

# The Relationship between Management Information Systems and Decision Support Systems and its Impact on Decision-Making: An Analytical Study in the UR General Company in Thi-Qar Province

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This paper aims at recognising the relationship between the decision support systems (DSS) and the management information systems (MIS), and the impact of this relationship on decision making (DM) in the studied company. A questionnaire is used to collect data from the sample of 231 employees from some of the departments that are important in the company: Planning Department, Information Centre Department, Human Resources Department, and the Technical Department. These departments represent the biggest managerial departments in the company. The descriptive analysis, the data analysis, and the coefficient of the hypotheses of the study are made. The results have referred to the connecting relationship and the significant impact between the variables of the study. The recommendations are made in a way that enable the studied company to improve the infrastructure and the specialised cadre, and the care for the extracted information and improving the intake systems of data.

**Keywords:** *Decision making, Management information systems, Decision support systems.*

## **Introduction**

The environment of business has changed with the development of the society, technology and the advancement of information technology as a whole, to a great deal. Furthermore, this has affected the information systems in an obvious and effective way, as well as affecting all ways of life. The information systems that depend on the computer aim at facilitating the interaction between the human factor and the information technology. The management information system (MIS) aims at analysing the routine reports and using the different samples and preparing the specialised and specific-framed reports in the field of management to produce information with a value that deals with routine problems which are connected to the middle and high management. Therefore, all other information systems have an integrated relationship with the MIS, and among them, is the decision support system DSS. Therefore, the DSS refers to the interaction between the human factor and the information technology to provide managerial support in the process of making decisions by supplying the managers of the systems with informational tools, such as tables, diagrams, samples and stimulation. It helps in solving the framed and the semi-framed problems due to the fact that the decisions do not rely on the technology of analysing, sampling and the search for ideal solutions — this is to be introduced by the information system.

## **The Problem of the Study**

The problem statement lies in showing the role that the international relationship performs (MIS, DSS) and the impact of this relationship on decision making. In other words, there is a philosophy that explains the importance of the relationship between the MIS and the DSS in making changes that may be radical within the UR General Company in the Thi-Qar Province, to achieve through it the correct information that helps the decision maker. Hence, the study aims at answer and achieve the following:

1. To what extent do the MIS and DSS affect the decision making (DM) in the UR General Company?
2. Recognising the role that the MIS and DSS play in the decision-making process.
3. Directing the attention of the decision maker in the UR General Company to the fast advancement in the field of information technology, both on the partial and entire levels.
4. Analysing the international relationship between the MIS and DSS with their dimensions in the process of decision-making.

## **The Significance of the Study**

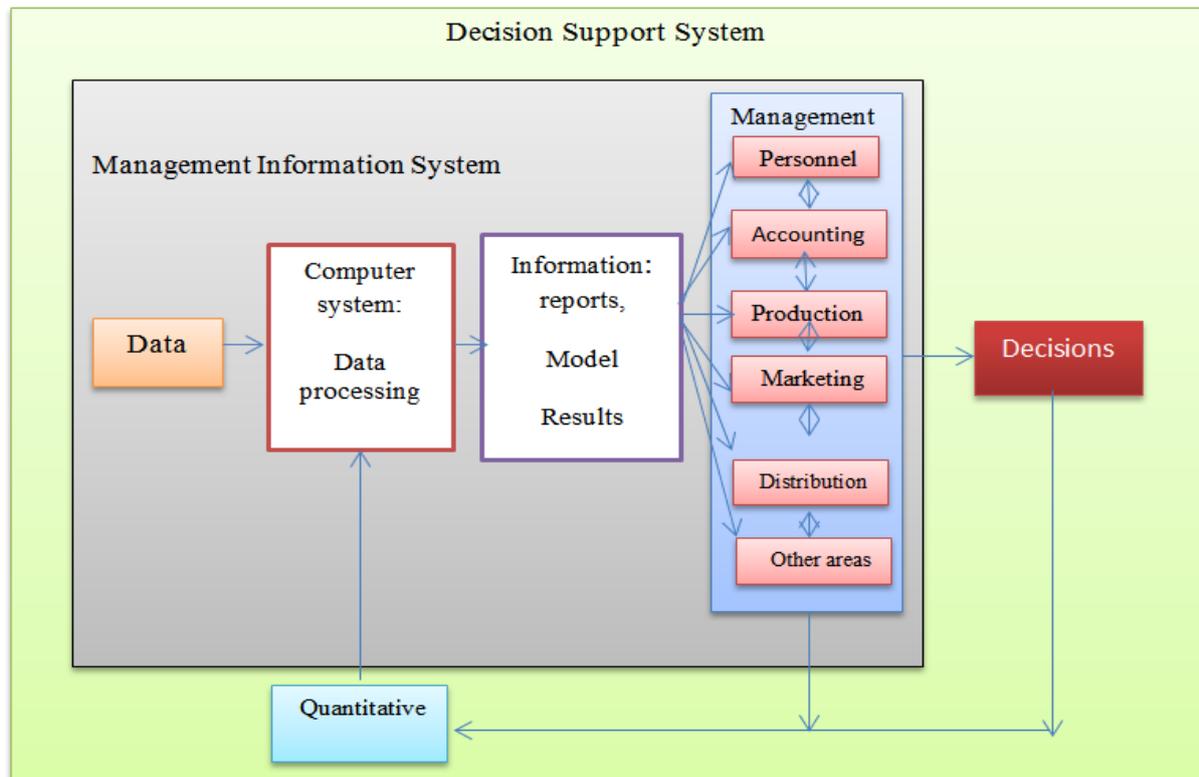
1. Increasing the awareness of the management teams regarding the importance of the MIS and DSS in the UR General Company.

