

Adoption of Information Systems (IS): The Factors that Influencing IS Usage and Its Effect on Employee in Jordan Telecom Sector (JTS): A Conceptual Integrated Model

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Abstract

Based on IS adoption theories and models, this research suggested a conceptual model to the adoption and use of information systems (IS) in the Jordanian Telecommunications Sector (JTS). The framework specifies some of contextual variables such as technological, organizational, and individual characteristics as primary factors influencing on IS adoption in JTS. This study is a significant contribution to managerial practices and academic literature in the future. The study also makes a conclusion followed by recommendations for future research.

Keywords: information systems (IS), TAM, TOE, IS adoption

1. Introduction

In this turbulent era, organizations strive to improve their competitiveness by enhancing productivity, innovation, quality and flexibility of services at the individual and organizational levels (Naranjo, 2009). According to this situation, information processing capabilities are challenged by additional and diverse demands in organization, such as speed and reliability. In order to address this strategic challenge, organizations develop and apply more sophisticated and comprehensive IS (Ghorab, 1997). A computer-based information system (IS) is an important fast growing technological innovation in this century. IS providing opportunities for businesses to increase efficiency, effectiveness and ability to survive in competitive markets (Porter & Millar, 1985).

Jordan organizations have been motivated to advanced use of IS / IT that are made possible through technology adoption initiatives. Recently, many Jordanian establishments substantial changes have been noted which can be attributed to the achievement in ICT. In general, Jordanian agencies such as JTS have encountered organizational, technological, and individual problems during the adoption and usage of recent technology. Therefore, it became necessary to diagnose the key factors affecting the adoption of information systems in one of the largest services sector in Jordan.

Jordan, is small and limited natural resources country, but highly educated people, Successive governments also continued it's improving in several fields where there is a fast development in education, e-government, computerization, and Information technology (IT) in coordination with private sector. Information and Communication Technology (ICT), is the largest sector for competition and opportunities that enables Jordan to obtain the competitive advantage compering with other countries in the Middle East.

In accordance of existing literature, the purpose of this research is: *First, highlight the factors that affect the adoption of IS and effectively use by employee in JTS. Second, due to the scarcity of research at the individual characteristics, the current research intend to understand the impact of IS use on employee attitudes and behavior in JTS, and Third, To develop an integrated conceptual model that enables academic and practitioners to understand the requirements that affect success with IS adoption and usage in JTS.* Accordingly, the research questions are: *What are the factors enabling or inhabiting IS adoption and use of IS in JTS? How these factors do relates to each other and determines the effects on end user attitude and behavior?*

2. Telecom Sector in Jordan: An Overview

The Telecommunication Regulatory Commission (TRC) which was established in 1996 is responsible for

regulating the Telecommunication sector in accordance with the government policy, and thus for achieving many of the objectives set out in the government policy statement including the promotion competition in the ICT sector (Source: www.tec.gov.jo). Jordan's telecom infrastructure is growing at a very rapid pace and continually being updated and expanded, as depicted in Table 1.

Table 1. Telecommunications indicators

Fixed Phone		Q2/2014	Q3/2014	Q4/2014	Q1/2015	Q2/2015
	Residential	243,220	242,501	242,976	244,477	244,318
	Business	133,988	134,768	132,507	131,996	131,283
	Total Subscriptions	377,208	377,269	375,483	376,473	375,601
	Penetration Rate	5.1%	5.1%	5.0%	5.0%	4.6%
Active Mobile Phone		Q2/2014	Q3/2014	Q4/2014	Q1/2015	Q2/2015
	Post-Paid	791,366	832,664	864,299	893,150	888,500
	Pre-Paid	9,900,231	10,170,727	10,255,982	10,670,516	11,379,843
	Total Subscriptions	10,691,597	11,003,391	11,120,281	11,563,666	12,268,343
	Penetration Rate	146%	147%	147%	147%	152%
Internet Users		Q2/2014	Q3/2014	Q4/2014	Q1/2015	Q2/2015
	Total Internet Users (millions)	5.4	5.6	5.7	5.9	6.2
	Penetration Rate	73.0%	74.0%	75.0%	76.0%	76.0%
Internet Subscriptions		Q2/2014	Q3/2014	Q4/2014	Q1/2015	Q2/2015
	Dial-Up	364	362	361	359	359
	ADSL	207,713	211,732	213,398	218,459	223,435
	Wi-Max	125,909	125,481	128,626	121,754	114,133
	Leased Line	1,629	1,525	1,620	1,575	9,270
	FTTx	6,069	6,000	6,200	6,400	
	Mobile Broadband	1,209,603	1,300,908	1,430,184	1,587,549	1,682,064
	Total Subscribers	1,551,287	1,646,008	1,780,389	1,936,096	2,029,261
	Penetration Rate	21%	22%	24%	25%	25%

