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Decision Support Systems and Their Relationship to Information Technology Re-Engineering Academic and Administrative Systems in Palestinian Higher Education Institutions

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Abstract— **The aim of the research is to identify decision support systems and their relationship to information technology, to re-engineer academic and administrative systems in Palestinian higher education institutions. The research was applied to four Palestinian universities (Al-Aqsa University, Islamic University, Al-Azhar University, and University of Palestine), and the academic research sample with an administrative position. The descriptive analytical approach was used and secondary data was obtained through a survey list consisting of (81) items that were distributed to the research community using stratified random sample according to the university. (250) survey lists were distributed and (216) were recovered with a recovery rate of (86.4%). The study found a set of results, the most important of which are: The existence of a positive statistically significant relationship between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions. The results showed that there are statistically significant differences between the average answers of the respondents attributed to "university, gender, job title". The results showed that there were no statistically significant differences between the respondents 'average answers due to (age group, academic degree, and number of years of service). The research reached a set of recommendations, the most important of which are: The importance of investing more in information technology in general and decision support systems in particular, to increase the efficiency of academic and administrative processes and provide better and comprehensive services. And that Palestinian higher education institutions must reconsider their organizational structures and re-engineer their operations in line with developments in the field of information technology. And the need for Palestinian higher education institutions to develop the information technology infrastructure in general, and decision support systems in particular.**

Keywords— *Decision Support Systems, Information Technology, Academic and Administrative Systems Re-Engineering, Palestinian Higher Education Institutions, Palestine.*

1. Introduction

Challenges at the global and regional levels have caused a radical and accelerating transformation in all aspects of life, in addition to what resulted from the information and communication technology revolution and the resulting abolition of distance, time and space barriers and the availability of a vast amount of information for decision-makers. [19] see that decision-makers are required in many cases to research continuously to identify the variables and challenges that affect the acceleration of development and scientific development and increase [13].

Decision support systems are one of the important types of computer-based information systems that are increasingly used in decision-making. The decision support system helps the decision maker find a good formula for decisions, semi-defined or structured problems and situations, which have predetermined procedures that can be considered a basic procedure in Decision support system in addition to situations that occur in a rare or infrequent manner [15].

Re-engineering is of great interest to administrators to distinguish it from other methods of organizational change by relying on making

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fundamental changes and it requires redesigning all the procedures, tasks, actions and systems that the organization undertakes to achieve tangible and substantial developments in various fields. This method also represents a starting point for institutions to achieve their goals. Strategy and improving its performance, whether strategic or operational [6]. Many studies have focused on the necessity of a set of factors for the success of applying the re-engineering method in institutions. Availability of these factors is a key element for the success of applying and adopting this method, and ensuring that these requirements are met is an important organizational basis for the re-engineering method[18].

2.   Problem Statement

Through the researchers' acquaintance, the research problem is determined by the following questions:

Q1-: What are the most common types of decision support systems used in Palestinian higher education institutions?

Q2-: Is there a relationship between decision support systems and information technology re-engineering academic and administrative systems in Palestinian higher education institutions?

Q3-: Are there differences between the respondents 'average opinions about decision support systems and their relationship to information technology re-engineering academic and administrative systems in Palestinian higher education institutions due to personal and organizational variables (university, gender, age group, academic degree, years of service, title, Career)

3.   Research Objectives

The main objective of the study is to identify decision support systems and their relationship to information technology, to re-engineer academic and administrative systems in Palestinian higher education institutions, and it also seeks to achieve the following set of objectives:

- To shed light on the extent to which Palestinian higher education institutions possess the dimensions of decision support systems, and to show the effectiveness of the current systems used in producing the information necessary for decision-making in Palestinian higher education institutions.
- Presenting the philosophical framework and principles of decision support systems, and re-

engineering of academic and administrative systems.

- Highlighting the role of the capabilities (physical, human, technical, and organizational) available for the use of decision support systems in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions.
- He drew the attention of decision-makers and officials to the importance of paying attention to decision support systems, in order for them to be able to deal with the rapid changes on the various aspects of his speech entries that have proven successful in developing and distinguishing higher education institutions.
- Presenting one of the most important modern methods and models in management science, which is the method of re-engineering, by shedding light on the concept and reality of re-engineering and the tasks and activities associated with it in light of recent technological developments, which may be adopted by higher education institutions.
- Demonstrate the importance and need for Palestinian higher education institutions to apply the method of re-engineering related to decision support systems, as one of the approaches to improving academic and administrative services and raising their efficiency.
- Presenting a number of recommendations of interest to decision makers to enhance the use of decision support systems that help in applying re-engineering of academic and administrative systems in Palestinian higher education institutions.

