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BENEFITS AND CHALLENGES OF CLOUD COMPUTING IN PRODUCTION AND SERVICE SECTOR IN IZMIR, THE CITY OF TURKEY

Can Sayginer[1*], Tuncay Ercan[2]
[1*]PhD Candidate, Business Administration, Yaşar University, Turkey; [2]Assoc.Prof. Department of Computer Engineering, Yaşar University, Turkey.
Email: *cansayginer@gmail.com

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Abstract

Purpose of the study: This research aims to understand the benefits and challenges of cloud and non-cloud adopter companies of production and service sectors on cloud computing and making recommendations based on companies' perceptions of the issue in Izmir, Turkey.

Methodology: This is a descriptive survey of businesses, forming a questionnaire for 99 companies in the service sector and 66 companies in the production sector to non-cloud or cloud user businesses in the city of Izmir in Turkey. SPSS 26.0 software is used to analyze the perceived benefits and challenges of cloud computing.

Main Findings: The descriptive analysis results show that increasing productivity in business processes and working collaboratively from remote are the most important perceived benefits of adopting cloud computing in the production sector and service sector, respectively. On the other hand, business processes adoption issues and concerns about security are the significant perceived challenges and barriers of cloud computing adoption, respectively.

Applications of this study: The study is useful for governments to understand the critical points of cloud computing and is believed to give governments the ability to prepare an appropriate environment for businesses. Cloud providers and companies also take a position to contribute to this environment by creating new I.T. products and purchasing these I.T. products conforming to their I.T. needs, respectively.

Novelty/Originality of this study: This research provides companies in Izmir with a guide for the adoption considering the appropriate cloud computing deployment models such as public cloud, private cloud, community cloud and hybrid cloud for certain types of applications such as software as a service (SaaS), platform as a service(PaaS) and Infrastructure as a service (IaaS) for developing countries.

Keywords: *Cloud Computing, Benefits of Cloud Computing, Challenges of Cloud Computing, Production Sector, Service Sector, Descriptive Analysis.*

INTRODUCTION

That companies aim to increase revenues and decrease costs, a general discussion on the issue of cloud computing adoption for companies in information and communication technology has emerged. Traditional computing is an on-premise computing process that enables companies to manage all their information and communication technologies on their own. With the advancement of the Internet in the last few years, this trend has changed that most computing products are rented and are managed by cloud providers. This gives companies the ability to position faster in the market and focus on their own products. Cloud provider interaction increases the level of services at a larger scale and helps develop the applications more flexible. The company gains the ability to increase the number of users, increase CPU (central processing unit) power, memory, bandwidth power of Internet, change server configurations, use operating systems and applications as cloud computing services. Cloud provider interaction has brought technical and business benefits but some external risks, including security of data holding in memory concerns, heavy contracts with cloud providers, and variable costs. However, cloud computing adoption is an inevitable process for each type of company because both sectors, manufacturing and service sectors, have future needs of artificial intelligence and data analytics in big data to survive and hold market share in the competitive market. Cloud service solutions in Turkey have increased over the last five years. Between 2014 and 2019, the proportions of services and software increased from 16% to 21%. And from 36% to 41% respectively, while the proportion of hardware decreased from 48% to 38% (Deloitte, 2018). The decrease in hardware and the growth in service proportions show that there is a tendency in Turkey to adopt cloud computing, especially for the future (Deloitte, 2018).

Research Gap and objectives

Thus, it is important to understand the perception of cloud computing in the Turkish market. Research in Turkey on cloud computing is at the beginning, but some have been done for general and SMEs (small and medium enterprises) of some large cities such as Istanbul. Therefore, there are no specific studies for Izmir to reveal the benefits and challenges of cloud and non-cloud adopter companies by categorizing them as production and service sectoral divisions. The objective of the paper is to identify the differences in production and service sectors concerning cloud adoption and increase the awareness of companies and cloud providers to create a healthy environment for an effective I.T. infrastructure

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LITERATURE REVIEW

CLOUD COMPUTING (CC)

Having been discussed by innovators, entrepreneurs and business scholars, cloud computing has several definitions. The founder of Apple, Steve Job's speech on Worldwide Developer Conference in 1997 about cloud computing is that storing data in servers will be a better idea than the local hard discs to be in business fast in the next 17 years (Lum, 2016). The founder of Microsoft, Bill Gates, explained that cloud computing would offer super-computation by using quantum in businesses in the next 6-10 years (Ranger, 2016). Larry Ellison, Oracle's Boss, opposed the perceived effects of cloud computing that this technology already used and I.T. people redefined the name of cloud computing as a charismatic brand for markets (Marston et al., 2011). Jeff Bezos, CEO of Amazon, stated that "*More and more people are actually using the cloud, and building more things, and will in the future."* (Furrier, 2017,1). Alibaba's owner declared that every business would be going digital and cloud Infrastructure will be built in this digital era to support all services that will be powered by cloud (Udemans, 2018).