Source: www.tec.gov.jo

Jordan has one of the most competitive mobile markets in the Middle East countries. This competition had created further of excellence and great deal of innovation. Jordan's mobile market is the second most competitive in the region according to a recent index produced by Arab Advisors Group (see Table 2). The most competitive mobile telecoms market divided between the three main operators: Zain Jordan, maintaining the largest share (40%) of the market, followed by Orange Jordan (36%) and Umniah (29%), (See Table 2). The increased competition has led to pricing that is more favorable to consumers. 103% of the population (6,860,776) has a cell phone, 15% have more than one.

Table 2. Mobile subscriptions

Active Mobile Subscriptions (Q2-2015)			
	Post-Paid	Pre-Paid	Total
Zain	598,559	3,856,850	4,455,409
Orange	175,959	3,777,452	3,953,411
Umniah	131,982	3,678,562	3,810,544
Total	906,500	11,312,864	12,219,364

Source: www.trc.gov.jo

Telecommunications is a billion-dollar industry with estimates showing that core markets of fixed-line, mobile and data service generate annual revenue of around JD836.5m (\$1.18bn) per year, which is equivalent to 13.5% of GDP (Inta, 2014).

2.1 Theoretical Background

With growing needs for technology, since more than three decades as well as the increasing failures of systems adoption, prediction of system usage has become focus of attention for many researchers in this area. IS adoption literature used as the theoretical background for this research. Adoption is conceived as a social change process in which an innovation is communicated over time among members of a social system (Ashrafi, Xu, Kuilboer, & Koehler, 2006). Adoption as the process through which an individual or other decision-making unit passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or not adopt new idea, and to confirmation of this decision (Rogers, 1995).

User acceptance or rejection of the technologies is considered of the main challenges facing the adoption of information systems in organizations. For this, many investigators in this field have studied the user's attitude towards the system and behavioral intention to use. There are many adoption behavior theories and models being developed in the IS disciplines which consider technological, environmental, and organizational characteristics as important predictor of individual technology adoption (Yaser, Alina, & Nor, 2015).

IS literature about telecom sector addressed the issues of implementation and sustainability implementation, little research on the determinants of IS adoption. While the debate is still going on about the nature of these factors and level of its impact on the adoption of IS by individuals. One should emphasize in this regard that the adoption of IS depends mainly on interrelated factors namely, technological, organizational and individual characteristics. Indeed, those factors have not yet received further attention from researchers' and businesses.

Success adoption of IS is fuzzy and wide concept, complex structured, and exhibits high level of complexity and uncertainty, for that it is not always clear what is expressed by this system. Based on interviews conducted by the researchers with concerned employees and managers of JTCs, the main obstacle that impede the adoption and use of IS in this companies are not only technological but also organizational and individual factors.

Based on the foregoing, it is significant to investigate the effect of some innovation factors that influencing IS in Jordan. This research intends to identify such characteristics and their components addressed by previous studies that actually effect on IS adoption in JTS that significantly improved organizational efficiency, effectiveness, and even gain competitive advantage. In summary, this research emphasized only on three factors, namely *characteristics of Technology, characteristics of Organization, and Individual characteristics*. The research findings could be applied in the telecommunication companies to increase managerial performance and effective IS adoption and use.

