Deleted items: one item from cloud-computing capabilities and one item from value co-creation), as can be observed in Table 3. As a second step of one-

pool evaluations, a model fit criterion is considered as a critical assessment to support the validity and reliability measurements. After affirming the factor loading and covariance correlation evaluations of model constructs, Awang (2018) confirms that model fit can be fulfilled based on various indices. Table 2 clarifies the results of model fit indices and their cut-off values, as results supported a good fit of the current study model.

Next, the convergent validity and construct reliability of the developed model constructs can be

**Table 3.** Summary of CFA measurement results

Constructs	Items	Convergent validity		Construct reliability	
		Loaded values	AVE	Cronbach Alpha	Composite reliability
Social engineering threats	SET.1	0.781	0.577	0.886	0.891
	SET.2	0.817			
	SET.3	0.758			
	SET.4	0.718			
	SET.5	0.775			
	SET.6	0.703			
Password security	PAS.1	0.759	0.542	0.882	0.903
	PAS.2	0.793			
	PAS.3	0.775			
	PAS.4	0.810			
	PAS.5	0.808			
	PAS.6	0.747			
	PAS.7	0.597			
	PAS.8	0.552			
Social media	SOM.1	0.555	0.588	0.864	0.875
	SOM.2	0.856			
	SOM.3	0.858			
	SOM.4	0.820			
	SOM.5	0.702			
Cybersecurity awareness	CYA.1	0.884	0.729	0.904	0.915
	CYA.2	0.884			
	CYA.3	0.815			
	CYA.4	0.830			
Cloud-computing capabilities	COC.1	0.733	0.518	0.856	0.864
	COC.2	0.810			
	COC.3	0.811			
	COC.4	0.676			
	COC.5	0.677			
	COC.6	0.584			
Value co-creation	VCR.1	0.747	0.585	0.891	0.908
	VCR.2	0.777			
	VCR.3	0.821			
	VCR.4	0.794			
	VCR.5	0.730			
	VCR.6	0.766			
	VCR.7	0.713			

evaluated. To do so, Raza and Awan (2021) asserted that convergent validity must be accomplished through factor loading measurement (as above-mentioned) and Average Variance Extracted approach (AVE) based on their benchmark values (factor loading and  $AVE \geq .50$ ). According to the same justification, construct reliability must be established through computing Cronbach Alpha estimation and composite reliability mechanism based on their cut-off values (Cronbach Alpha and composite reliability  $\geq .70$ ). The statistical results in Table 3 ensure that the evaluations of convergent validity and composite reliability have been affirmed. The full constructs' items are available in Appendix A.

To finalize the reliability and validity measurements of the model constructs, it is critical to provide statistical evidence regarding the discriminant validity assessment. Dijkstra and Henseler (2015) and Henseler et al. (2015) affirmed that discriminant validity assessment can be estimated relying on the following formula: the calculated  $\sqrt{AVE}$ s values of constructs (bold-font)  $>$  the calculated  $|AVEs|$  values of inner correlations. Obeying this criterion, Table 4 manifests the calculation of statistical results toward the discriminant validity of the current research model, to which the discriminant validity measurements were added. To sum up, the retrieved findings have confirmed overall validity and reliability measurements regarding the developed model of this study, which recommends conducting further analysis.