Definitions of businesses mainly show what cloud computing provides for individuals and organizations. They include data, hardware, software, resources, pay-per-use service, Internet, virtualization, utility computing, grid computing, service level agreement and automation.

Cloud computing was described as holding the data of companies external data centers. Armbrust *et al*. (2009), Leimeister *et al*. (2010), Son *et al*. (2011) and Youseff, Butrico, & Da Silva (2008)all defined cloud computing as a combined service and hardware delivered as services over the Internet in the data centers.

Cusumano (2010), Leimeister *et al*. (2010), Mell & Grance (2011) and Son *et al*. (2011) stated that cloud computing is presented as a flexible delivery model of supplying information technology. Cloud is a pool that provides usable and accessible resources such as hardware, development platforms and/or services (Armbrust *et al*., 2009; Brynjolfsson, Hofmann, & Jordan, 2010; Mell & Grance, 2011). The pool of services is delivered as a pay-per-use model online (Armbrust *et al*., 2009; Yang & Tate, 2009; Marston *et al*., 2011). Internet-based applications were delivered as a service derived by Bento & Bento (2011), Leimeister *et al*. (2010) and Mell & Grance (2011). Cloud computing contains virtualized resources of hardware, software and I.T. Infrastructure Lele (2019). Cloud computing is referred to as utility computing in businesses as the service being sold for utility (Youseff, Butrico, & Da Silva, 2008; Zhang *et al*., 2010a). Cloud computing is referred to as grid computing from a technical perspective like an electricity billing meter system (Zhang *et al*., 2010b; Mell & Grance, 2011). Service level agreement of cloud computing is the process of negotiating a contract between businesses and cloud providers (Mell & Grance, 2011). Cloud computing is the automation of I.T. solutions for businesses (Lele, 2019; Mell & Grance, 2011).

Characteristics of Cloud Computing

Existing technologies have formed the characteristics of cloud computing. Essential NIST characteristics of cloud computing are on-demand self-service, broad network access, resource pooling, rapid elasticity and measured service (Mell & Grance, 2011). Memory, CPU time, data transfer, network bandwidth and applications are the on-demand resources of businesses (Hernández *et al*., 2015). These services enable businesses to obtain the high capacity I.T. Infrastructure at reasonable costs via providers (Hernández *et al*., 2015). Broad network access enables complete mobility for users in businesses to work anywhere at any time through different devices with laptops, mobiles, tablets, PDAs and workstations (Velte, Velte & Elsenpeter, 2009; Bento & Bento, 2011; Susanto, Almunawar & Kang, 2012). Resource pooling provides resources in the cloud service pooled to increase the efficiency of data storing in businesses (Gallaugher &Ransbotham, 2010; Timmermans *et al*., 2010). Virtual machines, resource utilization and resource allocations take a priority part of rapid elasticity for businesses to improve resource utility (Greenberg et al., 2009; Tripathi & Nasina, 2017). Bill metering capability is the attribute of measured service and integrated with the accounting system of the businesses (Eweoya & Daramola, 2015; Seifu *et al*., 2017).

For cloud computing Service models, it is important to know which service model is required in order to meet the demands of the business processes. Cloud users in businesses use SaaS services without installation, management and licensing needs (Alhammadi, 2016). Reducing operation costs is the key advantage of SaaS applications (Alhammadi, 2016). No up-front cost investment, shortening the time of application availability, technical aspects such as development, deployment and testing and managing aspects such as maintaining, upgrading, backing up, and security are major duties of CSP (Alhammadi, 2016). Accordingly, such benefits cause the businesses to focus on their core businesses by eliminating testing, managing, maintaining, upgrading, backing up and security and operation costs concerns.