3. An Integrated Research Model

3.1 An Overview

Successful adoption of IS issues by organizations and individuals alike are areas of research that gained importance recently. Many theories/models being adopted in the context of adoption of IS and technology innovation, which explains user acceptance and utilization of IS. The most common theories in this regard: The Technology Acceptance Model (TAM) (Davis, 1989). Diffusion of Innovations Theory (DIT) (Rogers, 1995), the Technology, Organization, and Environment (TOE) framework (Tomatzky & Fleischer, 1990), and Computer Usage Model (CUM) (Igbaria & Iivari, 1995).

3.1.1 The Technology Acceptance Model (TAM)

In 1985, Fred Davis proposed the Technology Acceptance Model (TAM), in this propose Davis suggested that users' motivation can be explained by three factors: Perceived usefulness (PU), perceived ease of use (PEU), and attitude toward using the system (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Chuttur, 2009; Davis & Olson, 1985). Although PU and PEU were significantly correlated with system use, PU mediates the effect of PEU on usage (8). TAM is the most widely applied model of users' acceptance and usage of IS and IT (Venkatesh, 2000; Awa, Eze, Urieto, & Inyang, 2011). On the whole, TAM on the use of computer by individual's, with the motivation factors but did not address the essential social practicability of IS implementation and development and the implications of its usage. In this research, we extend TAM to include beliefs that are posited to influence use behavior via their impact on attitude.

3.1.2 Diffusion of Innovation Theory (DOI)

Diffusion of Innovation is defined as: "*the process by which an innovation is communicated through certain channels over time among the members of a social system*" (Rogers, 1995). DOI describes innovations as having certain characteristics, such as relative advantage, complexity, compatibility, trialability, and observability (Rogers, 1995).

COMPUTER USAGE MODEL (CUM): Social cognitive theory (SCT), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB); and TAM is the theoretical backgrounds of this theory. This theory introduces an extended technology acceptance model (TAM) that explicitly incorporates self-efficacy and its determinants (user experience and organizational support) as factors affecting, perceived ease of use, perceived usefulness and the use of computer technology (Igarria & Iivari, 1995).

3.1.3 Technology-Organization- Environment Model (TOE)

The (TOE) framework was developed by Tornatzky and Fleisher (1990) (Tomatzky & Fleischer, 1990). It identifies three aspects of an organization's context that influence the technology adoption process and its likelihood: *technological context, the organizational context, and the environmental context*. The TOE perspective has been used successfully by information system (IS) researchers to understand key contextual elements that determine new IS adoption at the firms (Tomatzky & Fleischer, 1990). For this study we adopt two factors: technology and organization context.

3.2 Proposed Research Model

After carefully reviewing the literature on IS adoption, the research found that both TAM and TOE models is a suitable framework for the study of factors influence the IS adoption and intension to use the IS form Jordan context (Figure 1). TAM is the most influential model in the adoption of IS in the literature in terms of initiatives factors and constructs that determines the acceptance and usage by individuals. While, the TOE framework has a solid theoretical foundation, empirical supported, and the potential of application to IS innovations though specific factors identified in the contexts may vary across different researches. Each of the variables is discussed below.

