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SOFTWARE AS A SERVICE (SaaS) ADOPTION AS A DISRUPTIVE TECHNOLOGY: UNDERSTANDING THE CHALLENGES AND THE OBSTACLES OF NON-SaaS ADOPTERS

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ABSTRACT

Software for a service (SaaS) brings unprecedented benefits to business applications such as cost reduction and productivity. This study aims to understand the behavioral intentions of businesses that are not considering using SaaS, are in the process of evaluating the use of SaaS, are evaluating but not adopting, and planning to evaluate and use SaaS. Data were collected by asking 18 questions from 76 businesses not adopting SaaS and analyzed with One-Way Analysis of Variance (ANOVA). Fisher's LSD test was used as a post hoc analysis to observe the differences between the groups. The findings showed that those who do not plan to use SaaS and those who evaluate and plan to use SaaS, and those who are in the process of evaluating the use of SaaS and those who plan to use SaaS, differed significantly in their opinions about the perceived advantages and security concerns. On the other hand, it is seen that the decision makers' support of all non-SaaS adopters and the attitudes of non-SaaS adopters located in different market regions were similar. The research will contribute to informing SaaS providers to ensure business continuity and to produce customized software and applications suitable for the challenges and barriers faced by business operations.

Keywords: *Choice of Technology, Organizational Behaviour, Hypothesis Testing, Diffusion Processes.*

JEL Classification Codes: *O14; D23; C12; O33.*

YENİLİKÇİ TEKNOLOJİ OLARAK HİZMET İÇİN YAZILIM (SaaS): SaaS KULLANMAYANLARIN ZORLUKLARINI VE ENGELLERİNİ ARAŞTIRMAK

ÖZET

Hizmet için yazılım (SaaS), işletme uygulamalarında maliyet azaltma ve üretkenlik gibi benzeri görülmemiş büyük faydalar sağlamaktadır. Bu çalışma, SaaS kullanmayı düşünmeyen, SaaS kullanımını değerlendirme aşamasında olan, değerlendiren ama benimsemeyen ve değerlendirip SaaS kullanımını planlayan işletmelerin davranışsal niyetlerini anlamayı amaçlamaktadır. Veriler, SaaS'ı kullanmayan 76 işletmeden 18 soru sorularak toplandı ve Tek Yönlü Varyans Analizi (ANOVA) ile analiz edildi. Gruplar arasındaki farkları gözlemlemek için post hoc analizi olarak Fisher'in LSD testi kullanıldı. Bulgular, SaaS kullanmayı düşünmeyenler ile değerlendirip SaaS kullanımını planlayanların ve SaaS kullanımını değerlendirme aşamasında olanlar ile değerlendirip SaaS kullanımını planlayanların göreceli avantajlar

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ve güvenlik konusunda düşüncelerinin önemli ölçüde farklı olduğunu gösterdi. Diğer yandan, tüm SaaS kullanmayanların karar verici desteği ile farklı pazar bölgelerinde konumlanan SaaS kullanmayanların tutumlarının benzer ölçüde aynı olduğu görülmektedir. Araştırma, işletmelerin devamlılığını sağlamak ve iş operasyonlarının karşılaştığı zorluklar ve engeller için uygun kişiselleştirilmiş yazılım ve uygulamalar üretmek konusunda SaaS sağlayıcılarının bilgilendirilmesine katkıda bulunacaktır.

Anahtar Kelimeler: *Teknoloji Seçimi, Örgütsel Davranış, Hipotez Testi, Yayınım Süreci.*

JEL Kodları: *O14; D23; C12; O33.*

1. Introduction

The businesses have a trade-off between the decision of adopting SaaS or traditional software. Traditional software is described as purchasing the businesses' IT infrastructure by conducting software, hardware maintenance, and upgrades with the internal IT team (Rifat, 2021). However, this enabled businesses to switch software hard for business requirements. As a result, software as a service (SaaS) has emerged as a breakthrough system via renting for software deployments. It is defined as an on-demand and outsourced service by Hidayanto et al. (2010), a delivered service by Benlian et al. (2011), and a web-based application by Faasen et al. (2013) via the internet. Customer benefits the lower upfront expenditures by Alotaibi (2016), improved productivity by Tan et al. (2013), faster transactions by Benlian (2009), fixed IT budgeting by Müller et al. (2015), and monthly flexible payment by Rai et al. (2015). However, the drawbacks of SaaS are data security by Gashami et al. (2016), cost savings by Faasen et al. (2013) in the long run, restricted customization by Benlian (2009), availability concerns by Lechesa et al. (2012), and integration obstacles by Alotaibi (2016).

