Migration Letters

Volume: 21, No: 1, pp. 708-724

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)
www.migrationletters.com

Critical Success Factors of Electronic Payment Services: Interpretive Structural Modeling (ISM)

Mohammad Faleh Ahmmad Hunitie [1]

Abstract

The aim of this study is to explore critical success factors (CSFs) of using electronic payment systems (EPS) and building a research conceptual framework using theoretical and empirical insights. Following the Interpretive structural modeling (ISM) methodology. Eighteen CSFs of EPS were elucidated based on a review of the literature, 10 were used as a baseline for the study. A panel of experts consisting of 10 academics and managers were asked to assess these CSFs. ISM was conducted using SmartISM (http://smartism.sgetm.com). The results showed that 7 factors were identified as CSFs of using EPS and the proposed model of the CSFs of EPS should incorporate customer technological capacity and government regulations as independent variables, system perceived usefulness as a dependent variable, and customer personal information, customer perceived security, system reliability, and system perceived risks as mediating variables. Results, conclusion, theoretical and empirical implications as well as recommendations are provided.

Keywords: *Electronic payment services, critical success factors, ISM methodology.*

1. Introduction

Advancements of information and communication technology play a critical role in goading digitization due to the strong driving power that these advancements have. However, applications of such advancements such as electronic payment services (EPS) depend on numerous factors related to formal and informal reasons like individuals' characteristics, government laws, firms and systems performance as perceived by users as well as related factors such as social influence (Singh et al., 2019; Zainol and Mokhtar, 2022). Using EPS from customers' perspectives receives considerable attention from academics and practitioners. The focus of one substantial vein of the literature on EPS is the critical success factors (CSFs) that affect customers' behavioral intention or actual use of EPS (e.g., Daud et al., 2011; Ashour et al., 2023; Treiblmaier et al., 2008; Park and Lee, 2014; Singh et al., 2019).

Various factors were introduced as CSFs of EPS including system perceived ease to use, system perceived usefulness, system perceived risk, customer self-efficacy (Daud et al., 2011; Teoh et al., 2013; Al-Ayed & Al-Tit, 2023), transaction productivity and speed as well as social influence, perceived security and government regulations (Junadi, 2015) in addition to technology infrastructure and behavioral intentions to use EPS (Isa et al., 2018).

[1] Associate professor, Department of public administration, Faculty of Business, University of Jordan, mohammad@ju.edu.jo

However, the importance of these CSFs is not clear yet in terms of their interrelationships, which means how these CSFs are arranged based on their driving and dependency powers. For instance, does system perceived usefulness influence or influence another factor such as system perceived security. Additionally, are there any factors that should be dismissed as CSFs of EPS. Hence, the current study seeks to answer these questions to mark the most influential factors that can be used to develop a research conceptual model. Such an aim can be attained using Interpretive structural modeling (ISM) methodology.

ISM depends on is conducted following three principal steps; reviewing the literature to detect CSFs of EPS, rating these factors with reference to the opinions of a panel of experts, and analyzing data (Singh et al., 2007). Recently, performing ISM methodology is on hand due to the availability of ISM software, i.e., SmartISM (Ahmad & Qahmash, 2021).

Conducting such a study contributes to literature as it shows the importance of each CSF and its inter-correlation to other CSFs and consequently assists researchers in building conceptual frameworks before verifying their embedded hypothesized relationships. In a board sense, the current study helps stakeholders like government and organizations in the information technology industry to focus on specific CSFs of adopting and using EPS.

2. Literature review

2.1 Definition and scope of CSFs

CSFs have been described as “those few things that must go well to ensure success for a manager or an organization and, therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance” (Boynton & Zmud, 1984, p. 17). For Zwikael and Globerson (2006), CSFs are factors that differentiate between a venture failure and success. The concept of CSFs has been introduced in the 1960s as an organizational approach that organizations can use to determine factors that help achieving goals of performance (Ram and Corkindale, 2014). Scholars investigated CSFs in many areas such as online education (Volery & Lord, 2000), destination marketing (Baker & Cameron, 2008), implementation of advanced manufacturing technologies (Singh et al., 2007), risks and opportunities of industry 4.0 (Moeuf et al., 2020; Al-Ayed & Al-Tit, 2023), e-commerce (Colla & Lapoule, 2012), business startups (Kim et al., 2018), construction planning (Chen & Chen, 2007), e-learning (Puri, 2012), software products (Mohd & Shamsul, 2011), business intelligence systems (Yeoh & Koronios, 2010), public management information systems (Vickland & Nieuwenhuijs, 2005), and total quality management (Seetharaman et al, 2006). Particularly, some studies were conducted to explore CSFs of using electronic payment systems, e.g., automated teller machine and e-payment system (Ebiringa, 2010), mobile banking (Daud et al., 2011), Internet payment system (Treiblmaier et al., 2008), and electronic payment systems (Rouibah, 2015). The focus of the current study is the CSFs for using electronic payment services due to numerous factors as illustrated in the next section.

2.2 CSFs for using electronic payment services.

Electronic payment services (EPS) refer to exchanging payments using electronic communication channels to allow customers to distantly achieve their transactions over electronic networks (Teoh et al., 2013). Numerous critical factors of using electronic payment systems were identified in the literature. Ebiringa (2010) reported numerous factors related to using electronic payment services through automated teller machine such as infrastructure availability, system reliability, customer willingness to use electronic payment systems, system accessibility, technological capacity of bank customers, cost of electronic service delivery, risks of robbery and fraud, standards and regulations, technological capacity of bank employees, reliability of internal control measures, and organizational commitment. Daud et al. (2011) highpoint some vital factors that affect users' intention to adopt mobile banking such as system perceived ease to use and usefulness, system credibility, customer awareness, and system perceived risk.

Singh et al. (2019) mentioned other critical factors such as perceived ease to use and perceived usefulness of using digital systems, resources availability such as Internet, software, and devices, social influence in terms of word-of-mouth and public opinions, cost of service delivery, customer knowledge and education, government policies, and risk-taking ability. Using multiple case studies, Park, and Lee (2014) highlight the importance of credit cards, complexity to use digital payment methods, customer sensitive information, and called companies to target non-customers to increase their market share. Moreover, Zainol and Mokhtar (2022) underlined other central factors such as system failures, stakeholder resistance to change, and technical skills.