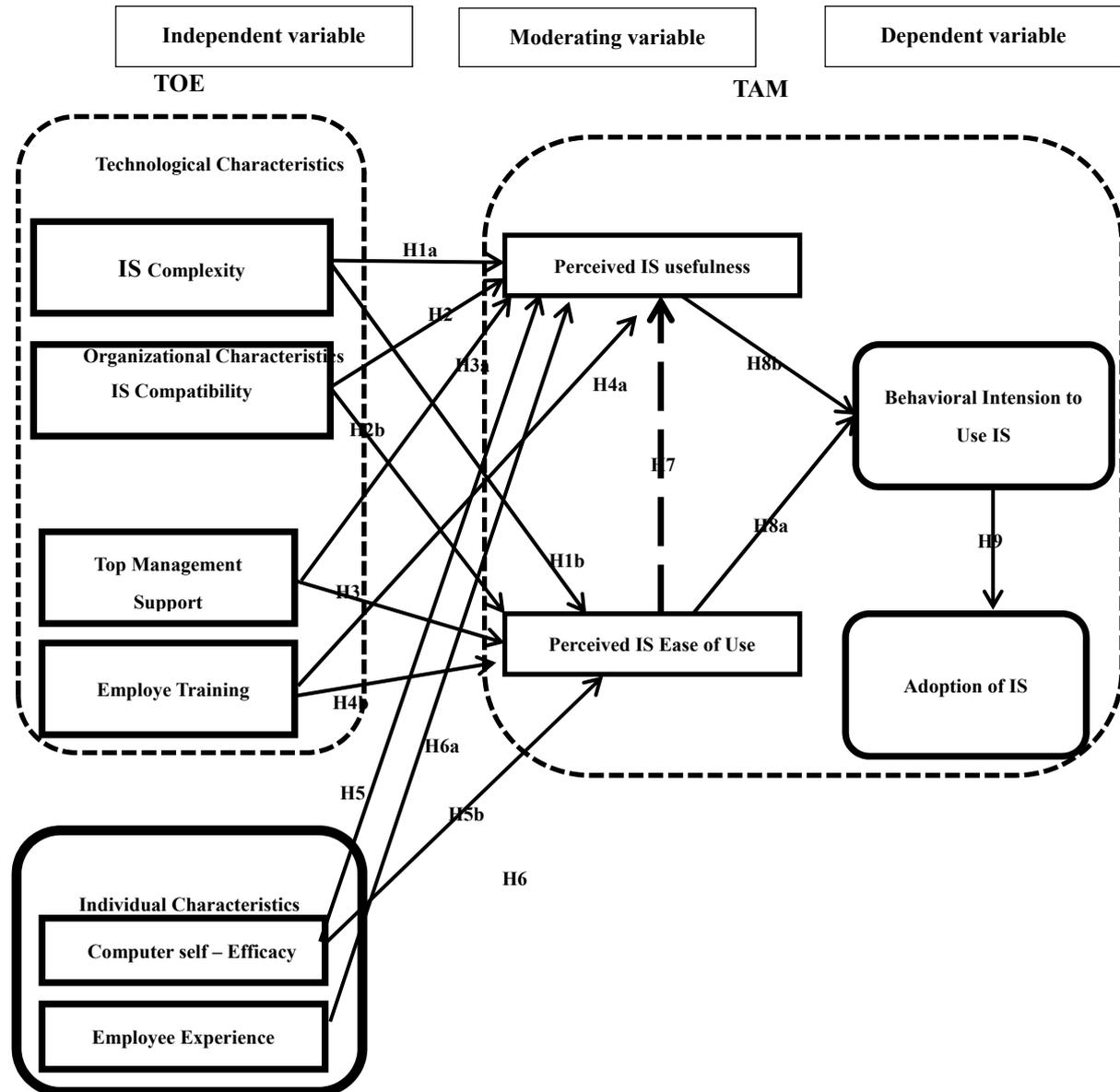


Figure 1. Proposed integrated research model

3.3 Technological Characteristics

Two components of technological characteristics that are related to adoption and usage of IS are: *Technology Complexity, and Technology Compatibility.*

IS Complexity: According to (Lee, 2007) and (Shih, 2007), complexity had a significantly negative impact on the intention to use (Yee, 2007; Shih & Huang, 2009). In addition, a negative relationship between complexity and PU was also supported by Hardgrave et al. (2003) Previous researches also shown higher complexity results in higher mental workload, stress, and lower the use’s intention to use the system (Sokol, 1994). The complexity of a system could negatively affect user’s attitudes towards using the system (Chang, Cheung, & Cheng, 2008). The following hypotheses can be stated based upon the presenting researches.

H1a: A higher Complexity of IS negatively influence employee Perceived IS usefulness.

H1b: A higher Complexity of IS negative influence employee perceived IS ease of use.

IS Compatibility: Karahanna et al. (2006) brought forward four dimensions reflecting the definition of compatibility. Compatibility with: existing work practices; preferred work style; prior experience; and existing values (Karahanna, Agarwal, & Angst, 2006). Chau and Hu (2001) compatibility was found to be significant

only in relation to PU (Chan & Hu, 2001). Wu and Wang (2005) and Chang and Tung (2008) reported that the compatibility had a significant positive and direct impact perceived usefulness (PU) and the behavioral intention to use the system (Chang & Tung, 2008). In addition, previous literatures have examined compatibility from different sides, resulting in support for compatibility effect on both PU and PEU (Hardgrave, Davis, & Riemenschneider, 2003). The following hypotheses address the impact of technology complexity on PU & PEU.

