

Factors Affecting Behavioral Intentions towards Cloud Computing in the Workplace

A Case Analysis for Jordanian Universities

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Abstract—Adopting new technologies in Jordanian universities, namely cloud services, represents change in practices that needs to be investigated, as it is expected to face resistance in adoption by faculty members and staff that are used to old practices. A dedicated questionnaire was constructed based on the UTAUT model in order to identify the factors affecting the behavioral intentions leading to use new technologies. Five Jordanian universities participated in this study, and the results showed that there is a high behavioral intention (BI) among staff and faculty members to use cloud services and solutions within their workplace. This research showed that there are factors positively affecting the adoption of cloud services in Jordanian universities, and negative factors have been identified too. University management and staff members needs to be introduced to these factors in order to have better judgement on the future investment and practices of using new technologies.

Keywords—MOS; Cloud Services; Structural equation modeling; UTAUT Model; Jordan Universities.

1 Introduction

Supporting organizations with new technologies brings different benefits and advantages to the competitive environment through enhancing processes, procedures, quality, lowering production and labor costs [39] The use of technology in organizations have been driven by the necessity to improve the efficiency, business development or the need to achieve specific requirements related to customer needs and industry standards [7]. According to [39], the previous mentioned factors are an essential element of the technology assessment procedures as management and

organizations measures the advantages of adopting new technologies based on the factors results. Based on another study by [37], they emphasize that the use of Information Technology in organizations assists in providing better communication and automation for business procedures and processes. However, in different cases it was found that adopting new technologies is posing as a serious challenge, as organizations are mainly antagonized with employee's resistance to the change. The existence of such challenges has led towards investigating differences and reacting behaviors of individuals towards technology adoption with respect to their workplace and environment. In the same scope, it was found that academic institutions became more dependent on IT for performing managerial and educational activities, especially with introduction of electronic learning activities in the late 2003. With the current development in IT solution and practices, different educational institutions have been introduced to cloud computing services to enable the institution and staff to earn the benefits of cloud services as defined by ([2],[28]). These include:

- Reduced IT costs
- Scalability
- Business continuity
- Collaboration efficiency
- Flexibility of work practices
- Access to automatic updates

On the other hand, [29], emphasize that the benefits of adopting new technology are not achieved if organizations engagement and commitment by staff is found low. In another research by ([13] , [14]), they proposed that presenting new technologies and accepting the change by staff is related to how the new technology is perceived in enabling staff to achieve better performance in their duties and tasks. This research study aims to define the factors that affect accepting the use of cloud services technologies, to have better understanding of how staff involvement can affect the use of cloud services in academic institutions. The data used for this research study came from participants in 7 different universities in Jordan. The main objectives of this research study were:

- Inspecting the factors that influences IT (Cloud Services) adoption in Jordanian universities.
- Inspecting the differences between these factors and their effect on the intention of using cloud services

2 Literature Review

2.1 Information technology adoption and challenges

The incorporation of IT has proved to have a major role in changing how businesses are conducted through organizations with the continuous enhancement to the influence and efficacy of such systems [19]. This resulted in increased needs by

companies to integrate up-to-date technologies into their practices. According to [12] their study surveyed 180 published studies in seven main MIS journals and defined six main factors towards accomplishment in incorporating information technology in organizations: (Information Quality, Use, System Quality, User Satisfaction, Individual Impact and Organizational Impact [10]. Despite the definition of the previous mentioned factors, organizations fall short to efficaciously apply new technologies in their current processes as they mainly fail in realizing the return of investment, or the used IT solutions are underused or not properly utilized. According to [1], they outlined in their research that the use of IT in organizations can fail in one of three stages that are (in the course of development, during the introduction to staff or in the course of operations). Moreover, they stressed that IT employment mostly fails if it is looked at as only as an IT project while the staff engagement aspect is entirely disregarded. There is a wide range of research evidence that suggests approximately 70% of information systems implementations end in failure [42]. The current practices of using information technology and e-learning in higher educational institutions have enlarged the engagement with information technology solutions and services, as many degrees are provided online or as hybrid courses within the institution. Moreover, most Jordanian universities are aiming towards empowering students with online and hybrid courses, and thus it is becoming mandatory to get involved with information technology solutions and services and minimizing resistance to change. Therefore, this research focuses at inspecting the factors affecting the acceptance of cloud services in the workplace in Jordanian universities, in order to provide insights for future recommendations in engaging with Cloud services that are becoming an integral part in E-learning management and activities engagement.