Treiblmaier et al. (2008) emphasized factors such as system ease to use, and customer privacy in terms of personal information. For Teoh et al. (2013), customers' perceptions toward electronic payment systems are significantly affected by system benefits, system ease to use, and customer self-efficacy. The same study found that trust and security had no significant effects on customers' perceptions. In contrast, Oney et al. (2017) found that customers' perceived trust and security are significant determinants of electronic payment systems. Using a sample of commercial banks, Harris et al.'s (2011) results revealed that system functionality, privacy, and security are three critical factors affecting banks' perceptions of using electronic systems. Junadi (2015) indicated that culture (Internet access, experience, education), perceived security (technical protection, and government regulations), performance expectancy (transaction productivity, and transaction speed), effort expectancy (system ease to use, and transaction flexibility), and social influence (family, relatives, and friends use, support, and recommendations) are key variables that affect customers' intention to use electronic payment systems.

Through a case study of a firm specialized in commerce electronic solutions, Lim et al. (2007) identified the factors behind the failure of electronic payment systems and found that lack of cooperation with established companies, lack of trust, systems complexity, lack of security, inadequate marketing initiatives, and neglecting important user problems are examples of such factors. Isa et al. (2018) pointed out that facilitating conditions, performance expectancy, effort expectancy, and social influence had positive relationships with customer acceptance of using electronic payment systems, however, their results indicated that customer acceptance is affected only by effort expectancy and facilitating conditions such as technology infrastructure, and behavioral intentions to use electronic payment systems. The above-mentioned CSFs for using electronic payment systems are summarized in Table 1 under five categories encompassing 18 factors related to system factors, firm factors, employee factors, customer factors, and government factors.

Table 1. CSFs of using EPS found in the literature.

Factors	Specifications	References
System factors	(1) Infrastructure availability; Internet, software, and devices. (2) System accessibility and reliability. (3) Cost of service delivery. (4) Perceived ease to use the system. (5) Perceived usefulness to use the system. (6) System functionality and failures, e.g., system	Ebiringa (2010); Daud et al. (2011); Treiblmaier et al. (2008); Teoh et al. (2013); Lim et al. (2007); Park and Lee (2014); Oney et al. (2017); Singh et al. (2019); Isa et

	benefits.	al. (2018); Harris et al. (2011); Junadi (2015); Zainol & Mokhtar (2022).
Firm factors	(7) Organizational commitment.	
	(8) Performance expectancy.	
	(9) Target customers and non-customers.	
	(10) System perceived risks.	
Employee factors	(11) Employee technological capacities, i.e., technical skills.	
Customer factors	(12) Customer willingness to use e-payment services.	
	(13) Customer technological capacities, i.e., customer knowledge.	
	(14) Customer awareness of system advantages and disadvantages.	
	(15) Customer personal information, e.g., credit card details.	
	(16) Customer perceived trust and security.	
Government factors	(17) Government regulations.	
	(18) Government policies.	

The following factors were chosen system perceived ease to use, system perceived usefulness, cost of service delivery, customer technological capacity, customer personal information, customer perceived security, infrastructure availability, system reliability, system perceived risks, and government regulations.

3. ISM methodology

Interpretive structural modeling (ISM) methodology was followed for the purpose of this study to explore the importance of the above-mentioned CSFs. According to Singh et al. (2007), ISM is interpretive as it depends on the opinions of a panel of experts to identify relationships between the CSFs that had been elucidated from the literature review, structural as the overall structure is gotten from a composite set of items, and modeling the interpretive relationships and the whole structure in a graphical model. A panel of experts consisting of 10 managers and academics were asked to value a list of CSFs of EPS. The first step of ISM was conducted through reviewing the extant literature as depicted previously in Table 1. Ten of those CSFs were chosen for this study, as shown in Table 2, from system factors (5 CSFs), customer factors (3 CSFs), firm factors (1 CSF), and government factors (1 CSF). The next step is related to establishing contextual relationships between those factors (Singh et al., 2007). This step was conducted based on the experts' opinions to generate the structural self-identification matrix (SSIM), followed by several steps to calculate the initial reachability matrix (IRM), the final reachability matrix (FRM), level partitioning (LP), MICMAC analysis, and the ISM final model (Ahmad & Qahmash, 2021).

Table 2. CSFs of using EPS selected for the current study.

Code	CSFs	References
CSF1	System perceived ease to use	Teoh et al. (2013); Treiblmaier et al. (2008)
CSF2	System perceived usefulness	Daud et al. (2011); Singh et al. (2019)
CSF3	Cost of service delivery	Singh et al. (2019); Ebiringa (2010)

CSF4	Customer technological capacity	Ebiringa (2010)
CSF5	Customer personal information	Treiblmaier et al. (2008)
CSF6	Customer perceived security	Junadi (2015)
CSF7	Infrastructure availability	Ebiringa (2010)
CSF8	System reliability	Ebiringa (2010)
CSF9	System perceived risks	Daud et al. (2011)
CSF10	Government regulations	Junadi (2015)

3.1 Structural self-identification matrix (SSIM)

SSIM was developed as shown in Table 3 with 4 characters: “A” (factor j affects factor i), “V” (factor i affects factor j), “O” (no correlation between factor i and factor j), and “X” (factor i and factor j affect each other) (Kumar et al., 2021). The results of SSIM are shown in Table 3.

Table 3. Structural self-identification matrix (SSIM)

CSFs	CSFj1	CSFj2	CSFj3	CSFj4	CSFj5	CSFj6	CSFj7	CSFj8	CSFj9	CSFj10
CSFi1	-	O	O	A	O	O	O	O	O	O
CSFi2		-	O	O	O	O	O	O	A	O
CSFi3			-	O	O	O	O	O	O	A
CSFi4				-	O	V	O	O	V	O
CSFi5					-	X	O	X	X	A
CSFi6						-	O	X	X	A
CSFi7							-	O	O	A
CSFi8								-	X	A
CSFi9									-	A
CSFi10										-

CSFi1: system perceived ease to use, CSFi2: system perceived usefulness, CSFi3: cost of service delivery, CSFi4: customer technological capacity, CSFi5: customer personal information, CSFi6: customer perceived security, CSFi7: infrastructure availability, CSFi8: system reliability, CSFi9: system perceived risks, CSFi10: government regulations. CSFj10: government regulations, CSFj9: system perceived risks, CSFj8: system reliability, CSFj7: infrastructure availability, CSFj6: customer perceived security, CSFj5: customer personal information, CSFj4: customer technological capacity, CSFj3: cost of service delivery, CSFj2: system perceived usefulness, CSFj1: system perceived ease to use.

