The Effect of Perceived Factors of Decision Support Systems on Actual Usage: Behavioral Intention of Using Decision Support Systems as a Mediating Variable: "An Empirical Study of Jordanian Higher Education Institutions"

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Abstract

Decision support systems (DSS) are interactive computer-based systems that provide information, modeling, and manipulation of data. DSS are clearly knowledge-based information systems to capture, Processing and analysis of information affecting or aims to influence the decision making process, performed by people in scope professional job appointed by a user. Hence, this study describes briefly the key concepts of decision support systems such as perceived factors with a focus on quality of information systems and quality of information variables, behavioral intention of using DSS, and actual DSS use by adopting and extending the technology acceptance model (TAM) of Davis (1989); and Davis, Bagozzi and Warshaw (1989).

There are two main goals, which stimulate the study. The first goal is to combine Perceived DSS factors and behavioral intention to use DSS from both the social perspective and a technology perspective with regard to actual DSS usage, and an experimental test of relations provide strategic locations to organizations and providing indicators that should help them manage their DSS effectiveness. Managers face the dilemma in choosing and focusing on most important factors which contributing to the positive behavioral intention of use DSS by the decision makers, which, in turn, could contribute positively in the actual DSS usage by them and other users to effectively solve organizational problems. Hence, this study presents a model which should provide the useful tool for top management in the higher education institutions- in particular-to understand the factors that determine using behaviors for designing proactive interventions and to motivate the acceptance of TAM in order to use the DSS in a way that contributes to the higher education decision-making plan and IT policy.

To accomplish or attain the above mentioned objectives, the researcher developed a research instrument (questionnaire) and distributed it amongst the higher education institutions in Jordan to collect data in order to empirically study hypothesis testing (related to the objectives of study). 341 questionnaires were returned from the study respondents. Data were analyzed by utilizing both SPSS (conducted descriptive analysis) and AMOS (conducting structural equation modelling).

Findings of the study indicate that some hypotheses were supported while the others were not. Contributions of the study were presented. In addition, the researcher presented some recommendations. Finally, this study has identified opportunities for further study which has progressed greatly advanced understanding constantly of DSS usage, that can help formulate powerful strategies Involving differentiation between DSS perceived factors.

Keywords: perceived factors of decision support systems, behavioral intention of using decision support systems, Jordanian higher education institutions

1. Introduction

Decision-making issue encounters evolved as a result of many changes and the remarkable developments in science; scientific networks and artificial intelligence. In addition, decision-making improved due to the integration of management, operations research and conception sciences. And rapid environmental and successive changes reflect managers of decision-makers' attitudes as the manager no longer needs to get the information only, "which represents a role of management information systems."

DSS are collaborative information systems which provide information, modeling, and data manipulation. The systems were used to support decision making in cases of semi structured and unstructured cases, Where nobody knows Specifically how the decision should be made (Taufiq & Sugiharto, 2011). The premium goal.

The end goal of DSS is to supply managers with the information which is useful for understanding various administrative aspects of a problem and to select the best solution among the many alternatives for complex, managerial decisions (Noori & Salimi, 2005) TAM originally composed of perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATU), behavioral intention of use (BIU) and actual usage. PU and PEOU are the two most important parameters of system use and intention (Wu, 2005). PEOU and PU are predictors of ATU and BIU (Calisir, Gumussoy, & Bayram, 2009).

Current actual research has focused on TAM because it seeks to understand the relationships between the perceptions (such as perceived usefulness and perceived ease of use of technologies) and usage behavior (Calisir et al., 2009).

2. Study Importance

This study tries to make an original Contributing to the common body of knowledge, particularly in an important aspect of DSS since it explores the effect of the perceived factors on the behavioral intention of using DSS in turn to affect the actual DSS use. Moreover, the model used in this research shall provide a useful tool for top management in the higher education institutions To understand the determinants of behaviors used for designing proactive interventions (behavioral interventions; Interventions intended to change the behavior can be directed at one or more of the determinants: attitudes, subjective norms, or Perceived behavioral control), and to motivate the acceptance of TAM in order to use the DSS in a way that contributes to the higher education decision making plan and the higher education IT policy.

This study is expected to be useful for both academies and practitioners. From the academic perspective, this study aspires to fill the gap of the lack of studies and research in this important area. Furthermore, and due to the lack of experimental evidence, the current study will not only provide a succinct and holistic review of the existing literature on perceived factors on the behavioral intention of using DSS and actual DSS usage, but also, to the best of the author's knowledge, it will be one of the few studies of this field.

Main theme for this study to use a TAM to demonstrate acceptance and usage behavior of the DSS by end users within the higher education sector in Jordan to investigate the extent to which the DSS is accepted by end users.

3. The Aim and Objectives of Study

The aim of study the adoption (Davis et al., 1989) and enhance (perceived of system quality and perceived quality of information, were new added variables) a study model that describes the effect of perceived factors and the ability on the behavioral intention of using DSS that in turn, actual impact of DSS usage. A study seeks in the context of trying to find solutions for its problems to reach the following goals:

- To describe the relationship between perceived factors (perceived usefulness, perceived ease of use, perceived of system quality, perceived of information Quality, perceived social influence) and actual usage of DSS.

- To describe the relationship between perceived factors (perceived usefulness, perceived ease of use, perceived of system quality, perceived Quality of information, perceived social influence) and behavioral intention of using DSS.

- To explore the extent to which behavioral intention of using DSS affects the actual usage of DSS.

- To identify if behavioral intention of using DSS mediates the relationship between the perceived factors (perceived usefulness, perceived ease of use, perceived of system quality, perceived quality of information, perceived social influence) and actual usage of DSS.

- Use TAM to demonstrate acceptance and use behavior of the DSS by end users within the higher education institutions in Jordan.

4. Study Problem

In the DSS implementation, important factors should be considered to investigate to which extent the current systems or intended proposed systems that support decision making is efficiently and effectively utilized in the organization. This can be achieved through understanding the user needs and satisfaction and to which extent the technology used is friendly and support decision makers (Maltz et al., 2007).

Several models and theories have been developed, some of the most of well-known theories/models were the TAM (Davis, 1989; Davis et al., 1989; Venkatesh & Bala, 2008) which concentrated on perceived usefulness,

perceived ease of use and user acceptance of information technology (Shroff et al., 2011).