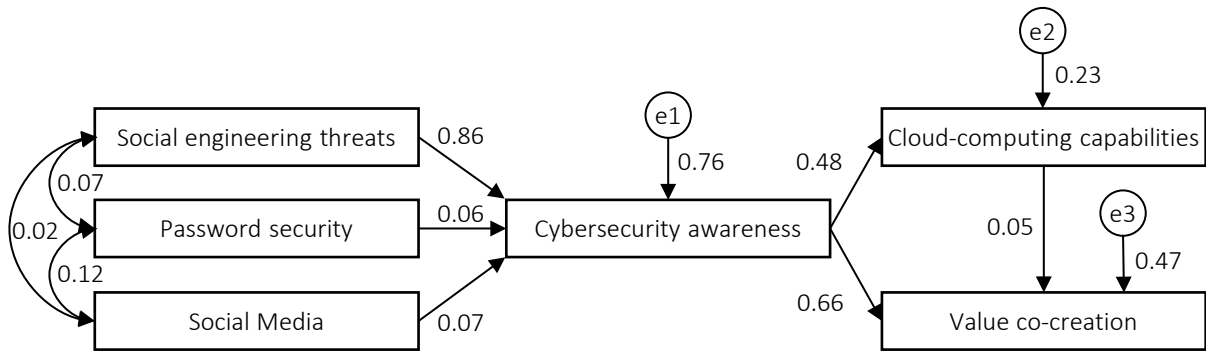
Following the summary of all critical assessments in the context of CFA measurements, the constructs of the present study model have been imputed, resulting in the generation of a new data set. The imputed data set has undergone into SEM approach, aiming at evaluating the hypotheses results. Accordingly, Figure 2 and Table 4 clarify the results of the developed hypotheses regarding

this study. The results also offer the calculation of squared multiple correlations ( $R^2$ ) that describe the variance of exogenous factors in endogenous factors as observed in Figure 2. The calculated ( $R^2$ ) for cybersecurity awareness is approximately 0.755, asserting that the external factors (Social engineering threats, Password security, and social media) jointly describe 75.5% of the variance in customers' cybersecurity awareness of cloud-based mobile fintech services in Jordan. Similarly, the computed  $R^2$  for cloud computing capabilities is approximately 0.228, confirming that the external factor (cybersecurity awareness) describes 22.8% of the variance in cloud computing capabilities among cloud-based mobile fintech services customers in Jordan. Finally, the computed  $R^2$  for value co-creation is approximately 0.467, ensuring that the external factor (cybersecurity awareness and cloud computing capabilities) jointly describes 46.7% of the variance in value co-creation among cloud-based mobile fintech services customers in Jordan.

Furthermore, Table 5 shows the developed hypotheses findings of the current study. The findings confirm that social engineering threats have a significant and positive influence on cybersecurity awareness among customers using cloud-based mobile fintech services in Islamic banks of Jordan ( $\beta = 1.066^{***}$ ), indicating that  $H1$  is statistically supported. Furthermore, the findings of this study indicate that password security has a considerable and positive effect on cybersecurity awareness among customers using cloud-based mobile fintech services in Islamic banks in Jordan ( $\beta = 0.041^*$ ), resulting in  $H2$  being statistically affirmed. Next, the results of the recent research uncover that social media has a significant and positive direct effect on cybersecurity awareness among customers using cloud-based mobile fintech services in Islamic banks of Jordan ( $\beta = 0.134^{***}$ ), concluding that  $H3$  is statistically confirmed. Besides, the

**Table 4.** Computed results of discriminant validity

Constructs	1	2	3	4	5	6
Cloud-computing capabilities	0.720	–	–	–	–	–
Social engineering threats	0.615	0.760	–	–	–	–
Password security	0.100	0.059	0.736	–	–	–
Social media	0.119	0.016	0.105	0.767	–	–
Cybersecurity awareness	0.475	0.711	0.112	0.090	0.854	–
Value co-creation	0.371	0.757	0.034	0.062	0.630	0.765



**Figure 2.** Full SEM results of the developed model within the framework of this study

**Table 5.** Full estimated results of the present study

Hypotheses direction	$\beta$	S.E.	C.R.	P
Social engineering threats → Cybersecurity awareness	1.066	0.031	34.065	***
Password security → Cybersecurity awareness	0.041	0.02	2.091	0.037
Social media → Cybersecurity awareness	0.134	0.025	5.456	***
Cybersecurity awareness → Cloud-computing capabilities	0.587	0.044	13.469	***
Cybersecurity awareness → Value co-creation	0.647	0.037	17.491	***
Cloud-computing capabilities → Value co-creation	0.118	0.045	2.646	0.008