The results in Table 3 indicate that system perceived ease to use (CSFi1) is influenced by customer technological capacity (CSFj4), system perceived usefulness (CSFi2) is affected by system perceived risks (CSFj9), cost of service delivery (CSFi3), customer personal information (CSFi5), customer perceived security (CSFi6), infrastructure availability (CSFi7), system reliability (CSFi8), system perceived risks (CSFi9) are affected by government regulations (CSFj10). Also, it was found that customer technological capacity (CSFj4) exerts effects on customer perceived security (CSFi6) and system perceived risks (CSFi9). On the other hand, customer personal information (CSFi5), customer perceived security (CSFi6), system reliability (CSFi8), and system perceived risks (CSFi9) have mutual effects, and customer perceived security (CSFi6), system reliability (CSFi8), and system perceived risks (CSFi9) have also joint effects. Finally, system reliability (CSFi8) and system perceived risks (CSFi9) have dual effects.

3.2 Initial reachability matrix (IRM)

IRM in Table 4 was developed based on the results of SSIM in Table 3. Four key rules were followed to create IRM via transforming the letters (A, O, V, and X) into binary digits (0 and 1) (Azevedo et al., 2019; Kumar et al., 2021; Al-Ayed & Al-Tit, 2021). First, all O (i-j) and O (j-i) cells are transformed into 0. Second, A (i-j) cells are transformed into 0 if a CSF (i) has an effect on another CSF (j) and A (j-i) cells are transformed into 1 if a CSF (j) shows an effect on another CSF (i). Third, V (i-j) cells are transformed into 1 if a CSF (i) has an effect on another CSF (j), and V (j-i) cells are transformed into 0 if a CSF (j) has an effect on another CSF (i). Fourth, X entries, i.e., X (i-j) and X (j-i), are transformed into 1 if a CSF (i) has an effect on another CSF (j) or if a CSF (j) has an effect on another CSF (i). Based on these digits, SFCs' driving power (DRP) and SCFs' dependence power (DEP) are calculated. A driving power of a factor represents the total number of factors including the factor itself with potential effects on it, while a dependence power of a factor refers to the total number of the factors including the factor itself which affect it (Azevedo et al., 2019; Al-Ayed & Al-Tit, 2021).

Table 4. Initial reachability matrix (IRM)

CSFs	1	2	3	4	5	6	7	8	9	10	DrP
CSFi1	1	0	0	0	0	0	0	0	0	0	1
CSFi2	0	1	0	0	0	0	0	0	0	0	1
CSFi3	0	0	1	0	0	0	0	0	0	0	1
CSFi4	1	0	0	1	0	1	0	0	1	0	4
CSFi5	0	0	0	0	1	1	0	1	1	0	4
CSFi6	0	0	0	0	1	1	0	1	1	0	4
CSFi7	0	0	0	0	0	0	1	0	0	0	1
CSFi8	0	0	0	0	1	1	0	1	1	0	4
CSFi9	0	1	0	0	1	1	0	1	1	0	5
CSFi10	0	0	1	0	1	1	1	1	1	1	7
DeP	2	2	2	1	5	6	2	5	6	1	-

On the basis of the results in Table 4, it was found that government regulations (CSFj10) has the highest driving power with a value of 7, followed by system perceived risks (CSFi9) with a driving power of 5, then customer technological capacity (CSFj4), customer personal information (CSFi5), customer perceived security (CSFi6), and system reliability (CSFi8) with a driving power of 4, and system perceived ease to use (CSFi1), system perceived usefulness (CSFi2), cost of service delivery (CSFi3), and infrastructure availability (CSFi7) with a driving power of 1.

3.3 Final reachability matrix (FRM)

The initial reachability matrix is developed to display the interrelationships between each pair of the variables while the final reachability matrix is developed based on transitivity to find indirect relationships between the variables (Tan et al., 2019; Kumar et al., 2021). The transitive links, i.e., 1*, were computed based on the rule that if factor "X" is linked to factor "Y" and factor "Y" is linked to factor "Z", then factor "Z" is linked to factor "Z" (Attiany et al., 2023). The results in Table 5 demonstrate that the driving power of government regulations (CSFj10) was increased to 8, the driving power of customer technological capacity (CSFj4), customer personal information (CSFi5), customer perceived security (CSFi6), and system reliability (CSFi8) was increased to 5, the driving power of system perceived risks (CSFi9) remains 5, the driving power of system perceived ease to use (CSFi1), system perceived usefulness (CSFi2), cost of service delivery (CSFi3), and infrastructure availability (CSFi7) continues 1.

Table 5. Final reachability matrix (FRM)

CSFs	1	2	3	4	5	6	7	8	9	10	DrP
CSFi1	1	0	0	0	0	0	0	0	0	0	1
CSFi2	0	1	0	0	0	0	0	0	0	0	1
CSFi3	0	0	1	0	0	0	0	0	0	0	1
CSFi4	1	1*	0	1	1*	1	0	1*	1	0	7
CSFi5	0	1*	0	0	1	1	0	1	1	0	5
CSFi6	0	1*	0	0	1	1	0	1	1	0	5
CSFi7	0	0	0	0	0	0	1	0	0	0	1
CSFi8	0	1*	0	0	1	1	0	1	1	0	5
CSFi9	0	1	0	0	1	1	0	1	1	0	5
CSFi10	0	1*	1	0	1	1	1	1	1	1	8
DeP	2	7	2	1	6	6	2	6	6	1	-

However, the results in Table 5 implied that customer technological capacity (CSFj4) and government regulations (CSFj10) have a dependence power of 1, which is the lowest one, system perceived ease to use (CSFi1), cost of service delivery (CSFi3), and infrastructure availability (CSFi7) have a dependence power of 2, customer personal information (CSFi5), customer perceived security (CSFi6), system reliability (CSFi8) and system perceived risks (CSFi9) have a dependence power of 6, and system perceived usefulness (CSFi2) has a dependence power of 7, which is the highest 1.