Based on the above debate, we need to answer the following questions:

➢ How Perceived factors of DSS affect or contribute to the actual DSS usage?
➢ How Perceived factors of DSS affect or contribute to the behavioral intention to use DSS by decision-makers?
➢ How does Positive behavioral intention to use DSS by decision-makers affect or contribute to the actual DSS usage?
➢ Does behavioral intention of using DSS mediate the relationship among the perceived factors and actual DSS usage?   We need to answer the following questions Debating

5. Hypotheses Formulation

H1. Perceived factors of DSS affect the actual DSS usage.

H1.1. A higher level of the perceived usefulness among DSS users, the greater is the actual DSS usage.

H1.2. A higher level of the Perceived ease of use among DSS users, the greater is the actual DSS usage.

H1.3. A higher level of the perceived system quality, among DSS users, the greater is the actual DSS usage.

H1.4. A higher level of the perceived social influence among DSS users, the greater is the actual DSS usage.

H1.5. A higher level of the perceived information quality among DSS users, the greater is the actual DSS usage.

H2. Perceived factors of DSS affects behavioral intention of using DSS.

H2.1. A higher level of the perceived usefulness among DSS users, the greater Positive behavioral intention to use DSS by decision-makers

H2.2. A higher level of the Perceived ease of use among DSS users, the greater Positive behavioral intention to use DSS by decision-makers

H2.3. A higher level of the perceived system quality, among DSS users, the greater Positive behavioral intention to use DSS by decision-makers

H2.4. A higher level of the perceived social influence among DSS users, the greater Positive behavioral intention to use DSS by decision-makers

H2.5. A higher level of the perceived information quality among DSS users, the greater Positive behavioral intention to use DSS by decision-makers

H3.Positive behavioral intention to use DSS by decision-makers will enhance actual DSS usage

H4. The behavioral intention of using DSS will mediate the relationship among the perceived factors and actual DSS usage

H4.1.The behavioral intention of using DSS will mediate the relationship among the perceived usefulness of DSS and actual DSS usage

H4.2. The behavioral intention of using DSS will mediate the relationship among the perceived ease of use and actual DSS usage

H4.3. The behavioral intention of using DSS will mediate the relationship among the perceived system quality and actual DSS usage

H4.4. The behavioral intention of using DSS will mediate the relationship among the perceived social influence and actual DSS usage

H4.5.The behavioral intention of using DSS will mediate the relationship among the perceived information quality and actual DSS usage

Study Model:

This study utilizes (TAM) to demonstrate the acceptance and use behavior of the DSS by end users within the higher education sector in Jordan to investigate the extent to which the DSS is accepted by the user. The researcher proposed a conceptual model of research that will appear in (Figure 1.):
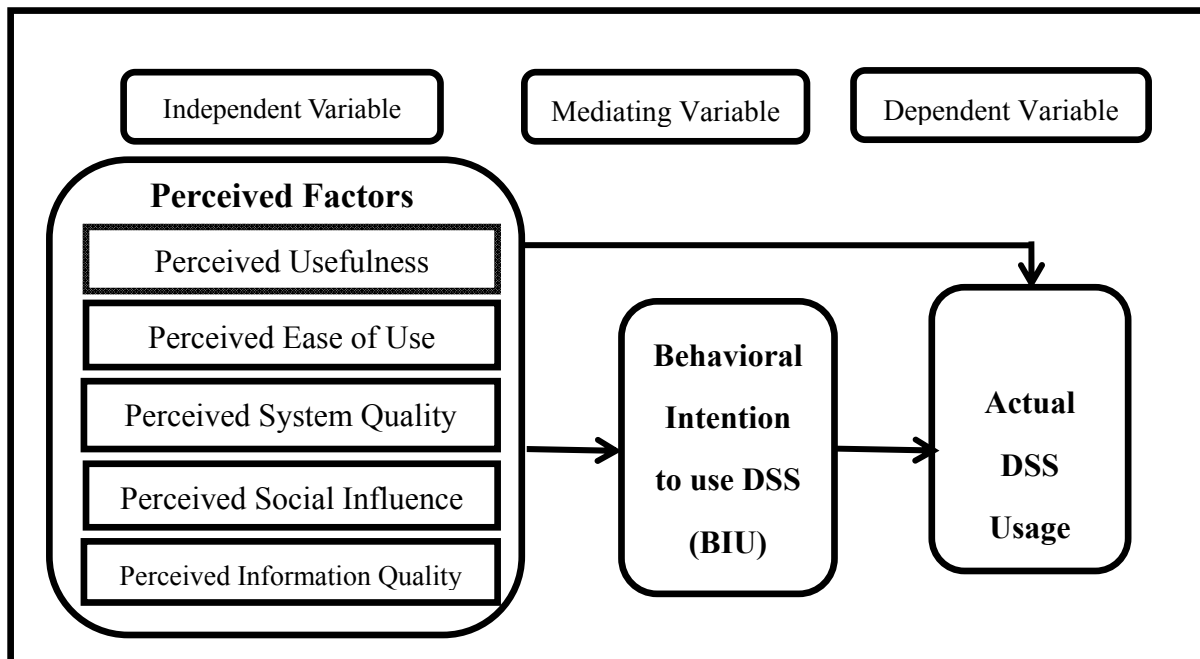
Figure 1. Study model

Source: Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8), 982-1003.

6. Terminologies

6.1 Decision Support Systems (DSS)

They are knowledge-based information systems to capture, process and analyze information that affects or is intended to influence the decision making process performed by people within the professional user assigns task (Bresfelean & Ghisoiu, 2010).

6.2 Attitude towards Usage (ATU)

Refers to "the extent to which a person assesses and endorses the goal system with his or her work" (Davis, 1989). Attitude towards usage has been identified to use as one of the factors that guide future behavior or cause faith that ultimately lead to specific behavior.

6.3 Perceived Usefulness (PU)

Defined as "the extent to which an individual thinks that using a particular system would boost and support his or her performance" (Davis, 1989).