SaaS is defined by Mell & Grance (2011) as the capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. PaaS is an operating system, storage and network based on-demand service model (Etro, 2009). Cloud users in businesses use PaaS services to develop and deploy their own applications. Qualified and good I.T. staffs in businesses needed to use PaaS services to manage software management tasks in terms of application types, lifecycle management, Application Programming Interfaces supported and data and application management such as programming language chosen and data logging (Alhammadi, 2016). Hence, these activities enable businesses to

build technical capabilities of businesses. IaaS is a virtual machine (V.M.), storage and CPU based on-demand service model (Etro, 2009). Cloud users in businesses use IaaS services without owning the physical Infrastructure and responsibility of maintenance (Alhammadi, 2016). Qualified and high levels I.T. staffs in businesses needed to use IaaS services to manage physical infrastructure tasks (Alhammadi, 2016). As a result, these activities enable businesses to build infrastructure capabilities of businesses.

Deployment of Cloud Computing

According to Mell&Grance (2011), cloud service model deployed into four categories to consider what type of applications, platforms and infrastructures is applied to a specific company**.** Public, on Premise cloud, is known as a deployment model that is open and accessible to public with cloud service provider management (Susanto, Almunawar & Kang, 2012). Hernández *et al*. (2015) and Singh & Jangwal (2012) mention that It costs less, but on the contrary, a less secure system expressed by Salah Hashim & Bin Hassan (2015), compared with other deployment models. Public cloud has an ability to guarantee flexibility and easy access for users (Susanto, Almunawar & Kang, 2012; Thakur et al., 2014). However, malicious attacks can emerge frequently (Susanto, Almunawar & Kang, 2012; Umaeswsari & Shanthini, 2014). Information leak can appear as a threat (Coppolino et al., 2017; Mohd, 2013). Data archiving is mostly used in businesses on public cloud. Private, off premise cloud, is described as a deployment model that functions within the company and is close to the cloud service provider or open to the extent that the company decides based on the features of organization management of resources and applications including deployment, customization, operations and maintenance (Susanto, Almunawar & Kang, 2012). It is believed by Dhawan (2017) and Domun & Bheemul (2019) that private cloud is more secure but more costly than public cloud. It is also different from public cloud in that it has customized features that gives accessibility to users in companies as well as stakeholders (Susanto, Almunawar and Kang, 2012). Providing application for businesses is mostly held on private cloud. Hybrid, on premise or off premise, cloud is defined as a mixture of public, private and community cloud (Priyadarshinee et al., 2016; Srilakshmi, Veenadhari, and Pradeep, 2013). Hybrid cloud has easy portability function of data and applications in case, the cloud provider changes (Priyadarshinee et al., 2016; Tripathi & Nasina, 2017). It is cost effective due to cost saving feature of public cloud, outsourcing, and it also maintains high level data control and applications benefiting from the features of private cloud. Data archiving and application providing can both be hold in hybrid cloud. Community cloud is known as maintaining business resources and applications for a group of organization that have a common interest such as storage, security, and compliance (Hiran et al., 2018; Susanto, Almunawar & Kang, 2012). Educational cloud and governmental cloud can be shared among universities and governmental bodies around the world for research and governmental service purposes.

Benefits of Cloud Computing

Benefits of cloud computing were classified as business oriented, employee oriented and both (Creeger(2009) and Garrison, Wakefield & Kim (2015).

From business oriented perspective, Khan and Al-Yasiri (2016) and Okan, Hacaloglu & Yazici(2016) mentioned about the success of focus on the core business to reach faster to market. Erdogmus (2009), Etro (2009) and Yang & Tate(2009) also expressed the cost reduction to lower the upfront costs and increase the revenue. Creeger (2009) classified three key factors: trusted relationship between customers and cloud providers, focusing on a core competence and success of economics with economies of scale that is business oriented. Abdollahzadehgan *et al.* (2013) pointed out the top management critical success factors and categorized them into four categories: management of information systems, human resource, vision and commitment clarity for positive innovative environment, knowledge of the capabilities and limitations of cloud based services and forming reasonable objectives and plans.