2. Identifying the importance and the accuracy of the correct information in helping the decision maker through the MIS and DSS.
3. Demonstrating the importance of the information system for high management and the prior experience due to their lack of welcome for the scientific approach of obtaining the information.

### Sample of the Study

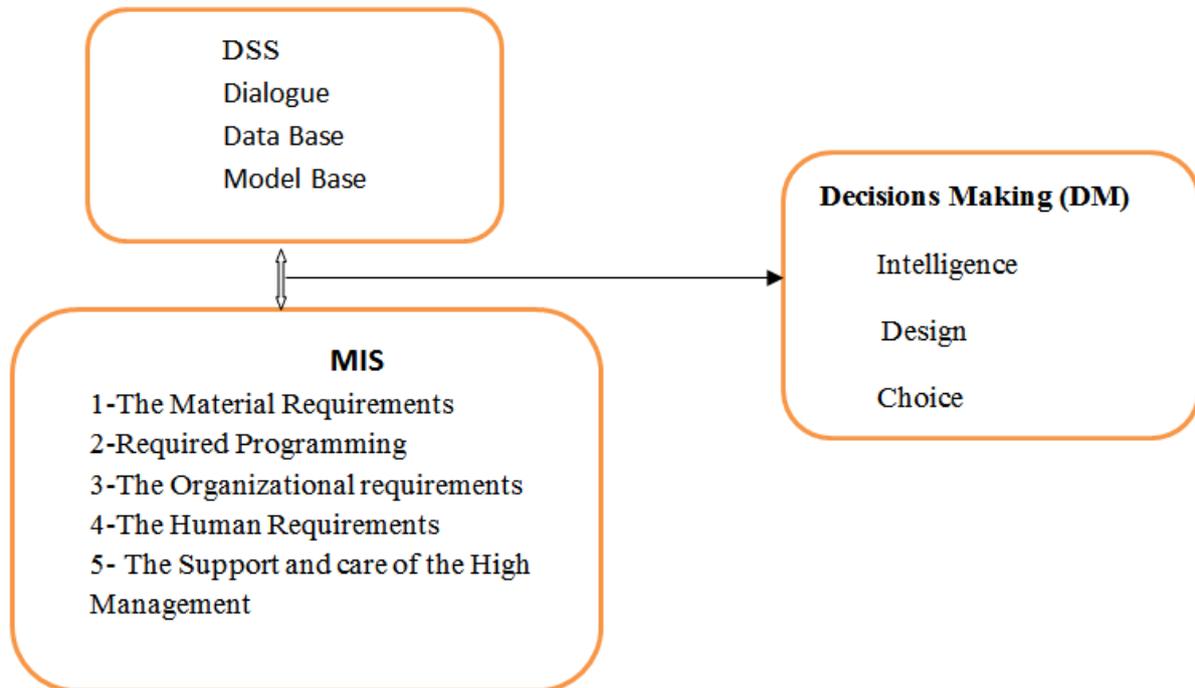
The researchers in this study relied on the sample of Russel and Taylor III (2000: 259) in identifying the independent variables (MIS and DSS) and the dependant variable (DM), as well as determining the relationship between them through the dimensions of every variable. This is shown in Figure 1 below.