6.4 Perceived Ease of Use (PEOU)

Refers to "the extent to which an individual thinks that using a particular system would be free from voltage" (Davis, 1989). PU and PEOU Cognitive factors can be considered.

6.5 Perceived System Quality (PSQ)

PSQ is considered to mean an international governance of the degree to which the technical ingredients (Incorporate hardware, software, help screens and user manuals) to deliver IS Providing quality information and services as required from stakeholders).

6.6 Perceived Social Influence (PSI)

Is defined as a person perceives that Other important figures believe it should or should not use decision support systems.

6.7 Perceived Information Quality (PIQ)

PIQ is a Multifunctional concept describing properties of informational output of the information system. It captures a large group of features such as accuracy, timeliness, completeness, consistency, importance and

suitability for use.

6.8 Behavioral Intention of Use (BIU)

BIU is defined as the degree to which a person intends to do certain behavior.

6.9 Actual System Usage (AU)

Actual system usage indicates and the size of system use by user (Davis, 1989). In this study, actual DSS use is determined by perceived factors and behavioral intention of use.

7. Literature Review

Madhurima and Ewuuk (2014) attempted to identify the factors impact for adoption mobile banking in India. To achieve the above aim a conceptual model was developed based on technology acceptance model (TAM) and diffusion of innovation (DOI). Initial data has been collected using a questionnaire from 600 customers. The study found that Experimental evidence for the positive relationship among PU, PEOU and Social impact to positive attitude towards m banking. Lastly, attitudes towards m-banking and intention to adopt m-banking

Tan, Chong and Lin (2013) Investigate factors affecting the determination to use internet marketing among Malaysians and South Koreans, the two fast developing Asian countries with good infrastructure for the Internet. This study adapts unified theory of acceptance and use of technology as a theoretical basis for assessing intention of using Internet marketing. Data has been collected using convenience sampling method from 150 Malaysians and 150 South Koreans through the use of self-reporting questionnaires. The results indicate that different factors affect the intentions of using internet marketing among Malaysians and South Koreans, while the social impact was not significantly relevant to the intention of using internet marketing between Malaysians and South Koreans.

Aldhmour and Eleyan (2012) designed to examine key factors affecting successful adoption (DSS) in Aqaba special economic zone authority (ASEZA), Jordan. The main objective of this study was to investigate a range of factors that influence the successful adoption of DSS within the context of ASEZA. Their results indicated that managers in ASEZA It seems that make their successful DSS adoption based on its perceived usefulness (PU) and information technology (IT) infrastructure.

Dulcic, Pavlic and Silic (2012) designed to achieve the intended use of DSS within medium and large business organizations in Croatia by implementing TAM. To identify factors that effect on using DSS by managers of medium and large business organizations in there, the questionnaire distributed online to the target sample. The study indicated the importance of PU and PEOU, affecting the perception of using DSS to assist management decision process.

Shittu, Basha, AbdulRahman and Ahmad (2011) investigate the factors that predict students' attitudes and intentions of using internet-based social software in higher institution of learning in Malaysia. A survey research conducted among students of a higher institution of learning. The results of the study disclosed that all the independent variables (PU, PEOU and subjective norm) predict student behavior toward social software adoption. And likewise, attitude turns out that position stronger expectation of students' intention of using social software.

Bresfelean and Ghisoiu (2010) found that the designed DSS would be suitable for the educational task of the university's, creative research, latest body of knowledge, and academic services awards to society and community, It is a great task for national and European institutions of higher education, Romania. DSS engineering is subject to further development, improvement and optimization that can extend to include other fields such as modern universities, finance, public administration, international relations, administration, and new qualifications required by the labor market etc. The development and integration of a DSS with the university information and communication technologies (ICT) systems may determine a reduced cost and time required to solve the major issues relating to the formulation and adoption of the most appropriate decisions, for the representative Complications of higher education systems. Finally, their study focused on the direction of detailing and development the elements of the educational DSS, based on databases, data mining and decision support technologies.

Sheikhshoaei and Oloumi (2011) study of the Critical factors in the acceptance of information technology (IT) Of Engineering Colleges libraries librarians in public universities in Tehran. TAM is used as a framework for research and possibility of applying this model on the research population is studied. The constructs of TAM include its perceived usefulness, perceived ease of use, attitude toward use, and the intention of using IT. These independent variables affect the dependent variable of IT use. The studied population included 160 librarians and

the questionnaire was sent to all of them. The research results shows that all independent variables in the framework of TAM affecting the acceptance of IT, but the final findings (R ¼ 0.033 for Model) shows that the applicability of the TAM model to study this group is weak. Fix

Saiti and Eliophotou-Menon (2009) examined the decision-making process in the Greek educational system, as an indicator for the design and implementation of education policy. This study is an attempt to explore the limitations of the Central education system in relation to the decision making process and the formulation of education policies. It took a critical approach to current practices in an attempt to improve the decision making process of education in Greece. The findings indicated that a small group of bureaucrats control policy proposals for education fix in Greece. These were the results of decision-making process which failed to take into account the interests of various stakeholders and wider societal needs.

8. Theoretical Framework

8.1 Decision Support Systems

Valverde (2011) defined DSS an interactive, computer-based system designed to help decision-makers to solve problems of poor management. Using a variety of models, analytical techniques, and information retrieval, such systems to assist in the development and assessment of appropriate alternatives. DSS should be focus on strategic decisions, not operational ones. More clearly, it should contribute to reduce the risks facing managers when they need to make decisions about future options.

Also, Tripathi (2011) defined DSS as interactive, flexible, and adaptable computer-based information system That uses rules decision models and the base model, coupled with an extensive database and insights of the decision maker, would lead to concrete decisions, enforceable in solving problems that will not be applicable to management science models (Agrahari & Tripathi, 2012; Ramteke & Dhande, 2013; Istudor & Duta, 2010).

The researcher adopts the definition of DSS an interactive, flexible computer-based information system to support decision-makers with comprehensive database tools and models to solve organized, unorganized or semi- organized problems.

8.1.1 Types of Decision Support Systems

Agrahari and Tripathi (2012); Bohanec (2009) listed the following five types of decision support systems: Widely spaced intervals

- A data-driven DSS or data-oriented DSS assures access to and manipulating of the time series statistics, signal processing, and many other areas. Time series is a series of data points, usually measured in consecutive times, widely spaced intervals... of internal company data and, in some cases, external data.

