

# The Impact of User Awareness on Successful Adoption of Decision Support System DSS in Developing Countries: The Context of Libyan Higher Education Ministry

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## Abstract

This research study aims to discuss and evaluate the effect of user awareness and other factors relating to the awareness to the successful adoption of the technology in the developing countries. The researcher employed the use of questionnaire for the collection of data from numerous users in an attempt to understand how the main factors of user awareness affects the successful adoption of DSS systems in the developing countries. This paper analyzes the data that was obtained from the research work. The paper will begin with a brief introduction and background of the study topic, continue with a section of analyzing and discussion, provide numerous recommendations based on the information obtained and conclude the paper.

The researcher employed the deductive method to generalize the responses of the sample participants. Being a quantitative research, the researcher will use the statistical method to analyze the data. The questionnaire was distributed to a sample of 180 respondents to collect primary data and based on the convenience sample of respondents; the response rate was approximately 92%. The purposive sample selection method enabled the researcher to achieve maximum information from a sample distributed among many numerous developing countries in the world. The results showed that low user awareness remains to be a major and a significant contributor to the low rate of adoption of decision support systems in the developing countries.

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**Keywords:** Decision support systems; Adoption of decision support systems; Developing countries; User awareness; Successful adoption of decision support system; DSS.

## **1. Introduction and Background Study**

Computer based decision support systems are regarded by many scientists, scholars, researchers and academicians as a key element in enhancing decision making in the different aspects of life. However, the concern of having DSS unused still remains one of the biggest and challenging issues in the developing countries for the developers and information technology specialists. The rapid changes in the business environment have remained to be a major push for the acceptance of technology at an accelerating rate in the developed countries. Business organizations have become more and more flexible using decision support systems to support strategic and complex decision making processes and activities. However, as more and more organizations in the developed world continue to make huge investments in the application of information technology systems, especially decision support systems, in the developed world, the rate of adoption remains very low in the developing countries. If a new information technology is accepted and adopted by the users, the chance of the systems and the investment's success also increases. Thus, the success of DSS has been very slow in the developing countries [1].

The first DSS systems were adopted by organizations and companies around the world approximately four decades ago. Mcnurlin & Sprague [2] describes a decision support system (DSS) is a computer based information system that assist decision makers to confront complex strategic problems through the direct interaction with the data and the analysis models. DSS systems are designed and implemented to increase the productivity, reduce the costs, enhance time efficiency of the workers, enhance the quality of the decisions made by the strategic employee's team, and achieve a competitive advantage against the competitors and attain efficiency and effectiveness in their overall performance [3] and [4].

Many organizations have continued to place huge amounts of investments on information technology systems to assist them in performing many different operations and tasks. In the developing countries, the adoption rate for the decision support systems have been on a high rate mainly due to the acceptance of the people. In his paper, Rogers [5] defined adoption as the process through which an individual or other form of decision making units goes through from the first phase of innovation, to form an attitude towards the specific innovation, to make the decision to adopt or reject the implementation of the new idea and to confirm this new idea. In their paper, Premkumar & Roberts [6] also agreed with the definition of adoption and considered five phases of the adoption process. The five phases of the adoption message include the awareness phase which involves the individuals acquiring the information on the specific topic or technology, the persuasion stage in which the individual or the group becomes persuaded to adopt the new technology, the decision stage in which the individual or the group makes the decision to adopt, the implementation stage in which the technology is implemented by the party and finally the confirmation stage in which the individuals evaluate the actual outcomes of the specified technology and the expected outcomes.

The level of awareness of the potential or the expected users on any technology has a direct influence on the

adoption of the particular technology. However, the level of awareness of an individual is also an aspect that is determined by various factors such as the availability of information. In this research study, the researcher aimed to analyze how age, gender, the level of education, the managerial level of the individual in a company, the experience of the individual and the number of courses have influenced the awareness and the adoption of decision support systems in the developing countries. Kusunoki et al. [7] identifies numerous facets of awareness that are important to any individual. These included the social and spatial awareness, the temporal awareness, the activity and articulation awareness and the process awareness. Among these facets, the adoption and utilization of DSS systems is mainly concerned with the process awareness.