3.4 Level partitioning

The results of level partitioning as displayed in Table 6 show that the CSFs are categorized into three key sets, which are reachability set, antecedent set, and intersection set. The first one represents the factors that facilitate each factor, the second one signifies the factors that enable each factor, and third one characterizes the factors that are identical in the reachability and antecedent sets (Attiany et al., 2023). Factors have identical reachability and intersection sets come at the top level (level I) and have no ability to drive any other factors (Kumar et al., 2021).

Table 6. Results of level partitioning

CSFs	Reachability set	Antecedent set	Intersection set	Level
CSFi1	1	1, 4	1	I
CSFi2	2	2, 4, 5, 6, 8, 9, 10	2	I
CSFi3	3	3, 10	3	I
CSFi4	4	4	4	III
CSFi5	5, 6, 8, 9	4, 5, 6, 8, 9, 10	5, 6, 8, 9	II
CSFi6	5, 6, 8, 9	4, 5, 6, 8, 9, 10	5, 6, 8, 9	II

CSFi7	7	7, 10	7	I
CSFi8	5, 6, 8, 9	4, 5, 6, 8, 9, 10	5, 6, 8, 9	II
CSFi9	5, 6, 8, 9	4, 5, 6, 8, 9, 10	5, 6, 8, 9	II
CSFi10	10	10	10	III

3.5 Conical matrix (CM)

CM represents a wise order of the results of level partitioning based on the level recognized in the step and supports drawing the diagraph (Ahmad & Qahmash, 2021). The results in Table 7 categorized the ten CSFs into three levels; level I (system perceived ease to use, system perceived usefulness, cost of service delivery, and infrastructure availability), level II (customer personal information, customer perceived security, system reliability, and system perceived risks) and level III (customer technological capacity and government regulations). Based on these results, MICMAC analysis was conducted to catalogue the ten CSFs according to their driving and dependence powers as autonomous, independent, linkage, or dependent variables (Tan et al., 2019; Azevedo et al., 2019; Kumar et al., 2021).

Table 7. Conical Matrix (CM)

CSFs	1	2	3	7	5	6	8	9	4	10	DrP	Level
1	1	0	0	0	0	0	0	0	0	0	1	I
2	0	1	0	0	0	0	0	0	0	0	1	I
3	0	0	1	0	0	0	0	0	0	0	1	I
7	0	0	0	1	0	0	0	0	0	0	1	I
5	0	1*	0	0	1	1	1	1	0	0	5	II
6	0	1*	0	0	1	1	1	1	0	0	5	II
8	0	1*	0	0	1	1	1	1	0	0	5	II
9	0	1	0	0	1	1	1	1	0	0	5	II
4	1	1*	0	0	1*	1	1*	1	1	0	7	III
10	0	1*	1	1	1	1	1	1	0	1	8	III
DeP	2	7	2	2	6	6	6	6	1	1	-	-
Level	I	I	I	I	II	II	II	II	III	III	-	-

3.6 MICMAC analysis

MICMAC analysis symbolizes a mapping of the variables under investigation onto a two-directional grid based on both driving and dependence power (Ahmad & Qahmash, 2021). Figure 1 shows the results of MICMAC analysis which was developed based on the final reachability matrix (Tan et al., 2019). MICMAC is used to categorize the factors into four clusters (I, II, III, IV).

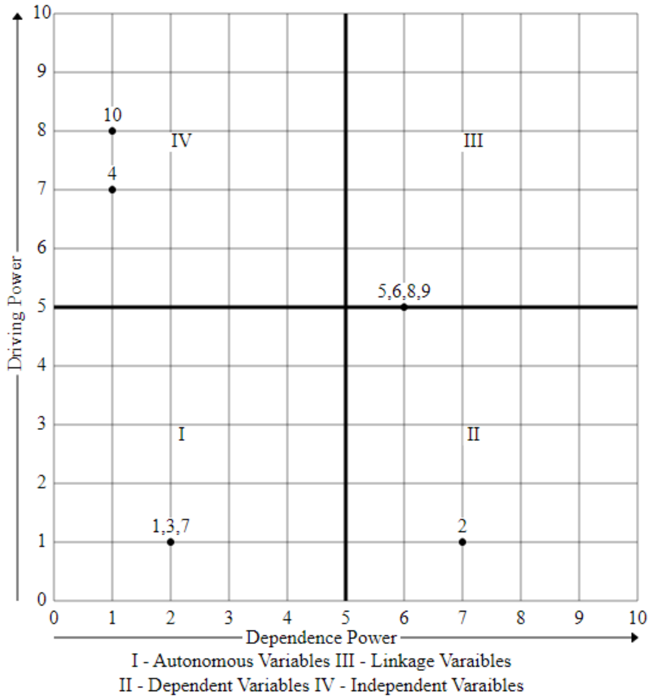

Figure 1. Grid of MICMAC analysis

The figure indicates that the factors in cluster I (1, 3, 7) are autonomous variables. These factors are system perceived as ease to use, system perceived usefulness, cost of service delivery, and infrastructure availability. Such variables have low driving and dependence power (Tan et al., 2019). Autonomous variables have no influence on other variables (Attiany et al., 2023). In cluster II, there is one dependent variable, which is system perceived usefulness. Dependent variables have low driving power but high dependence power (Ajmera & Jain, 2019). In cluster 3, there are 4 elements that work as linkage variables, i.e., customer personal information, customer perceived security, system reliability, and system perceived risks. Linkage variables have strong driving and dependence power (Kumar et al., 2021). In cluster IV, there are two independent variables, i.e., customer technological capacity and government regulations. It can be noted that independent variables have high driving power and low dependence power (Attiany et al., 2023). A summary of ISM can be seen in Table 8. It shows that system perceived usefulness is regarded as a dependent variable, while government regulations and customer technological capacity are independent variables Furthermore, customer personal information, customer perceived security, system reliability, and system perceived risks are linkage variables.