- A communication-driven DSS assist more than one individual working on joint mission. Usually measured in consecutive times

- A document-driven DSS can support managers to restore and mange unorganized documents and web pages by integrating a variety of storage and processing technologies to provide a full document retrieval and analysis.

- A model-driven DSS emphasizes access to and statistical manipulation, finance, optimization, or simulation model.

- A knowledge-driven DSS provides specialized expertise in problem-solving stored as facts, rules, procedures, or in similar structures.

8.2 Technology Acceptance Model

In 1989, Davis suggested the technology acceptance model to clarify the potential user's behavioral intention of using a technological innovation. The TAM assumes that the perceptions or beliefs about innovation are instrumental in the development of attitudes that will eventually lead to a system using behavior. It also assumes that the actual usage of the system is determined for each user behavioral intention of using, that is in turn, influenced by each user's attitudes towards use (Lim &Ting, 2012).

TAM provides a basis for measuring beliefs and attitudes that can predict future behaviors. PU and PEOU are two essential beliefs in TAM to predict the behavior. These beliefs form the cognitive response to the person and the decision to use a particular technology, affecting response or attitude toward technology, and ultimately drives behavioral response about whether using technology (Figure 2.) original technology acceptance model). In TAM, PU and PEOU are supported as fundamental constants that determine user acceptance of a given form of technology (Anne & Slatten, 2010).

One of the primary purposes of TAM is to provide a basis for tracing the effect of external variables on internal beliefs, attitudes, and intentions. It is suggested that PEOU and PU are the most important factors in explaining the use of the system (Legris, Ingham & Colleretle, 2003). The ultimate goal of TAM was to predict use, and for this, a linear regression model was most often used (Legris et al., 2003). However, according to, Hsiao, Wu and Chen (2013), there is one limitation of the TAM uses, which its deficit to consider the effect of exogenous variables and barriers to the technology acceptance.
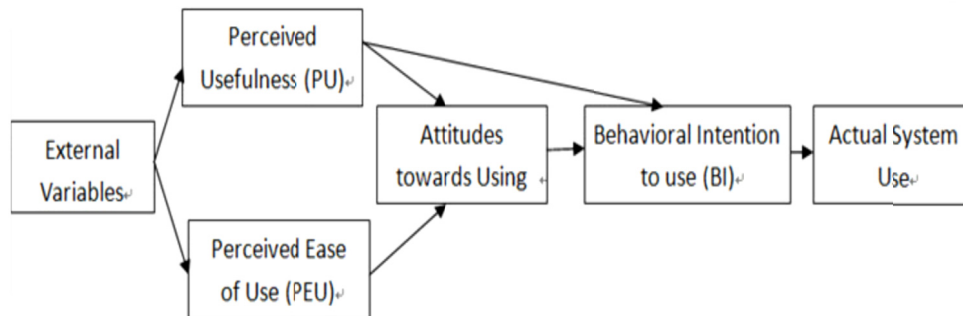

Figure 2. Original technology acceptance models

Source: Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.

8.2.1 Perceived Usefulness (PU)

For the purpose of this study, PU is defined as the extent to which an individual believes that using the decision support systems will boost and support his or her performance within an organizational context. Any person who considers that

PU is strongly correlated with productivity, it is suggested that computer use in the workplace would increase user productivity, improved functionality, enhance the effectiveness of job, and be useful in the job (Guriting & Ndubisi, 2006). Kulviwat et al. (2007) also defined PU as the extent to which an individual believe that technology will boost their productivity or improved functionality. Online with this definition, many studies defined PU as the degree to which an individual thinks that using a particular system would boost his or her job performance (Allahyari & Ramazani, 2012; Esmaeilzadeh et al., 2013; Lim & Ting, 2012; Sheikhshoaei & Oloumi, 2011; Keong et al., 2012; Gombachika & Khangamwa, 2013; Islam et al., 2013; Abbasi et al., 2011; Rauniar et al., 2014; Wang & Lin, 2012). It is closely related to the expected job performance. PU is the most important determinant of scientist's behavioral intention to accept the technology (San & Yee, 2013).

Venkatesh and Bala (2008) identified the determinants of PU; as: Subjective norm, image, job relevance, quality of output and result demonstrability. Subjective norm is the extent to which a person considers that most of the people who are important to him believe he should or should not use the new system (Zhang et al., 2013; Lee, 2009). Image is the extent to which a person considers that use of an innovation will boost his or her status in his or her society (Gounaris & Koritos, 2008). Job relevance is the extent to which a person considers that the viable of target system to his or her work. Output quality is the extent to which a person considers that the system performs his or her job missions well (Zhang et al., 2013). Result demonstrability is the extent to which a person considers that the findings of using a system are tangible and observable (Gounaris & Koritos, 2008)

8.2.2 Perceived Ease of Use (PEOU)

For the purpose of this study, PEOU is defined as the extent to which an individual believes that using the decision support systems would be free from voltage and it is considered to be, a direct determinant of behavioral intention.

Rahman, Khans and Islam (2013) defined PEOU as any individual's perception that using the new technology would be free from voltage. The components of PEOU are the process, easy system, elastic and easy to become skillful.

San and Yee (2013) stated that PEOU has been containing as one of the significant factors for behavioral intention to use the technology. It was defined as the degree of person's perception, and knows that the technology is understand and easy to use. When individual believes that the technology would be free from

voltage, and it would be support with him the behavioral intention of person's to use the technology.

8.2.3 Perceived Social Influence (PSI)

For the aim of this study, perceived social influence is defined as a person perceives that other important persons believe he or she should or should not use the decision support systems. San and Yee (2013) defined PSI as one's can imagine that the people which are important to him/ her believe that he should or should not implement specific behavior. It could be other persons, peers, heads, or the opinion of the supervisory authority.

Finally, Rao and Troshanin (2007) found that social impact is the extent to which persons perceive that other important believe they should use an innovation.