## **2. Hypothesis of the study**

This research was aimed at investigating and assessing the influence of gender, age, level of education, area of specialization, the level of management and experience in the workplace on the awareness of DSS systems. As a result, the researcher developed the following hypothesis to guide the research:

### **2.1 Gender**

**H<sub>0</sub>:** Men are more aware of DSS systems and their services than women.

**H<sub>1</sub>:** There is no difference in the level of awareness of DSS systems and their services between men and women.

### **2.2 Age**

**H<sub>0</sub>:** The youths (between 20 years and 35 years) are more aware of DSS systems than other age groups.

**H<sub>1</sub>:** Age has no impact on the level of awareness of DSS systems. All age-groups are similarly aware of DSS systems and their services.

### **2.3 Level of education**

**H<sub>0</sub>:** Learned individuals have a high level of awareness of DSS systems than the illiterate people or people with a low level of education.

**H<sub>1</sub>:** There is no difference in the level of awareness of DSS systems between the literate and the illiterate individuals.

### **2.4 Level of management**

**H<sub>0</sub>:** Employees in the high levels of management have a high level of awareness of DSS systems and their services.

**H<sub>1</sub>:** The level of management of an individual has no influence on the level of awareness of DSS systems.

## 2.5 *Experience*

**H<sub>0</sub>:** The higher the period of experience of an employee in the workplace, the higher the level of awareness of DSS systems and their services.

**H<sub>1</sub>:** The level of experience of an individual in the workplace has no influence of the level of awareness of DSS systems.

## 3. Data analysis and discussion

### 3.1 *Factor Analysis on the results*

Factor analysis is a statistical method that is used to describe the variability among observed, the correlated variables with regard to potentially lower number of unobserved variables called factors. In this research, the researcher conducted factor analysis eight DSS systems awareness against the first three DSS system awareness questions. Age showed the highest correlation with the three initial interview questions. A correlation of 0.169 was obtained between age and the rate of awareness that DSS systems help define and analyze problems, a correlation of 0.65 between age and aware that DSS systems provide alternatives to manage scenarios to defined problems and a correlation of 0.122 between age and the awareness that DSS systems enhance the quality of decisions made by decision makers. Thus age significantly affects the awareness of people regarding the importance of DSS systems in defining and analyzing complex organizational problems.

Gender has the highest correlation of 0.107 on the awareness that DSS systems provide alternative scenarios to manage the defined problems. The level of education has however very low correlation levels on the three questions on awareness of the services and the importance of DSS systems. The Area of specialization has the highest influence on the awareness that DSS systems define and analyze problems on behalf of the decision makers. The managerial level also has the highest influence on the awareness that DSS systems provide an easier manner to define and analyze problems with a correlation of 0.182. Experience also showed significant results on its correlation to the awareness that DSS systems define and analyze problems with a correlation of 0.312. The number of courses on DSS systems also had similar results but showed high correlations on awareness of services that DSS systems provide.

### 3.2 *Analysis and Discussion*

Information and communication technology have become an important feature in most of the developing countries. Even though technology, especially the decision support systems still remains a new concept, an increasing number of professions are appreciating the use of decision support systems for development. Researchers and extensionists in the different fields of research are important and very significant in the development of the different sectors in the economy. In the managerial professions, users of decision support systems in the developed countries have suggested massive assistance and beneficial advantages from the use of the systems. Adebayo and Adesope [8] conducted a research in Nigeria aimed at assessing the rate of awareness, access and the usage of information and communication technologies between the female researchers and

extensionists. The research showed that while agriculture remains a core business in Nigeria, the level of awareness of the individuals on the different technologies still remain very low.

As discussed above, the research brought together a total of 164 respondents. The factors that were of main consideration to the researcher included the age of the users, their gender, the areas of specialization, the level of management at the workplace, their work experience and the number and type of courses that the respondents have taken on decision support systems. 27 of the participants were females, making up a total of 16.5% and 137 males who made up a total of 83.5%. Table 1, presents the gender distribution of respondents.