Despite the perceived disadvantages of SaaS, the SaaS market has increased over and over the years. With the Web 3.0 and 5G technology evolvement, Industry Research (2022) declared that the number of SaaS application markets will especially have grown by 15.9% from 2022 to 2028. The usage of SaaS applications was also 70% of the company's overall software (BetterCloud, 2020:1). In addition, Alves (2021) stated that SaaS adoption of businesses increased to 73% of businesses in 2021, and the projects' expenditures of SaaS providers grew by 44% from 2020 to 2021. Half of the companies are expected to use integrated SaaS applications by 2026 by forming centralized management (BetterCloud, 2020). Hence, the businesses needed to position their software deployed conforming to the business needs in the changing competitive conditions.

Various studies addressed the perceived intention to adopt SaaS adoption by all businesses, the business sizes, and the sectoral distinctions in qualitative, and quantitative analysis. For businesses in general, Johansson& Ruivo (2013) conducted a descriptive analysis approach to SaaS adoption in European countries. Seethamraju (2015) developed a qualitative-based Technological, Organizational, and Environmental (TOE) research model pioneered by Tornatsky & Fleischer (1990) for Enterprise Resource Planning (ERP) SaaS adoption in Australia. Mangula et al. (2015) organized a qualitative analysis approach to adopt SaaS for Dutch businesses. Palos-Sanchez et al. (2017) built a Technology Acceptance Model (TAM) by implementing a confirmatory factor analysis in Spain. Ferrari et al. (2012) developed a multi-case study model for Italian businesses. Verma et al. (2016) proposed a qualitative analysis

approach for Indian SaaS adoption. For SMEs as business size, Ayoobkhan & Asirvatham (2019) proposed an integrated Diffusion Of Innovation (DOI), and Technological, Organizational, and Environmental (TOE) framework by implementing an Analysis Of Variance (ANOVA), and multiple regression for ERP as SaaS adoption. Seethamraju (2015) built a multi-case study analysis to compare and contrast the SaaS enterprise systems of Indian, and Australian businesses. Akinrolabu et al. (2019) developed a probabilistic model for the ERP as SaaS cloud providers in the UK. Lechesa et al. (2012) organized a qualitative analysis approach to adopt ERP as SaaS for South African businesses. For SMEs as a sector, Hadi et al. (2020) conducted the TOE, DOI, and HOT-Fit (Human, Organization, and Technology) models by applying a Confirmatory Factor Analysis (CFA) to the Iraqi public sector. Hadi et al. (2021) also developed an integrated Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM) for Iraqi higher education.

DOI proposed by Rogers (1995) addressed two important challenges, such as perceived advantage, and security concerns. Perceived advantage has been investigated by Seethamraju (2015), and Ayoobkhan & Asirvatham (2019). There are also various constructs for the DOI theory applied such as compatibility, complexity, and cost savings. Compatibility was addressed by Kung et al. (2015) for manufacturers and retailers, Kruja et al. (2019) for SMEs, and Complexity was mentioned by Lechesa et al. (2012) for cloud-based ERP offerings and Pathan et al. (2017) for SMEs. Cost Saving was investigated by Faasen et al. (2013) for SMEs, and by Lechesa et al. (2012) for cloud-based ERP offerings.