**Figure 1.** Decision Support System



**Source:** Russell, Roberta s. & Taylor III, Bernard W. (2000), Operations Management, Third Edition, prentice Hall.

**Figure 2.** DSS, MIS and Decision Making



**Source:** Suggested Sample by the researchers, based on (Russel & Taylor III, 2000: 259).

### Hypotheses of the Study

Based on the problem statement, the main hypotheses have been formulated as follows:

#### *The First Main Hypothesis*

There is no significant relationship between the **DSS** and **its dimensions** (the dialogue, data base, model base) and the **MIS** on a level of significance of 0.05, and from which the three hypotheses branch as follows:

1. H01: there is no significant statistical relationship between the **DSS** and the **material requirements** on the significance level of 0.05.
2. H01: there is no significant statistical relationship between the **DSS** and the **required programming** on the significance level of 0.05.
3. H01: there is no significant statistical relationship between the **DSS** and the **organisational requirements** on the significance level of 0.05.
4. H01: there is no significant statistical relationship between the **DSS** and the **human requirements** on the significance level of 0.05.
5. H01: there is no significant statistical relationship between the **DSS** and **the support and care of the high management** on the significance level of 0.05.

### ***The Second Main Hypothesis***

There is no significant statistical relationship between the **MIS** and the **DSS** on the one hand, and the **decision-making (DM)** on the other, in a level of significance of 0.05, and from which the following hypotheses branch:

1. H02: there is no significant statistical relationship between the **DSS** and the **MIS** regarding **intelligence**, in a level of significance of 0.05.
2. H02: there is no significant statistical relationship between the **DSS** and the **MIS** regarding **design**, in a level of significance of 0.05.
3. H02: there is no significant statistical relationship between the **DSS** and the **MIS** regarding **choice**, in a level of significance of 0.05.

### **The Society and the Sample of the study**

The society of the study is formed by the employees of the UR General Company in the Thi-Qar Province. The company has 3,214 employees. Whereas, the sample of the study includes some of the important departments in the company, including the Planning Department, Information Centre Department, Human Resources Department, and the Technical Department. These departments represent the biggest and the main managerial departments in the company. The number of employees identified in these above-mentioned departments is 231.

### **Decision Support Systems**

The support of the decision is the approach to decision-making that is based on the scientific approach. Making appropriate decisions in businesses is usually based on the quality of the data and its analysis and finding the directions that lead to gaining the best solutions among the substitutes that are available. The DSS simply focusses on providing the suitable support for the decision maker (Ibrahim, 2013: 171). From this point, the role of the DSS starts, which is built on a computer that provides the required dialogue between the manager and the DSS, in order to get the right information that is built on the scientific approach to support the process of making decisions (Alhousseini, 2013: 34). Alnajar (2007: 125) has referred that the DSS is an integrated group of programming, readymade sets and samples, and treatment tools that interact with the information and data to introduce the suggested solutions. Furthermore, the DSS can integrate many samples to form an integrated sample, introduce management programs, and produce the dialogue as it allows the decision maker to interact with the system and directly address it, to regain the information that benefits in making decisions that are framed and semi-framed. Yasin (2009: 66) described the DSS as the information systems that are interactive and computing that assumes the support of the framed and the semi-

framed decisions. Issani and Jabiry (2016: 16) view that it is information systems that aim to help the managers in making decisions that are unconstructive and repeated. They are the systems that depend on the computer in order to introduce the help that is necessary for making decisions that are related to the semi-framed tasks, through integrating the data base factors and the quantitative samples (statistical, mathematical and researches of the processes), in addition to taking into consideration the viewpoint of the decision maker (Alariani, 2016: 4). They are interactive information systems that provide the managers with information, samples and data treatment tools that help them in making decisions that are framed and semi-framed, especially in the circumstances where there is no certain and suitable decision that is necessary to take. Abuelghanam (2008: 51), and Thripathi (2011: 112) define the DSS as the system of information that is interactive, flexible and adaptable. Moreover, based on a computer, it uses the rules of decision and its samples, the base of the sample along with the entire database and the special visions of the decision maker that performs certain decisions, and is ready to be implemented to solve the problems. Meanwhile, Hasan et al. (2017: 154) defined the DSS as the application that is built on a computer and improves the ability of the individual or the group in the process of decision-making. The dimensions of the DSS that are to be taken into account in the research are (Alhusseini, 2013: 42):

