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The Status Quo of Information Security from the Perspective of Information Technology Staff in Jordanian University Libraries

Hussam Mohammed Almasalha, Nasharawan Naser Taha*, and Amnah Abumqibl
Department of Library and Information, School of Educational Sciences, The University of Jordan, Amman, Jordan.

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Abstract

This study aims to explore the status quo of information security from the perspective of information technology (IT) staff in Jordanian university libraries and to discuss the most prominent difficulties they face. Moreover, it aims to identify the effect of the variables (years of experience, type of university, job level, and specialization) on the staff estimation of the status quo of information security and the difficulties they face. The study population consisted of all (96) staff members of the IT departments in the libraries of public and private Jordanian universities for the academic year 2015-2016, of whom (84) responded. To answer the study questions, a questionnaire that examines the status quo of information security was adopted, it consisted of five themes. The questionnaire also included questions to study the difficulties facing IT staff. The results indicated that the respondents' estimation of the status quo of information security in Jordanian universities libraries was at medium level, as the item "procedures for the protection of computer systems and networks" and the item "access control to information systems" were ranked first in the study fields with a high rating. Results also indicated that the overall level of difficulties attained a medium level, and that the most prominent difficulties facing IT staff in universities libraries are the shortage of personnel specialized in information security and the lack of budget allocated to information security in university libraries. The study also showed a statistically significant difference at the level of significance ($\alpha \leq 0.05$) for the variables of "job level" and "specialization" in the staff estimation of the status quo of information security. Also, a statistically significant difference was found in the staff estimation of the difficulties they face related to the specialization variable. The study recommends paying more attention to the various aspects of information security in libraries, such as the infrastructure in regard to technology and the existence of a precise policy to ensure information security and to increase the number of human resources specialized in the field of information security.

Keywords: Information Security; Confidentiality; Information Technology; University Libraries.

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* Corresponding Author: Nasharawan Naser Taha
Email: N.taha@ju.edu.jo
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I. Introduction to the Study

The world today is witnessing a rapid and remarkable growth in information and communications technology. Technology has affected all aspects of life, and information has become the most important element in this era. This rapid growth in technology has formed a huge information move as information occupies a high place and has become subject to processing and transmission faster than ever. Furthermore, obtaining and handling information has become extremely important. The effectiveness of computers in processing and saving information with communications technology and its advanced networks has contributed to the formation of a huge network for processing data and transmitting information around the world. This pairing between computer technology and communications technology has led to the explosion of the information revolution that the world is harvesting today in all areas of life. In addition, this pairing has become a condition and a standard for the growth and development of institutions [1].

While the Internet has achieved a dream that was not previously expected, it created many problems for the digital information society, in terms of; privacy, protection, intellectual property rights, and some abuses, including theft, espionage and electronic manipulation. This was due to the enormity of this giant network and its nature as a free network, far from the control of a particular state [2].

Libraries and information centers are among the institutions that are most in need of using computers and information networks to raise the level of the services they provide to patrons, and with the development witnessed in the modern era in organizing scientific institutions, this has necessitated a parallel development in libraries and information centers to keep pace with these developments, and to meet the needs of the patrons. Libraries were affected by these modern technological developments, as they were keen to deal with electronic resources and automated systems to keep abreast of all developments.

II. Problem and Research Questions

The information revolution and tremendous technological developments have changed the role that information institutions, especially university libraries, play in serving their community of users. These developments, such as the Internet of Things [3] and Artificial Intelligence [4], have led to the emergence of new methods and change in the nature of university libraries. They secure the provision of services, maximize the exchange of information, and ensure that university libraries remain leaders when it comes to serving their community of users. These technologies and developments in the library and information sector have led to the emergence of challenges that pose a clear threat to information security in university libraries [5], and these developments have increased the possibility of information breaches and leaks, exposing it to the risk of change, forgery, and infringement on its digital holdings, whether intentionally or unintentionally [6]. It has become necessary to focus on information security in university libraries because libraries play an important role in dealing with information and communicating it to patrons, a result of technological changes such as the Internet of Things [7]. It is also important to make library departments aware of the challenges and risks related to information security [8].