4.   Research Importance

The study derives its importance from its subject, and aspects of the importance of the study can be determined from the contribution and the expected addition, as follows:

- This study derives its importance from the vitality of the topic it deals with, and its relative scarcity, as this topic is characterized by both modernity and scientific and practical excellence.
- This study sheds light on decision support systems and their relationship with information technology. Re-engineering academic and administrative systems in higher education institutions, which contribute to developing and

increasing the efficiency of Palestinian higher education institutions.

- The study represents a call for re-engineering in Palestinian higher education institutions by recognizing their performance and redesigning their academic and administrative processes in line with the requirements of the times.

- The study is useful in defining re-engineering as a new strategy for change, which leads to a change in academic and administrative performance in line with the available competencies, through the application of this strategy.

- This study gives a scientific evaluation of universities on the subject of decision support systems and on re-engineering and their programs, which contributes to developing the efficiency and performance of Palestinian higher education institutions and upgrading their academic and administrative level.

- The study in practice provides recommendations and suggestions for decision makers in Palestinian higher education institutions to develop the performance of Palestinian higher education institutions by using re-engineering, thus helping to achieve the development of their academic and administrative systems.

5. Research hypothesis

In order to provide an appropriate answer to the scholarly questions raised, the study seeks to test the validity of the following hypotheses:

H0₁: There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions.

H0₂: There are statistically significant differences at the level of significance ($\alpha \leq 0.05$) between the averages of respondents' responses about decision support systems and their relationship to information technology Re-engineering academic and administrative systems in Palestinian higher education institutions due to personal data (university, gender, age group, Scientific grade, number of years of service, job title).

6. Research Limits and Scope

The scope of the study shall be as follows:

The Objective (Academic) Limit: The study was limited in its objective extent to the study of decision support systems and their relationship to information technology, re-engineering academic and administrative systems in Palestinian higher education institutions.

The Human Limit: The study was conducted on academics with an administrative position working in Palestinian higher education institutions in the Gaza Strip.

Spatial Limit: The study was conducted in the State of Palestine, and it was limited to Palestinian higher education institutions in the Gaza Strip.

Time Limit: The study was conducted in the year (2020).

7. Literature Review

➢ Study of [11], which aims to manage the financial business of colleges and universities, and establishes a financial participation platform centered on "cloud computing", and re-establish the financial accounting process, financial institutions, employee allocation, financial payment process, fund settlement process, the system can deal With a wide range of big financial data. The results of the study: Big financial data led to an increase in complex spending, resulting in employees' inability to handle financial data, re-engineering of the financial system of colleges and universities is imminent, and it is imperative to use completely new thinking in implementing comprehensive reforms.

➢ Study of [16] aimed to identify the perceptions of employees at Sonatrach about the level of use of information technology in the organization and its role in re-engineering operations. The most important results of the study were: The need to adopt a clear and explicit method of re-engineering the operations of the organization. And the importance of continuous investment in the components of information technology and the need to increase reliance on information technology to support process re-engineering.

➢ Study of [3] aimed to promote the use of decision support systems and Re-engineering of Operations and Business - Applied Study of the Palestinian universities in Gaza. This study was applied on Palestinian University in Gaza strip, Palestine. This research depends on decision support systems. Second dimension Re-engineering of Operations and Business was developed by the authors. The control sample was (500). Several statistical tools were used for data analysis and hypotheses testing, including reliability correlation using Cronbach's alpha,

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"ANOVA", Simple Linear Regression and Step Wise Regression. The overall findings of the current study suggest that no statistically significant impact on top management support to promote the use of decision support systems in the Re-engineering of Operations and Business at the universities in the Gaza Strip, the results highlighted that there is a statistically significant effect on the impact of decision support user systems type to promote the use of decision support systems in Reengineering of Operations and Business at Palestinian universities in the Gaza Strip, and that there are statistically significant differences between the mean study sample estimates of the impact of the decision support systems Reengineering of Operations and Business in Palestinian universities in Gaza due to the variable Gender in favor of males, and the existence of differences for the age variable relative to the field of "senior management support for the use of decision support systems" by the respondents, aged (45-55 years) and (55) years and over, and the presence of differences for the variable level of education relative to the field of "senior management support for the use of decision support" by the respondents, who hold master's degrees, and the existence of differences to the variable name of the university systems and that each area of study for the benefit of the Islamic University , Al-Azhar University and Al-Aqsa University, and the existence of differences for the variable years for service to the field of "senior management support for the use of decision support systems" by the respondents, who have service between (15-20) years and 21 years and over. The current study is unique by the virtue of its nature, scope and way of implied investigation, as it is the first study at Palestinian Universities explores the status of Enhancing the use of Decision Support Systems for Re-engineering of Operations and Business, and Recommended increasing interest in decision support systems through continuity, keeping pace with technological means and modern techniques.