**Table 1:** Gender distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	27	16.5	16.5	16.5
	Male	137	83.5	83.5	100.0
	Total	164	100.0	100.0	

All the participants were divided into five groups depending on their age. The first group was composed of participants below 25 years of age. There were no participants who were in this age group.

Table 1, presents the age distribution of respondents. 17.7% of the total numbers of participants were between the age of 25 years and 30 years. 57.3% of the participants are between the age of 31 years and 40 years. This was the largest group of participants in the research. 25% of the respondents were between the age of 41 years and 50 years while there were no respondents above the age of 50 years. Table 2, illustrates the age distribution of respondents.

**Table 2:** Age distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25 - 30 yrs	29	17.7	17.7	17.7
	31 - 40 yrs	94	57.3	57.3	75.0
	41 - 50 yrs	41	25.0	25.0	100.0
	Total	164	100.0	100.0	

On their level of education, the participants were divided into five categories starting from secondary education, undergraduate education level, university degree level, master’s degree level and those with a philosophy of doctor’s degree. There were no secondary school participants in the sample. 46.3% of the participants had graduated from University and were holders of university degree. 27.4% had completed their master’s education

and are in a possession of a master’s degree certificates from the universities. The remaining 26.2% holds doctors of philosophy degrees in various different fields. 12.8% of the participants majored in business administration, 8.5% have majored on finance and accounting, 36% majored on engineering disciplines, 27.4% on information technology and 15.2% on other disciplines. Table 3 and Table 4, present the educational level distribution of respondents and the specialization distribution of respondents respectively.

**Table 3:** Educational level distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	University Degree	76	46.3	46.3	46.3
	Masters Degree	45	27.4	27.4	73.8
	PhD	43	26.3	26.2	100.0
	Total	164	100.0	100.0	

**Table 4:** Specialization distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business Administration	21	12.8	12.8	12.8
	Finance & Accounting	14	8.5	8.5	21.3
	Engineering	59	36.0	36.0	57.3
	IT	45	27.4	27.4	84.8
	Others	25	15.2	15.2	100.0
	Total	164	100.0	100.0	

With the above mentioned levels of study and specialization, 34.1% are heads of departments in their places of work, 7.9% are deputy managers, 26.2% are managers, 29.9% are deputy directors and 1.8% are general directors or are in high levels of management. 16.5% have had a working experience of between 5 to 10 years, 36.6% had an experience of between 11 years and 15 years, 7.9% have had an experience of between 16 and 20 years while the remaining 39% have had an experience of more than 20 years in the field. In their studies, 62.2% of the participants have taken no course in decision support systems, 21.3% have taken 1 course in decision support systems, and 16.5% have had 2 courses while only 1.2% have had three courses in DSS systems. Tables 5, 6 and 7, presents the respondents distribution for managerial level, experience level and courses attended in the area of DSS respectively.

During the analysis, the researcher compared the gender of the participants and their awareness of DSS as obtained from the responses of the questions on the questionnaire about DSS systems. As may be expected, and as have been evident from other research works on technology, men are the main user of computerized systems.

The responses of the women on the questionnaires clearly depicted that they were not sure of the importance of DSS systems with the provided criteria. Most of the responses ranged from agree to disagree with no response on highly agree level or highly disagree levels. This is to clearly show that they are barely 100% sure that decision support systems perform the specified operations as provided by the question in concern.

**Table 5:** Managerial level distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Head of Department	56	34.1	34.1	34.1
	Manager Deputy	13	7.9	7.9	42.1
	Manger	43	26.2	26.2	68.3
	Director Deputy	49	29.9	29.9	98.2
	General Director/Above	3	1.8	1.8	100.0
	Total	164	100.0	100.0	

**Table 6:** Experience level distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5 – 10 years	27	16.5	16.5	16.5
	11 – 15 years	60	36.6	36.6	53.0
	16 – 20 years	13	7.9	7.9	61.0
	More than 20 years	64	39.0	39.0	100.0
	Total	164	100.0	100.0	

**Table 7:** Courses attended in the area of DSS distribution of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	102	62.2	62.2	62.2
	One Course	35	21.3	21.3	83.5
	Two Courses	27	16.5	16.5	100.0
	Total	164	100.0	100.0	