Note: P-Value: \* < 0.05, \*\* < 0.01, \*\*\* < 0.001.

findings show that cybersecurity awareness has a considerable and positive direct effect on cloud-computing capabilities among customers using cloud-based mobile fintech services in Islamic banks of Jordan ( $\beta = 0.587^{***}$ ), indicating that *H4* is statistically emphasized. Moreover, the results of the present study reveal that cybersecurity awareness has a significant and positive direct effect on value co-creation among customers using cloud-based mobile fintech services in Islamic banks of Jordan ( $\beta = 0.647^{***}$ ), resulting in *H5* being statistically ensured. Lastly, the results of this study confirm that cloud-computing capabilities has a significant and positive direct effect on value co-creation among customers using cloud-based mobile fintech services in Islamic banks of Jordan ( $\beta = 0.118^{**}$ ), ensuring that *H6* is statistically supported.

#### 4. DISCUSSION

The findings of the first hypothesis of this study show that social engineering threats provide a significant influence on cybersecurity awareness among customers of cloud-based mobile fintech services in Islamic banks of Jordan, meaning

that customers are aware of the social engineering threats. The first hypothesis findings are in line with similar investigations in the financial services literature (Alhanatleh et al., 2024a; Pósa & Grossklags, 2022). Therefore, customers know that using cloud-based mobile fintech services in Islamic banks of Jordan may expose them to threats and risks from various sources, such as e-mail and deceptive phone calls. As a result, cybersecurity awareness will be increased since customers have a high knowledge of social engineering threats, motivating the policymakers and top management in Islamic banks of Jordan to constitute their strategic planning in terms of providing serious actions toward raising customers' awareness of the potential threats from social engineering. Moreover, the findings regarding the second hypothesis of this study indicate that password security provides a significant influence on cybersecurity awareness among customers of cloud-based mobile fintech services in Islamic banks in Jordan.

The findings regarding the second hypothesis of this study model are in line with previous investigations in the existing financial services scope (Wash et al., 2016). This confirms that respondents have sufficient skills to form a strong password to

protect their accounts from cybercrimes and attacks while performing their financial activities, depending on cloud-based mobile fintech services, and achieve a high rate of cybersecurity awareness. Consequently, leaders and managers in Islamic banks in Jordan are responsible for maximizing customer knowledge and experiences in terms of shaping passwords when accessing cloud-based mobile fintech services through the complexity of password content and frequent change. Finally, the outcomes regarding the third hypothesis of this study model affirm that social media has a significant role in cybersecurity awareness among customers of cloud-based mobile fintech services in Islamic banks of Jordan.

The results of the third hypothesis are in line with similar studies in financial services literature (Alhanatleh et al., 2024a; Alhanatleh et al., 2023). As a result, customers are cautiously dealing with social media applications by avoiding sharing their information regarding their usage of cloud-based mobile fintech services. Thus, top management in Islamic banks in Jordan is in charge of providing comprehensive guidance policies toward consumers' behavior of using social media platforms.

The findings regarding the fourth hypothesis of this study indicate that cybersecurity awareness significantly influences cloud-computing capabilities among customers of cloud-based mobile fintech services in Islamic banks of Jordan. The results of the fourth hypothesis are in line with similar empirical confirmations in financial services literature (Dang et al., 2023). Thus, maximizing the customers' cybersecurity awareness is considered a major key in leveraging the benefits of cloud-computing capabilities. As a result, management of Islamic banks in Jordan is responsible for taking significant attention toward cybersecurity threats in this digital era by adopting adequate security systems for protecting cloud-based mobile fintech services. In this way, customers may provide considerable trust in performing their financial practices through cloud-based mobile fintech services. In addition to that, management should pay great attention to customers' cybersecurity awareness by providing them with knowledge and information on the diversity of crimes and risks of cybercrime.