➢ Study of [6] aimed at knowing the role of decision support systems in making strategic decisions in an economic enterprise. The most important results of the study were that decision support systems are a tool or technology, aiming to convert administrative work from traditional information systems to computerized work, in order to make appropriate strategic decisions and give the institution a competitive advantage that distinguishes it from other competing institutions. It is imperative to provide the various basic capabilities of material, technical, organizational, and human resources, as well as the support of senior management as the basic pillar for the implementation of decision support systems. And the existence of awareness in their frameworks of the effective role that results from applying it to the institution and the benefits arising from it. The availability of programs and capabilities that help to implement it, which makes them eligible to keep pace with the rapid technological developments.

➢ Study of [7] aimed to identify the role of information technology in re-engineering administrative processes (engineering) from the point of view of workers in the UNRWA office, Gaza Regional Office. The most important results of the study were: There is a statistically significant relationship between communication technology and administrative process engineering. There is a statistically significant relationship between software and administrative process engineering. There is a statistically significant relationship between the physical components and the engineering of administrative processes. And the existence of a statistically significant effect of information technology on re-engineering administrative processes.

➢ Study of [9] aimed to suggest a smart decision support approach for assigning references. Integration of knowledge from important research models and expert processes. And to maximize the level of expertise allocated to the proposals for all reviewers. And the effectiveness test in the case of government funding agency in the world. The results of the study were: The use of the decision models approach to identify increases the level of expertise allocated to the proposals. It also leads to a balance also in the distribution of proposals in different degrees, and resolves conflicts of interest between the reviewers and applicants. And its application in the National Natural Science Foundation in China has increased its effectiveness and efficiency.

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➢ Study of [10] aimed to identify the importance, necessity and justification for re-engineering the supervisory system in Egypt to carry out a course. And learn how to take advantage of information technology support to re-engineer the system of control over public funds and support for its client to operate it, activate and improve its performance. The most important results of the study were that information technology supports the re-engineering process itself, and information technology supports the regulatory system after re-engineering through its support for the performance of the control system. And the necessity to rely on the appropriate technology (hardware, software, communications) according to the nature of the process to be re-engineered to ensure that the re-engineering is carried out according to a sound basis. And the need for comprehensive coordination between the tools used in re-engineering, whether databases, operation, report or communications. And that the top management should support the re-engineering process by relying on information technology to fix any errors up to date. And the provision of adequate infrastructure for the application of information technology and the communication process.

➢ Study of [11] aimed to identify the degree of agreement among professors regarding the extent of the electronic administration's contribution to re-engineering administrative processes in some of the M'sila state secondary schools. The most important results of the study were: A moderate degree of agreement regarding the extent of electronic management's contribution to the re-engineering of administrative processes, and that the difference is statistically and practically insignificant from the professors 'and professors' viewpoints regarding the e-management's contribution to re-engineering administrative processes, as the size of the impact was zero to average for all fields of study. , Which indicates that there is no difference between professors on the role of electronic management in re-engineering administrative processes, and thus changing administrative performance and developing it.

Commentary on Previous Studies and Their Analysis:

By reviewing previous studies that were conducted in the field of research, the researcher found that all previous studies have a high scientific and research list, and the researcher found that these studies depend on polling the opinions of the parties to the research problem through the survey list, and that there is an increasing interest in decision support systems and re-engineering. The current study is concerned that all studies should be recent to represent the reality in our time, which is characterized by being a rapidly evolving and changing reality. It should be noted that the current study attempted to address the gap that was not covered by previous studies that dealt with the issue of decision support systems and the issue of re-engineering, and by presenting and analyzing previous studies.

8. Theoretical Framework

First - Decision Support Systems

Organizations have begun to use decision support systems to obtain the necessary information to support decision-making processes at the higher administrative level, which is a less expensive and time-saving process. Computer-based decision support systems interact with the decision-maker through the information they provide to reach quality decisions. . Senior management is now able to determine its information needs and obtain it in a way that serves its purposes. For this reason, decision support systems are considered one of the most important developments that have occurred in information technology, because of their important and sensitive role in linking the decision-making process of senior management to the process of using computers [12].

The Concept and Definition of Decision Support Systems

The main concept of decision support systems is that they represent a relatively new way of thinking using computers for administrative purposes. They are computer-based systems designed with the aim of improving productivity and increasing efficiency by supporting decision-makers and policy makers. These systems are applied in long-term planning fields [13].

Decision support systems are flexible, and interact with users with high efficiency, as they are designed to support decision-makers in an uncertain and unstructured environment, and electronic list software is one of the most popular examples used for decision support systems [14].