TOE theories also pointed out that IT decision-making support is a significant construct for understanding the organizational environment of SaaS adoption. IT decision-making support has been experimented with by Mangula et al. (2015), Palos-Sanchez et al. (2017), and Ayoobkhan & Asirvatham (2019). There are also several constructs for TOE theory investigated such as organizational readiness, firm size, and sector studies. Organizational readiness was declared by Verma et al. (2016) for ERP-based SaaS. Firm size was applied by Pathan et al. (2017) and Kruja et al. (2019) for SMEs. Ferrari et al. (2012) developed multiple case study approaches to understanding the perceived benefits and challenges of SaaS adoption in Italy. Hadi et al. (2021) proposed an integrated TOE, DOI, and HOT-Fit model by applying CFA to the Iraqi public sector. Taufiq-Hail et al. (2021) formulated an integrated Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM) model by applying CFA to the Malaysian higher education sector. There are also no theories derived by Seethamraju (2015), Akinrolabu et al. (2019), Johansson& Ruivo (2013), Lechesa et al. (2012), Mangula et al. (2015), Ferrari et al. (2012), and Verma et al. (2016), and they discovered to point out the perceived consideration over SaaS adoption.

The originality of the study is that the research, which was implemented for the blurred businesses over specific distinct decision phases in terms of not considering, currently evaluating, have evaluated, but do not plan to adopt, and have evaluated, but plan to adopt over SaaS adoption, was a lack. In this context, this research addressed the indecisive businesses' intention for considering SaaS adoption in Turkey. It also gave a prescription of what these businesses' opinions are about perceived advantages and security concerns, and decision-makers' support as well as what these businesses driving in the national market and international market encounter in different decision phases. This research contributes to understanding the

challenges and obstacles of newly experienced businesses and will expect to find out to what extent businesses in each decision stage obtain benefits from SaaS adoption.

2. Materials and Methods

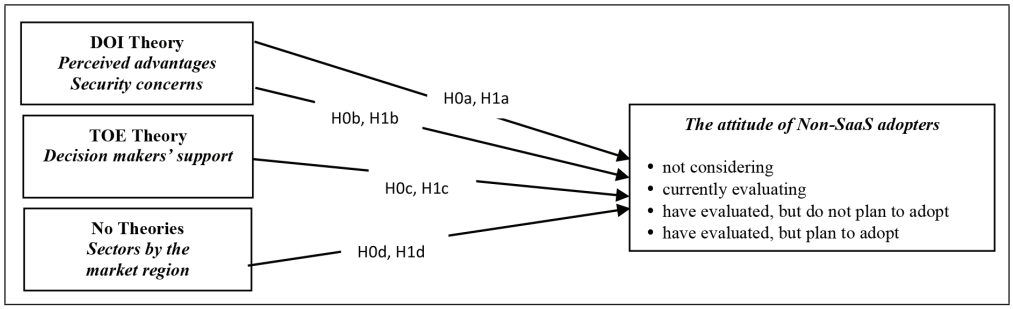
The research proposed a model, as illustrated in Table 1. A quantitative research design was conducted to check whether the attitude of non-cloud adopters (not considering, currently evaluating, have evaluated, but do not plan to adopt, and have evaluated, but plan to adopt) is significantly different for separate factors in terms of perceived advantage and security concerns from DOI theory, IT decision support from TOE theory, and the sector by the market region from no theories. Data were collected between May 2022 and July 2022. An ANOVA analysis was applied to investigate non-SaaS adopters' constructs and whether they consider them different or the same. Among the attitude of non-cloud adopters, the proposed constructs, in which the means were found different, were observed. Fisher's LSD test was applied to find out which mean pairs are significantly different.

Table 1. The Proposed Constructs From Scholars and Their Derived ICT

Dependent constructs		
Theories	**Scholars**	**The Proposed Constructs**
DOI	Seethamraju (2015), Ayoobkhan & Asirvatham (2019).	Perceived advantages, Security Concerns
TOE	Mangula et al. (2015), Palos-Sanchez et al. (2017), and Ayoobkhan & Asirvatham (2019)	Decision makers' support
No Theories	Ferrari et al. (2012), Hadi et al. (2021), and Taufiq-Hail et al. (2021)	Sector by the market region
Independent Constructs		
Theories	**Scholars**	**The Proposed Constructs**
No Theories	Thiesse et al. (2011)	The attitude of non-adopters (Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but Plan to Adopt)

The unit of analysis is the non-SaaS adopters' businesses in Turkey. From the trade of commerce in Istanbul, Ankara, and Izmir, non-SaaS adopters were chosen. 212 companies answered, and 76 of those weren't SaaS adopters. Three IT decision makers' profiles, three non-SaaS adopters' profiles, and 12 Likert scale questions were asked of 76 non-SaaS adopters' businesses by using Google Forms. Data were collected based on the non-probability sampling method as the sample selection was made judgmentally based on the business, which did not adopt SaaS. To avoid bias in sample selection, the effort was taken during the survey prepared from the proposed constructs of the scholars mentioned in Figure 1. The combined scales derived from distinct theories of different scholars in Table 1 were tested by clarifying the reliability in Table 3. The model was formed for understanding the differences and similarities of the DOI, TOE, and non-model constructs over the four stages of the attitude of non-SaaS adopters, as shown in Figure 1.