- The preface of the users (dialogue)
- Data Base
- Model Base
- Management Information Systems (MIS)

Alhadithy and Alkheikh (2019: 62) define the MIS as a group of components that work with each other collectively as a calculated system that collects the data, processes it and transforms it into information of value and benefit, sending it to the decision makers in the right timeframe to help them performing many tasks. Alazawi and Alkhafaji (2015: 79) defined the MIS as the group of human and mechanical components that work together in collecting data and processing, analysing, and directing it according to the rules and briefed procedures for specific purposes, in order to make them available for the decision maker in a form of appropriate information. Meanwhile, Alsammarai and Alzubi (2015: 49) understand it as a system of discipline, designed to transfer and transform the information on the managerial levels after supplying and updating them to enable the administration to make the right decisions and with the best methods. The MIS appears as an integrated system of factors, multi-dimensional and multi-applications, yet it is necessarily formed of secondary information systems. This includes the secondary marketing system, the accounting and the financial information secondary system, and the secondary system of the information process, which forms a federal union based on the data warehouse or data management systems

(Yasin, 2012: 54). Based on the above, the important benefits that the MIS introduces are as follows (Abid Raba, 2013: 6):

1. Introducing the information for the different levels of the management to help them in making decisions.
2. Introducing the information to all the employees to help them in performing their work activities.
3. Helping in evaluating the activities of the organisation and proceeding the monitoring process.
4. Helping the managers to anticipate the future regarding all the activities of the organisation.
5. Saving the data in order to introduce them for the users when needed.

Furthermore, the dimensions of the MIS that are used for the research are (Alwadiya, 2015: 6):

1. The material requirements
2. The programming requirements
3. The organisational requirements
4. The human requirements
5. Supporting and care for the higher management

### **The Relationship Between the MIS & DSS**

There are two views that look at the relationship between the DSS and MIS. Firstly, the practical viewpoint of the evolution of the DSS from the MIS through using the DSS in making decisions on the level of the executive management. Meanwhile, the academic viewpoint refers that the MIS and DSS facilitate the collecting and saving of data for the management and processing it and using it in decision-making. Alshubki (2010: 29) has identified the components of every system of the MIS and DSS from the point of view of the inputs and the output processes, and from the other side of the benefit of the quality of each system, as shown in Table 1 below:

**Table 1:** MIS & DSS properties

<b>DSS</b>	<b>MIS</b>
It is based on the data base, model base, and management systems for each of the model base and data base.	It is based on the data base and the systems of managing the data bases.
It doesn't produce or distribute the information but contributes to support the decisions through building the models, analysing the substitutes, and suggesting the solution (interaction-simulation and analysis).	It produces valued information and presents it in the right timeframe (analyses and routine reports).
It is connected to the higher and the middle authority but is mostly used by the technicians.	It is connected to the higher and the middle authority.
It can be used to support the unrepeatable, unexpected and the semi-framed problems.	It deals with framed and routine problems, whereas, the information that it introduces is in the form of diagnosing reports or extraordinary reports and this information is usually enough to support making the framed decisions, but it is with limited benefit regarding the semi-framed problems.

### **Decision-Making (DM)**

The process of making decisions has huge importance in our personal life and the life of the managerial organisations, both in the long and short term. Therefore, the process of decision-making is the essential activity of the individual and the group in their own life or the work environment. Hence, the significance of the decision-making emerges on the level of managerial organisations, as the managerial decisions are the essential work of the administrative leadership, and it is the starting point of all the activities and the behaviours that are happening within the organisation, moreover, in its relationship and interaction with the external environment.