Through reviewing a set of definitions of decision support systems, we find that [14] defined it as one of the types of systems that support decision-making activities within the administrative apparatus, where

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the decision-making process is the basis of the administrative process. [15] defined them as interactive information systems that provide managers with information, models and data-processing tools that help them make semi-structured and unstructured decisions, in those circumstances in which no one knows exactly what decision to take. While [16] defined it as an extension of management information systems, which provide managers with the tools and data they need to make decisions, while management information systems provide the structural and routine information necessary for administrative decision-making, then the field of decision support systems helps managers solve unstructured and non-routine problemsp [12].

Importance of Decision Support Systems:

Decision support systems of different generations have emerged due to the objective need for departments to have techniques and tools to support complex decisions that are subject to conditions of risk and uncertainty, as it is that effective mixture of human intelligence, information technology and software that interact with each other in order to solve complex problems, and the importance and benefits of these can be summarized. The systems are as follows[18]:

- Decision support systems are distinguished by their development from other information systems by integrating technology and operations research within the framework of the efficiency of the decision-maker.
- Increasing the number of alternatives and the ability to choose the optimal alternative from the pool of alternatives tested by providing a faster sensitivity analysis and faster response. It can provide support for a series of interconnected decisions, providing support for all stages of the decision-making process.
- A better understanding of the business enables decision-makers to see the relationships, which can be used to prepare a holistic business picture.
- Quick response to unexpected situations, easy review of forms and quick visualization of variables.
- The ability to perform analysis for a specific purpose, providing a set of various technical means and methods for preparing analyzes for specific purposes.
- Improved communications and oversight, documented and improved communication

channels, more consistent plans and standardized accounting procedures.
- Save time and costs, shorten office work and reduce overtime, thus saving costs.
- Better decisions, better teamwork, better efficiency and use of data resources.

The researchers believe that the use of decision support systems provides advanced information technologies that lead to the organization obtaining an important advantage over all its competitors who do not use these systems and technologies.

Aims and Principles of Decision Support Systems:

Decision support systems have many benefits, including the ability to support solutions to multiple problems, quick reactions to unexpected situations that result from a change in circumstances, support the decision-making process and facilitate its completion, improve administrative control, reduce the cost of decision-making, improve management effectiveness through Make quick and accurate decisions [13]. Decision support systems are designed to solve problems in their semi-structural and unstructured parts, to help managers separate the places and parts of the problem so that they can use their expertise and judgment in solving it through its basic components: data management systems, and models Knowledge and user interaction [11].

[9] stated that the objectives that a decision support system should achieve are:

1. Assisting managers in making decisions to solve semi-structured (complex) problems.
2. Supporting managers' decisions rather than changing them.
3. Improving the effectiveness of decision-making, not just its efficiency.

These objectives are linked with three principles of the concept of decision support systems, which are as follows [15]:

1. **Structuring The Problem**: It is difficult to find a fully structured or unstructured problem. Rather, most of these problems are semi-structured problems. This means that decision support systems refer to this area where most of the problems exist.
2. **Decision Support**: The following figure shows the relationship between the problem structure and the degree of support provided by the computer on certain parts of the problem composition, so that the manager and the computer work side by side as a team to find solutions to the problems that fall within the unstructured (complex) problems.

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3. **Decision Effectiveness**: Not only do decision support systems aim at efficient decision-making, but the real benefit is good decision making.
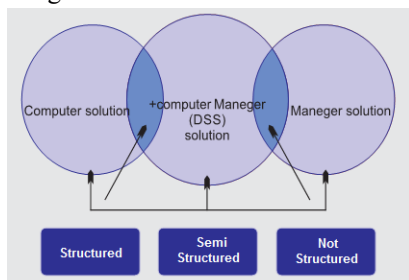

Figure (1): Degree of problem structuring
Source: [16]

Characteristics and Components of Decision Support Systems

Decision support systems are concerned with supporting decision-makers by providing the necessary data and models to solve unstructured and semi-structured problems. From the above, some basic features that distinguish decision support systems from other computer-based information systems can be explained. The most important characteristics of decision support systems can be summarized as follows [8]:

- The system provides support to the manager, as the system cannot replace him and be a substitute for the decision maker. Rather, it focuses on the non-routine parts of the problem in order to reach the provision of support and support in the decision-making process.

- A distinction must be made between the decision support system and computer tools from the programs and devices that make this system possible. The decision support system is the application of these programs and devices.

- The support system does not substitute the decision-maker for resorting to judgment and personal judgment, as not all decision-making can be subjected to quantitative analysis.

- Effective decision-making takes place through the interaction of the decision maker and the system, and this is accompanied by the dialogue between them.

Decision support systems consist of: inputs, processes, outputs, and feedback, and we will explain each of these components as follows:

A. **Inputs**: These inputs are represented in students as materials, classrooms, libraries, books, demonstration aids, laboratories as equipment, members of the teaching and administrative staff as individuals, fees paid by students and government grants and investment returns as

money, and knowledge of the market needs of human competencies and skills as information[9].

