Pamukkale Üniversitesi
Sosyal Bilimler Enstitüsü Dergisi
Pamukkale University Journal of Social Sciences Institute
ISSN 1308-2922 E-ISSN 2147-6985

Article Info/Makale Bilgisi
√Received/Geliş:10.06.2020 **√Accepted/Kabul:**01.12.2020
DOİ:10.30794/pausbed.750829
Araştırma Makalesi/ Research Article

Saygıner, C. ve Ercan, T. (2021). "Critical Factors Affecting Cloud Computing Adoption in Turkish Companies with Diffusion of Innovation Theory" *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, Sayı 45, Denizli, ss. 91-105.

CRITICAL FACTORS AFFECTING CLOUD COMPUTING ADOPTION IN TURKISH COMPANIES WITH DIFFUSION OF INNOVATION THEORY

Can SAYGINER*, Tuncay ERCAN**

Abstract

Cloud computing provides an effective computing technology in the way IT services such as data storage, network, and application are supplied externally by companies without software and hardware, long implementations, and delayed maintenance to decrease operational expenditures. However, there is an inadequate amount of scholars studying the effects of cloud computing adoption among Turkish companies. In order to fill the gap, this study aims to exhibit the factors affecting cloud computing adoption in Turkish companies. Diffusion of innovation (DOI) theory was developed to understand the critical factors affecting cloud computing adoption, deriving three factors: perceived advantage, cost-saving, and compatibility. Confirmatory factor analysis was applied to assess data. The findings showed that compatibility directly affected cost-savings. Cost-savings directly affected perceived advantage, and perceived advantage directly affected cloud computing adoption. The variance of perceived advantage also explained 15.8% of the proposed model. By adopting DOI theory, this study will intend to contribute to businesses for increasing the awareness of companies' IT decision-makers about the perception of cloud computing adoption in the cloud computing decision making period in Turkey.

Keywords: *Cloud Computing, IT adoption, Diffusion of Innovation Theory, Confirmatory Factor Analysis.*

YENİLİĞİN YAYILMA TEORİSİYLE TÜRK ŞİRKETLERİN BULUT BİLİŞİM ADAPTASYONUNU ETKİLEYEN KRİTİK FAKTÖRLER

Abstract

Bulut bilişim, veri depolama, ağ ve uygulama gibi BT hizmetlerin, işletim giderlerini azaltmak amacıyla yazılım ve donanım ile uygulamaların hızlı kurulumunu ve gecikme olmaksızın bakımlarını şirketler tarafından harici olarak sağlanan etkili bir bilgi işlem teknolojisidir. Bununla birlikte, bulut bilişimin Türk şirketleri arasında benimsenmesinin etkilerini araştıran yeterli sayıda araştırma yapılmadığı görülmektedir. Bu çalışma ile sözkonusu bu boşluğu doldurmak amacıyla, Türk şirketlerinde bulut bilişimin benimsenmesini etkileyen faktörlerin ortaya konması amaçlamaktadır. Bulut bilişimin benimsenmesini etkileyen kritik faktörler için geliştirilen İnovasyonun Yayılması (DOI) teorisi ile algılanan avantaj, maliyet tasarrufu ve uyumluluk şeklinde üç faktör elde edilmiş ve bu faktörler için doğrulayıcı faktör analizi uygulanmıştır. Çalışma sonucunda ise; uyumluluğun maliyet tasarrufunu, maliyet tasarrufunun algılanan avantajı ve algılanan avantajın da bulut bilişimin benimsenmesini doğrudan etkilediği sonucuna varılmıştır. Algılanan avantajın varyansı ise, önerilen modelin % 15,8'ini açıklamaktadır. DOI teorisini benimseyerek yapılan bu çalışma, Türkiye'de bulut bilişim karar verme sürecinde şirketlerin BT karar vericilerinin bulut bilişimin benimsenme algısı hakkındaki farkındalıklarını artırmak amacıyla işletmelere katkıda bulunacaktır.