Table 8. Summary of ISM results

Variables	No.	CSF	Status	DrP	Rank	DeP	Rank
Autonomous variables	1	System perceived ease to use	×	1	1	2	2
	3	Cost of service delivery	×	1	1	2	2
	7	Infrastructure availability	×	1	1	2	2
Independent variables	4	Customer technological capacity	✓	7	3	1	1
	10	Government regulations	✓	8	4	1	1
Linkage variables	5	Customer personal information	✓	5	2	6	3
	6	Customer perceived security	✓	5	2	6	3

	8	System reliability	✓	5	2	6	3
	9	System perceived risks	✓	5	2	6	3
Dependent variables	2	System perceived usefulness	✓	1	1	7	4

3.7 ISM diagram

Figure 2 pictures the ISM diagram. An arrow from a factor (i) to another factor (j) means that the factor (i) can result in factor (j), and a two-way arrow between a factor (i) and a factor (j) indicates that these two factors have mutual effects (Tan et al., 2019). Factors 1, 3, and 7 were excluded from the model. Hence, a proposed model of the CSFs of EPS should incorporate customer technological capacity and government regulations as independent variables, system perceived usefulness as a dependent variable, and customer personal information, customer perceived security, system reliability, and system perceived risks as mediating variables. The conceptual model of the current study should be developed based on this diagram.

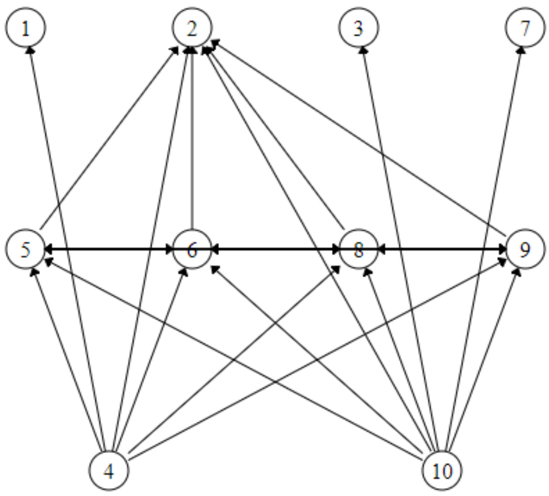

Figure 2. Diagram of ISM model

4. Research results and discussion

4.1 CSFS of EPS

Based on a review of the literature, 10 CSFs of EPS were selected; system perceived ease to use, system perceived usefulness, cost of service delivery, customer technological capacity, customer personal information, customer perceived security, infrastructure availability, system reliability, system perceived risks and government regulations. Following ISM methodology, these CSFs were categorized into four clusters: autonomous variables (system perceived ease to use, cost of service delivery, infrastructure availability), independent factors (customer technological capacity, government regulations), linkage factors (customer personal information, customer perceived security, system reliability, system perceived risks), and dependent factors (system perceived usefulness). Due to their low driving and dependence power, autonomous variables were excluded as CSFs of EPS in the current study. So, seven CSFs were remaining in the system, out of these factors two are the most important; customer technological capacity and government regulations because of their high driving power. These two factors have crucial effects on other CSFs of EPS. Moreover, the results show that four factors were linkage factors, that is, have strong driving and dependence power and therefore affected by the independent variables and exert significant effects on the dependent variable, which is system perceived usefulness. Based on these results, conceptual models on CSFs of EPS in future studies should consider two independent variables, four linkage or mediating variables, and one dependent variable.

The following conceptual model in Figure 3 was constructed based on the above-mentioned results. It comprises two independent variables: CTC (customer technological capacity) and GR (government regulations), one mediating variable: CPS (customer perceived security) and one dependent variable: SPU (system perceived usefulness). The results of ISM yielded 4 mediating variables, one of those variables, which is customer perceived security (CPS), was selected as a mediating variable for the present conceptual model. It can be noted that the model assumes seven hypothesized relationships between these variables. That is, one common relationship between CPS and SPU, and six relationships between CTC and CPS, CTC and SPU, CTS and SPU through CPS, GR and CPS, GR and SPU, GR, and SPU through CPS. These hypothesized relationships can be abridged in two hypotheses on the mediating role of CPS in the effect of CTC on SPU as well as the mediating role of CPS in the effect of GR on SPU. To verify the assumptions of the conceptual model, a supportive literature is required to lead hypotheses development. The next section provides a supportive link between the results of ISM methodology and the literature.

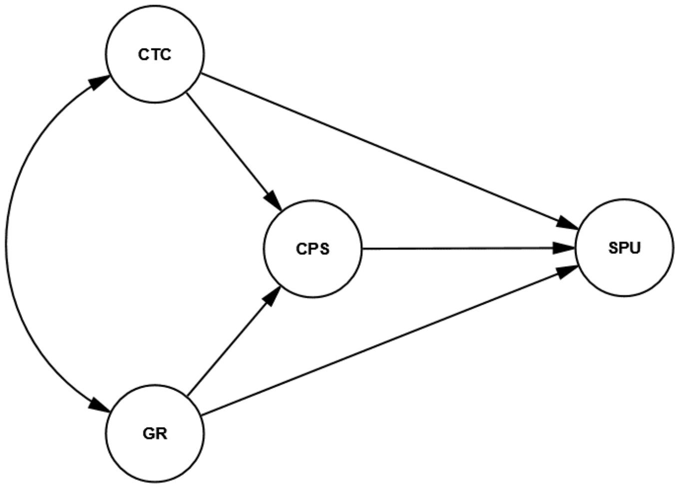

Figure 3. Research conceptual model

4.2 Supportive literature

4.2.1 CTC and SPU through CPS

The current study seeks to investigate the mediating role of CPS between CTC and SPU. Such an aim was not investigated in previous works. CTC has been deemed as a key factor for using EPS (Ebiringa, 2010; Singh et al., 2019; Daud et al., 2011; Zainol and Mokhtar, 2022; Teoh et al., 2013; Junadi, 2015). CTC can be understood as customer knowledge and education (Singh et al., 2019), customer technical skills (Zainol and Mokhtar, 2022), customer self-efficacy (Teoh et al., 2013; Jawad et al., 2022) and customer technological experience (Junadi, 2015) such as computer literacy (Skvarciany & Jureviciene, 2017).