B. **Operations**: The University has its operations represented in the lectures, seminars and exams students receive in order to provide students with sufficient skills needed by society [10].

C. **Outputs**: After the input and processing process, the system extends the surrounding environment with its outputs, which were inputs that were transformative processes. At the university, students with their skills and education constitute the university's outputs [11].

D. **Feedback**: The system provides the possibility of obtaining information about the previous three stages so that adjustments can be made in any of them. At the university, for example, its administration may decide to establish a new laboratory because the information indicates that the number of current laboratories is not sufficient[8].

Despite the multiplicity of the concepts of decision support systems, there are a number of important components that must be met in decision support systems. The decision support system consists of three elements that interact with the user of the system, and these elements include the database, the model base, and the dialogue base, see the following figure.
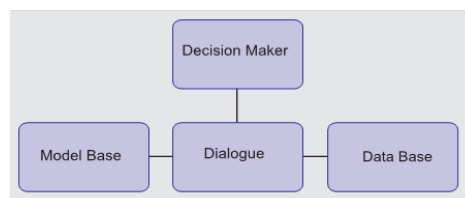

Figure (2): the components of decision support systems
Source: [8].

Some believe that decision support systems consist of five subsystems that include each of the decision support systems that are data-oriented, models-oriented, knowledge-oriented, communication-oriented, and document-oriented, where researchers will explain the components of decision support systems as follows:

The Possibilities of Decision Support Systems

Decision support systems are distinguished from other types of information systems with high analytical capabilities, as these systems are designed to include within them many data analysis models, and decision support systems rely on the use of

programs that are easy to encourage direct use of the system, and the use of these systems is characterized as interactive Al-Kurdi and Al-Abd, 2003)), there are many capabilities that decision support systems enjoy, including[8]:

- Supports one-time decisions that are not repeated except in a rare case.
- It harnesses analytical, modeling tools and databases to support decision-making.
- Assist in the scenario planning process by making use of the capabilities of answering what-if questions.
- The emphasis is very much on the graphic display, and this is usually in color.
- Emphasis on building reports that serve the decision-maker, in terms of the way they are presented, and also in terms of time that suits the decision maker, such as reports on demand.

Second - Re-Engineering Information Technology

Information technology is the necessary catalyst in re-engineering university work and the correct use of information technology should not interfere with technology, as technology provides us with more effective ways to correct the wrong things. The correct use of information technology can create more effective and innovative ways of working. In addition, the development of universities has become largely dependent on advanced technology and its employment[5]. As information technology is the means by which inputs are converted into outputs, despite the importance of machines as components of technology, the most important element in this is knowledge without which there is no possibility of converting inputs into services that can achieve the private and public goals of any university, where knowledge management is defined as It is the processes that help universities obtain information, select, organize, use, and publish, and transfer important information and experiences that the university has, which are necessary for various administrative activities such as decision-making, problem-solving, strategic planning [9].

The university's use of these systems helps it develop its administration, structure and methods, as it deals with a complete database that serves as a pillar of its success and a guide for its hard work and an outlook for its current and future needs [17]. Whereas, when the re-engineering process enters into actual application, it is necessary to employ the basic IT infrastructure that is being established to support re-engineering initiatives. Infrastructure and

IT capabilities are the basic component of the technology portfolio and are common to all departments of the organization and work teams that must realize the appropriate combination. Information technology serving re-engineering [12]. The benefits of information technology in re-engineering programs are highlighted by analyzing the re-engineering program, designing re-engineering processes, drawings, software, case tools, scheduling programs, process maps, and databases that track customer satisfaction and complaints. E-mail also facilitates communication and coordination across geographical and organizational distances [3]. Information technology plays an important and positive role in re-engineering through the following aspects [4]:

- Use of automated assistance programs associated with voice information systems.
- Help in doing new work that was not available before, such as teleconferencing.
- Helping to envision new solutions to expected problems.
- Get rid of rigid and old patterns.
- Integration and merging between parts of work to form meaningful interrelated processes.
- Do business quickly, flexibly and with transparency.
- Continuous updating of information via e-mail and electronic billboards.
- Obtaining general training courses from external training institutions and institutes.
- Setting up a system for testing in all training programs to assess the effectiveness of training and the capabilities of workers.
- Providing self-learning and continuous learning needs from tests and re-determining performance levels through automated systems.
- Direct computer information regarding training programs, course fees and course dates.
- Evaluate the actual training via computer at the workstation of the worker through the use of advisory systems for management, leadership, motivation and others.