2.2 Theoretical framework

In most organizations, the employment of new information technology tools and services exemplifies change, and as such, it is expected to be resisted by staff due to different factors that were defined by [23], such as; fear of ambiguity in use; complexity of the technology; fear of difficulty of interaction and processes; fear of staff-technology replacement). Resisting adoption of new information technology tools and services is looked at as obstruction of users to adjust to new practices, which is closely connected with the new technology implementation [18]. From this perspective, it is understood that users acceptance for technology plays an important role, that needs to be considered in information technology adoption, operation and practices within organizations, as the level of usage is defined by the level of acceptance for the new information technology tools or services ([4] , [33]). Different theories have been formed for IT acceptance, such as

- Theory of Diffusion of Innovations (DIT) [9].
- Theory of Task-technology fit (TTF) [16].
- Theory of Reasonable Action (TRA) [20].
- Theory of Planned Behavior (TPB) [3].

- Technology Acceptance Model (TAM) [30].
- Technology Acceptance Model 2 (TAM2) [20]
- Unified Theory of Acceptance and Use of Technology (UTAUT), [38].

The shared features among the previous theories and models is found to be their attempt in obtaining users consent and utilization of information technology in organizations using users' beliefs and insights towards adopting new technology, which impacts their real usage behavior [5]. From the previous models, the TAM model is used to forecast the acceptance of technology usage and to assess users' reactions regarding new technology adoption [32]. The TAM model forecasts two aspects that affect usage behavior using the perceived usefulness (PU) and perceived ease of use (PEU). The PU resembles a condition where a specific application or service usage enhances job performance, while the PEU resembles the effort of using service or application [32]. According to [25], user beliefs impact attitudes toward the behavior, and behavior intention impacts the actual behavior of using technologies in organizations. TAM model is broadly used in literature, however, on the other side it was criticized too by different research studies due to the lack of adaptiveness towards information technology changing settings, and moreover, it neglects the social effects related to implementation process. The need for user's approval and usage of information technology can be expected with the presence of users different variables such as users seniority, age and educational level. The TAM model didn't reflect the significance of groups in relation to their social involvement and cultural aspects of technology acceptance, as individuals live in social environments where they relate with others. The group concept is important feature for technology acceptance, alongside the user differences between cultures. Moreover, users in different cultures were found to respond in a different way in relation to technology through having expressions of their personal feelings, reasons and intellectual processes, which explains users' determinations for adopting new technology [21]. In another study by [17] they developed the Unified Theory of Acceptance and Use of Technology (UTAUT) to overpower the deficiencies found in TAM, using different factors such as behavioral intention to use information technology that is formed from (social effect, performance expectation and effort expectation), technological use formed from (facilitating conditions and behavioral intention), contingencies formed from (gender, age, experience and voluntarily). Using the UTAUT model implies that behavioral intention is defined by performance expectation which fluctuates according to different factors such as users' characteristics, gender and age. Moreover, effort expectation anticipates behavioral intention to change among users' characteristics such as gender and age and to have impact on user experience. In addition, the social influence has been found to have influence on user's behavioral intention. According to UTAUT model, the facilitating condition related to technical and organizational support makes influence on behavioral intention towards using technology, and they are also affected by age and level of experience ([38], [40]). Different research studies have examined the acceptance of new technologies using UTAUT model in different settings, such as with different age groups, cultures, organizations, countries and technologies. This research study has built upon the literature of using UTAUT

model, to examine the factors that affect the acceptance of new technology namely cloud computing services in Jordanian academic institutions by defining the behavioral intentions, which in turn affects the actual use of technology. The adopted framework for this research is comprised of four hypotheses that are introduced in the following figure 1:

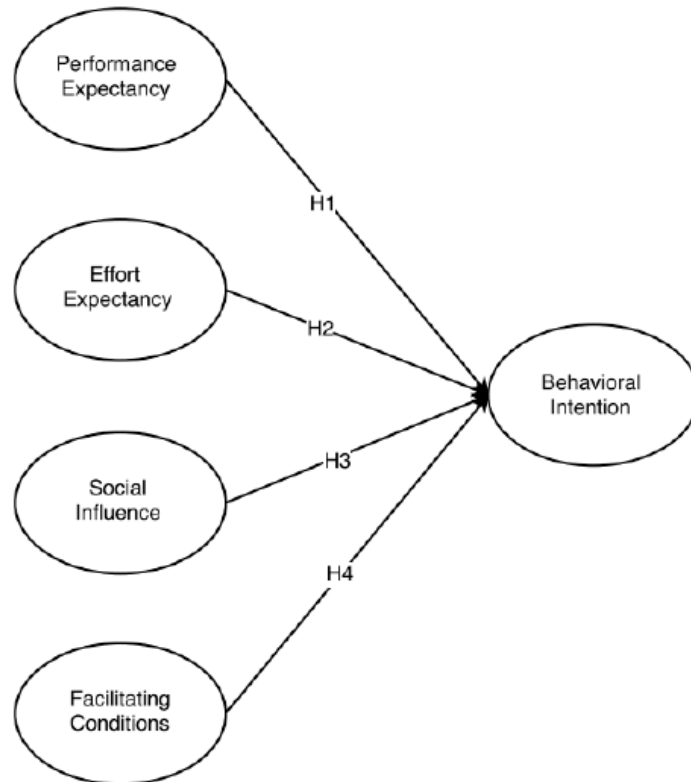


Fig. 1. The Structural Model

- **Hypothesis 1:** Performance expectation (PE) impacts Behavioral Intention (BI) to adopt cloud computing services in Jordanian universities.
- **Hypothesis 2:** Effort expectation (EE) impacts Behavioral Intention (BI) to adopt cloud computing services in Jordanian universities.
- **Hypothesis 3:** Social influence (SI) impacts Behavioral Intention (BI) to adopt cloud computing services in Jordanian universities.
- **Hypothesis 4:** Facilitating conditions (FC) impacts Behavioral Intention (BI) to adopt cloud computing services in Jordanian universities.

3 Research Methodology

3.1 Research design and measurement instrument

The used methodology in this research is based on utilizing quantitative approach to define the support of the previous hypotheses in Jordanian universities. Five different universities in Jordan were approached as they recently adopted cloud computing service in 2018 within educational and managerial settings and practices. In terms of the used questionnaire, it was prepared based on the literature of using UTAUT model for defining the acceptance of adopting technology in different studies ([24], [15], [27], [12]). The questions were added based on the predefined constructs of UTAUT model taking into consideration the technology adopted for this study of using cloud computing services. Four questions were added for each of PE, EE, SI, FC, and 3 questions for BI with a 5-point Likert scale. Another part of the questionnaire had demographical questions to enrich the finding of this study. The questionnaire was pilot tested to ensure its validity, and the results will be shown in later section.

3.2 Sampling and data gathering

This research study aims to provide understandings of the behavioral intention leading to accepting the use of cloud services in Jordanian universities. A total of five universities participated in this study by having managerial staff and faculty members interact with the designed questionnaire. The list of employees contact information were obtained from the official website of each university, and a link to the questionnaire were attached with an introduction defining the aim of this study and the importance of their voluntary participation in this study. The questionnaire was designed to be filled online using Microsoft forms and in total the respondents came from 153 valid responses used in the analysis presented in this study. The demographic information for the respondents, considered satisfactory for this research study are presented in the following Table 1.

Table 1. Demographical Information

Category		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	121	79.1	79.1	79.1
	Female	32	20.9	20.9	100.0
	Total	153	100.0	100.0	
Age Group	Below25	11	7.2	7.2	7.2
	25-34	28	18.3	18.3	25.5
	35-44	60	39.2	39.2	64.7
	45-54	40	26.1	26.1	90.8
	More than 55	14	9.2	9.2	100.0
	Total	153	100.0	100.0	
Educational	Diploma	8	5.2	5.2	5.2

Level	BA	16	10.5	10.5	15.7
	Master	38	24.8	24.8	40.5
	PHd	91	59.5	59.5	100.0
	Total	153	100.0	100.0	
University Type	Public	53	34.6	34.6	34.6
	Private	100	65.4	65.4	100.0
	Total	153	100.0	100.0	
Cloud Service Used	Google	57	37.3	37.3	37.3
	Microsoft	96	62.7	62.7	100.0
	Total	153	100.0	100.0	
Work Type	Educator	107	69.9	69.9	69.9
	Managerial	46	30.1	30.1	100.0
	Total	153	100.0	100.0	