H2a: IS Compatibility positively influence employee perceived IS usage.

H2b: IS Compatibility positively influence employee perceived ease of IS usage.

3.4 Organizational Characteristics

Two variables are used in the present study to consider the organizational factor: *Top management support, and employee training.*

Organizational Support: Organizational support was categorized by Lee et al. (2006) into technology support and top management support (Lee, Kim, Rhee, & Trimi, 2006). Top management support is the readiness of that management to provide a necessary resources and the authority for the success adoption of IS and actually used within an organization. Ralph (1991) defined technology support as people assisting the users of computer software and hardware products, and other facilities (Ralph, 1991).

Organizational support is considered one of the critical factors when adopting and using the new systems. However, there is a lack in the literature on the impact of this component, in particular; the technical support at the adoption of IS and its impact on employee behavioral intention to use the system. Organizations such as telecom companies which intensively use a technical systems, the organizational support will impact on employee perceived usefulness and ease of IS usage.

It is reasonable that, when top management consecrate a high level of necessary resources to support IT; they resort to embrace a better utilize of IS within an organization; meanwhile, if senior managers support using an IS, they may establish a reward systems to prompt the employee to use the IS (Yaser, Alina, & Nor, 2015). Our proposed integrated theoretical assumed a positive link between organizational support and employee PU and PEU. Chen and Hsiao confirming the view of others do that top management support positively influences employee PU of IS and usage (Chen & Hsiao, 2012). In addition to this, Shih & Huang strongly supported that top management support positively affects perceived usefulness and ease of system use (Shih, 2007). Organizations such as telecom companies which intensively use a technical systems, the organizational support will impact on employee perceived usefulness and ease of IS usage. Accordingly, we hypothesized:

H3a: Top management support positively influence employee perceived usefulness of IS.

H3b: Top management support positively influence employee perceived ease of IS usage.

3.4.1 Employee Training

Individual considered as a basis of production process, for that, he needs to renovation and development; this comes by providing him with modern and sophisticated methods that enhance his performance and skills refinement. Training has an effective and significant role in the development of individual's regular work to increase productivity by providing him with information that will help to achieve goals and develop skills and abilities. Employee training within an organization has a great significance in the development of work and organization alike.

Employee training constitutes a cornerstone for adopting IS successfully in organization. Companies increasingly use end-user training to help create a more productive and competitive workforce. End-user training programs are often designed to specifically address issues of usefulness and ease of use. Training influence user's belief towards the system, while training programs increases the user's certainty to use.

The proposed model for this research proposed that end user training effect on employee PU and PEU of IS. Rouibah et al. (2009) and Igbahia et al. (1995), confirmed that employee training had a direct influence on PU. Accordingly, the following hypotheses were formulated:

H4a: Employee training positively influences his perceived of IS usefulness.

H4b: Employee training positively influences his perceived ease of IS usage.

3.4.2 Individual Characteristics

These relates to the interpersonal skills of the individuals involved with the project. Burke et al. (2001) suggests that human issues have the biggest impact on the process as they argue that when implementation and adoption of information systems is successful, it is because a focused attention was paid to the human issues (Burke,

2001). In this dimension, two variables are used in the present study to consider: *Computer self – efficacy, and User Experience in Technology.*

3.4.3 Computer Self-Efficacy

Computer self-efficacy has a great effect on an individual's expectations towards using computers, according to Compeau and Higgins (2000) Computer self-efficacy plays a vital role in demonstrating the usage intention out of PU (Agarwal & Karahanna, 2000). Previous literatures in technology adoption (Holden, & Rada, 2011; Venkatesh, 2000), denoted that the higher level an employee's computer self-efficacy; the more he/she perceives using IS to be beneficial

The proposed model for this study assumed that computer self – efficacy influence PU as well ease of IS use. This assumption also supported by Ramaya and Aafaqi (2004) that self-efficacy positively influence employee PU of IS (Ramayah, & Aafaqi, 2004), this was supported by Lopez and Manson(1997) that computer self-efficacy positively related to PU (Lopez, & Manson, 1997), last, Venkatesh (2000), Wu and Wang (2005) based on these previous researches the below hypotheses were stated as follows:

H5a: Computer Self- efficacy positively influence employee perceived usefulness of IS.