The importance of decision making can be generally referred to through the expected and arranged results on the decision making, as the decision making is an essential process in management. Therefore, the process of making decisions may be the only process that distinguishes one manager from another one or one successful from a failure. He may make a decision that concerns the general objectives, policies, adjusting the organisational framework, employing an employee, issuing a promotion or directing the employees and solving their problems (Alwadia, 2015: 44). The importance of the decision-making for any

organisation may be manifested through associating with the different practical and managerial sides in the forms of planning, coordination, polices and communications. This is because the success that any organisation may achieve is, to a further extent, based on the ability and the capability of it in making the appropriate decisions (Kenan, 2009: 388).

Awad (2012: 221) defines decision-making (DM) as the outcome of the process of the decision making, that is the stage related to finishing the selection process, and the stability of the one substitute that is the decision. Alian (2010: 59) defines DM as the objective and mental work that aims at choosing the appropriate substitute to solve the problem that faces the decision maker, among the group of the available options.

As for the dimensions of the DM that are recognised and assumed in this study, made by Herbert Simon (Khalfi, 2009: 68), they are as follows:

- Intelligence
- Design
- Choice

## **Discussion of the Results of the Statistical Analysis and Examination of the Hypotheses**

### ***Measurement of the Stability of the Research Tool***

In order to measure the stability of the tool of the research and the amount of the internal harmony of it, the calculated data is subjected to Cronbach's Alpha Coefficient test which calls for the extracted value of more than 60 per cent that is acceptable in the managerial research. This is shown below in Table 2.

**Table 2:** Coefficients of the stability of the internal harmony (Cronbach's Alpha Coefficients)

<b>The Variables</b>	<b><math>\alpha</math> Value</b>
<b>MIS</b>	94
<b>DSS</b>	96
<b>DM</b>	92

These coefficients indicate that the research tool generally has a high stability coefficient to achieve the purpose of the study.

### ***Displaying the Results of the Variables of the Study***

Table 3 shows an arithmetic that is general with standard deviation and difference coefficient, for the variables of the study (DM, DSS, MIS).

**Table 3:** The average, standard deviation and the total and general difference coefficient

<b>Variables</b>	<b>Arithmetic</b>	<b>Standard Deviation</b>	<b>Difference Coefficient</b>
<b>MIS</b>	2.91	0.84	29.32
<b>DSS</b>	3.24	0.53	6.45
<b>DM</b>	3.60	0.59	16.39

The results of the MIS variable have referred to a general arithmetic of 2.91, with a general standard deviation of 0.84, and general different coefficient of 29.32. This reflects according to the viewpoint of the sample of the study, the extent that the company is recognised in the UR General Company with the importance of the existence of MIS that suits with the size of the available information for the high managements and other departments.

Furthermore, the DSS variable reached an arithmetic of 3.24, with a general standard deviation of 0.53, and a general different coefficient of 6.45. Included in Table 3, the high level of DSS in the UR General Company (Thi-Qar) refers to allowing the user in the company to analyse the information with ease and speed and affording it accurately in the right timeframe.

The DM variable obtained an arithmetic of 3.60, and it is higher than the arithmetic of the variables DSS and MIS with a general standard deviation of 0.59, with a general standard deviation of 16.39. This result refers to the high level of the decision-making process through affording the objective and the correct information, which frees the UR General Company of difficulties in making decisions and there is no hesitation in executing it.

### ***Testing the Hypotheses of the Study***

The researchers of this study have worked to test the hypotheses of the study by using the simple and multiple regression to find the relationship between the two independent variables and the dependant variable.

#### **The First Main Hypothesis**

There is no significant statistical relationship between the MIS and DSS, in a level of significance of 0.05. In order to test this hypothesis, it was divided into five sub-hypotheses

and the approach of simple linear regression was used to test each hypothesis separately, as explained in Table 4 below:

**Table 4:** Analysing the simple regression of the relationship between the DSS and the dimensions of the MIS

The Statement	Coefficient (R)	R Square	Calculated F	Regression Coefficient B	Sig Level of Significance
DSS and the Material Requirements	0.49	0.24	69.34	2.26	0.000
DSS and the Programming Requirements	0.54	0.29	89.9	2.21	0.000
DSS The Organisational Requirements	0.48	0.23	63.71	2.35	0.000
DSS and the Human Requirements	0.67	0.44	173.88	1.61	0.000
DSS and the care and the support of High Manager	0.67	0.45	178.06	1.74	0.000