Researchers believe that the most important information technology functions revolve around three basic issues, which are recording data and information, translating information into knowledge that can be shared, and then networking between information, data and knowledge to solve complex problems. And that information technology plays a vital and major role in re-engineering processes, and

that universities that cannot change their ideas and attitudes towards IT technology and invest in it as required, will not be able to re-engineer their processes.

Third - Higher Education in Palestine:
Palestinian higher education occupies a unique and distinct position in all international higher education systems, as the total enrollment rate in Palestinian higher education, between the ages of 18 and 24, is more than (15%) [16]. In 1998 the Higher Education Law was issued in Palestine. Supervision and coordination also between higher education institutions was under the responsibility of the Ministry of Education and Higher Education (www.peace-programme.org). The following table shows the distribution of higher education institutions accredited by the Ministry of Education and Higher Education for the year [19].

Table 1: Distribution of higher education institutions in Palestine

Geographical Division	A Traditional University	University College	Medium Community College	Open Education	Total
West Bank	9	12	13	1	35
Gaza strip	5	6	7	1	19
Total	14	18	20	2	54

Source: Prepared by researchers based on the Annual Statistical Index of Palestinian Higher Education Institutions, 2020.

According to the previous table, some of these universities and colleges are under the supervision of the Ministry of Higher Education, and others are public or private, so that the ministry's role remains supervisory only with regard to public and private universities.

9. Methodology and Procedures:

Study Population and Sample: The study community is represented by the academic staff in the Palestinian higher education institutions in the Gaza Strip, and the following table shows the distribution of the study population by university.

Table 2: Distribution of academic staff in an administrative position according to the university

University Name	Academics With A Management Position

Islamic University	87
Al Azhar University	61
Al-Aqsa University	114
University Of Palestine	52
The total number of workers in the Palestinian higher education institutions under study = 314	

Source: Prepared by the researchers based on the Personnel Affairs Department of the universities under study, 2020

Describe the Characteristics of the Study Sample
The researchers used the random sampling method, where (250) questionnaires were distributed to the study population and (216) questionnaires were obtained, with a recovery rate of 86.4%. The following is clear the distribution of the study sample members according to the personal data of the individuals in it:

Table 3: Distribution of the study population according to personal data (n = 216)

Personal Data		The Number	Percentage %
University Name	Islamic University	65	30.1
	Al Azhar University	40	18.5
	Al-Aqsa University	82	38.0
	University Of Palestine	29	13.4
Gender	Male	208	96.3
	Female	8	3.7
Age Group	Less Than 30 Years Old	5	2.3
	30 Years Old - Less Than 40 Years Old	47	21.8
	40 Years Old - Less Than 50 Years Old	72	33.3
	50 Years Or More	92	42.6
Qualification	Bachelor	18	8.3
	M.A.	49	22.7
	Phd	149	69.0
Years Of Service	Less Than 5 Years Old	11	5.1
	5 Years - Less Than 10 Years	40	18.5
	10 Years - Less Than 15 Years	53	24.5
	15 Years And Over	112	51.9
Job Title	University President	3	1.4

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	Vice President Of The University	7	3.2
	Assistant President Of The University	3	1.4
	Assistant Vice President	13	6.0
	Dean	39	18.1
	Deputy / Assistant Dean	25	11.6
	Director	22	10.2
	Deputy Director	9	4.2
	Head Of The Department	93	43.1
	Other	2	0.9

Study Tool: A questionnaire was prepared on "Decision Support Systems and its Relationship with Information Technology Re-engineering Academic and Administrative Systems in Palestinian Higher Education Institutions", whereby the five-year Likert scale was used to measure respondents' responses to the questionnaire items according to the following table:

Table 4: The degrees of the five-point Likert scale

Response	Very Much	Greatly	Medium	Slightly	Very Little
Degree	5	4	3	2	1

Validity of The Study Instrument: The researchers verified the validity of the questionnaire by adopting the validity of the scale:

1. **Internal Consistency**: Internal consistency sincerely means the extent to which each paragraph of the questionnaire is consistent with the field to which this paragraph belongs, and the researchers calculated the internal consistency of the questionnaire by calculating the correlation coefficients between each paragraph of the areas of the questionnaire and the total degree of the same field.
2. **Constructive Validity**: It is considered one of the measures of validity of the tool, which measures the extent to which the objectives that the tool wants to reach is achieved, and shows the extent to which each field of study is related to the total degree of the paragraphs of the questionnaire, and the researchers have done so.

Resolution of Resolution:
The stability of the questionnaire means the degree to which the questionnaire gives close readings every time it is used, or what is the degree of its consistency, consistency, and continuity when it is repeated at different times. Among the most famous tests used to measure stability is the Cronbach alpha coefficient, as it was found that its value for the resolution as a whole (0.973), and this value is considered high and reassuring of the stability of the study tool.