H5b: Computer Self- efficacy positively influence employee perceived ease of use of IS.

3.4.4 Employee Experience

Employee experience in this research defined as: the awareness and abilities needed to fulfill computer-related duties, and technical skills as well as other specific tasks. User experiences have been classified into three main categories: user's state and previous experience, system properties, and the usage context (Hassenzahl, & Tractinsky, 2006). Meditating employee typical, interactions, characteristics, and resulting senses, all of which helps to use the system.

Employee experience in technology is measured by using terms such as but not limited to: I have experience in using the systems, I have experience in using spreadsheet, I have experience in using word processing, I have experience in using programming languages, and I participation in design of computerized information systems (Igarria & Iivari, 1995). Experience as conceptualized in previous research conducted by Kim and Malhotra 2005; reflects an opportunity to use a target technology and is typically operationalized as the passage of time from the initial use of a technology by an individual (Venkatesh, Moris, & Davis, 2003). Our research integrated theoretical model proposed that user experience influence on the PU & PEU. This is supported by Kim (2008) user experiences had a positive impact on PU (Kim, 2008). Also, Igarria & Iivari supported that employee technical experience will have a positive direct impact on PU (Igarria & Iivari, 1995). The following hypotheses address the impact of user experience on PU and PEU.

H6a: Employee experience positively influences his perceived usefulness of IS.

H6b: Employee experience positively influences his perceived ease of use of IS.

3.5 Perceived Ease of Use

It is argued that perceived ease of use is the extent to which a person accepts as true that usage an exacting method would be free to that individual (Gahtani, 2001; Gefen & Straub, 2000). Zeithaml et al. (2002) declared that the degree to which an innovation is easy to understood or used could be considered as perceived ease of use.

Over the past decade, expanded research provides evidence of the significant impact of perceived ease of use on usage intention, either directly or indirectly (Guriting & Ndubisi, 2006; Wang, Lin, & Tang, 2003). IS literature indicated that PEU has a positive effect on employee behavioral intention to use the system (Chin & Todd, 1995). Recently, Chen and Barnes (2007) have empirically found that two technological aspects of the mediator, viz PU and PEU significantly affect end – user adaptation intentions to use the system (Chen & Barnes, 2007).

Information systems that users perceive easier to use and less complex will increase the likelihood of its adoption and usage (Teo, 2008). According to several researches on TAM (Davis, 1989; Teo, 2008). PEU has been shown to influence behavior through two causal ways: a direct effect on behavior and an indirect effect on behavior via PU. Therefore, the following hypothesis was formulated:

H7: Perceived IS ease of use positively influence perceived IS Usefulness.

H8a: Perceived IS ease of use positively influence employee behavioural intention to use IS.

3.6 Perceived Usefulness

Perceived usefulness is positively associated with system usage (Thompson, Higgins, & Howell, 1999). IS literature have investigated technology acceptance model (TAM), and proven that PU was proper in predicting the person's approbation of various information systems (Venkatesh, Moris, & Davis, 2003). Several researches indicated that PU positively influences users' behavioral intention to use the system.

There are extensive evidences demonstrates the significance influence of perceived usefulness on employee behavioral intention to use IS. (Venkatesh, Moris, & Davis, 2003; Guriting P, Ndubisi, 2006; Chen & Barnes, 2007; Tan & Teo, 2000). According to, Tan and Teo (2000) perceived usefulness is an important factor in determining adaptation of innovations. Similarly, Zeithaml et al. (2002) stated that the degree to which an innovation is easy to understand or use could be considered as perceived ease of use. Recently, Chen and Barnes (2007) have empirically found that the technological aspects of the interface, namely perceived usefulness significantly affect end user adaptation intentions. Therefore, the following hypothesis was formulated:

H8b: Perceived IS usefulness positively influence employee behavioural intension to use IS.