Anahtar Kelimeler: *Bulut Bilişim, BT adaptasyonu, Yeniliğin Yayılma Teorisi, Doğrulayıcı Faktör Analizi.*

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INTRODUCTION

Companies in Turkey require cloud computing adoption because this technology helps companies find an effective solution for hardware, software, and data storage in a pay-per-use model manner that decreases ICT expenditure costs. However, this also brings cloud provider lock-in and security issues since the data is in the cloud provider's hand. Because of these two trade-off ways, this study is designed to show which factors are important to determine the cloud computing adoption for improving their business processes mentioned by Sallehudin, Razak, & Ismail (2015) and sustaining their businesses declared by Alshamaila, Papagiannidis, & Li (2013). The motivation of this study is there are no DOI theory model studies of cloud computing adoption applied in any specific industrial area to increase IT decision-makers' knowledge over cloud computing adoption in Turkey. In order to determine the efficiency cloud computing adoption pre-process, this study monitors perceived benefits, compatibility, and cost-saving obtained from DOI theory. The study aims to explore which innovation diffusion determinants affecting in Turkey. 16 questionnaires were asked to 120 IT decision-makers. SmartPLS 3.0 software was used to analyze data. Under this condition, this study contributes to acknowledging non-cloud adopters about the critical factors adopting cloud computing. It also encourages them to decrease vagueness and doubtful thoughts during the cloud computing adoption process. In addition, this leads them to work collaboratively with cloud providers in a healthy manner in the IT landscape of Turkey for an effective IT infrastructure. Hence, this study proposes an IT decision framework for literature to fill the gap in determining the decision making of cloud computing adoption.

LITERATURE REVIEW

1.Cloud Computing

There are various definitions of cloud computing from technology, non-functional and economic perspectives.

From a technology perspective, Marston et al (2011) defined cloud computing as applications in strong powerful computers that are delivered over the internet. Armbrust et al. (2009) described cloud computing as data centers and the hardware that is managed in a virtual environment. El-Gazzar (2014) generally referred cloud computing as grid computing which configures the use of distributed servers. Bento & Bento (2011) and Lele (2019) mentioned about cloud computing as data physically located in outside servers and can be partially manipulated by IT departments and cloud providers. Youseff, Butrico, & Da Silva (2008) and Zhang, Zhang, Chen, & Huo (2010) stated that cloud computing is virtualization that hardware and software resources are shared by systems, applications and end-users interact with each other. Marston et al. (2011) and Leimeister et al. (2010) defined cloud computing as a multi-tenancy system that all resources are shared with multiple users at the same time. Wills et al. (2018) defined cloud computing as an application platform interface that includes sets of tasks to form platform management to software developers in IT departments.

From a non-functional perspective, Kadhim et al. (2018) and Lele (2019) described cloud computing as a cloud system that is scalable on-demand that can be priced on a pay-as-you-go model. Dai et al. (2009) and Tripathi& Nasina (2017) also defined cloud computing as a cloud system that has a rapid elasticity to scale up users, bandwidth power, and server settings based on company's requirements. In addition, Bento& Bento (2011) and Marston et al. (2011) described cloud computing as a cloud system that can be accessed by internet connection from any time at anywhere via smartphones and PDAs. Furthermore, Astri (2015) defined cloud computing as computing tools that are available to the general public called public cloud or in the internal organization called a private cloud.

Okan, Hacaloglu& Yazici (2016) referred to cloud computing as an agile and adapted computing that their computing speed and systems are robust and automated. Armbrust et al. (2009) and Garrison, Wakefield & Kim (2015) stated that cloud computing is a quality of service that IT requirements are guaranteed by service level agreements (SLA) among cloud providers and companies. Cloud computing is a reliable system that no loss data and no code reset in the execution are guaranteed by cloud services (Marston et al.,2011).

From an economic perspective, Garrison, Wakefield, & Kim (2015) asserted that cloud computing causes to increase time to market fast. Cloud computing also allowed to decrease operational expenditures (OPEX)

(Alharbi, Atkins, & Stanier, 2016; Avram, 2014). In addition, Misra& Mondal (2011) and Vidhyalakshmi& Kumar (2016) defined cloud computing as a cloud system that can decrease the return of investment (ROI) time. Moreover, Alismaili et al. (2016) and Zacharias (2016) affirmed that cloud computing reduced the total cost of ownership (TCO) of companies. Furthermore, Katzan (2010) also acknowledged that cloud computing decreased the initial costs of IT equipment by specifying upfront costs in SLA contracts.