It is concluded from the results of the validity and reliability tests that the measuring instrument (the questionnaire) is honest in measuring what it was designed to measure, and it is very stable, which qualifies it to be an appropriate and effective measurement tool for this study and can be applied with confidence.

Normality Distribution Test:
The Kolmogorov-Smirnov Test was used to test whether the data follow a normal distribution or not. The distribution of the data follows a normal distribution where the parameter tests were used to analyze the data and test hypotheses for the study.

Statistical Tools Used:
The data were extracted and analyzed from the reality of the questionnaire through the Statistical Analysis Program (SPSS), where the following statistical tests were used:

1. Percentages and Frequencies.
2. The arithmetic mean, the relative arithmetic mean, and the standard deviation.
3. Cronbach's alpha test.
4. Pearson Correlation Coefficient.
5. Kolmgorov-Smernov test.
6. T test in case of one sample.
7. T test in the case of two independent samples.
8. The mono-analysis of variance test.

10. Data Analysis and Hypothesis Testing

Analysis of the Axes of the Questionnaire:

– **The First Axis: Decision Support Systems**
The T-test was used to find out whether the average response score had reached a median approval score of 3 or not, as in the following table:

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Table 5: the arithmetic mean, standard deviation, and t-test value for all decision support systems items

#	Items	SMA	Standard Deviation	Relative Arithmetic Mean	Test Value T	Probability Value (Sig)	Rank
1.	The material capabilities available to use decision support systems in general	4.05	0.63	80.93	24.47	*0.000	1
2.	The human capabilities available to use decision support systems in general	3.79	0.63	75.81	18.55	*0.000	3
3.	The technical capabilities available to use decision support systems in general	3.77	0.67	75.47	16.88	*0.000	4
4.	The organizational capabilities available to use decision support systems in general	3.82	0.64	76.48	18.94	*0.000	2
5.	Supporting senior management to use decision support systems in general	3.58	0.76	71.63	11.17	*0.000	6
6.	The training process in general	3.45	0.90	69.05	7.37	*0.000	7
Decision Support Systems In General		3.75	0.60	74.99	18.36	*0.000	5

* The mean is statistically significant at a significance level of 0.05.

It is clear from the previous Table that:

- The arithmetic mean of all the material capabilities available to use decision support systems is 4.05, the relative arithmetic mean is 80.93%, the test value is 24.47, and the Sig value is 0.000, which means that there is a large degree of agreement by the sample members for the material potential items generally available to use decision support systems.

- The arithmetic mean of all the paragraphs of the human potential available to use decision support systems is equal to 3.79, that the relative arithmetic mean is equal to 75.81%, the test value is 18.55, and that the probability value (Sig) is equal to 0.000. Generally available to use decision support systems.

- The arithmetic mean of all the organizational capacity items available for the use of decision support systems is equal to 3.82, the relative arithmetic mean is equal to 76.48%, the test value is 18.94, and that the probability value (Sig) is equal to 0.000. Generally available to use decision support systems.

- The arithmetic mean of all senior management support items for the use of decision support systems is equal to 3.58, that the relative

arithmetic mean is equal to 71.63%, the test value is 11.17, and that the probability value (Sig) is equal to 0.000. Supreme for the use of decision support systems in general.

- The arithmetic mean of all the items of the training process equals 3.45, that the relative arithmetic mean equals 69.05%, the test value is 7.37, and that the probability value (Sig) is equal to 0.000 and this means that there is agreement to a large degree by the sample members on the items of the training process in general.

- In general, the arithmetic mean of all decision support systems paragraphs is equal to 3.75, that the relative arithmetic mean is equal to 74.99%, the test value is 18.36, and that the probability value (Sig) is equal to 0.000, which means that there is a large agreement by the sample members on the paragraphs of the decision support systems axis generally.

- **The Second Axis: Information Technology, Re-Engineering Academic And Administrative Systems**

The T-test was used to find out whether the average response score had reached a median approval score of 3 or not, as in the following table:

Table 6: the arithmetic mean, standard deviation, and test valuet for all clauses of information technology, re-engineering academic and administrative systems

#	Items	SMA	Standard Deviation	Relative Arithmetic Mean	Test Value T	Probability Value (Sig)	Rank
1.	The use of information technology leads to the ability to coordinate operations in various colleges, departments and departments.	3.73	0.99	74.60	10.80	0.000*	5
2.	The use of information technology in the university features a course in the ability to redesign administrative processes.	3.68	1.01	73.64	9.86	0.000*	7
3.	The university is improving its processes and procedures to ensure quality performance.	3.79	0.98	75.72	11.74	0.000*	3
4.	The technology used provides the information needed in making decisions.	3.89	0.89	77.87	14.74	0.000*	2
5.	The university provides protection programs that are safe and private.	3.93	1.09	78.70	12.61	0.000*	1
6.	The university is characterized by its high pace of technological developments in the surrounding environment.	3.77	0.84	75.40	11.78	0.000*	4
7.	The university coordinates its internal operations using information technology	3.63	0.86	72.60	9.80	0.000*	8
8.	The university includes its employees in training courses related to information technology	3.69	0.92	73.80	9.92	0.000*	6
	Information Technology In General	3.76	0.60	75.28	12.56	0.000*	

* The mean is statistically significant at a significance level of 0.05.