Furthermore, the findings regarding the fifth hypothesis of the present study support that cybersecurity awareness has a significant influence on value co-creation among customers of cloud-based mobile fintech services in Islamic banks of Jordan. The results of the fifth hypothesis are in line with similar empirical confirmations in financial services literature (Kaur et al., 2021a). Thus, maximizing customers' cybersecurity awareness plays a critical role in generating value through the co-creation of using cloud-based mobile fintech services for both Islamic banks and customers in Jordan. The results also show that respondents of this study realize that using cloud-based mobile fintech services is expected to bring various risks and threats, such as infringement of personal privacy, attacks on transactions of money and data, and damage to mobile devices. However, management of Islamic banks in Jordan is responsible for increasing their customers' cybersecurity awareness by presenting various types of training that include cyber threats, methods of protection, usage policies, and others.

The findings regarding the sixth hypothesis of this study assert that cloud-computing capabilities have a significant influence on value co-creation among customers of cloud-based mobile fintech services in Islamic banks in Jordan. The results of the sixth hypothesis are in line with similar empirical confirmations in financial services literature (Bodemer, 2024; Luo et al., 2022). Accordingly, customers realize the substantial role of cloud-computing capabilities in assisting them to easily browse cloud-based mobile fintech services, to locate the required information on cloud-based mobile fintech services, and the capacity of cloud computing to empower customers to perform their financial transactions quickly across the cloud-based mobile fintech services system.

However, there have been various limitations and future work regarding this study. First, maximizing the sample size and conducting in other fields may enable us to generalize the study results. In addition, future work may develop the model of this study through a cross-sectional approach in different Islamic countries, establishing a robust understanding of the objectives of this research. Furthermore, future research may examine the mediation role of cloud-computing capabilities that are expected to provide another new insight.

Moreover, adding other factors may provide new insight into the same field of study, such as artificial intelligence. It is also recommended that future research investigate the moderating role of demographic variables to enhance customer value

co-creation. Finally, using different research methodologies, like a qualitative method, is expected to provide valuable knowledge and insight into the existing financial services literature, especially in the Islamic banking domain.

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## CONCLUSION

The critical purpose of this study is to explore how cybersecurity awareness, based on its predictors and cloud-computing capabilities, can model value co-creation using cloud-based mobile fintech services in the Islamic banking domain. This study has offered worthy insights into financial services literature and co-creation value theory. Firstly, the recent study introduced a novel model by integrating cybersecurity awareness based on its antecedents and cloud-computing capabilities with value co-creation theory for estimating the successful adoption of cloud-based mobile fintech services in the Islamic banking sector, which is a gap in the literature. Moreover, the present study affirms the significant role of the model constructs cybersecurity awareness based on its predictors and cloud-computing capabilities in identifying their influence on value co-creation among customers of cloud-based mobile fintech services in Islamic banks in Jordan.

The results imply that Islamic banks in Jordan have captured a considerable influence on cost savings via deploying cloud-based mobile fintech services among their customers. Furthermore, cloud-based mobile fintech services reinforce the realm of scalability and flexibility, enabling Islamic banks in Jordan to allocate their resources based on customer demands. In this way, the Islamic banks in Jordan can benefit from processing heavy loads of customer transactions, leading to generate value mutually. The results also supported that cybersecurity awareness based on its antecedents confirms a significant role in fostering cloud-computing capabilities and value co-creation, meaning that performing customers' financial services transactions with a high-security rate can leverage cloud-computing capabilities and increase customers' value co-creation. Therefore, these findings can assist Islamic bank managements in Jordan to provide sufficient knowledge and guidance for their customers on how to protect themselves against cyber threats during the use of cloud-based mobile fintech services. Lastly, the outcomes provide deep information for the cybersecurity developers, designers, and specialists, which aid in the lifecycle development processes of cybersecurity algorithms regarding cloud-based fintech services.