3.3 Analyzing data

For this research study SPSS V21.0 and AMOS 21 were used to analyze the data gathered from respondents. SPSS V21.0 was used to provide descriptive statistics; AMOS was used for structural equation modeling to test and provide results related to multiple independent and dependent variables found in this research study with respect to the used model. The results obtained using descriptive statistics showed in Table 2, that the minimum mean was (2.87) and the maximum result was (4.23). With regards to the reliability of the questions, the results showed that all constructs had a greater Cronbach's alpha level value than (0.70) that is considered the minimum acceptable level, which suggests internal consistency for the questions used in this study.

3.4 Measurement model evaluation

According to AMOS V21.0 result, Table 3: Assessment of the measurement model shows questions factor loadings, average variance extracted (AVE) and the composite reliabilities (CR).

The results from CR in this study varied between (0.80 and 0.89) and these results are over the minimum acceptable value of (0.70) ([6], [36]). Taking into consideration the CR values and the results obtained by Cronbach's Alpha shows that the questions have acceptable internal consistency reliability for this research study. The results obtained from factor loading and AVE shows the convergent validity with values above 0.50. The literature suggests that values associated with questions that have less than 0.4 should be removed. In this research study the values ranged from (0.537) and (0.897) which indicates acceptable convergent validity.

Table 2. Statistics results of the constructs

Constructs	Items	Questions	Mean	Std. Deviation	Cronbach's alpha
Performance Expectations (PE)	PE1	Computing Services can be useful for performing duties related to my job	4.06	.719	0.771
	PE2	Using Cloud Computing Services will facilitate accomplishment of tasks in faster manner	4.20	.701	
	PE3	Using Cloud Computing Services Will increases my productivity.	4.23	.782	
	PE4	Using Cloud Computing Services, will enlarge my opportunities Towards obtaining better performing assessment	3.80	1.070	
Effort Expectation (EE)	EE1	I expect it will be easy to become skilled in employing Cloud Computing Services in Short time	4.07	.670	0.888
	EE2	I Expect to find the Cloud Services Easy to Use.	4.05	.793	
	EE3	Understanding the use of Cloud Computing Services is Easy For Me	4.04	.742	
	EE4	The use of Cloud Computing Services is clear and understandable for performing Tasks.	4.06	.754	
Social Influence (SI)	SI1	Co-Workers who affect my performance, believe I should use Cloud Computing Services	3.33	1.087	0.874
	SI2	Co-Workers Who are Essential to Me, believe I Should use Cloud Computing Services	3.50	1.176	
	SI3	University management has been helpful in Promoting the use of Cloud Computing Services	3.08	1.200	
	SI4	My University has Supported the use of Cloud Computing Services	3.31	1.263	
Facilitating Conditions (FC)	FC1	Necessary Resources are available for using Cloud Computing Services	3.84	.773	0.766
	FC2	I have the necessary knowledge for using Cloud Computing Services	3.78	.842	
	FC3	My University provides Technical Staff for Assistance with Cloud Computing Services.	2.87	1.306	
	FC4	The use of Cloud Computing Services Corresponds well to my work.	3.84	.988	
Behavioral Intention (BI)	BI1	I expect using Cloud Computing Services in the next 6 months.	4.05	.884	0.89
	BI2	I predict using Cloud Computing Services in the Next 6 Months.	4.01	.888	
	BI3	I Intend using Cloud Computing Services in the Next 6 Months.	4.05	.979	

Table 3. Measurement model assessment

Construct	Items	loadings	AVE	CR
PE	PE1	0.537	0.509	0.713
	PE2	0.797		
	PE3	0.742		
	PE4	0.75		
EE	EE1	0.824	0.668	0.817
	EE2	0.821		
	EE3	0.842		
	EE4	0.782		
SI	SE1	0.792	0.521	0.722
	SE2	0.773		
	SE3	0.675		
	SE4	0.634		
FC	FC1	0.737	0.522	0.722
	FC2	0.548		
	FC3	0.767		
	FC4	0.811		
BI	BI1	0.821	0.738	0.859
	BI2	0.858		
	BI3	0.897		

This research study examined the convergent validity as shown in previous results, also it examined discriminant validity. Table 4 shows discriminant validity results for the five constructs used in this research. The diagonal values in the table represents the square roots of AVEs, and their values are larger in all incidents that then off-diagonal values in their subsequent rows and columns. Thus, this research demonstrated discriminant validity.