2.Cloud Computing Adoption

According to El-Gazzar (2015), internal, external, evaluation, proof of concept, adoption decision, implementation and integration, and IT governance are the key steps of cloud computing adoption.

For external adoption, one of the external effects of cloud computing adoption is government regulations mentioned by Wills et al. (2018). Second is IT industry standards institutes explained by Mell & Grance (2011). Third of the external effects of cloud computing adoption is cloud providers stated by Cruzes (2015) and Singh & Randhawa (2015). Business partners in the fourth external effects that are mentioned by Bogataj Habjan & Pucihar (2017) and Kyriakou et al. (2017). Competitors and cloud service brokers are the last that is mentioned by El-Gazzar (2014).

For internal adoption, the first internal factor is investment desire that explained by El-Gazzar (2014). second of the internal factor is top management that asserted by Alharbi et al. (2016) and Kyriakou et al. (2017). Firm size is the third internal factor that is expressed by Son, Lee, Lee, & Chang (2011). Lynn et al. (2018) and Senyo, Effah, & Addae (2016) mentioned about organizational culture compatibility as the fourth internal factor of cloud computing adoption. Staff's IT skills Alhammadi (2016) and Ali, Soar, Yong, & Tao (2016) stated that staff's IT skills and knowledge are the fifth internal factor. The sixth and the last internal factor is prior experience of cloud computing adoption (Lele, 2019; Mukherjee, 2019).

For evaluation in the adoption process, firstly, cost, and benefits are the factors considering important by Maresova (2014) and Ndukwe & Chukwudi (2015). Secondly, the Technological readiness of companies is examined as a factor by Amron et al. (2017) and Senyo et al. (2016). Thirdly and lastly, cloud provider selection is studied by Kaneko& Pavarangkoon (2016), Repschlaeger, Wind, Zarnekow& Turowski (2013) and Singh& Randhawa, 2015).

For proof of concepts in the adoption process, the trialability processes of cloud services are formerly discussed by Alshamaila, Papagiannidis, & Li (2013). Perceived risks are latterly assessed by Bannerman (2010) and Iyer (2014).

For adoption decisions in the adoption process, firstly, implementation planning is assessed by Amron et al. (2019), Dachyar & Prasetya (2014), and Sallehudin, Razak, & Ismail (2015). Secondly, service model selection is studied by Gupta et al. (2017) and Suryateja (2018). Thirdly, deployment model selection is examined by Kemal (2019) and Leloglu (2018). Fourthly and lastly, the contract and SLA negotiation are discussed by Wazir, Khan, & Shah (2016).

For implementation and integration, complexity is the first task discussed by Ali et al. (2016), Avram (2014) and Hall & Hord, (2001). Compatibility is the second that is examined by Lian et al (2014), Lynn et al. (2018), and Senyo et al. (2016).

For IT governance, audibility is the first characteristic of cloud computing adoption mentioned by Bedward & Fokum (2014), Tarmidi et al. (2015), and Wang et al. (2010). Traceability is the second characteristic of cloud computing adoption affirmed by El-Gazzar& Wahid (2015) and Gallaugher& Ransbotham (2010). Risk management is considered as the third characteristic of cloud computing adoption for IT governance asserted by Carcary et al. (2014)

3.Adoption Theories

For usage continuance, Diffusion of Innovation (DOI) theory proposed by Rogers (1983) is pioneered to determine whether using technology or not by assessing attributes such as perceived advantage (PA), compatibility