8.2.4 Perceived System Quality (PSQ)

System quality (SQ) is a measure of the information processing system, and focuses on the results of interaction between user and the system (Migdadi et al., 2009). SQ is considered to mean an international judgment of the extent to which the technological components (such as hardware, software, user manuals, and help screens) of information system delivered which supporting quality information and service as requested by stakeholders. SQ can be measured by ease-of-use, flexibility, reliability, portability, functionality, quality of data, integration, and importance (Migdadi, Awartany & Khayatg, 2009).

System quality measures technical success. It was measured by ease-of-use, flexibility, reliability, functionality, portability, quality of data, integration, and importance (Delone & Mclean, 2003).SQ is used for assessing multiple dimensions of information necessary to produce an output processing system.

8.2.5 Perceived Information Quality (PIQ)

PIQ is a multidimensional concept which identifies the characteristics of the informational output of the information system. It represents a wide collection of features such as consistency, completeness, accuracy, timeliness, relevance and fit for use (Lee et al., 2010). Quality of data and information is generally thought of as a multidimensional concept with varying attributed characteristics depending on the philosophical viewpoint of the author. The most common, the term "data quality" is described as data that is "fit-for-use", which mean that it is relative, as data that are appropriate to use one it may not have sufficient attributes to another use (Migdadi et al., 2009).

To achieve the goal of this study, the dimensions of information quality construct will include the variables (accuracy, content, format, timeliness).

8.3 Behavioral Intention of Use (BIU)

BIU is defined as the degree to which a person intended to perform a specific behavior (Yi & Hwang, 2003; Shittu et al., 2011). Furthermore, BIU is defined as an individual's intention to perform a specific action; it could be used of Corresponding behavior prediction which provided that person can do the action voluntarily. Therefore, presumably the intention to capture the motivating factors that affect behavior; those factors are indicators of how stubborn people are ready to try, how much effort they are planning to exercise, in order to involve in a behavior, the power of intention is decided by the subjective probability that an individual will perform the action (Islam et al., 2013). Intention of using a new information technology is defined as user discretion in the actual behavior of using new information technology (Esmaeilzadeh et al., 2013).

Finally, According to Tobing et al. (2008), behavioral intention is a strong factor and a predictor to perform actual behavior. In the situation of the system adoption, this behavioral intention is claimed to be a strong factor and predictor of actual system use.

8.4 Actual System Usage

In this study, actual DSS use is determined by perceived factors (perceived usefulness, perceived ease of use, perceived system quality, perceived social influence, and perceived information quality) and behavioral intention to use.

Actual system usage refers to ('how often') and the size of system usage ('how much') by user (Davis, 1989). Davis asserted that a person behavioral intention is enough to affect the actual use of the system. This is a reason of identification and internalization and may affect the directly of the behavioral intention through compliance. It is further protested that, end users of the system at once are not notified or learned about the need or importance; this will vastly affect their behavioral intention to use and then the actual usage. Shroff et al. (2011) defined that actual use of the system is determined by the users' behavioral intention of using (BIU) the system, which is determined by users' attitude towards using the system and their PU and PEOU of it.

9. Study Methodology

9.1 Type and Nature of the Study

The type of this study is descriptive and explanatory. It is descriptive because the study will collect demographic data which represents facts about the characteristics or criteria of the decision makers who use the DSS to support them in the decision-making process. Furthermore, it is explanatory because it aims at testing the hypotheses regarding the impact of the independent variables on the dependent variables.

9.2 Study Population

Consist of all higher education institutions: Ministry of higher education, Higher education council, Higher education accreditation Commission, Public and Private Universities. Which encompass the following (Table 1):

Table 1. Study population (Jordanian higher education institutions with their decision makers)

Name of institution	Number of decision makers	Name of institution	Number of decision makers
Higher education council	11	The Hashemite University	114
Higher education accreditation commission	14	Applied science private university	86
Ministry of higher education	18	Princess Sumaya University for Technology	53
The university of Jordan	153	Amman Arab University	73
Jordan university of science and technology	124	Al-Zaytoonah University of Jordan	78
Yarmouk university	121	Jadara University	95
Mu'tah university	142	Al-Isra University	94
AL-Hussein Bin Talal University	78	Petra University	82
Al -Balqa' applied university	248	Middle East University	95
Tafila Technical University	80	Al-Ahliyya Amman University	101
German Jordanian University	89	Jerash University	110
AL al-Bayt University	95	American University of Madaba	42
Philadelphia University	103	The World Islamic Sciences & Education University	57
Zarqa University	87	Ajloun National Private University	54
Irbid National University	52		
Total	2549		

9.3 Study Sample

Table 2 presents the study sample which consists of Higher education council /Commission, 9 public universities (out of 10) and 9 private universities (out of 16) accompanied with the decision makers.

Table 2. Lists the institutions which participated in the study

Name of institution	Total number of distributed questionnaires	Name of institution	Total number of distributed questionnaires
Higher education council	9	The Hashemite University	15
Higher education accreditation commission	5	Applied science private university	18
Ministry of higher education	12	Princess Sumaya University for Technology	10
The university of Jordan	29	Amman Arab University	14
Jordan university of science and technology	18	Al-Zaytoonah University of Jordan	13
Yarmouk university	15	Jadara University	11
Mu'tah university	18	Al-Isra University	22
AL-Hussein Bin Talal University	23	Petra University	15
Al -Balqa' applied university	39	Middle East University	16
Tafila Technical University	9	Al - Ahliyya Amman University	24
German Jordanian University	15		
Total		350	

In order to comply with the statistical sample size condition, the number of decision- makers who filled the questionnaire was (341) of the total (350) of the distributed questionnaires, therefore, the response rate achieved was (i.e., 97.4%) is acceptable.

9.4 Unit Analysis

The members of Ministry of higher education, Higher education council, Higher education accreditation Commission,

9.5 Data Collection

This study used questionnaire as a tool for primary data collection. Otherwise, he/she should select another method like interviewing or observation. And secondary data from: books, periodicals, theses, dissemination of scholarly research and theoretical studies.