Figure 1. Research Model



The attitude of non-cloud adopters (Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but Plan to Adopt) was chosen as an independent construct. Perceived advantage, Security Concerns, IT Decision Support, and Sector by the Market Region were applied as dependent constructs. The null (H0) and the alternate hypothesis (H1) were derived as shown below.

H0a: There are no statistically significant differences in Perceived Advantages of Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but Plan to Adopt of Non-SaaS adopters.

H1a: There are statistically significant differences in Perceived Advantages of Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but planned to Adopt Non-SaaS adopters.

H0b: There are no statistically significant differences in Security Concerns of Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but Plan to Adopt Non-SaaS adopters

H1b: There are statistically significant differences in Security Concerns of Not Considering, Currently Evaluating, Have Evaluated, but do not Plan to Adopt, and Have Evaluated, but Plan to Adopt Non-SaaS adopters.

H0c: There are no statistically significant differences between decision makers' support and the attitude of non-SaaS adopters.

H1c: There are statistically significant differences between decision makers' support and the attitude of Non-SaaS adopters

H0d: There are no statistically significant differences between the market region and the attitude of Non-SaaS adopters.

H1d: There are statistically significant differences between the market region and the attitude of Non-SaaS adopters

3. The Research Findings

In the first phase, the survey was conducted to show the demographical appearances of the profile of IT decision-makers and non-SaaS adopters businesses as shown in Table 2. For demographics, the percentages of the male, and the female were 40.8%, and 59.2%, respective-

ly. For education level, the most participants were graduates with 55.3%. The other participants were masters, doctorates, and vocational schools by 18.4%, 6.6%, and 6.6%, respectively. For the age, most respondents, who were between 31 and 35, were with 23.6%. The second most respondents were between 41 and 45 with 11.8%. The third most respondents were between 46 and 50 with 10.5%. The fourth most respondents were shared among these three between 20 and 25, between 36 and 40, and 56 and above by 9.3%. The least respondents were between 51 and 55 with 7.8%. For the company profile, the ratio of service, and manufacturing businesses, which were non-SaaS adopters were 68.4%, and 31.6%, respectively. The non-SaaS adopter businesses driving in national, and international markets were 64.5%, and 35.5%, respectively. The attitude of the non-SaaS adopters' process was not considered, have evaluated, and plan to adopt, have evaluated, but do not plan to adopt, and currently evaluating by 57.8%, 19.8%, 14.5%, and 7.9%, respectively.

Table 2. The Demographic of IT Decision Makers' and Companies' Profile

IT Decision Makers' Profile		**Frequencies**	**Ratio**
(1) Gender:	Male	45	59.2%
	Female	31	40.8%
(2) Education Level	High School	10	13.2%
	Vocational School	5	6.6%
	Graduate	42	55.3%
	Masters	4	18.4%
	Doctorate	5	6.6%
(3) Age:	20-25	7	9.3%
	26-30	14	18.4%
	31-35	18	23.6%
	36-40	7	9.3%
	41-45	9	11.8%
	46-50	8	10.5%
	51-55	6	7.8%
	56 and above	7	9.3%
Company Profile		**Frequencies**	**Ratio**
(4) Sector	Manufacturing	24	31.6%
	Service	52	68.4%
(5) Market Region	National	49	64.5%
	International	27	35.5%
(6) Non Cloud Adopters' Process	Not considering (1)	44	57.8%
	Currently evaluating (2)	6	7.9%
	Have evaluated, but do not plan to adopt (3)	11	14.5%
	Have evaluated and plan to adopt (4)	15	19.8%