Table 4. Convergent Validity and Discriminant Validity

	PE	EE	SE	FC	BI
PE	0.713				
EE	0.616	0.817			
SE	0.41	0.283	0.722		
FC	0.493	0.577	0.676	0.722	
BI	0.579	0.552	0.45	0.653	0.859

3.5 Structural model evaluation

In order to test the accuracy of the conceptual model, this research used one of the widespread method found in literature on structural equation modeling and it comprises of two-stage method. The first stage consists of measurement model and on later stage performing structural model. In terms of measurement model, it shows how variables are characterized by the observed variables, and it is primarily known as confirmatory factor analysis (CFA) and it shows the construct validity of the used scales. However, if the values from the used scale that are related to the measurement

model fit indices are low, then there is no need to assess the structural model [11]. The measurement and structure models are interconnected, and structural equation modeling is centered on the confirmatory approach. In addition, the structural equation modeling is based on the statistical approval of the theoretical model, thus the measurement model is confirmatory factor analysis. The following figures 2 and 3 shows the results of measurement and structural models found in this research study.

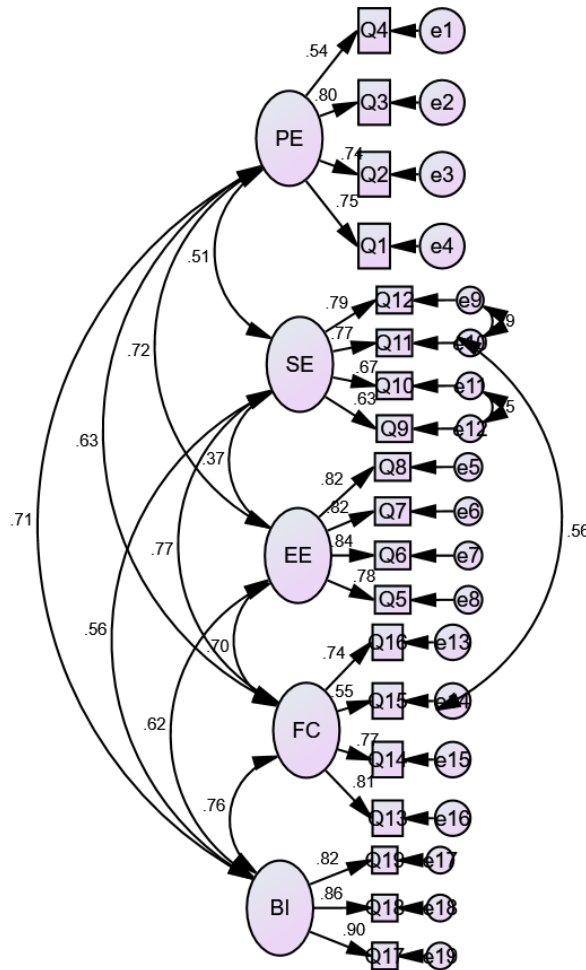


Fig. 2. Measurement model

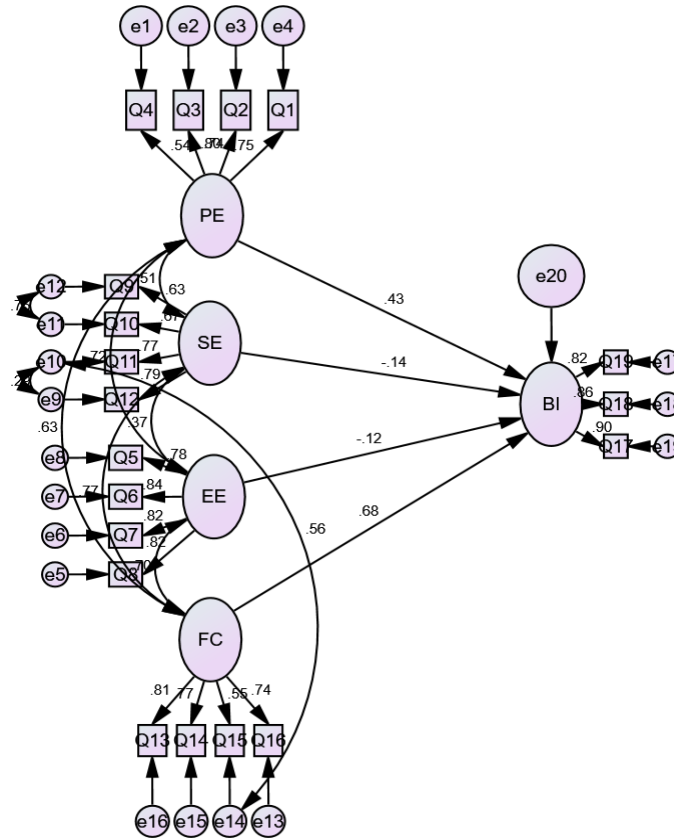


Fig. 3. Structural model

The methodology of structural equation modeling uses fit indices that represents the measures that evaluate the conformity of the used models against the gathered data from participants in this study. In terms of fit indices for the previous structural model , the outcomes are presented in the following Table 5 :

Table 5. Model Fit

CMIN/DF	1.689
RMR	0.078
GFI	0.866
AGFI	0.817
CFI	0.949
RMSEA	0.067

The CMIN/DF represents the probability ratio (chi-square test). The previous result shows the connection between the projected model and the actual model, it is considered the most applied fit indices. The fact that the result of CMIN / DF ratio is

less than 3 this shows that the model's overall fit is within acceptable limits [8]. The DF is known as the degree of freedom, and it is determined based on total observations in a model and the number of factors needed estimation. The comparative fit index (CFI) is used to compare the saturated model with the independent model by measuring the degree of variance and covariance that are explained by the model. CFI values range is between 