3.7 Behavioral Intension to Use IS

According to Davis, an individual's intention to use the system and its applications is explained and predicted by his perception and attitude towards the technology's usefulness and its simplicity / complexity to actually use, TAM posit that perceived usefulness is influenced by perceived ease of use and both predict attitudes (Davis, 1989). TAM proposed that individual adopt and accept IS based on his perceptions and attitudes. More precisely, TAM characterizes the causal relationship between user's attitudes and perceptions toward IS and the actual adoption and use (Davis, 1989). Moreover, if the information system is easy to use and require less effort from employee, this will increase the adoption processes and usage (Teo, 2008). PEU has been shown to influence behavior through two causal ways: a direct effect on behavior and an indirect effect on behavior via PU. Thus, users' intention to use IS can be depending on their perception towards the ease of use of the system. The following hypothesis can be stated for this research:

H9: Employee Behavioral Intension to Use IS will have a positive impact on IS adoption.

3.8 Procedural Definitions

Table 3 shows the procedural definitions for key words and the variables that have been used throughout this suggested integrated model.

Table 3. Procedural definitions

Term/Variable	Definition
Information Systems(IS)	<i>A set of interconnected components including : machinery, peoples, and procedures which manages the necessary data in organization.</i>
TAM	<i>An IS theory that paradigms how employed accept and actually use a new technology.</i>
TOE	<i>A construal framework which identify the lineaments of technology, the organizational capabilities, and the environmental situations as critical factors for technology adoption.</i>
Technological Characteristics	<i>The internal and external technologies (infrastructure, equipment's, processes) that is relevant to the organization.</i>
Technology Complexity	<i>The extent to which a new technologies is more troublesome for the employee than the prior that applied for the same or comparable activities.</i>
Technology Compatibility	<i>The extent to which a technology fits with employee's current job processes.</i>
Organizational Characteristics	<i>"The characteristics and resources of the firm, including the firm's size, degree of centralization, degree of formalization, managerial structure, human resources, technology infrastructure, amount of slack resources, and linkages among employees.</i>
Top management Support	<i>The degree to which top managers perceived the significance of the information systems role, and the extent to which it is interested in IS implementation and development activities.</i>
Employee Training	<i>The amount of training provided by computer specialists inside or outside the organization.</i>
Individual Characteristics	<i>Interpersonal skills of individual through his interaction in work environment with other people, machines such as computer self- efficacy and experience in technology.</i>
Computer self-	<i>Employee's perception of efficacy in accomplishing a particular computer - related tasks within the field of</i>

<i>efficacy</i>	<i>common computing.</i>
<i>Employee Experience</i>	<i>The awareness and abilities needed to fulfill computer-related duties, and technical skills as well as other specific tasks.</i>
<i>Perceived usefulness</i>	<i>An employee expectation that computer usage will be helpful in improving his functional duties.</i>
<i>Perceived ease of use</i>	<i>The extent to which a person believes that using a particular system with little effort.</i>
<i>Behavioral intention</i>	<i>The degree to which an employee has formulated awareness outlines to do or not to do somewhat specified future behavior.</i>
<i>IS adoption</i>	<i>Using computer software and hardware applications to support management, operations, and any work – related activities.</i>

4. Conclusion

This research urges organizations to better understand the factors in terms of technological, organizational, and individual characteristics that promote or inhibit the adoption of IS. A conceptual integrated model is suggested by combining different theories/ models to develop the hypotheses depending on these six components. The adoption of this model by Jordan telecom companies will impact on end user attitudes and behavior intention to use IS. A definition of key terms and model components is structured according to the nature of the factors. Empirical examining for this integrated research model will be the subsequent phase of this study.

5. Recommendations for Future Research

Future research is recommended to explore the interrelationships between technological, organizational, and individual characteristics. It is suggested also to expand the model to including other applicable variables including, organization size, management structure, computer anxiety, and IS quality from theories/models that have a high influence on understanding of IS success adoption in recent years.

Finally, it would be useful to study in depth the individual factors which an organization constitutes both managerial and functional departments' personal attributes, skills and attitudes affects greatly IS adoption. Individual issues have the critical impact on the processes when implementing and adopting IS successfully. The adoption of IS in organizations need further studies and investigation, these studies could open up prospects for researchers in information systems to examine and develop the current model to encompass other variables that influence IS adoption and actually usage by individuals and organizations.

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