From employee oriented perspective, Avram (2014) and Jones (2015) asserted that access to I.T. resources is important for raising user involvement in businesses. Okan, Hacaloglu and Yazici (2016) expressed that scalability, accessibility, flexibility and agility/adaptability are success factors to deploy fast in case requirements arise without minimum service provider interaction. Cost reducing, flexible, redundancy and reliability, scalability, collaboration, efficiency, virtuality and availability are important benefits to use cloud computing (Astri, 2015). Abdollahzadehgan *et al.*(2013) also divided the technological readiness critical benefit factors for production and service sector into five groups: Reducing infrastructure management,reducing I.S. cost,data availability, reduction of software maintenance,technical skills of I.S. staff with the knowledge and experiences of I.T. human resources. Abdollahzadehgan *et al.* (2013) also divided the critical success factors for production and service sectors into five groups: flexibility advantages of production and service sectors, ability of cloud computing for the creation of companies and new products to develop market share, grow sales turnover and raise profitability.

From both business and employee oriented point of views. Creeger (2009) focused on employee oriented benefits that the users of cloud computing should also be acknowledged but the adoption process also makes the employees hesitate in case of losing their jobs. Creeger (2009) also considered assessing both business and employee-oriented benefits that concern with the costs and the planning the future value of cloud computing adoption for companies.

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From the literature, increasing productivity in business processes, cost reduction, satisfying risk and quality requirements, security, working collaboratively from remote, trust in cloud providers and easy scalability are selected for descriptive analysis from the benefits of cloud computing, as shown in Table 1.

Table 1: The Benefits of Cloud Computing

BENEFITS	ADOPTED	AUTHOR
Increasing Productivity in Business Processes	Consequences of Cloud Computing	Alharbi, Atkins, &Stanier, (2016),Marston*et al.* (2011) andMas'adeh, (2016)
Cost Reduction	SuccessFactors of Cloud Computing, Consequences of Cloud Computing	Qasım& Abu-Shanab (2014), Marston*et al.* (2011) andSingh, &Tripathi, 2016
Satisfying Risk and Quality Requirements	Requirements of Cloud computing	Kyriakou*et al.*(2017),Okan, Hacaloglu, &Yazici (2016) andPyae (2019)
Security	Consequences of Cloud Computing	Qasım& Abu-Shanab (2014),Marston*et al.* (2011) andSharma, Singh, &Misra, (2015)
WorkingCollaborativelyfrom Remote	Requirements of Cloud Computing	Alhammadi, Stainer, &Eardley, (2015),Eweoya&Daramola, (2015)andMasrom&Rahimli (2014)
Trust of Cloud Providers	SuccessFactors of Cloud Computing	El-Gazzar&Wahid, (2015) and Shimba (2010)
EasyScalability	SuccessFactors of Cloud Computing, Consequences of Cloud Computing	Venters&Whitley, 2012

Source: Developed by authors

Potential and Challenges of Cloud Computing

The potential and challenges of cloud computing were explained by Iyer & Henderson (2010) and Lele (2019). Trigueros *et al.*,(2013) categorized potential and challenges into five categories: Security, availability and quality of service, vendor lock-in, the control loss of data and data privacy, confidentiality and law requirements.

For security (Armbrust *et al.*, 2009) classified potential and challenges for data loss and software security. For availability and quality of service, Garrison, Wakefield& Kim (2015) stated that mobility and collaboration are important potential and challenges of cloud computing adoption. For vendor lock-in, Hoberg, Wollersheim & Krcmar (2012) explained the potentials for the behaviors among cloud service providers and companies. For the control loss of data and data privacy, cloud provider and company lock-in and reliability issues were also addressed as a challenge by Marston*et al.* (2011). For confidentiality and law requirements, Marston*et al.* (2011) and Iyer & Henderson (2010) mentioned I.T. security and compliance issues as a mayor challenge. As a result, these potential and challenges of cloud computing adoption leads to a faster market positioning, scalability of services and flexible applications to reach the benefits of cloud computing.

From the literature, business process adoption issues, high costs, feeling insecure of the cloud provider and concerns about the benefits of cloud computing, concerns about security, competitiveness, feeling insecure of the cloud provider and concerns about the regulation and laws are selected for descriptive analysis from the potential and challenges of cloud computing as shown in Table 2.