CTC works with another crucial factor, which is CPS (Isa et al., 2018; Lim et al., 2007; Junadi, 2015; Harris et al., 2011; Daud et al., 2011; Ebiringa, 2010). EPS security refers to procedures and programs used to ensure integrity, privacy and information authenticity and represents how EPS protects customer transactions (Junadi, 2015). A third critical factor of adopting or using EPS is SPU (Ebiringa, 2010; Daud et al., 2011; Singh et al., 2019). SPU represents a system's utility from a customer perspective (Jawad et al., 2022).

The mediating role of CPS can be elucidated through some remarks, as classified in Table 9, drawn from the literature. It can be noted that CTC is related to CPS and SPU (Masengu et al., 2022; Suhaimi et al., 2022; Sutarso and Setyawan, 2022; Al-Majali & Bashabsheh, 2016; Chukwu and Idoko, 2021; Yaokumah et al., 2017; Min et al., 2019). In the absence of direct previous results on the relationships between CTC, CPS and SPU, these studies provide valuable signals on relationships between these variables. It was expected that customers who have good technological capacities perceive EPS as secure and can benefit from EPS and customer perceptions of EPS security support their capacities to consider EPS as useful. Hence, it was hypothesized that: CPS significantly and positively mediates the effect of CTS on SPU (H1).

Table 9. Literature remarks on the relationships between CTC, CPS and SPU

Variables	Remarks	References
CTC & CPS	– Customers who have no technological experience are susceptible to security. – Individual skills are significantly associated with system security. – Customers who have important levels of ICT skills perceive EPS as less secure. – Technology complexity (customer expertise) is significantly related to perceived security.	Suhaimi et al. (2022); Yaokumah et al. (2017); Al-Majali & Bashabsheh (2016); Chukwu and Idoko (2021).
CPS & SPU	– Perceived security is significantly and positively correlated to perceived usefulness.	Hammouri et al. (2021); Keni et al. (2020); Ashour et al. (2023).
CTC & SPU	– Customers who have important levels of education are less likely to use EPS. – System complexity (technical skills) is negatively related to system usefulness. – Customer skills are significantly related to system benefits. – System perceived security has a strong correlation with system perceived usefulness. – Customer knowledge moderates the effect of system usefulness on customer behavioral intention.	Masengu et al. (2022); Yaokumah et al. (2017); Al-Majali & Bashabsheh (2016); Suhaimi et al. (2022); Min et al. (2019); Sutarso and Setyawan (2022).

4.2.2 GR and SPU through CPS

GR symbolizes three key issues, which are laws and policies that individuals must fulfill, provisions of government authorities used to guarantee organizations integration, and legal environment systems that protects users in the information technology context (Borazon & Nguyen, 2022). For the current study, GR refers to governmental laws and policies that protect customers of EPS and control their money transactions. GR has been regarded as one of the most critical CSF of using EPS (Singh et al., 2019), as it shapes the legal environment of money transactions in SPS context. Some remarks, as demonstrated in Table 10, from the literature indicate that GR is related to CPS as system security is controlled by several factors including GR (Al-Tit, 2020; Borazon & Nguyen, 2022; Kofoworola & Ojo, 2022; Çaldağ et al., 2019), and GR is related to SPU as lack of laws and policies negatively affects customers' perceptions of EPS usefulness (Rouibah, 2015). Consistent with the significant association between system perceived security and system perceived usefulness (Hammouri et al., 2021; Keni et al., 2020; Ashour et al., 2023), GR is expected to exert significant effects on both CPS and SPU. As GR is expected to show significant effect on CPS and SPU in line with the expected effect of CPS on SPU there is potential mediating effect of CPS between GR and SPU. These hypothetical effects are in line with Baron and Kenny's (1986) mediation conditions, even though CPS as a mediator exerts no effect on SPU as a dependent variable, the potential intervening effect of CPS is possible (Zhao et al., 2010). Therefore, it was anticipated that government regulations enhance customer perceptions of EPS security and usefulness, particularly, a customer perception of EPS security plays a significant part in line with government regulations to perceive EPS as useful. Then, it was assumed that: CPS significantly and positively mediates the effect of GR on SPU (H2).

Table 10. Literature remarks on the relationships between GR, CPS and SPU

Variables	Remarks	References
GR & CPS	– Legal barriers have significant effects on e-commerce adoption. – Government regulations and policies have a significant effect on innovation technology adoption. – Legal regulations improve system perceived safety.	Al-Tit (2020); Çaldağ et al. (2019); Kofoworola & Ojo (2022); Borazon & Nguyen (2022).
CPS & SPU	– Perceived security is significantly correlated to perceived usefulness.	Hammouri et al. (2021); Keni et al. (2020); Ashour et al. (2023).
GR & SPU	– Using EPS is negatively influenced by lack of regulations. – Customers' perceptions of system security are influenced by their perception of regulations and system legal protection.	Rouibah (2015).

5. Conclusion and research implications

It was concluded that not all CSFs of EPS have the driving or dependence power, therefore, investigating these factors should be based on empirical results upon which priorities of CSFs are recognized. In the current study, CSFs of EPS were categorized into three types: independent variables, mediating variables, and dependent variables. Such a conclusion comprehends theoretical and empirical implications. Theoretically, two implications were elucidated. First, research on adopting or using EPS regarded these CSFs as antecedents or independent variables aiming at exploring their effects on users' behavioral intentions. The current study shows that factors such as system perceived ease to use, cost of service delivery, and infrastructure availability are no longer CSFs of using EPS. Users are changed as smartphones are increasing and spread all over the world, costs are reasonable and technology infrastructure nowadays is available in many countries. Second, investigating the CSFs of EPS should determine the interrelationships between these CSFs prior to testing their effects on other constructs. The current study found that system perceived usefulness has a great possibility to be influence by other CSFs while customer capacity and government regulations are the most driving factors of the other CSFs of EPS. Empirically, two implications were revealed. First, decision makers in formal authorities and telecommunication business organizations should consider four pivotal factors regarding EPS using, which are customer capacity in terms of knowledge, skills and access, customer perceived security, government regulations, and EPS perceived usefulness. Second, using EPS from customers' perceptions depends on two conditions, which are EPS security and EPS legal protection to cope with uncertainty.