0 and 1, and values above 0.90 shows good fit [31]. The GFI fit indices is evaluated according to degree of freedom. GFI values range between 0 and 1, and the closer values to 1 show that the fit is good [35]. RMSEA is a fit measurement that compares the mean differences of each expected degree of freedom that can occur in the population with each other. The RMSEA accepted fit values are in the range of 0.05 and 0.08 [22]. Based on the previous results, it concludes that the used model if fit as per shown evidences by the previous displayed results.

The presented structural model in figure 3, shows that the performance expectancy (PE) have a positive impact on behavioral intention (H1: Standardized estimates (Path coefficient) =0.435; $p < 0.05$), thus H1 is supported. Another positive impact has been found for H4 that represents the impact of facilitating conditions (FC) on behavioral intention (H4: Standardized estimates (Path coefficient) =0.680; $p < 0.05$). However, the impact social influences (SI), effort expectancy (EE) on behavioral intentions are insignificant, thus H2 and H3 are rejected. Table 6 shows structural model evaluation results.

Table 6. Structural modelling results

Hypothesis				Unstandardized estimates	Standardized estimates	S. E	t-value	P	Result
H1	BI	<---	PE	0.609	0.435	0.199	3.056	0.002	Supported
H2	BI	<---	SE	-0.114	-0.142	0.142	-0.805	0.421	Rejected
H3	BI	<---	EE	-0.155	-0.12	0.217	-0.713	0.476	Rejected
H4	BI	<---	FC	0.751	0.68	0.256	2.935	0.003	Supported

4 Findings and Discussion

The results of data analysis show that hypotheses H1 and H4 are supported, these results reflects that users at Jordanian Universities have high behavioral intention (BI) towards using cloud services within their workplace duties and practices. To have better understanding of the results, we will reflect on the questions results used in questionnaire with respect to the performance expectancy (PE) and facilitating conditions (FC) as they should effect on behavioral intention (BI). In terms of performance expectancy, the highest mean came for the question (using cloud computing services will increase my productivity) with a mean of (4.23) and standard deviation of (0.782). Increased productivity is one of the recognized benefits of cloud computing services, as many research studies have concluded that using cloud services can increase productivity through features of sharing resources, collaboration, availability and improved performance [34]. The same previous features have impact