(CO), complexity (CX) and trialability (TR) of cloud services(El- Gazzar, 2014). Institution theory is another theory derived by Scott (1987) to understand the attributes during companies under pressure internally with cultural resistance and internal readiness attributes and externally with competitors and business partners' attributes. TOE theory found by Tornatzky and Fleischer (1990) monitors a technological, organizational, and environmental readiness to understand internal and external factors of technology adoption. UTAUT created by Venkatesh et al. (2003) is another theory to understand the behavioral intentions of IT decision-makers including performance expectancy, effort expectancy, facilitating conditions, and social influence attributes to adopt technologies. The Fit-viability model (FVM) proposed by Tjan (2001) is a theory that examines tasks and technology in fit factor, economic, IT infrastructure, and organization in viability factor to measure the performance of cloud computing. Human-Organization and Technology and Fit (HOT-Fit) model derived by Kadhim et al. (2018) is another model to measure success and fit of technology adoption. Technological Acceptance Model (TAM) found by Davis (1989) is a theory to understand the behavioral and attitude of technology adopters containing perceived ease of use and usefulness. Theory of Reasoned Action (TRA) proposed by Fishbein& Ajzen (1975) is another attitude and behavior model measuring normative beliefs and subjective norms. The reason for the DOI theory selected in the model was because it was an organizational oriented theory that aimed to understand what perceived idea about this new technology was in Turkey. Besides the other theories mentioned above, DOI theory was the most effective way to understand social, cultural, and actors in the cloud computing adoption environment. Here is the DOI theory applied for technology adoption in distinct technologies with different analysis mentioned in Table 1 below. Apart from these Turkish researches that were the last three studies, confirmatory factor analysis was applied to analyze Turkish companies' cloud computing adoption readiness. These studies investigated the key benefits and drawbacks of cloud computing adoption, however, unlike these three studies in Turkey, the originality of the research was mainly perceived advantages of cloud computing adoption were measured by the effect of compatibility and cost savings in the model. In the world, the study of (Alhammadi, Stanier, & Eardley, 2015) about cloud computing adoption was different from Turkish researches in that compatibility directly affected cloud computing adoption.

Table 1: DOI Studies

Technology	**Analysis**	**Source**	**DOI Constructs**					
			PA	**CS**	**SPC**	**CX**	**CO**	**TR**
Construction Technology Adoption	t-test	(Gledson & Greenwood, 2017)	X				X	
ICT Adoption	Multiple regression	(Osorio-gallego, Londoño-metaute, & López-zapata, 2016)	X	X	X	X		
Medical ICT Adoption	Descriptive analysis and Correlation	(Kwabena et al., 2014)	X			X	X	X
Cloud Computing Adoption	Logistic regression	(Alhammadi, Stanier, & Eardley, 2015)	X			X	X	
Smartphones Adoption	Descriptive analysis	(Wani & Ali, 2015)	X			X	X	
Genomics Research Adoption	Descriptive analysis	(Charlebois et al., 2016)	X		X			
E-government Adoption	Confirmatory Factor analysis	(Sallehudin, Razak& Ismail, 2015)	X				X	X
Cloud Computing Adoption	AHP ranking analysis	(Sener et al., 2016)	X		X	X		
Cloud Computing Adoption	Qualitative analysis	(Guner & Sneiders, 2016)	X	X	X			X
Cloud Computing Adoption	Descriptive analysis	(Hassan et al., 2017)	X			X	X	

4.Research Model

The research mainly proposes a framework of cloud computing adoption at the usage continuance and in the decision process of companies via DOI theory. Constructs of DOI theory are cost savings (CS), perceived advantage (PA), compatibility (CO), and cloud computing adoption (CCA) as shown in Figure 1. Security and privacy concerns (SPC), complexity (CX), and technological readiness (TR) were not eligible to add the model because reliability and validity tests were not satisfied.