Table 2: The Challenges and Barriers of Cloud Computing

CHALLENGES AND BARRIERS	ADOPTED	AUTHOR
Business Process Adoption Issues	Risks of Cloud Computing	Loukis&Kyriakou (2015)
High Costs	Risks of Cloud Computing	Ibrahimi, (2017),Mazrekaj, Shabani, &Sejdiu (2016) and Iyer&Henderson(2010)
Concerns about the Benefits of Cloud Computing	Requirements of Cloud Computing	Avram (2014)
Concerns about Security	Risks of Cloud Computing	Altobishi, Podruzsik, &Gabor(2018), Khan& Al-Yasiri, (2016) and Kulkarni*et al.* (2012)
Competitiveness	Risks of Cloud Computing	Karkonasasi*et al.* (2016) and Senyo, Effah, &Addae (2016)
Feeling Insecure of Cloud Provider	SuccessFactors of Cloud computing, Requirements of Cloud computing	El-Gazzar (2015)

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Concerns about the Regulation and Laws	Potential and Challenges of Cloud Computing	Khajeh-Hosseini, Sommerville, &Sriram (2010)

Source: Developed by authors

METHODOLOGY

The research is a quantitative study of the perception of cloud computing in Turkey and has a descriptive approach to obtain the perceived benefits, challenges and barriers of cloud computing. Secondary data are collected from literature as shown in Table 1 and Table 2. The main research objective is to analyze the perceived thoughts about cloud computing by the companies in the city of Izmir. A survey of six common questions were asked to both cloud adopters and non-cloud adopters; one separate additional set of three different questions were asked to cloud adopter group; the first question was a one-option-multiple choice question; the second question was a multiple-option-multiple choice question (three options out of 7 choices were allowed); the third question was a multiple-option-multiple choice question (all three options were allowed). Another separate set of two questions were asked to non-cloud adopters. The first question was a one-option-multiple choice question; the second question was a three-option-multiple choice question (three out of seven choices were allowed). SPSS 26.0 software was used to analyze perceived benefits, challenges and barriers of cloud computing. The respondents were I.T. decision-makers or entrepreneurs of companies in Izmir. The unit of analysis is at the individual level in Turkey. The distribution of samples is shown in Table 3.

RESULTS

Here are the respondent characteristics, company characteristics, results for adopters of the production sector and service sector and reasons for the reluctance of non- adopters of production and service sectors section explained below.

Respondent Characteristics

Table 3: Respondents' Characteristics (N=176)

DemographicFeatures	Frequency	Percent
Gender		
Male	116	65,9
Female	60	34,1
Total	**176**	**100,00**
Educational Level		
High School	17	9,7
Vocational School	18	10,2
Graduate	84	47,7
Postgraduate	47	26,7
Doctorate (PhD)	10	5,7
Age of theRespondents		
18-25	14	7,9
26-35	78	44,3
36-50	59	33,5
50-65	24	13,6
65 above	1	0,6
IndustrySpecificWorkExperience		
2 years and below	23	13,1
3-5 years	40	22,7
6-10 years	55	31,3
11-20 years	39	22,7
More than 21 years	19	10,8

Source: Developed by authors

Company Characteristics

Out of 176 companies, 99 were cloud adopters; 77 were non-cloud adopters. 43 companies were in the production sector, out of which 19 were cloud adopters and 24 were of non-cloud adopters. 133 out of 176 companies were in the service sector; 80 out of 133 were cloud adopters and 53 companies were non-cloud adopters as shown in Table 4 below

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Table 4: Company Characteristics

CompanyFeatures	Frequency	Percent
I.T. Decision		
Cloud Adopter	99	56,3
Non-Cloud Adopter	77	43,7
Sector		
ProductionSector	**43**	**24,4**
Cloud Adopter	19	44,2
Non Cloud Adopter	24	55,8
Service Sector	**133**	**75,6**
Cloud Adopter	80	60,2
Non Cloud Adopter	53	39,8

Source: Developed by authors

Results for Adopters of Production Sector and Service Sector

As seen in Figure 1, the priority of production sector cloud adopters is the idea that cloud computing increases productivity in business processes by 19.3 %**.** Their second most important reason for adopting is able to work collaboratively from remote areas by 17.5 %. Thirdly, reducing cost is the third reason for adopting cloud computing by 15.8 % followed by other reasons such as easy scalability, satisfying risk, quality and performance requirements, the trust of cloud providers and security 14.1 %, 12.3 %, 10.5% and 10.5%, respectively.