9.6 Study tool Validity

Validity of the questionnaire instruments were tested by a committee of five Professors, Associate Professors in the business administration and management information system departments in the Jordanian public and private universities. Generally, they all agreed upon the importance and contribution of this study to Jordan. Based on their feedback, some modifications to the original questionnaire were made. Study tool validity

9.7 Testing the Reliability of the Study Tool

Table 3. Cronbach's alpha value for each construct

Construct	Number of questions	Cronbach's alph
Perceived Usefulness	8	.892
Perceived Ease of Use	5	.873
Perceived System Quality	6	.826
Perceived Information Quality	6	.895
Perceived Social Influence	5	.850
Behavioral Intention to Use	5	.898
Actual Decision Support System Usage	4	.887

The table shows that all the values are greater than (0.70), signifying internal consistency to do statistical analysis (Al-najjar, Al-najjar & Al-Zubi, 2013, p. 151).

10. Hypothesis Testing

10.1 Testing the Direct Effects A Statistical Technique Is Used to Test and Evaluate Causal Relations Combination of Statistical and Qualitative Causal Assumptions Data

Direct effects are the relationships between two constructs with a single path (Hair et al., 2006). In the other words, a direct effect is the effect a variable has on another in a direct relationship. In this study, there are eleven direct effects, as stated previously. To make sure that all paths (represent the tested hypotheses) in the model are either supported or rejected, the researcher should utilize the recommended values of critical ratio (C.R) and the probability level (P value) as illustrated in Table (4.). Critical ratio (C.R) refers to the parameter estimate (Beta) divided by an estimate of its standard error (S.E.). The value of C.R should be more than 1.96 to achieve recommendation value (Hair et al., 2006). This means that if C.R value of the tested path is more than 1.96, then the path (represent the tested hypothesis) is supported, while if C.R value of the tested path is less than 1.96, then the path is not supported; that is, the hypothesis is rejected.

Table 4 below: results of testing the study's eleven direct hypotheses by utilizing the structured equation model (SEM) through AMOS. SEM a statistical technique is used to test and evaluate causal relations combination of statistical and qualitative causal assumptions data (Awasthi & Sangle, 2013). AMOS stands for Analysis of Moment Structures, it is an easy-to-use software package implements the general approach to data analysis known as structural equation modeling (Awasthi & Sangle, 2013). Using AMOS, you specify, assess, estimate, and present your model in an intuitive path diagram to show hypothesized relationships among variables (Castaneda et al, 2009).

Table 4. Results of testing the study's eleven direct hypotheses by utilizing the structural equation modeling (SEM) through AMOS

Path			Beta	S.E.	C.R.	P
Behavioral intention to use	←	Perceived system quality	0.334	0.052	6.861	.000
Behavioral intention to use	←	Perceived social influence	0.324	0.052	6.284	.000
Behavioral intention to use	←	Perceived Usefulness	0.173	0.06	3.309	.000
Behavioral intention to use	←	Perceived ease of use	-0.059	0.047	-1.176	0.24
Behavioral intention to use	←	Perceived information quality	0.08	0.056	1.386	0.166
Actual system usage	←	Behavioral intention to use	0.16	0.062	2.988	0.003
actual system usage	←	Perceived ease of use	0.143	0.054	2.894	0.004
Actual system usage	←	Perceived information quality	0.34	0.064	5.943	.000
Actual system usage	←	Perceived social influence	0.189	0.063	3.51	.000
Actual system usage	←	Perceived Usefulness	0.014	0.069	0.276	0.783
Actual system usage	←	Perceived system quality	0.031	0.064	0.608	0.543
Explained value of behavioral intention to use (R^2)						.504
Explained value of actual system usage (R^2)						.514

Furthermore, probability level (P value) provides a cut-off beyond which it is asserted that the findings are 'statistically significant' (by convention, that is, p<0.05). Finally, "smaller p-values (p<0.01) are sometimes called (high statistically significant) because they indicate that the observed difference would happen less than once in a hundred times if there was really no real difference" (Davies & Crombie, 2011). Table (4.) present the results of testing the direct effects (hypotheses represented as paths) by utilizing the structured equation model through AMOS.

Finally, since some of the independent variables (perceived DSS factors) have positive and significant effects on the dependent variable (behavioral intention of using DSS), then (R^2) is used to represents the change or variance that the independent variable caused in the dependent variable. As appear in Table (4.), R^2 =.504 which means that the change or variance is a little more than 50%.

The first main hypothesis of this study is presented as follows:

H1. Perceived factors of DSS affect the actual DSS usage.

Sub hypotheses of the first main hypothesis are presented as follows:

H1.1. The higher the level of perceived usefulness among DSS users, the greater actual DSS usage.

Table 4 show that there is no direct impact of perceived usefulness among DSS users on the actual DSS usage (β=.014, CR=.276, *P*>.05), hence, the researcher accepts the null hypothesis; Ho1.1 which states that the higher the level of the perceived usefulness among DSS users doesn't contribute to the greater actual DSS usage.

H1.2. The higher the level of perceived ease of use among DSS users, the greater actual DSS usage.

Table 4 show that there is a direct impact of perceived ease of use among DSS users on actual DSS usage (β=.143, CR=2.894, *P*<.05), hence, the researcher accepts H1.2 which stated that the higher the level of perceived ease of use among DSS users, the greater actual DSS usage.

H1.3. The higher the level of perceived system quality *among DSS users, the greater* actual DSS usage.

Table 4 show that there is no direct impact of perceived system quality*, among DSS users* on actual DSS usage *(*β=.031, CR=.608, *P*>.05)),), hence, the researcher accepts the null hypothesis H01.3 which states that the higher level of perceived system quality, among DSS users, doesn't contribute to the greater actual DSS usage.

H1.4. The higher the level of perceived social influence *among DSS users, the greater* actual DSS usage.

Table 4 show that there is a direct effect of perceived social influence among DSS users on actual DSS usage *(*β=.189, CR=3.51, *P*<.05), hence, the researcher accepts H1.4 which states that the higher the level of perceived

social influence among DSS users, the greater actual DSS usage.

H1.5. The higher the level of perceived information quality *among DSS users, the greater* actual DSS usage.

Table 4 show that there is a direct effect of the perceived information quality *among DSS users* on actual DSS usage (β=.34, CR=5.943, *P*<.05), hence, the researcher accepts HI.5 which states that the higher the level of perceived information quality among DSS users, the greater actual DSS usage.