The first question of the questionnaire required the respondents to explain the level at which they are sure that DSS systems define and analyze problems. According to the responses obtained from the respondents, 36.59% of the respondents explained that they agree that DSS systems assist define and analyze problems, 19.51% do

not know while 43.90% disagree with the statement. Significant results however were obtained regarding this question. On an analysis of the way different genders responded to the question, it was found out that most of the women do not clearly understand or have information regarding whether or not DSS systems help define and analyze problems. 66.67% of the female participants in this research said that they do not know whether DSS systems help define and analyze problems for the users. 25.93% disagree with the statement while the remaining 7.4% agree with the statement. The facts that most of them did not select either strongly agree or strongly disagree shows that most of them are not sure of the responses. The results indicate similar findings as the results found by Jackson et al. [9] on a research on the impacts of race and gender on the use of technology. According to the findings of Jackson, females are not very intense in the use of computer technology except mainly in the use of mobile phones technology. On the other hand, the males, regardless of their race, are more intense in the use of computer and are thus more aware in the use of computer systems. Men had varied responses on the questions and most of them seemed to agree with the statement.

The second question required the respondents to answer on their level of agreement on whether DSS systems provide alternative scenarios to manage the defined problems. The aim was to test how the respondents have worked with DSS systems to understand the different ways in which they use DSS systems to manage decision making problems. Similar to the previous question, women were also not very good at answering the specific question. Out of the 27 female participants who participated in the research, 81.48% of them agreed with the statement, 14.81% disagree with the statement while the remaining 3.7% did not know the response to the question. It was also found out that the individuals between the age of 25 years and 40 years have a very good understanding on the use of DSS systems more than the other age groups. These results are not new and numerous other researchers have obtained similar results in the adoption of technology by the different age-groups. The elderly people have continued to lag behind in benefiting from technology and the internet. As seen from the responses of the different age groups, individuals beyond 40 years seem to have lagged behind from the adoption of decision support systems. Czaja and Lee [10] explains that one of the benefits that information technology offers to the elderly people is the significant potential of remaining independent for a longer time. However, despite these many advantages, the reported gap in the use of technology still exist. [11,10,12,13]. The digital divide means that despite all the potential advantages associated with the use of technology, the elderly people still remain behind in their exploitation of information technology. This research also produced similar results as those discussed above. As a result of the low usage of technology by the old aged, the world has been faced by a major challenge in the development and the construction of an exclusively informed society.

The third question aimed at researching the knowledge of the participants with regard to the efficiency and the effectiveness of decision support systems. The participants were either required to agree or disagree with the statement that decision support systems minimize the costs, the efforts and the time of carrying out activities. Varied responses were obtained with regard to this question. However, most of the participants agreed with the statement. 34.76% of the total number of participants agreed with the statement while 52.44% disagree with the statement. Moreover, 12.80% do not know whether the system minimizes time, efforts or the cost of decision making. The responses of the respondents depicted the high levels with which most people have not adopted the use of decision support systems in their operations. It was however noted that the level of management and the level of education have a direct impact on the awareness of the participants on the use of decision support

systems. The results of this study on the impacts of the level of education and the level of management produced similar results as those obtained by Fawole and Olajide [14]. According to their research, the people with low levels of education have very basic information or had no information at all regarding the technology today. Fawole and Olajide [14] explained that among the farmers that formed the participants in the research had no formal education. Only the older technology was prevalent among them. The results of this study showed that the managers are the main users of decision support systems and have some, though basic, information regarding the use and the different abilities and services provided by decision support systems. A research conducted by Riddell and Song [15] showed that educated workers tend to highly affect and influence the adoption of technology by the employees. The research also showed that education increases the probability of an individual to use computers and thus increasing the awareness of the individual regarding the different types of computer systems and applications. Participants with doctorate and masters degrees seemed to have a better understanding of decision support systems than their counterparts.