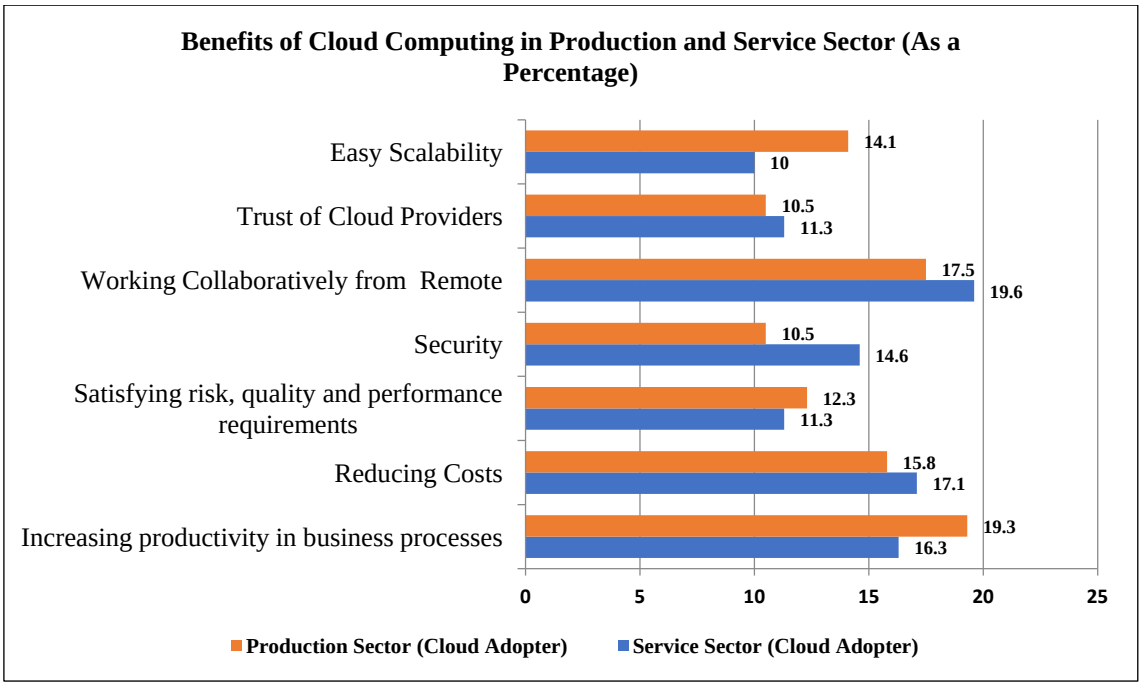

Figure 1: Benefits of Cloud Computing in ProductionSector(N=99)(As a percentage)

Source: Developed by authors

In the production sector, as illustrated in Table 5, 19 out of 43 companies use 31 cloud services in total. In other words, 1 adopter approximately uses 1.63 cloud services. The most used is IaaS with 13 services. The second most used is SaaS with 8 services. The third most used is PaaS with 7 services. The least used service is the other 3 services including additional security. On the other hand, in service sector, 80 out of 133 companies use totally 167 cloud services. In other words, 1 adopter approximately uses 2.08 cloud services. The most used is IaaS with 58 services. The second most used is SaaS with 41 services. The third most used is PaaS with 36 services. The least used service is the others with 32 services, including additional security. In Table 3, 12 out of 19 adopter companies use 1 to 3 services. 4 out of 19 companies use 7 services or more. 3 out of 19 companies use 4 to 6 services. In service sector, 80 out of 133 companies use 167 cloud services in total. The most used is IaaS with 58 services. The second most used is SaaS with 41 services. The third most used is PaaS with 36 services. The least used service is the others with 32 services including additional security. In service sector, 3, 51 out of 80 adopter companies use 1 to 3 services. 16 out of 80 companies use 4 to 6

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services.13 out of 80 companies use 7 services or more as shown in Table 5.

Table 5: Types of Cloud Services Used and Number of Cloud Services Used (N=99)

	SECTORS	
ADOPTERS	**PRODUCTION**	**SERVICE**
Types of Cloud Services Used		
SaaS	8	36
PaaS	7	41
IaaS	13	58
Number of Cloud Services Used		
Between 1 and 3 years	12	51
4-6 years	3	16
7 yearsandabove	4	13

Source: Developed by authors

Reasons for reluctance of Non- Adopters of Production and Service Sectors

In production sector, as exhibited in Figure 2, non-cloud adopters are not likely to adopt cloud computing firstly because complex business processes adoption issues by 22.2% due to their fragmented product and management processes. Second biggest concern is the security by 20.8%. The third reason is high costs by 18.1%. The fourth reason is concerning about the benefits of cloud computing by 15.3%. In addition, feeling insecure of cloud provider, competitiveness and concerning about regulatory and law in Turkey are the reasons of being non-adopter by 9.7 %, 6.9 % and 6.9%, respectively. In service sector, as illustrated in Figure 5, concerning about security (22.0%) is the primary reason for not adopting non-cloud companies. Business process adoption issue (21.4%) is the second reason for not adopting cloud computing. High costs (15.7%) follows is the third reason for not adopting cloud computing. Concerning about the benefits of cloud computing, concerning about regulatory and law in Turkey, feeling insecure of cloud provider and competitiveness are the other reasons of being non-adopter by 11.9 %, 11.9 %, 9.4 % and 7.5% respectively.