It is clear from the previous table that the arithmetic mean of all academic and administrative systems reengineering information technology items is equal to 3.76, that the relative arithmetic mean is equal to 75.28%, the test value is 12.56, and that the probability value (Sig) is equal to 0.000 and this means that there is agreement to a large degree by individuals. The sample is on the items of the information technology axis, in general academic and administrative systems re-engineering.

The paragraph "The University provides protection programs characterized by safety and privacy" received the highest approval score on the axis with a rate of 78.70%, while the "The University works to coordinate its internal operations using information technology to re-engineer academic and administrative systems" received the lowest approval score of 72.60%. .

Test Hypotheses of the Study

H0$_1$: There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions.

To test this hypothesis, the "Pearson correlation coefficient" test was used, and the following table illustrates that.

Table 7: The correlation coefficient between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions

The Premise	Pearson Laboratories For The Link	Probability Value (Sig.)
There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) Between the decision - support information systems and technology used in the application of re - engineering academic and administrative systems in the educational institutions of higher Palestinian.	.559	0.000*

* Correlation is statistically significant at a level of significance $\alpha \leq 0.05$.

The previous table shows that the correlation coefficient is equal to .559, and that the probability value (Sig.) is equal to 0.000 and it is less than the significance level $\alpha \leq 0.05$. This indicates the existence of a direct relationship of statistical significance between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions.

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H0₂: There are statistically significant differences at the level of significance ($\alpha \leq 0.05$) between the averages of respondents' responses about decision support systems and their relationship to information technology Re-engineering academic and administrative systems in Palestinian higher education institutions due to personal data (university, gender, age group, grade Scientific, number of years of service, job title).

To test this hypothesis, a "T-test for two independent samples" and a "single-sample variance" test were used. The results are shown in the following table.

Table 8: Results of the test "T - For two independent samples" test "mono - contrast "- Personal data

Personal data	Name of the test	Test value	Probability value (.Sig)
The University	Monochromatic contrast	12.362	0.000
Kind Of Social	T For two independent samples	-2.266	0.024
Age Group	Monochromatic contrast	0.797	0.452
Degree	Monochromatic contrast	1.062	0.348
Number Of Years Of Service	Monochromatic contrast	0.565	0.569
Job Title	Monochromatic contrast	2.426	0.049

From the results shown in the previous table, it was found that the probability value (Sig.) Is less than the significance level of 0.05 for the variables "university, gender, job title" and thus it can be concluded that there are statistically significant differences between the mean of the respondents' answers attributable to "university, gender, Job title, "As for the rest of the variables, it was found that the probability value (Sig.) Is greater than the significance level 0.05. Thus, it can be concluded that there are no statistically significant differences between the respondents' answers averages attributable to (age group, academic degree, and number of years of service).

11. Conclusion and Recommendations

11.1 Conclusions

The study reached the following conclusions:

- The results showed the existence of a direct, statistically significant relationship between decision support systems and information technology used in the application of re-engineering of academic and administrative systems in Palestinian higher education institutions.

- The results showed that there are statistically significant differences between the average answers of the respondents attributed to "university, gender, job title".

- The results showed that there are no statistically significant differences between the mean of the respondents' answers due to (age group, academic degree, number of years of service).

11.2 Recommendations

Based on the above results and previous studies and the researchers' experience in this delicate topic, a set of suggested recommendations have been identified, as follows:

- The importance of investing more in information technology in general and decision support systems in particular, to increase the efficiency of academic and administrative processes and provide better and comprehensive services.

- Palestinian higher education institutions actively contribute to increasing interest in providing material and technical capabilities and making them available to all users, while continuing to keep pace with modern technological means and techniques.

- Increasing interest in human potentials by developing and developing human resources, developing their capabilities, skills and knowledge, and attracting competencies with creative capabilities.

- Increasing interest in the organizational capabilities available through an independent unit for decision support systems that directly reports to the higher management in Palestinian higher education institutions, and allowing the organizational structure to easily flow information between colleges, departments and departments.

- Palestinian higher education institutions must review their organizational structures and re-engineer their operations in line with developments in the field of information technology.

- The need for Palestinian higher education institutions to develop the information technology infrastructure in general, and decision support systems in particular.

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