on the second highest mean of (4.20) that is related to the question of (Using Cloud Computing Services will facilitate accomplishment of tasks in faster manner) with a standard deviation of (0.701). The third highest mean of (4.06) with standard deviation of (.719) was related to (Computing Services can be useful for performing duties related to my job). There is high agreement between participants (faculty members, managerial staff) on the usefulness of using cloud services in Jordanian universities, as it provides scalability and flexibility on services selection and adaptation with respect to the educational and managerial duties and services. The last question in this category was (Using Cloud Computing Services, will enlarge my opportunities Towards obtaining better performing assessment) had the lowest mean in the (PE) category with a mean of (3.80) and standard deviation of (1.070). The value of the mean is not high, as it is related to practiced policies in Jordanian universities, as few universities undertake evaluating staff performance on cloud or digital services. In terms of facilitating conditions (FC), the highest mean of (3.84) was for two questions (The use of Cloud Computing Services Corresponds well to my work.) and (Necessary Resources are available for using Cloud Computing Services), with a standard deviation of (0.988) and (0.773). Justifying the first question results can be related to the wide range of cloud services provided, as a broad range of cloud computing services are available that can fit the educational and managerial tasks and activities [41]. In terms of the needed resources related to the second question, it is evident that many Jordanian universities are providing the needed resources on using cloud services ranging from infrastructure resources, hardware and tutorials. The question (I have the necessary knowledge for using Cloud Computing Services) had a mean of (3.78) with a standard deviation of (0.842). This result shows that using cloud services is becoming accepted and widely used among staff and faculty members in Jordanian universities. The last question in this category was (My University provides Technical Staff for Assistance with Cloud Computing Services) had the lowest mean of (2.87) and standard deviation of (1.306). This shows that not many universities in Jordan are providing the technical staff support for cloud computing services, as they rely on the service provider to handle the issues related to cloud services. However, the results show that there is some support by university staff, especially for universities that are using Microsoft cloud services as Microsoft provides training in many cases for organizations that are using its products and services. In term of results associated with behavioral intention (BI), the results show that faculty members and staff have high behavioral intention to use cloud computing services within their workplace in 6 months and the contributing factors are performance expectancy (PE) and facilitating conditions (FC). However, other results show that there should be more support and involvement from university management, as the questions in SI3 and SI4 shows lack of support by university management taking into considerations that the mean results of (3.08, 3.31) are associated with a 5 stage Likert scale where the value of 3 shows undecidedness. Promoting better use of technology in Jordanian universities must be supported by clear policies and incentives that can better promote the adoption of cloud services and technologies to provide better educational services.

5 Conclusion

Many universities worldwide are trying to cope with new technologies and services to bridge the gap between the current practices in market, business and academia. Huge investments have been made in an effort to be more effective, competitive and valuable. On the other side, different factors are hindering the adoption of these technologies that are related to staff resistance towards new practices and technologies. The case for Jordanian universities is similar to many western universities, as the resistance is a common human behavior towards change. However, this research study has investigated the factors affecting behavioral intention of using new technologies, namely cloud services, as different factors can differ according to cultural and social practices affecting staff behavior in Jordanian universities. Therefore, this research study is creating a substantial contribution through analyzing factors that affect staff acceptance of cloud services in Jordanian universities. The main objectives of this research were to analyze those factors and define their effect on behavioral intention of using technology in Jordanian universities. This study found that faculty members and staff are more likely to use cloud services in their workplace if they know that cloud services will help them to operate better in their jobs and duties, and if they are supported with appropriate facilitating conditions. Supporting staff with dedicated policies by university management through recognizing their digital efforts by employee rankings and incentives, plus providing focused training to better utilize technologies through task-oriented solutions that promote better practices and quality, will highly improve the adoption of cloud services technologies in Jordanian universities. This research study found that hypothesis H2 and H3 are rejected, and no association for effort expectancy (EE) and social influences (SI) on behavioral intention (BI) of using cloud services technology. The contribution of this research study is believed to be enriching the current theories, and from the other side it also enriches the practices related to using UTAAUT model and research methodology. The theoretical aspect relies on the existing literature that has employed the UTAUT model, and on the other hand it provides additional insight on the factors influencing the adoption of new technologies in universities, particularly those in Jordan. In terms of practical perspective, we consider that research results and conclusions found in this study will help University managers in Jordanian universities to better understand the factors affecting the adoption of cloud services and other future technologies. This can assist in the better planning of future investments in the educational sector, which will reflect positively on practices leading to better performance and quality of educational output and services.

6 References

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