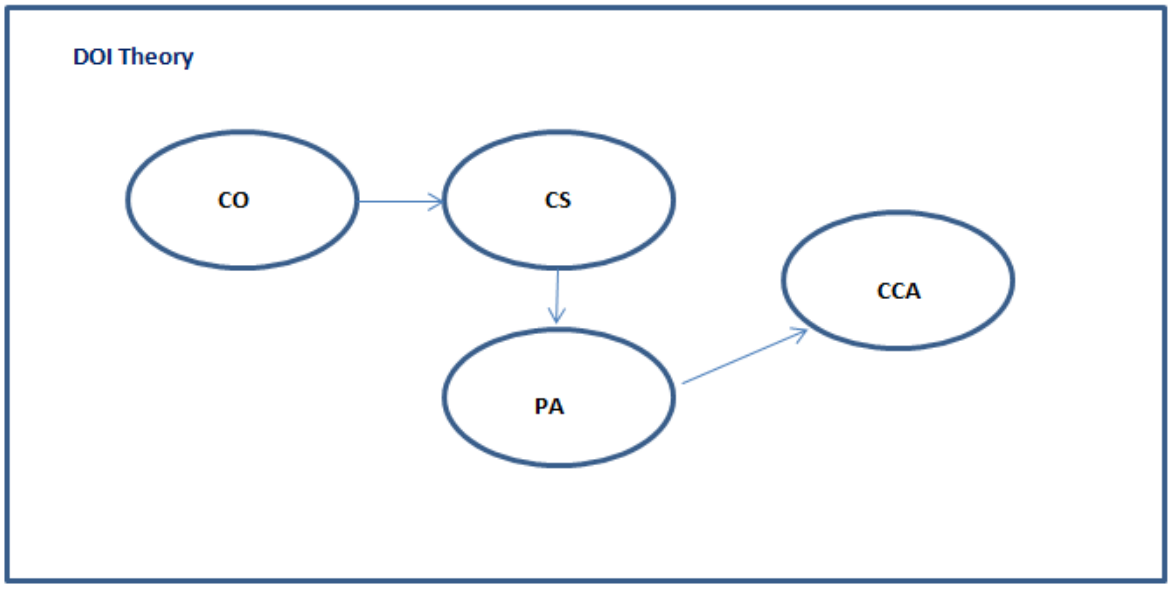

Figure 1: Proposed Model

4.1.Perceived Advantage (PA)

Perceived advantage is defined as *"the degree to which an innovation is perceived as being better than the idea it supersedes"* Rogers (1983). Alshamaila, Papagiannidis& Li (2013), Oliveira, Thomas& Espadanal (2014), and Sallehudin, Razak& Ismail (2015)we develop a research model based on the innovation characteristics from the diffusion of innovation (DOI found perceived advantage significantly important for English SMEs, Portuguese companies and Malaysian public sector, respectively. However, Charlebois et al. (2016) and Hassan& Nasir (2017) opposed the effects of the perceived advantage on cloud computing adoption in the Genomics project in Germany and Malaysian SMEs. In this research, the perceived advantage of businesses decreases the chances of complexity, thus the first hypothesis is:

H1. Perceived advantage positively influences cloud computing adoption.

4.2.Cost Saving (CS)

Cost-saving is described as *"the degree to which decision-makers perceive the total cost of using cloud computing lower than other computing paradigms"*(Rogers, 1983). Alajmi *et al.* (2018), Bhuyan& Dash (2018) and Lynn *et al.* (2018)we adapted Diffusion of Innovation (DoI proved that cost savings affect cloud computing adoption in the education sector in Umman, Indian hospitals, and Irish companies. Oliveira, Thomas& Espadanal, (2014) and Sallehudin, Razak& Ismail (2015) opposed the effects of the perceived cost savings on cloud computing adoption in Portuguese companies and the Malaysian public sector.

H2. Cost-saving positively influences the perceived advantage.

4.3.Compatibility (CO)

Compatibility is defined as "the degree to which cloud computing is perceived as consistent with the existing values, experience, and needs of companies" (Rogers, 1983)." Deil& Brune (2017), Bhuyan& Dash, (2018), and Lynn et al., 2018) proved that compatibility affects cloud computing adoption. On the other hand, Oliveira,

Thomas& Espadanal (2014), Alismaili et al. (2016), and Hassan& Nasir (2017) claimed that perceived compatibility was not likely to affect the adoption. In this context, I believe that cloud computing's compatibility with the work environment has a positive impact on complexity, therefore the related hypothesis is as follows:

H3. Compatibility positively influences the cost savings.

METHODOLOGY

The research is a quantitative survey that IT managers took part in as respondents. 16 questionnaires were asked by using Google forms that were sent to the company emails shown in Appendix 1. Questionnaires were translated from an English–language questionnaire to Turkish-language and validated by two professors, who were experts in this area. Company profiles were found from the Izmir Chamber of Commerce website. 835 companies were selected as respondents. 129 of them are filled. 120 of them are found valid. The research is mainly about software related to data storage and CRM software and infrastructure services related to broadband and network of hardware used in Turkey.