In the second phase, as illustrated in Table 3, the reliability was checked by Cronbach's Alpha (CA) values. These values, which exceeded 0.60 stated by Hair et al. (2013), were valid. The skewness (SK) values and the kurtosis (RKU) were satisfied between the range values -1 and +1 (Hair et al., 2013), and -2 and +2 (George& Mallery, 2010), respectively. The CA values of perceived advantages, security concerns, and decision makers' support were also fit, which were 0.819, 0.919, and 0.798, respectively. The Kappa value of the market regions, which was 0.434, was found as the moderate agreement stated by Landis& Koch (1977) for reliability. Before applying ANOVA analysis and parametric post hoc tests, the standard normal distribution of each construct (perceived advantages (5 items), security concerns (3 items), decision makers' support (3 items), and the market region (1 item)) was ensured with the SK values of -0.548, 0.292, 0.473, and 0.617, respectively. They were also satisfied with the RKU values of 0.191, -0.277, -0.106, and -1.664, respectively. The M values of perceived advantages, security concerns, decision makers' support, and the market region were 3.66, 3.55, 3.13, and 1.35, respectively. Their SD values were 0.68, 0.99, 0.84, and 0.48, respectively.

In the third phase, N, M, and SD values of the attitude of non-SaaS adopters were grouped by the perceived advantages, security concerns, decision makers' support, and the market region constructs, as shown in Table 4. In Table 5, the results of ANOVA and Fisher's LSD as a Post hoc test were presented. There was a statistically significant difference between groups in Perceived Advantages as determined by one-way ANOVA (F (1.209,.432) = 2.796, p = .046). An LSD post hoc test revealed that Perceived Advantages were statistically significantly different between "Not Considering" (3.54 ± 0.67) and "Have evaluated, but plan to adopt" (3.97 ± .73) at p= .031 *(H1a Supported (1-4*))*. Perceived Advantages were also statistically much more significant between "Currently evaluating" (3.33 ± .43) and "Have evaluated, but plan to adopt" (3.97 ± 0.73) at p=.048 *(H1a Supported (2-4*))*. There was no statistically significant difference between "Not Considering" and "Currently Evaluating" (p = .471). There was no statistically significant difference between "Not Considering" and "Have evaluated, but not plan to adopt". (p = .072). There was no statistically significant difference between "Currently Evaluating" and "Have evaluated, but not plan to adopt" (p = .071). There was no statistically significant difference between "Currently Evaluating" and "Not Considering" (p = .071). There was no statistically significant difference between "Have evaluated, but not plan to adopt" and "Have evaluated, but plan to adopt" (p = .915).

There was a statistically significant difference between groups in Security Concerns as determined by one-way ANOVA (F(2.563,.929) = 2.759, p = .048). Security Concerns were statistically significantly different between "Not Considering" (3.69 ± .92) and "Have evaluated, but plan to adopt" (3.02 ± .98) at p= .022 (*H1b Supported (1-4*))*. Security Concerns were also statistically far more significant between "Currently evaluating" (4.16 ± .78) and "Have evaluated, but plan to adopt" (3.02 ± 0.98) at p=.001 **(***H1b Supported (2-4*))*. There was no statistically significant difference between "Currently Evaluating" and "Not Considering". (p = .267). "Currently Evaluating" and "Have evaluated, but not plan to adopt" were statistically no different. (p= 119). There was no statistically significant difference between "Have evaluated, but not plan to adopt" and "Not Considering" (p = .355). "Have evaluated, but not plan to adopt" and "Currently Evaluating" were not statistically significantly different (p = .119). There was no statistically significant difference between "Have evaluated, but not plan to adopt" and "Have evaluated, but plan to adopt" (p = .333). There was no significant difference

between the decision makers' support and the attitude of non-cloud adopters *(H0c Supported)*. There was no significant difference between the market region and the attitude of non-cloud adopters *(H0d Supported)***.** Decision makers' support and market region were not statistically significant among all the attitudes of non-SaaS adopters.