The second main hypothesis of this study is presented as follows:

H2. Perceived factors of DSS affect behavioral intention to use DSS.

Sub hypotheses of the second main hypothesis are presented as follows:

H2.1. The higher the level of perceived usefulness *among DSS users, the greater* positive behavioral intention *to use DSS by decision-makers.*

Table 4 show that there is a direct impact of the perceived usefulness among DSS users on the behavioral intention to use DSS *(β*=.173, CR=3.309, *P*<.05), hence, the researcher accepts H2.1 which states that the higher the level of perceived usefulness among DSS users, the greater the positive behavioral intention to use DSS by decision-makers.

H2.2. The higher the level of perceived ease of use *among DSS users, the greater* positive behavioral intention to use *DSS by decision-makers.*

Table 4 show that there is no direct effect of the Perceived ease of use among DSS users on the behavioral intention of using DSS (β=.059, CR= -1.176, P>.05), hence, the researcher accepts the null hypothesis H02.2 which stated the higher the level of the perceived ease of use among DSS users, doesn't contribute to greater positive behavioral intention to use DSS by decision-makers.

H2.3. The higher the level of perceived system quality *among DSS users, the greater* positive behavioral intention to use *DSS by decision-makers.*

Table 4 show that there is a direct effect *of* perceived system quality*, among DSS users on the behavioral intention to use DSS (*β=.334, CR=6.861, *P*<.05), hence, the researcher accepts H2.3 which stated that *the higher the level of* perceived system quality*, among DSS users, the greater positive behavioral intention to use DSS by decision-makers.*

H2.4. The higher the level of perceived social influence *among DSS users, the greater* positive behavioral intention to use *DSS by decision-makers*

Table (4.**)** show that there is a direct effect *of* the perceived social influence among DSS users on the behavioral intention of using *DSS (*β=.324, CR=6.284, *P*<.05), hence, the researcher accepts H2.4 which stated *the higher the level of* perceived social influence among DSS users, the greater positive behavioral intention to use DSS by decision-makers.

H2.5. The higher the level of perceived information quality *among DSS users, the greater* positive behavioral intention to use *DSS by decision-makers*

Table 4 show that there is no direct impact of the perceived information quality among DSS users on the behavioral intention to use DSS *(β*=.08, CR=1.386, P>.05), hence, the researcher accepts H2.5 which stated that t*he higher the level of* perceived information quality among DSS users doesn't contribute to the greater positive behavioral intention to use DSS by decision-makers.

The third main hypothesis of this research is:

H3. Positive behavioral intention to use DSS by decision-makers will enhance actual DSS usage

Table 4 show that there is a direct effect of behavioral intention of using DSS by decision maker on actual DSS usage (β=.16, CR=2.988, *P*<.05), hence, the researcher accepts H3 which states that positive behavioral intention to use DSS by decision-makers will enhance actual DSS usage.

10.2 Testing the Indirect Effect

The researcher then can calculate the result of the mediating effect by estimating each variable from output of analysis. Therefore, if the indirect effect (PF→BI→ AU) is more than the direct effect (BF → AU) and all paths are significant, then it can be considered as full mediator. In contrast, if the indirect impact is less than the direct impact, it is not considered a mediator.

Table 5. Results of testing the indirect effect

Path		Direct Beta w/Med		Indirect Beta		Total Beta		Mediation type observed
		B	Sig	β	Sig	B	Sig	
actual system usage ← perceived social influence		0.189**	0.001	0.052**	0.004	0.241**	0.001	Partial mediation
actual system usage ← perceived information quality		0.34**	0.001	0.013	0.128	0.353**	0.001	No mediation
actual system usage ← perceived system quality		0.031	0.532	0.054**	0.005	0.085	0.094	Full mediation
actual system usage ← perceived ease of use		0.143**	0.005	-0.009	0.145	0.134**	0.01	No mediation
actual system usage ← perceived usefulness		0.014	0.843	0.028**	0.005	0.042	0.552	Full mediation

The fourth main hypothesis of this study is presented as follows:

H4. The behavioral intention of using DSS will mediate the relationship among perceived factors and actual DSS usage

H4.1. The behavioral intention of using DSS will mediate the relationship among perceived social influence and actual DSS usage

As shown in Table (5.), there *is a significant direct impact of* perceived social influence on actual system usage (β=.189, P<.05), and there is a *significant indirect impact of* perceived social influence on actual system usage through behavioral intention of using (β=.052, P<.05), hence, the researcher accepts the hypotheses H4.1 partially, which states that t*he behavioral intention of using DSS will mediate the relationship among perceived usefulness of DSS and actual DSS usage.*

H4.2. The behavioral intention of using DSS will mediate the relationship among the perceived information quality and actual DSS usage.

Table (5.) *shows that there is a significant direct impact of* perceived information quality on actual system usage (β=.34, P<.05), and there is no *significant indirect effect of* perceived information quality on actual system usage through behavioral intention of using (β=.013, P>.05). Hence, the researcher rejects the hypotheses H4.2 which stated that the behavioral intention of using DSS will mediate the relationship among perceived usefulness of DSS and actual DSS usage and accepts the null hypothesis H04.2.

H4.3. The behavioral intention of using DSS will mediate the relationship among the perceived system quality and actual DSS usage.

Table **(**5.) shows that *there is no significant direct effect of* perceived *system quality* on actual system usage (β=.031, P>.05), and there is a *significant indirect impact of* perceived system quality on actual system usage through behavioral intention of using (β=.054, P<.05), hence, the researcher accepts the hypotheses H4.3 fully which states that the behavioral intention of using DSS will mediate the relationship among perceived usefulness of DSS and actual DSS usage.

H4.4. The behavioral intention of using DSS will mediate the relationship among the perceived ease of use and actual DSS usage.

Table (5.) shows that *there is a significant direct impact of* perceived ease of use on actual system usage (β=.143, P<.05), and there is no *significant indirect effect of* perceived ease of use on actual system usage through behavioral intention of using (β=.009, P>.05), hence, the researcher rejects the hypotheses H4.4, which states that the behavioral intention of using DSS will mediate the relationship among perceived ease of use of DSS and actual DSS usage.

H4.5.The behavioral intention of using DSS will mediate the relationship among perceived usefulness and actual DSS usage.