SmartPLS 3.0 software was used to measure three factors. The data sample was collected from non-cloud adopters and cloud computing adopters in Turkey. The questionnaires were adapted from Ghobakhloo et al. (2011) and Thiesse et al. (2011). Non-random sampling method was applied to find approximately equal numbers of non-cloud companies and cloud companies. Likert scale measurement (from 1 to 5) is used to analyze which factors influencing cloud computing adoption. Fit analysis, validity and reliability measurement, correlation matrix, and structural model results are exhibited below.

RESEARCH RESULTS

The research results consist of four main elements: descriptive analysis, fit analysis, validity and reliability measurement, correlation matrix, and structural models.

1. Descriptive Analysis

The descriptive analysis exhibited that 69.1% of companies were familiar with cloud computing adoption. Participants also took place by 75.8% in the Aegean Coast of Turkey and 75.8% in the service sector as shown in Table 2.

Table 2: Descriptive Analysis

Companies Profile in Turkey			
		Frequencies	Percentage
Familiar with Cloud Computing Adoption (Yes/No)	Yes	83	69.1%
	No	37	30.9%
Companies by Location	Aegean region of Turkey	91	75.8%
	Marmara region of Turkey	15	12.5%
	Central Anatolia Region	7	5.8 %
	Other Regions	7	5.8 %
Companies by Sectors	Manufacturing sector	29	24.1%
	Service sector	91	75.8%

2. Fit Analysis

The results showed that SRMR value, in which the proposed model is 0.073, is considered as a perfect fit which is below 0.08 (Lohmöller, 1989). The model result's NFI value is 0.807 which exhibited a fit as shown in Table 3. Chi-Square is the value of 223,644.

Table 3: Fit Analysis

Fit Indices	Structural Model
Chi-Square	223.644
SRMR	0,073
NFI	0,807

3.Validity and Reliability Measurement

The value of composite reliability (CR), average variance extracted (AVE) and Cronbach's alpha exceeds the value of 0.7 by Arifin (2018), 0.5 by Arifin (2018) and 0.7 by Hair et al. (2017), respectively. In the proposed model, the value of CR, AVE, and Cronbach's alpha threshold is between 0.802 and 0.975, 0.578 and 0.952 and, 0.627 and 0.950 that they are in the recommended values as shown in Table 4.

Table 4: Validity and Reliability Values

Constructs	CR	AVE	Cronbach's Alpha
CO (4 items)	0,943	0,806	0,920
CS (3 items)	0,802	0,578	0,627
PA (4 items)	0,925	0,755	0,893
CCA (2 items)	0,975	0,952	0,950

4.Correlation Matrix

According to Hair et al. (2017), there are three dimensions of correlations: weak correlation, moderate correlation, and strong correlation. As shown in Table 5, the correlation among CO and CS, CO and PA, CO and CCA, CS and PA, CS and CCA, and PA and CCA are moderate. There are no weak and strong correlations among any factors.

Table 5: Correlation matrix of Proposed Model

	CO	CS	PA	CCA
CO	**1**			
CS	0,550	**1**		
PA	0,682	0,622	**1**	
CCA	0,606	0,342	0,421	**1**

(below 0.3: weak, 0.3-0.7: moderate, above 0.7: strong)

5.Structural Model Results

The results showed that the variance of compatibility (CO) explained 18.1% of the variance of cost-savings (CS). The variance of cost savings (CS) explained 23.1% of the perceived advantages (PA). The variance of perceived advantage (PA) explained 15.8% of the proposed model as shown in Figure 2.

According to Hair (2017), T value which was greater than 1.96 or less than -1.96 was in a valid threshold and denoted as the hypothesizes are accepted as shown in Table 6.

Table 6: Structural Model Results

CONSTRUCTS	Path Coefficients	T- Value	Results
H1- PA-> CCA	0.398	3.784***	**SUPPORTED**
H2- CS-> PA	0.480	4.055***	**SUPPORTED**
H3- CO->CS	0.426	3.920***	**SUPPORTED**
R^2 of CCA: 0.158 R^2 of PA: 0.231 R^2 of CS: 0.181			