Table 3. Reliability Table

Constructs	**N**	**Items**	**M**	**SD**	**SK**	**RKU**	**CA**
Perceived Advantages	76	5	3.66	0.68	-0.548	0.191	0.819
Security Concerns	76	3	3.55	0.99	0.292	-0.277	0.919
Decision Makers' Support	76	3	3.13	0.84	0.473	-0.106	0.798
Constructs	**N**	**Items**	**M**	**SD**	**SK**	**RKU**	**Kappa value**
Market Region	76	1	1.35	0.48	0.617	-1.664	0.434

*Mean (M), standard deviations (SD), skewness (SK), and Kurtosis (RKU)

Table 4. Comparison of the difference of the mean between the attitudes of non-cloud adopters

Dependent Constructs	**Independent Constructs: Attitudes of Non-SaaS Adopters**	**N**	**M**	**SD**	**Std. Error**	**95% Confidence**		**Min.**	**Max.**
						Lower Bound	**Upper Bound**		
Perceived Advantages	Not considering (1)	44	3.54	0.67	0.101	3.33	3.74	2.00	5.00
	Currently evaluating (2)	6	3.33	0.43	0.176	2.87	3.78	2.80	4.00
	Have evaluated, but do not plan to adopt (3)	11	3.94	0.55	0.166	3.57	4.31	3.00	4.80
	Have evaluated and plan to adopt (4)	15	3.97	0.73	0.189	3.56	3.82	3.00	5.00
Security Concerns	Not considering (1)	44	3.69	0.92	0.139	3.41	4.98	1.00	5.00
	Currently evaluating (2)	6	4.16	0.78	0.318	3.34	4.16	3.00	5.00
	Have evaluated, but do not plan to adopt (3)	11	3.39	1.14	0.344	2.62	3.56	1.00	5.00
	Have evaluated and plan to adopt (4)	15	3.02	0.98	0.255	2.47	3.78	1.00	4.67
Decision Makers' Support	Not considering (1)	44	2.97	0.75	0.113	2.74	3.20	1.33	5.00
	Currently evaluating (2)	6	3.16	0.95	0.391	2.16	4.17	2.00	4.33
	Have evaluated, but do not plan to adopt (3)	11	3.27	0.86	0.261	2.68	3.85	2.00	5.00
	Have evaluated and plan to adopt (4)	15	3.46	0.99	0.257	2.91	4.01	2.00	5.00
Market Region	Not considering (1)	44	1.36	0.48	0.073	1.21	1.51	1.00	2.00
	Currently evaluating (2)	6	1.33	0.51	0.210	0.79	1.87	1.00	2.00
	Have evaluated, but do not plan to adopt (3)	11	1.27	0.46	0.140	0.95	1.58	1.00	2.00
	Have evaluated and plan to adopt (4)	15	1.40	0.50	0.130	1.11	1.68	1.00	2.00

Table 5. The results of ANOVA Analysis for the Attitudes of SaaS Adoption by Perceived Advantages, Security Concerns, Decision Makers' Support, and Market Region

Dependent Constructs		Sum of Squares	sd	Mean of Squares	F	Sig.	Posthoc Results
Perceived Advantages	Between Groups	3.628	3	1.209	2.796	0.046	**(H1a Supported) 1-4* 2-4***
	Within Groups	31.136	72	0.432			
Security Concerns	Between Groups	7.688	3	2.563	2.759	0.048	**(H1b Supported) 1-4* 2-4***
	Within Groups	66.878	72	0.929			
Decision Makers' Support	Between Groups	2.958	3	0.986	1.409	0.247	**(H0c Supported) -**
	Within Groups	50.401	72	0.700			
Market Region	Between Groups	0.111	3	0.037	0. 154	0.927	**(H0d Supported) -**
	Within Groups	17.297	72	0.240			

p<.05 ** denoted as significantly different. (1: **Not considering,** 2: **Currently evaluating**, 3: **Have evaluated, but do not plan to adopt,** 4: **Have evaluated, and plan to adopt)**

4. Discussion

SaaS adoption has been considered at the beginning phase by Turkish businesses. 6 out of 10 businesses have never attempted it before. 2 out of 10 businesses, which evaluated the SaaS adoption process, were more likely to plan SaaS adoption than the businesses, which don't plan the 1 out of 10. It can be inferred that *"If the businesses evaluate it, they are more likely to attempt it as numbers"*. However, as a perceived thought, *the difference between evaluating the SaaS adoption and having evaluated and planning to adopt SaaS compared to never considering and having evaluated and plan to adopt SaaS is by far less likely to be eager to adopt it*. As a result, the never attempting ratio was high, which can be generalized that *"the awareness of SaaS adoption was at a low level"*.