**\*the link with statistical significance in the level of ( $\alpha \leq 0.05$ )**

Table 4 shows the relationship between the DSS and the human requirements. The results of the statistical analysis show the existence of the link relationship with statistical significance between the DSS and the human requirements, as the link coefficient is 0.49, in a level of  $\leq 0.05$  ( $\alpha$ ). The significance of this relationship is asserted by the calculated F that reached 69.34, and it is significant at level of  $\leq 0.05$  ( $\alpha$ ). This asserts the invalidity of the first zero sub-hypothesis and accepts the substitute hypothesis, that there is a significant statistical relationship between the DSS and the human requirements. The explanation of this result reflects that the human requirements start with the company for the DSS.

The results of the statistical analysis in Table 4 show that there is a significant statistical relationship between the DSS and the programming requirements, as the linkage coefficient of 0.54, is on a level of  $\leq 0.05$  ( $\alpha$ ). The significance of the relationship is asserted by the calculated F, which reached 89.9, and it is significant in a level of  $\leq 0.05$  ( $\alpha$ ). This affirms the invalidity of the second zero sub-hypothesis and accepts the hypothesis that there is a significant statistical relationship between the DSS and the programming requirements. Table

4 also stresses the invalidity of the fourth and the fifth zero sub-hypotheses through the results of the statistical analysis that confirms the significance of the relationship with the calculated F-value that reached 178.06, and 173.88, respectively. Hence, the fourth and the fifth substitute hypotheses are accepted respectively, which indicates there is a significant statistical relationship between the DSS and the human requirements (fourth substitute hypothesis) and there is a significant statistical relationship between the DSS and the support and care of the upper management (fifth substitute hypothesis).

### The Second Main Hypothesis

There is no significant statistical relationship between the MIS and DSS and the DM, in a significant level of 0.05. In order to test this hypothesis, it was divided into three sub-hypotheses, and the approach of multiple regression was used to test every sub-hypothesis separately, as explained in Table 5:

**Table 5:** Analysing the multiple regression relationship between MIS & DSS and the dimension of the DM

The Statement	Coefficient (R)	R Square	Calculated F	Regression Coefficient B	Sig* Level of Significance
MIS & DSS & Intelligence	0.56	0.31	49.48	1.45	0.000
MIS & DSS & Design	0.58	0.34	56.09	1.42	0.000
MIS & DSS & Choice	0.58	0.34	55.1	1.46	0.000

#### The link with a significant statistical in a level of ( $\alpha \leq 0.05$ )

The results of the statistical analysis in Table 5 show that there is a linkage relationship with statistical significance between intelligence and the MIS and DSS. Whereas, the link coefficient reached 0.56, in a level of  $\leq 0.05$  ( $\alpha$ ), and with an identification coefficient of (0.31). The value F stresses the significance of this relationship which reached 49.48, and it is significant in a level of ( $\leq 0.05$ ) ( $\alpha$ ). This confirms the invalidity of the zero first hypothesis, and so it is rejected, and the substitute hypothesis is accepted, which shows there is a significant statistical relationship between the intelligence, MIS and DSS.

Meanwhile, the test of the third sub-hypothesis is shown through Table 5, as it shows the relationship between choice, the MIS and DSS. Whereas, the link coefficient has reached 0.58, in a level of  $\leq 0.05$  ( $\alpha$ ), and with an identification coefficient of 0.34. The F value calculated stresses the significance of the relationship which reached 55.1, and it is

significant in a level of ( $\leq 0.05$ ) $\alpha$ . This stresses the invalidity of the third sub-hypothesis and it is rejected. The substitute hypothesis is accepted which indicates there is a significant statistical relationship between choice and the MIS and DSS.

Table 6 shows the coefficient links between the MIS and DSS through the following:

1. The values of the coefficients of the links between the MIS and dialogue are six relationships in a level of 0.01.
2. The values of the coefficients between the MIS and data base have shown six relationships in level of 0.01.
3. The model base has shown six relationships in a level of 0.01 with the MIS.
4. The highest value of the coefficient link achieved was between the totals of the MIS and DSS with a value of 0.69. The lowest value of the link coefficient was between the data base and the organisational requirements with a value of 0.43, on the sub and the total levels.