6. Limitations and future research directions

This study has three limitations. First, it is limited to 10 CSFs selected from 18 factors identified through a literature review. Future studies are requested to use more CSFs of EPS. Second, it was conducted using a sample of EPS users in Amman, the capital city of Jordan, hence, further studies are needed to verify the research findings and other samples from other Arab countries. Third, the study developed two hypotheses on the mediating role of CPS in the relationship between CTC and GR as independent variables and SPU as a response variable. Further study is required to examine these two hypotheses. Moreover, researchers are called for investigating the mediating roles of the other linkage factors, i.e., customer personal information, system reliability, and system perceived risks, in the effect of CTC and GR on SPU.

Acknowledgment

The authors are thankful for Dr. Naim Ahmad and Dr. Aymen Qahmash from the Department of Information Systems, King Khalid University, Saudi Arabia for their Smart ISM Software.

References

Ahmad, N. and Qahmash. A. (2021). SmartISM: Implementation and assessment of Interpretive Structural Modeling. Sustainability, 13(16), 8801. https://doi.org/10.3390/su13168801.

Ajmera, P. and Jain, V. (2019). Modelling the barriers of Health 4.0 - the fourth healthcare industrial revolution in India by TISM. Operations Management Research, 12(3), 129-145.

Al-Ayed, Sura & Al-Tit, Ahmad (2023). The effect of supply chain risk management on supply chain resilience: The intervening part of Internet-of-Things. Uncertain Supply Chain Management, 11: https://doi.org/10.5267/j.uscm.2022.10.009

Al-Ayed, Sura I. & Al-Tit, Ahmad (2021). Factors affecting the adoption of blended learning strategy. International Journal of Data and Network Science, 5(3): 267–274. https://doi.org/10.5267/j.ijdns.2021.6.007

Al-Majali, M. M. and Bashabsheh, A. A. (2016). Factors that affect commercial banks customers' intention towards electronic payment services in Jordan. International Business Research, 9(3), 79-96.

Al-Tit, A. (2020). E-commerce drivers and barriers and their impact on e-customer loyalty in small and medium-sized enterprises (SMES), Verslas: Teorija ir praktika / Business: Theory and Practice, Vilnius Gediminas Technical University, Vilnius, 21(1), 146-157.

Ashour, L. M., Magatef, S. G. and Alzaghal, Q. K. (2023). The impact of e-ticketing on behavioral intention to use and the moderating role of information and communication technology tools. In B. Alareeni and A. Hamdan (eds.). Impact of artificial intelligence and the fourth industrial revolution on business success. Proceedings of International Conference on Business and Technology (ICBT 2021). Switzerland: Springer Nature. pp. 483-507.

Attiany, M. S., Al-kharabsheh, S. A., Al-Makhariz, L. S., Abed-Qader, M. A., Al-Hawary, S. I. S., Mohammad, A. A. and Al-Rahamneh, A. A. (2023). Barriers to adopt industry 4.0 in supply chains using interpretive structural modeling. Uncertain Supply Chain Management, 11(1), 299-306.

Azevedo, S. G., Sequeira, T., Santos, M. and Mendes, L. (2019). Biomass-related sustainability: A review of the literature and interpretive structural modeling. Energy, 171, 1107-1125.

Baker, M. J. and Cameron, E. (2008). Critical success factors in destination marketing. Tourism and Hospitality Research, 8(2), 79-97.

Borazon, E. Q. and Nguyen, H. T. T. (2022). E-government use in Vietnam: Do external variables drive a positive attitude towards technology? Research Square. Available at: https://assets.researchsquare.com/files/rs-2191455/v1/.DOI: https://doi.org/10.21203/rs.3.rs-2191455/v1

Boynton, A. C. and Zmud, R. W. (1984). An assessment of critical success factors. Sloan Management Review, 25(4), 17-27.

Çaldağ, M. T., Gökalp, E. and Alkış, N. (2019). Analyzing determinants of open government based technologies and applications adoption in the context of organizations. In Proceedings of the International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government (EEE) e-Government (EEE), Las Vegas, NV, USA, 29 July-1 August 2019.

Chen, W. T. and Chen, T. T. (2007). Critical success factors for construction partnering in Taiwan. International Journal of Project Management, 25(5), 475-484.

Chukwu, M. A. and Idoko, E. C. (2021). Inhibitors of electronic banking platforms' usage intention in deposit money banks: Perspectives of Elderly Customers in Developing Economy. Sch. Bull, 7, 134-145.

Colla, E. and Lapoule, P. (2012). E-commerce: Exploring the critical success factors. International Journal of Retail & Distribution Management, 40(11), 842-864.

Daştan, İ. And Gürler, C. (2016). Factors affecting the adoption of mobile payment systems: An empirical analysis. EMAJ: Emerging Markets Journal, 6(1), 17-24.

Daud, N. M., Kassem, N. E. M., Said, W. S. R. W. and Noor, M. M. M. (2011). Determining critical success factors of mobile banking adoption in Malaysia. Australian Journal of Basic and Applied Sciences, 5(9), 252-265.

Ebiringa, O. T. (2010). Automated Teller Machine and Electronic Payment System in Nigeria: A synthesis of the critical success factors. Journal of Sustainable Development in Africa, 12(1), 71-86.

Hair, J. F., Ringle, C. M. and Sarstedt, M. (2011). PLS-SEM: Indeed, a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139-152.

Hammouri, Q. M., Abu-Shanab, E. A. and Nusairat, N. M. (2021). Attitudes toward implementing e-government in health insurance administration. International Journal of Electronic Government Research (IJEGR), 17(2), 1-18.

Harris, H., Guru, B. K. and Avvari, M. V. (2011). Evidence of firms' perceptions toward electronic payment systems (EPS) in Malaysia. International Journal of Business and Information, 6(2), 226-245.

Isa, M. A., Nasrul, F. and Mohamed, S. (2018). Factors affecting consumers' acceptance towards electronic payment system: Case of a government land and district office. Jurnal Intelek, 13(1), 1-8.

Jawad, A. I., Parvin, T. and Hosain, M. S. (2022). Intention to adopt mobile-based online payment platforms in three Asian countries: An application of the extended Technology Acceptance Model. Journal of Contemporary Marketing Science, 5(1), 92-113.

Junadi, S. (2015). A model of factors influencing consumer's intention to use e-payment system in Indonesia. Procedia Computer Science, 59, 214-220.