- Perceived Advantages were statistically significantly different between "Not Considering" and "Have evaluated, and plan to adopt" *H1a Supported (1-4*)*.

The difference between Not Considering" and "Have evaluated, and plan to adopt" would be because of the misinterpretation of cloud computing, and unclear information before the SaaS adoption. The perceived advantages of SaaS adoption for non-adopters were less implementation cost by Lechesa et al. (2012), less maintenance cost by Pathan et al. (2017), and fast to enter the market by Wulf et al. (2021). However, customizing the software for specific business operations mentioned by Ullah & Khan (2014) would be challenging for businesses, which is not considered. It can be deducted that *third-SaaS providers should present trial applications for businesses by continuing the old system and the new system not to prohibit the reduction of the former production or former business processes productivity and should also train IT decision-makers and other staff in the IT department for the effective integration to create bespoke software in their cloud environment."*

- Perceived Advantages were also statistically much more significantly different between "Currently evaluating" and "Have evaluated, but plan to adopt" *H1a Supported (2-4*)*.

The difference between "Currently evaluating" and "Have evaluated, and plan to adopt" for perceived advantages would be because of being skeptical about the adoption process, the lack of regulations, and the lack of IT infrastructure during the SaaS adoption in Turkey.

The first reason is being skeptical. There would have been a dependency on service-level agreement contracts for non-adopters between businesses and third-party SaaS providers (Timmermans et al., 2010). Integration costs between the old and the new technology would be higher for the businesses, which currently evaluating the SaaS adoption (Bradford, 2015). It can be inferred that *Third-party SaaS providers should present exit strategy, change management process, and risk management to ensure a smooth transition for businesses*.

The second reason is the lack of regulation policy. During the SaaS adoption evaluation, service level agreements can be strict for businesses as the regulations such as the commercial code of laws, the copyright law, and industrial property law in Turkey were at the beginning phase (The Software Alliance, 2018). The security concern about the technology would be higher. It can be deducted that *Government should also give incentives for the proprietary cloud providers to bring customers, operators, and high-level IT people together in one platform to build a secure centralized network for building the community cloud for each sector*.

The third reason is the IT infrastructure in Turkey. The IT infrastructure of Turkey is also under evaluation. The broadband strategy plan for 4G technology is in its early stages (Kuyucu, 2011). Migrating business processes from one platform to another platform is difficult for businesses, which currently evaluating SaaS adoption. There is a law no 6769 named industry property law in Turkey to protect industrial designs, computer-related inventions, patents, and trademarks (The Software Alliance, 2018). However, as there is no safe harbor agreement explained by (Kuyucu, 2011) for carrying data abroad, the cloud providers such as Salesforce, Microsoft, and SAP products can have a tough duty to enter the Turkish market, which has brought a restricted SaaS product in the market. The service availability would be harder for businesses. It can be inferred that "*Government should work collaboratively with three operators: Vodafone, Turkcell, and Turk Telekom to create a market entry for famous cloud providers such as Google, SAP, and Oracle to build the data centers' within the boundaries of Turkey*."

- Security Concerns were statistically significantly different between "Not Considering" and "Have evaluated, and plan to adopt" *H1b Supported (1-4*)*.

The difference between "Not Considering" and "Have evaluated, and plan to adopt" for security concerns would be because of the perceived data loss concern, and perceived migration issues before the SaaS adoption. For the data loss concern, the businesses, for which SaaS adoption was not considered, suspected of the internet downturn by Ali et al. (2016) and unauthorized user access by Motta et al. (2012) as there is a possibility to leak important data. For migration issues, backup, recovery, maintenance, and modification costs would be a surprise cost during the SaaS adoption. It can be deduced that *"The IT decision-makers should draw a roadmap of the selection, the evaluation of SaaS providers, and form the cost-benefit analysis model approach for reporting top management levels*."

- Security Concerns were also statistically far more significant between "Currently evaluating" and "Have evaluated, but plan to adopt" *H1b Supported (2-4*)*.