**Table 6:** The values of link coefficients spearman between MIS & DSS

MIS DSS		The Material Requirements	The Programming Requirements	The Organisational Requirements	The Human Requirements	Support and the Care of the High Administration	Total MIS	The Significant Relationships	
								No.	The Relative Significance
Dialogue		0.47**	0.47**	0.44**	0.60*	0.58**	0.59**	6	100%
Data Base		0.47**	0.44**	0.43**	0.62*	0.55**	0.58**	6	100%
Model Base		0.51**	0.56**	0.61**	0.65*	0.57**	0.68**	6	100%
Total DSS		0.46**	0.55**	0.55**	0.67*	0.65**	0.69**	6	100%
The Significant Relationships	No.	4	4	4	4	4	4	24	-
	The Relative Significance	100%	100%	100%	100%	100%	100%	-	100%

\*In a level of 0.05

\*\* In a level of 0.01

Table 7 has shown the values of the link coefficients between the DM and MIS, as follows:

1. The values of the link coefficient between the MIS and intelligence are six relationships in a level of 0.01.
2. The values of the link coefficient between the MIS and design are six relationships in a level of 0.01.
3. The values of the link coefficient between the MIS and choice are six relationships in a level of 0.01.
4. The highest value of the link coefficient was achieved between the design and the programming requirements with a value of 0.53. The lowest value of coefficient was between the choice and the support and the care of the high administration with a value of 0.19, on the two levels of the sub and the total.

**Table 7:** The values of the coefficients between DM & MIS Spearman

MIS DM		The Material Requirements	The Programming Requirements	The Organisational Requirements	The Human Requirements	The Support and the Care of the High Administration	Total MIS	The Significant Relationships	
								No.	The Relative Significance
Intelligence		0.43**	0.35**	0.37**	0.22**	0.29**	0.44**	6	100%
Design		0.50**	0.53**	0.46**	0.25**	0.29**	0.51**	6	100%
Choice		0.48**	0.47**	0.43**	0.28**	0.19**	0.48**	6	100%
Total DM		0.50**	0.49**	0.43**	0.26**	0.27**	0.50**	6	100%
The Significant Relationships	No	4	4	4	4	4	4	24	-
	The relative Significance	100%	100%	100%	100%	100%	100%	100%	100%

\*In a level of 0.05

\*\* In a level of 0.01

Table 8 has shown the values of the link coefficient between the DSS and DM, as follows:

1. The values of the link coefficient between the DSS and intelligence are four relationships in a level of 0.01.
2. The values of the link coefficients between the DSS and design have shown four relationships in a level of 0.01.
3. The values of the link coefficient between the DSS and choice have shown four relationships in a level of 0.01.
4. The highest value of the link coefficient was achieved between the model base and intelligence with a value of 0.44, on the sub and the total levels.

**Table 8:** The values of the link coefficient between DSS & DM Spearman

DSS \ DM		Dialogue	Data Base	Model Base	Total DSS	The Significant Relationships	
						No.	The Relative Significance
Intelligence		0.48**	0.44**	0.71**	0.56**	4	100%
Design		0.45**	0.51**	0.60**	0.56**	4	100%
Choice		0.44**	0.50**	0.61**	0.55**	4	100%
Total DM		0.48**	0.52**	0.68**	0.59**	4	100%
The Significant Relationships	No.	4	4	4	4	16	-
	The Relative Significance	100%	100%	100%	100%	-	100%

\* In a level of 0.05

\*\* In a level of 0.01

### Recommendations

1. The UR General Company has to thoroughly acknowledge and study the working environment and recognise the decisions that are made inside the company, as well as analysing the methods of making decisions and the results of applying them.
2. The company must rely on the MIS and DSS with consideration to the development of the infrastructure and the specialised cadre.
3. Assuring to follow and update the data base that is used in the UR General Company.



4. Holding regular classes in the systems of the high management to assure confidence in the importance of the information that is correct in selecting the substitutes in the process of making decisions.
5. Working on assuring the flow of the information between the different departments of the UR General Company to help in decision-making.
6. Caring for the extracted information from the MIS and DSS in the UR General Company through the development and the improvement of the inputs of the systems in the data.
7. The high administration must be aware in the company to provide the multiple substitutes through the data base and the models base in decision-making.

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