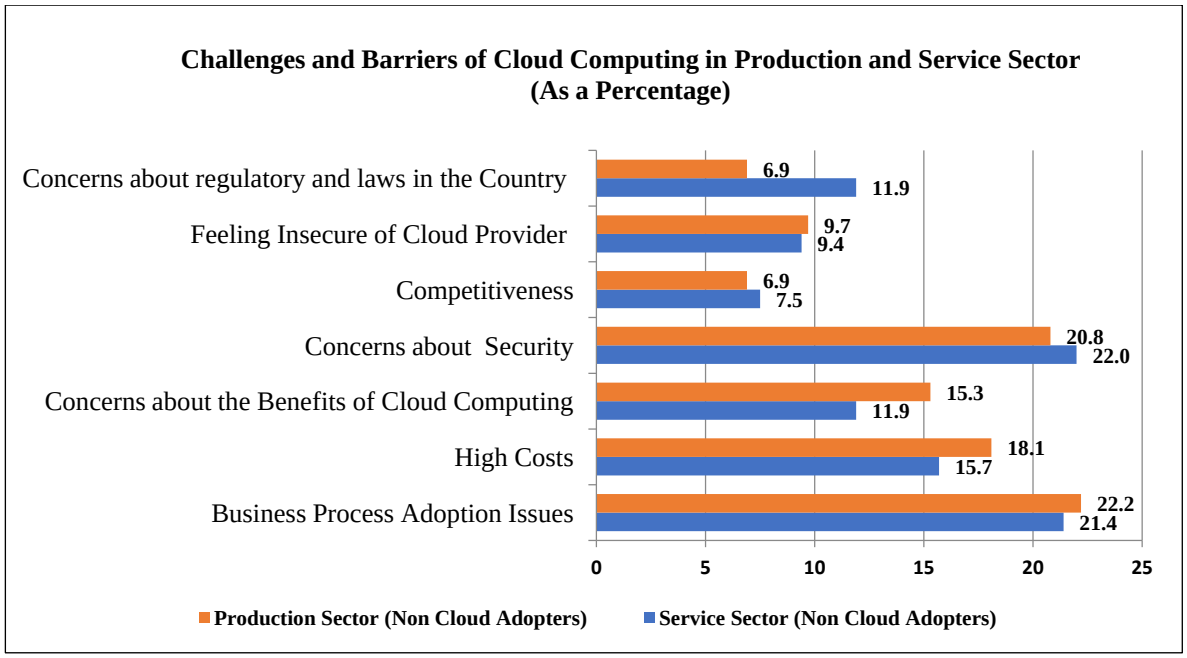

Figure 2: Challenges and Barriers of Cloud Computing in Service Sector (N=77) (As a percentage)

Source: Developed by authors

In production sector, as shown in Table 6, 37.5% stated that they do not consider adopting cloud computing; 29.2% stated that they will consider adopting cloud computing in 1 to 3 years' time; 25% said that they will consider adopting cloud computing in 4 years and above; 8.3% confirmed that they will consider adopting cloud computing in less than 1 year. On the other hand, in service sector, 35.8% declared that that they will consider adopting cloud computing in 1 to 3 years' time; 26.4% stated that they do not consider adopting cloud computing; 24.5% stated that they will consider adopting cloud computing in 4 years and above; 13.2% stated that they will consider adopting cloud computing in less than 1 year.

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Table 6: Types of Cloud Services Used and Number of Cloud Services Used (N=77)

	SECTORS	
NON ADOPTERS	**PRODUCTION**	**SERVICE**
We don't consider it	37.5%	26.4%
Less than 1 year	8.3%	13.2%
Between 1 and 3 years	29.2%	35.8%
4 years and above	25.0%	24.5%

Source: Developed by authors

DISCUSSION

Companies in İzmir are at an early stage in terms of cloud adoption. Those who adopted CC have a 25% (7 out of 28) of PaaS use for production companies and have a 30% (41 out of 135) of PaaS use for service companies. It is inferred that service companies are more enthusiastic than production companies. Haugetal. (2016) also agreed on this inference and added that business services, financial and wholesaler sectors are especially the most adoptive ones.