## AUTHOR CONTRIBUTIONS

Conceptualization: Hasan Alhanatleh, Amineh Khaddam.

Data curation: Hasan Alhanatleh, Amineh Khaddam.

Formal analysis: Hasan Alhanatleh.

Funding acquisition: Hasan Alhanatleh, Amineh Khaddam.

Investigation: Hasan Alhanatleh, Amineh Khaddam.

Methodology: Hasan Alhanatleh, Amineh Khaddam.

Project administration: Hasan Alhanatleh, Amineh Khaddam.

Resources: Hasan Alhanatleh, Amineh Khaddam.

Software: Hasan Alhanatleh, Amineh Khaddam.

Supervision: Hasan Alhanatleh.

Validation: Hasan Alhanatleh.

Visualization: Hasan Alhanatleh, Amineh Khaddam.

Writing – original draft: Hasan Alhanatleh, Amineh Khaddam.

Writing – reviewing & editing: Hasan Alhanatleh, Amineh Khaddam.

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## APPENDIX A

**Table A1.** Full constructs' items

Constructs	Items
Password security	<p>My password consists of lowercase, uppercase, numbers, and special characters.</p> <p>My password doesn't follow the keyboard pattern.</p> <p>I do use the "Remember my password option on my phone.</p> <p>I use a similar password for different applications.</p> <p>My passwords are based on my personal information.</p> <p>I never change passwords.</p> <p>I keep my password somewhere in my phone.</p> <p>I can share passwords with other people.</p>
Social engineering threats	<p>I wouldn't reveal any confidential information under any circumstances.</p> <p>I check the authorization or identity of someone before talking about any issues.</p> <p>I wouldn't communicate with a stranger, although his/her looks warrant sympathy.</p> <p>I'm not willing to respond to calls, SMS, or email messages to friendly/non-threatening strangers.</p> <p>I think I'm not a target of social engineering attacks due to client status.</p> <p>I'm not interested in reading social engineering issues.</p>
Social media	<p>It is OK to publish private photographs on social networking sites.</p> <p>Accepting invitations from outsiders seems OK.</p> <p>There is no concern with openly posting one's present location on social networking sites.</p> <p>No problem with adding all personal information to social media.</p> <p>Learn how to submit any danger or questionable conduct on social networks.</p>
Cybersecurity awareness	<p>I'm aware of the Cybersecurity concept.</p> <p>I'm aware of the Antivirus software concept.</p> <p>I regularly check the updates of antivirus.</p> <p>I think, a total reliance on technology and the available software security in preventing such an attack.</p>
Cloud-computing capabilities	<p>Cloud-Based Mobile Fintech Services make our data retrievable.</p> <p>Cloud-Based Mobile Fintech Services help us to easily share our data.</p> <p>Cloud-Based Mobile Fintech Services support high processing.</p> <p>Cloud-Based Mobile Fintech Services support our activities seamlessly.</p> <p>Cloud-Based Mobile Fintech Services can support large fluctuations in service requirements.</p> <p>Cloud-Based Mobile Fintech Services support the greater instantaneous volatility of service quantity.</p>
Value co-creation	<p>I give suggestions to Cloud-Based Mobile Fintech Services on how to improve its product offerings.</p> <p>I have always participated in improving the services provided by Cloud-Based Mobile Fintech Services.</p> <p>I would say positive things about Cloud-Based Mobile Fintech Services to others.</p> <p>When I receive good service, I will let Cloud-Based Mobile Fintech know.</p> <p>When I have a new idea on how to improve service, I will let Cloud-Based Mobile Fintech know.</p> <p>When I experience a problem, I will let Cloud-Based Mobile Fintech know.</p> <p>I would carefully observe the rules and policies of Cloud-Based Mobile Fintech.</p>