Table (5.) ***shows that there is*** *no significant* **direct** *impact* **of perceived usefulness on actual** system usage (β=.014,P>.05), and there is *significant indirect impact of* **perceived usefulness on actual system** usage through behavioral **intention of using** (β=.028 , P<.05) , hence, the researcher accepts the hypotheses H4.5 fully which states that the behavioral intention of using DSS will mediate the relationship among perceived usefulness and actual DSS usage.

11. Results

Research Question 1: Concerned with the Contribution of the Perceived Factors to the Actual DSS usage (Hypotheses H1.1-H1.5)

Perceived factors or variables are found to be partially essential for the actual DSS usage since results of testing the first hypothesis revealed that there is a positive significant effect of perceived ease of use among DSS users on the actual usage of DSS. This is in line with (Chatzoglou et al., 2010; Zhang et al., 2013) and contradictory to (Islam et al., 2013; Lin et al., 2009). In addition, there is a positive significant effect of perceived information quality on actual usage of DSS. This result is in agreement with Delone & McLean (2002, 2003) and Petter et al. (2008). Lastly, there is a positive significant impact of perceived social influence on actual usage of DSS. This result is in line with (Bonizzato, 2011). While, there is no positive significant effect of perceived usefulness among DSS users on actual usage of DSS. This finding is consistent with some studies (Abbasi et al., 2011) and inconsistent with Zhang et al., 2013; Islam et al., 2013. Finally, the results show that there is no positive significant direct impact of perceived system quality on actual usage of DSS. This result is inconsistent with Delone & McLean (2002, 2003) and Petter et al. (2008).

Research Question 2: Concerned with the Contribution of the Perceived Factors to the Behavioural Intention of Using DSS by Decision-Makers (Hypotheses H2.1-H2.5)

Perceived factors or variables are found to be partially essential for the behavioral intention to use DSS by decision-makers since results of testing the second hypothesis revealed that there is a positive significant impact of perceived usefulness among DSS users on the behavioral intention to use DSS by decision-makers. This is consistent with the findings of several studiest (Sheikhshoaei & Oloumi, 2011; Chatzoglou et al., 2010; Abbasi et al., 2011; Awasthi & Sangle; 2013; Wang & Lin, 2012; Wei et al., 2009). Also, there is a positive significant impact of perceived system quality on the behavioral intention of using DSS by decision-makers. This result is in agreement with Delone & McLean (2002, 2003) and Petter et al. (2008). Lastly, there is a positive significant impact of perceived social influence on the behavioral intention of using DSS by decision-makers. This finding is contradictory to the results of (Wei et al., 2009). While, there is no positive significant effect of perceived ease of use among DSS users on the behavioral intention of using DSS by decision-makers. This result is inconsistent with (Castaneda et al., 2009; Guriting & Ndubisi, 2006; Shittu et al., 2011; Elwood et al., 2006; Wang & Lin, 2012). Finally, there is no positive significant effect of perceived information quality on the behavioral intention of using DSS by decision-makers. This result contradicts Delone & McLean (2002, 2003) and Petter et al. (2008).

Research Question 3: Concerned with the Contribution of the Positive Behavioural Intention to Use DSS by Decision-Makers on the actual DSS Usage (Hypothesis H3)

Positive behavioral intention to use DSS by decision-makers was found essential in enhancing actual DSS usage since the result of testing the third hypothesis revealed that there is a positive significant impact of the positive behavioral intention of using DSS by decision-makers on the actual DSS usage. The result agrees with several studies such as Castaneda et al., (2009), Sheikhshoaei and Oloumi, (2011).

Research Question 4: Concerned with the Mediation Role of the Behavioural Intention to Use DSS by Decision-Makers between perceived usefulness of DSS and the Actual DSS Usage (Hypothesis H4.1-H4.5)

Behavioural intention to use DSS by decision-makers variables partially mediate the relationship among perceived usefulness of DSS and actual DSS use since the results of testing the fourth hypothesis revealed that perceived usefulness, perceived system quality, and perceived social influence mediate the relationship between perceived usefulness of DSS and actual DSS use. While, perceived information quality, and perceived ease of use did not mediate it.

12. Recommendation

1. In order to attract more users and promoting the usage of DSS by decision-makers in the higher education institutions in particular and Jordan in general, thought to just enter DSS to Jordanian decision-makers may not be sufficient. By using the derived results in the analysis, the systems designers and sellers have focused on the improvement of constructs or attributes that have positive impact on IU. Since perceived usefulness, system

quality, and social influence are the most critical factors among all independent variables, the systems designers and venders content and applications should be developed which users will find valuable and usable to keep up with their fast-paced life style. Systems designers and sellers could beef up use by strengthening perceptions of the usefulness and quality of their systems by focusing on these anchors. By providing before and after-sales support and helping to improve/develop computing skill of users, designers and sellers will not only create a stronger and more favorable perceptions of the systems usefulness and quality, but as more will be encouraged. Therefore, design of the systems and contents should be focused on the important and unique properties of DSS, such as agility (flexibility and adaptability), interactivity and user friendly interface such as graphical user interface (GUI), an easy-to-follow user manual, the ability of the decision-maker to incorporate his/her insights, ideas and experience, and other potentially useful facilities should be provided.

2. Since the same variables mentioned in the first point impact the intention to use DSS which also mediates the relationship between perceived factors of decision support systems and the actual decision support systems usage, DSS providers and the top management level in organizations that utilize these systems should stress the importance of these factors (and improve their effects) by following the above-mentioned first point and by providing training and education programs, conferences and so on regarding DSS usages and their benefits and advantages.

3. The results of the study could be used to consider investment in information system/ information technology (IS/IT) and people as well as with regard to the consideration of factors motivating end users. Top managements are responsible for ensuring that end-users involved adequately enough time to develop a system or through outsourcing to achieve IS/IT success. Engaged in more end users in these processes and their feedback and suggestions were considered or even implemented, the more their requirements will have the opportunity to insert and then increase usability systems.

4. System quality, concerning to the required characteristics of the decision support systems that produce the information or service, should be emphasized, as decision makers who see the system to be useful will be more willing to continue to use this system for obtain the information and support they need from the system.

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