The difference between "Currently evaluating" and "Have evaluated, and plan to adopt" for security concerns would be because of the risks of the SaaS adoption during the adoption. The businesses, which currently evaluating SaaS adoption, should take into account the audit trail based on the standards and controls in advance. The audit trail should be conducted to track each information technology assets' transactions (Faasen et al., 2013). The process owners should also inform IT auditors about the possibility of high-level risks to the critical processes (Doshi, 2020). IT auditors should build an information security management system framework for businesses by forming policies based on ISO 27006 Standards (Wright, 2008). IT auditors should create procedures with line managers by applying detective and corrective controls against the malware defects, such as denial of service (DOS) attacks, and Trojan attacks (Doshi, 2020). The sustainability of a secure environment would be interrupted. It can be deduced that *"IT auditors should build a log monitoring and checkpoints in the production for the detective controls, and form business continuity planning, and disaster recovery planning for the corrective controls by counseling with the process owners to take precautions for the businesses."*

- There was no significant difference between the decision makers' support and the attitude of non-cloud adopters *(H0c Supported)*. There was no significant difference between the market region and the attitude of non-cloud adopters *(H0d Supported)*.

The non-SaaS adopter businesses, which the attitudes had "Not Considering", "Currently evaluating", "Have evaluated, but do not plan to adopt", and "Have evaluated, and plan to adopt", considered the same for the IT decision-maker support, and the market region. No matter where the businesses market region: the Turkish national market or the international market, IT decision-makers for distinct sectors had a common belief on cloud computing adoption about the benefits and challenges in Turkey to promote SaaS adoption. Decision-makers have an important role in resource management (Lynn et al., 2018). Integrating SaaS with the former traditional software can be more challenging than integrating SaaS with the former electronic data interchange (EDI) offerings (Ullah & Khan, 2014). It can be inferred that *"IT decision-makers can accumulate the requirement analysis of SaaS adoption for every task of the business processes by working closely with line managers of each business function such as marketing, logistics, and supply chain, and report them to the SaaS developers for effective integration of database management systems. It gives businesses the ability to use artificial intelligence algorithms within IoT-based cloud systems.*

5. Conclusion

The SaaS adoption level is low in Turkish businesses. The results showed that investigating the relationships between "Not Considering" and "Have evaluated, and plan to adopt", "Currently evaluating" and "Have evaluated, but plan to adopt" was significantly different in the perceived advantages construct. The results also exhibited that observing the relationships between "Not Considering" and "Have evaluated, and plan to adopt", "Currently evaluating" and "Have evaluated, but plan to adopt" was significantly different in the security concerns construct. In addition, it is also shown that the decision makers' support and the attitude of non-cloud adopters, and the market region and the attitude of non-cloud adopters were the same. The knowledge and risks should be maintained for separate sectors by the key IT people, who got involved in many SaaS adoption projects, with the booklets for businesses and the coor-

dination of governments. If internally qualified IT people exist for businesses, IT departments and key users can take part in building the business processes complied with the SaaS products, which had implementation, hardware, and operating costs, as they built for themselves. Otherwise, outsourcing from third-party SaaS providers was essential for businesses by considering their budget, which had the integration, and exit strategy costs. Either both decisions, external or internal IT decision-makers should build a customized and business-driven model by coordinating with the IT auditors to reduce security risks, the process owners to diminish the workload delays for maintaining quality, and the line managers to track daily failures. In return, SaaS providers should collect the data for the requirements, building know-how solutions against the perceived barriers and challenges of SaaS adoption for distinct sectors with external or internal IT decision-makers.

The limitation of the study is the SaaS offerings will first be broken into pieces, such as mail systems, ERP systems, Supply chain systems, and Customer Relationship Management (CRM) systems so the challenges and obstacles of SaaS adoption will be grouped by the distinct offerings as a service-oriented to demonstrate the previous failures, threats, and vulnerability. Secondly, service-oriented SaaS offerings will be categorized into the private or public sectors, the service and manufacturing sectors, and the critical business processes division such as the ordering process, product scheduling system, payroll system, and invoice systems so the integration, and migration processes issues can be addressed.

Contribution Statement of Researchers

The contribution to the study belongs to me.

Conflict of Interest Statement

There are no conflicts of interest with any institution or individual within the scope of this study.

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