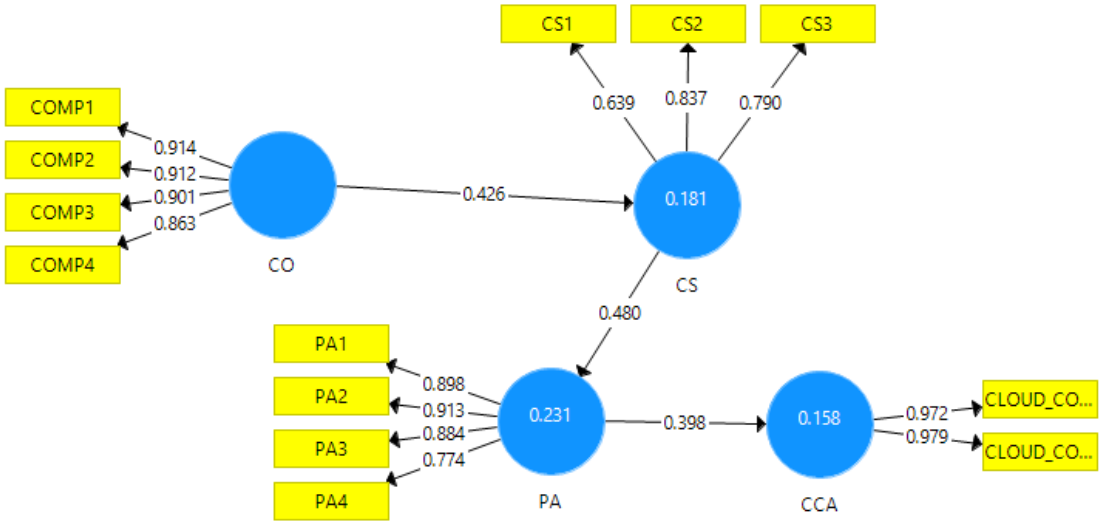

Figure 2: Structural Model Path Diagram

DISCUSSION

H1. Perceived advantage positively influences cloud computing adoption.

Rapid elasticity, scalability, agility, and robust are important characteristics of cloud computing that increases the probability of cloud computing adoption in the world. In Turkey, their practices were mentioned below that bring issues for Turkish companies. For rapid elasticity and scalability, cloud computing gives the company ability to scale up or down cloud-based services system according to end user's requirement for software, software developer's requirement for platforms, and ICT technician's requirements for infrastructure. Because of Internet connectivity issues and the lack of a broadband plan in Turkey, data use and infrastructure request accessibility issues emerged. For agility and robust, integration issues of combining distinct software from different providers have emerged in Izmir. Because of the technical weakness of third party cloud providers and of IT development teams in companies, data integration issues emerged that negatively affect cloud computing adoption.

A perceived advantage in micro-companies is the least important factor affecting the decision making of the adoption as Charlebois, Palmour& Knoppers (2016) mentioned from Germany micro-companies.

H2. Cost-Saving positively influences perceived advantages

Strategic selection of cloud services cost, evaluation, and selection of cloud provider, service charge for the query, database transactions, and telephone support and the number of end-users, implementation, migration and integration costs, maintenance and configuration costs are essential for companies to take into consideration to increase perceived advantages by assessing their operational expenditure (OPEX) cost policy.

Trial of Companies in Izmir should attempt a trial edition in advance. Integration and migration costs (if cloud provider changing or new service features) and other costs must be specified in service level agreement (SLA) contracts for the future to prevent themselves from surprising costs such as back up, recovery, maintenance, and modification costs.

Cost savings are less likely to affect public sectors Sallehudin, Razak& Ismail (2015), but more likely to affect the hospital and education sector in Umman and Indian hospitals (Alajmi *et al.*, 2018; Bhuyan& Dash, 2018).

H3. Compatibility positively influences cost-saving.

In Turkey, workloads fit, employee fit of tasks by cloud computing, and educative staff in terms of compatibility critically affect cost-saving.

Popular known IT brands are the basis of the Izmir market. They make heavy contracts and use a market strategy to make the companies lock-in. Even the former IT strategy worked successfully, they offered services and promotions and the companies accepted their offer without considering the pros and cons. Companies should examine the cloud provider's offers and cloud providers should get involved in their business processes in the pre-adoption process and acknowledged the companies to give them an effective decision idea to decrease costs.

Compatibility is more likely to affect developed countries and hospitals based on Deil& Brune (2017), Bhuyan& Dash (2018), and Lynn et al. (2018) in German SMEs, Indian hospitals, Irish SMEs, respectively.