Keni, K., Tjoe, H., Wilson, N. and Negara, E. S. (2020). The effect of perceived security, ease of use and perceived usefulness on intention to use towards mobile payment services in Indonesia. In The 2nd Tarumanagara International Conference on the Applications of Social Sciences and Humanities (TICASH 2020) Advances in Social Science, Education and Humanities Research, 478 (pp. 78-84). Atlantis Press.

Kim, B., Kim, H. and Jeon, Y. (2018). Critical success factors of a design startup business. Sustainability, 10(9), 2981.

Kofoworola, O. J. and Ojo, A. C. (2022). Influence of performance expectancy and government regulations on electronic commerce adoption in Nigeria. International Academic Journal of Management and Marketing, 7(1), 1-11.

Kumar, P., Bhamu, J. and Sangwan, K. S. (2021). Analysis of barriers to Industry 4.0 adoption in manufacturing organizations: An ISM approach. Procedia CIRP, 98, 85-90.

Lim, B., Lee, H. and Kurnia, S. (2007). Exploring the reasons for a failure of electronic payment systems: A case study of an Australian company. Journal of Research and Practice in Information Technology, 39(4), 231-243.

Masengu, R., Prinsloo, J. J. and Pelser, T. (2022). Customer perceptions and adoption of e-Marketing in Zimbabwe. African Journal of Business and Economic Research, 17(1), 257-301.

Min, S., So, K. K. 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 & Tourism Marketing, 36(7), 770-783.

Moeuf, A., Lamouri, S., Pellerin, R., Tamayo-Giraldo, S., Tobon-Valencia, E. and Eburdy, R. (2020). Identification of critical success factors, risks, and opportunities of Industry 4.0 in SMEs. International Journal of Production Research, 58(5), 1384-1400.

Mohd, H. N. N. and Shamsul, S. (2011). Critical success factors for software projects: A comparative study. Scientific Research and Essays, 6(10), 2174-2186.

Oney, E., Guven, G. O. and Rizvi, W. H. (2017). The determinants of electronic payment systems usage from consumers’ perspective. Economic Research-Ekonomska Istraživanja, 30(1), 394-415.

Park, A. and Lee, K. J. (2014). Critical success factor of noble payment system: Multiple case studies. Journal of Intelligence and Information Systems, 20(4), 59-87.

Puri, G. (2012). Critical success factors in e-Learning–An empirical study. International Journal of Multidisciplinary Research, 2(1), 149-161.

Ram, J. and Corkindale, D. (2014). How "critical" are the critical success factors (CSFs)? Examining the role of CSFs for ERP. Business Process Management Journal, 20(1), 151-174.

Rouibah, K. (2015). Electronic Payment Systems Use and Satisfaction in an Arabic Country: Evidence from Kuwait. Issues in Information Systems, 16(2), 149-160.

Rouibah, K. (2015). Electronic payment systems use and satisfaction in an Arabic Country: Evidence from Kuwait. Issues in Information Systems, 16(2), 149-160.

Seetharaman, A., Sreenivasan, J. and Boon, L. P. (2006). Critical success factors of total quality management. Quality and Quantity, 40(5), 675-695.

Singh N. K., Sahu G. P., and Rana N.P. (2019). Critical success factors of the digital payment infrastructure for developing economies. In A. Elbanna, YK Dwivedi, D. Bunker et al (Eds). Proceedings of the Smart Working, Living and Organizing: IFIP WG 8.6 International Conference on Transfer and Diffusion of IT. 25 Jun 2018. Portsmouth, UK. IFIP Advances in Information and Communication Technology. Vol 533, 113-125. Cham: Springer.

Singh, R. K., Garg, S. K., Deshmukh, S. G. and Kumar, M. (2007). Modelling of critical success factors for implementation of AMTs. Journal of Modelling in Management, 2(3), 232-250.

Skvarciany, V. and Jureviciene, D. (2017). Factors influencing customer trust in mobile banking: case of Latvia. Economics and Culture, 14(2), 69-76.

Suhaimi, N. A. N., Nawi, N. M. and Kamarudin, W. N. B. W. (2022). Determining the use of cashless payment methods and the contributing factors: Hotel guests’ perspectives in Malaysia. International Journal of Accounting, 7(41), 198-208.

Sutarso, Y. and Setyawan, D. B. (2022). Internet banking adoption in Indonesia: TAM extention with the moderation role of customer knowledge and trust. Jurnal Manajemen dan Pemasaran Jasa, 15(2), 289-306.

Tan, T., Chen, K., Xue, F. and Lu, W. (2019). Barriers to building information modeling (BIM) implementation in China's prefabricated construction: An interpretive structural modeling (ISM) approach. Journal of Cleaner Production, 219, 949-959.

Teoh, W. M. Y., Chong, S. C., Lin, B. and Chua, J. W. (2013). Factors affecting consumers’ perception of electronic payment: An empirical analysis. Internet Research, 23(4), 465 – 485.

Treiblmaier, H., Pinterits, A. and Floh, A. (2008). Success factors of Internet payment systems. International Journal of Electronic Business, 6(4), 369-385.

Vickland, S. and Nieuwenhuijs, I. (2005). Critical success factors for modernizing public financial management information systems in Bosnia and Herzegovina. Public Administration and Development: The International Journal of Management Research and Practice, 25(2), 95-103.

Volery, T. and Lord, D. (2000). Critical success factors in online education. International Journal of Educational Management, 41(5), 216-223.

Yaokumah, W., Kumah, P. and Okai, E. S. A. (2017). Demographic influences on e-payment services. International Journal of E-Business Research (IJEBR), 13(1), 44-65.

Yeoh, W. and Koronios, A. (2010). Critical success factors for business intelligence systems. Journal of computer information systems, 50(3), 23-32.

Zainol, Z. and Mokhtar, N., (2022). Implementing an electronic payment system: Getting things done! IIUM Journal of Case Studies in Management, 13(2), 7-11.

Zhao, X., Lynch Jr, J. G. and Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. Journal of consumer research, 37(2), 197-206.

Zwikael, O. and Globerson, S. (2006). From critical success factors to critical success processes. International Journal of Production Research, 44 (17), 3433-3449.