Some production and service companies in İzmir have adopted CC. Rather than software services (ERP), CRM and platform services, infrastructure services including virtual machines, data storage and processors used are observed to be benefited from as cloud. The research showed that 13 out of 28 companies in the production sector and 58 out of 135 companies in service sector applied IaaS to their businesses that are the most used cloud types in comparison with SaaS and PaaS (Akar & Mardiyan, 2016) opposed the idea that SaaS such as open-source ERP and storage services are more likely to be adopted than PaaS and SaaS in the world reason for why all services are not accommodated in the cloud is that software services do not fit workflows by 21.4% and that companies have security concerns by 22.0%. (Sayginer & Ercan, 2018) especially had a conclusion that security and privacy concerns in both sectors are found to be the most significant decision making factor of cloud computing adoption. Also, the fact that all stored data, either on the servers within the company (private cloud) or outside the company (public cloud) in the hands of the provider, is among the reasons that increase the concerns on whether to adopt CC.

This study determined the primary advantages of CC as; decreasing I.T. costs; increasing productivity and enabling easier remote operations. The advantage of being remotely operable is that sales and procurement departments are more mobile within the whole operation. Reducing I.T. cost is also important because all data flow for marketing, sales, procurement, I.T., human resources, finance and accounting are over the I.T. infrastructure provided by the cloud provider at much less cost. Production is increased because of the company becomes more flexible in all operations, which also helps costs be reduced. Mobile access to operations decreased %30 of paperwork as documents are electronically reachable (Jones, 2015).These concerns can be left behind through effective training of the company's I.T. staff. Meetings with cloud providers should be held so that a mutual comprehension can be established. The trust issue can be solved through comprehensive understanding which means they should not rush for gathering bids without building trust and eliminating security concerns**.** Reputation, image and history of cloud providers are the important criteria on for trusting CC providers in the world (Kumar et al., 2013).

Since the production sector has more complicated workflows compared to the service sector, they might need to use a combination of distinct software from different cloud providers. Therefore, final contracts with cloud providers should enable the services to be available for integrations with future technologies.

If the cloud adoption decision is for a single cloud provider, "private cloud,"; if the decision if for more than one provider, "public cloud," and if the decision is for multiple cloud and multiple providers, "hybrid cloud" can be chosen.

While production companies do not consider or plan cloud adoption in near future by 37.5%, those in service sector are planning to adopt cloud computing in 1 to 3 years by 35.8%.**[DONE]**This reveals that company owners or I.T. decision makers in service sector have more comprehensive knowledge about cloud services. Private cloud is recommended to service sector companies when there is trust issue; If the company can afford owning the Infrastructure and devices or if its mobile users have limited access, private cloud; if its I.T. department is well trained; traditional computing.

CONCLUSION

As the Internet progresses, cloud computing has become one of the most important I.T. decisions for companies. In order for companies to position fast in the competitive markets, they outsource infrastructure, platform services and software services instead of having them within their companies. Based on descriptive analysis, this study makes recommendations to both production and service companies in terms of which service models should be accommodated in which cloud model based on benefits and drawbacks of CC. As a result, while private cloud or public cloud or hybrid cloud are found to be feasible for production sector, traditional computing orprivate cloud or public cloud or hybrid are found to be feasible for the service sector. Since service sector is more open to new technologies and innovations, they will pioneer adopting public or hybrid cloud and guide the production sector on that path.

LIMITATION AND STUDY FORWARD

Considering the benefits for those already adopted CC, this study will play a considerable role on the decision-making processes for CC adoption and comprehending their own workflows of the companies in Izmir who haven't made a forward decision. As for future studies, a more detailed benefits/ concerns study can be conducted on CC implementation. Even if sectors are divided as production and service, comprehensive studies can be done on specific sectors such as textile, cotton, packaging and renewable energy, which are considered production companies and also on banking, judiciary and health sectors, which are considered service sector. In addition, a micro-scale study of benefits and concerns for small and medium size companies can be carried out.

One limitation over the study is that this study does not contribute to the studies in developed countries/regions because Izmir is selected as a case for it is a developing region/country.

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