On the question regarding the application of decision support systems, 7.32% of the total respondents explained that they do not have any information as to whether or not decision support systems have any impact on the amount of paper work that an individual does. 48.78% of the participants agreed with the statement that decision support systems reduce the amount of paper work that is required in making decision regarding the different operations in the workplace. The remaining 43.90 explained that decision support systems have no impact on the amount of paper work that is required. Based on the responses, the individuals that agreed with the statements did not highly agree which shows that there is a level of uncertainty in responding to the specific questions. Based on the fact that most of the participants in the research are in the management levels in their workplaces, there exists very low knowledge of decision support systems in the industry. Researchers and users of decision support systems, especially in the developed world, have shown that decision support systems enable them to reduce most of the paper work that mainly characterizes the decision making processes. The responses to this question enabled the research in coming up with the conclusion that there is a very low utilization of decision support systems in companies and organizations in the developing countries. The low utilization is mainly as a result of the low awareness of the people in these countries regarding the decision support systems.

The final question was designed to understand the knowledge and awareness of the decision support systems with the regard to the quality of decisions made by the participants. The impacts of unethical decisions on organizations and their stakeholders is significant to the society and has become the focus of most recent research works. Though many organizations regularly assess the quality and the importance of the decisions made by the managerial departments, it is typical the very less attention is given on their ethicality (Carlson, Carlson, Wadsworth [16]. While not every decision has sufficient complexity to warrant the use of decision support systems, providing an individual decision maker with support of a decision support system has been found to rapidly increase the quality of decisions along numerous dimensions, especially when decision support systems have been designed and used [17].

The results of the study showed that 12.20% of the participants do not have the information of whether or not decision support systems enhances the quality of decisions made or not. 42.68% of the total participants agreed with the statement that decision support systems increased the qualities of decisions made by the employees

while the remaining 45.12% disagreed with the statement. Among the individuals that agreed with the statement, most of information technology specialists agreed with the statement. The low rate of usage of decision support systems have made it difficult for the participants to understand the systems and how they work.

#### **4. Conclusion**

In light of the research objectives and the results obtained during the research, and in order to answer the research questions in the research, the researcher has reached to the following conclusions regarding the influence of user awareness on the successful adoption of Decision Support System DSS in developing countries:

The rate of awareness and use of decision support systems is very low in the developing countries.

- The awareness of the different benefits of decision support system is specifically low for the individuals above the age of 40 years, in which age is the most significant for the use of decision support systems.
- In the developing countries, technology is highly used by the youths, and is mainly used for other applications such as social networking sites and applications.
- The level of education has a direct impact on the awareness of individuals on the services offered by decision support systems and the benefits that these systems have on the users. The more an individual is educated, the more aware they are on different aspects of technology.
- Individuals who in their studies specialized in information technology or any computer-related course tend to be more aware of DSS systems than individuals from other areas of specialization. Engineers follow the rating with business and finance and accounting related course students showing the minimal level of awareness.
- The individuals who are in the low levels of management in the organizations tend to have a high level of awareness of decision support systems than the individuals in the higher ranks of management.
- Moreover, the more courses one had on decision support systems, the more they became more aware of the services their offer, how to carry out different activities and the benefits of decision support systems to the organizations.
- More work need to be done in order to raise the awareness of the people in the developing world with regard to the use of decision support systems.

#### **5. Recommendations**

The above study has various implications for software developers, the government, the general public as well as the companies and organizations. It is clear that decision support systems have been very impactful in assisting strategic management personnel in their work of decision making. However, the adoption of the technology is at very low rates especially in the developing countries. In order to attain high rates of adoption and awareness of decision support systems, there is need for more educative lessons to be conducted to educate the people on the importance and the use of decision support systems in their companies.

## 6. Research limitations

Researcher exerted efforts to get benefit of the research results, but there were a number of certain constraints that limit the research results. These limitations should be taken in consideration for any future work.

- The study was conducted on government institutions only and did not cover non-government institutions. The impact of user awareness on the adoption of decision support systems could be different in non-government institutions.
- Data collected from one country on despite that the impact of user awareness on the adoption of decision support system could different in other developing countries.
- The researcher did not consider using various techniques in data collection process to aid proper analysis. The researcher used a single method for collecting data (questionnaire).

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