CONCLUSION

The research contains a strong link between compatibility and cost-savings in Turkey but this does not affect directly adopt cloud computing.

First and foremost, the model showed that perceived advantage takes an important role in the adoption. Cost, agility, robust, and scalable systems directly influence cloud computing adoption Secondly, cost savings have a sound influence on the perceived advantages. Companies, which they just use services as online by not paying licenses and not maintain the system, were an effective idea to optimize their expenditures by taking in control. Lastly, compatibility has a major impact on cost-saving. The country's values, norms, and cultural role take one step further to reduce the costs of companies by training the IT staff and end-users training for workload fit. Thus, this study proposes a decision-making model for non-cloud adopters to show the cloud computing adoption pre-evaluation roadmap of IT decision-makers. This research also advises the government to increase bandwidth power in Turkey and regulate SLA contracts not to victimize companies by cooperating with third-party cloud providers. With these recommendations, cloud computing providers can contribute to companies by educating IT decision-makers' to increase their awareness of cloud computing adoption. With this education, this research shows a roadmap for companies to adopt cloud computing effectively by minimizing their costs.

The limitations of the study were, firstly, security and privacy concerns (SPC), complexity (CX) and technological readiness (TR) will be added to increase the variance of explaining cloud computing adoption. Secondly, organizational factors such as firm size, and IT decision-makers, and Environmental factors such as competitors and law regulations in Turkey will be adjoined to extend DOI study with internal and external factors. Thirdly and lastly, cloud computing adoption by sectors will be analyzed to compare factors among the manufacturing sector and the service sector.

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APPENDIX 1. Questionnaires

Questionnaires for Demographic Information		
1. Familiar with Cloud Computing Adoption (Yes/No) 2. Companies by Location (Aegean Coast, Marmara Coast, Central Anatolia Coast, Others) 3. Companies by Sector (Manufacturing Sector, Service Sector)		
	Items	**Questionnaires for Confirmatory Factor Analysis**
COMPATIBILITY	**COMP1.**	4. The use of cloud computing fits the work style of the company.
	COMP2.	5. The use of cloud computing is fully compatible with current business operations
	COMP3.	6. Using cloud computing is compatible with your company's corporate culture and value system.
	COMP4.	7. The use of cloud computing will be compatible with existing hardware and software in the company
COST SAVINGS	**CS1.**	8. The benefits of cloud computing are greater than the costs of this adoption.
	CS2.	9. With cloud computing, there is a reduction in energy costs and environmental costs.
	CS3.	10. Maintenance costs of cloud computing are very low
PERCEIVED ADVANTAGES	**PA1.**	11. Cloud computing allows you to manage business operations efficiently.
	PA2.	12. The use of cloud computing services improves the quality of operations.
	PA3.	13. Using cloud computing allows you to perform specific tasks more quickly.
	PA4.	14. Using cloud computing allows you to increase business productivity.
CLOUD COMPUTING ADOPTION	**CLOUD_COMPUTING_ ADOPTION1.**	15. At what stage of cloud computing adoption is your organization currently engaged? Not considering; (Currently evaluating; Have evaluated, but do not plan to adopt this technology; Have evaluated and plan to adopt this technology; Have already adopted services; Have evaluated and plan to adopt this technology; Have already adopted services)
	CLOUD_COMPUTING_ ADOPTION2.	16. If you're anticipating that your company will adopt cloud computing in the future. How do you think it will happen? (Not considering; More than 7 years; Between 3 and 7 years; Between 1 and 3 years; Less than 1 year; Have already adopted)

Beyan ve Açıklamalar (Disclosure Statements)

1. Bu çalışmanın yazarları, araştırma ve yayın etiği ilkelerine uyduklarını kabul etmektedirler (The authors of this article confirm that their work complies with the principles of research and publication ethics).

2. Yazarlar tarafından herhangi bir çıkar çatışması beyan edilmemiştir (No potential conflict of interest was reported by the authors).

3. Bu çalışma, intihal tarama programı kullanılarak intihal taramasından geçirilmiştir (This article was screened for potential plagiarism using a plagiarism screening program).

4. Bu makale için etik kurul izni gerekmemektedir (Ethics committee permission is not required for this article).