The information departments in university libraries carry out the programming work that these libraries need. They also supervise databases and electronic subscriptions and take the necessary procedures to preserve their materials, such as barcodes, and follow up on the work of the integrated library system. Hence, it is necessary to ensure that workers in these departments are aware of the risks related to information security and guarantee that there are resources that enable them to protect information security and to assess any security risk in university libraries [9]. This study sought to identify the status quo of information security in Jordanian university libraries and to present proposals in the field of information security to help the administration and employees in university libraries protect information security in its various aspects. Due to the importance of the topic, particularly in light of these rapid technological developments, and the scarcity of studies that have investigated this topic; the researcher has justified the conduct of this study, which consists in identifying the status quo

of information security in the libraries of Jordanian universities from the perspective of information technology staff and the difficulties they face.

The research questions are represented in the following:

1. What is the status quo of information security from the perspective of IT staff in Jordanian university libraries?
2. What are the difficulties the IT staff face in addressing electronic violations in Jordanian university libraries?
3. Are there any statistically significant differences at the significance level ($\alpha \leq 0.05$) between the means values in the estimations of IT staff in Jordanian universities libraries as to the status quo of information security based on the following variables: Years of experience, type of university, job level, and specialization?
4. Are there any statistically significant differences at the significance level ($\alpha \leq 0.05$) between the mean values in the estimations of IT staff in Jordanian universities libraries as to the difficulties they face in addressing electronic violations, based on the following variables: Years of experience, type of university, job level, and specialization?

III. Objectives of the Study

The study seeks to achieve a set of objectives:

1. To explore the status quo of information security in Jordanian university libraries.
2. To investigate the difficulties that IT staff face in addressing electronic violations in Jordanian university libraries.
3. To recognize whether there are any statistically significant differences between the mean values in the estimations of IT staff in Jordanian universities libraries as to the status quo of information security based on the variables: Years of experience, type of university, job level, and specialization.
4. To identify whether there are any statistically significant differences between the mean values in the estimations of IT staff as to the difficulties they face in addressing electronic violations in Jordanian university libraries based on the variables: Years of experience, type of university, job level, and specialization.

IV. Importance of the Study

The study acquires its importance from the importance of the subject it addresses, which is the status quo of information security from the perspective of IT staff in Jordanian university libraries and the difficulties they face. Further value is derived from the importance of information security in preserving and protecting information from various dangers and damages. Moreover, the importance of the study stems from the scarcity of previous studies on this subject.

Therefore, each of the following parties can benefit from the findings of this study:

1. University library administration. Reviewing the findings of this study shall assist administrations to identify the level of information security and develop new strategies to solve related problems.
2. University library staff. The findings of this study shall contribute to raise their awareness of the importance of information security.
3. Researchers in the field of information technology and the field of library and information science, especially those willing to conduct similar studies.
4. Libraries and information departments in Jordanian universities. This study shall motivate them to offer specialized materials in information security.

V. Theoretical Framework of the Study

Information in this era has become the infrastructure upon which political, social, administrative, and educational systems are based. Information constitutes wealth and is highly valuable, possessing it demands great skills, which makes information vulnerable to threats and breaches. And despite the cost of information represented in its value and scarcity, information technology and its

mediums have provided significant amounts of information. Therefore, cybercrime and information systems crimes are increasing dramatically, and investigating and judging them has become a complex process [10].

A. The Concept of Information Security

Information security is a consistently significant issue, especially in recent years after all the developments in computers and means of communication that have taken place. Information security is defined as "the protection and security of all resources used in information processing, whereby the facility itself, its personnel, computers, and information media are secured". The facility is secured by following several procedures and means of protection that ultimately ensure the safety of information, which is a valuable treasure that the facility must preserve" [11]. Moreover, information security is the protection of information and systems through measures and tools taken by institutions to prevent unauthorized access [12].

Furthermore, it is defined as the protection of information and its important elements from unauthorized access by persons or entities, from theft or manipulation, intentionally or unintentionally, and from damage in all its forms, whether from people or software, spontaneous errors, and disasters such as fires, floods, etc. [13]. From an administrative perspective, [14] defines it as the planning and implementation of administrative practices and procedures aimed at preserving information security.

B. The Concept of University Libraries

University libraries are an important financial and administrative part of universities, affiliated to the service of the academic community, by providing information and various library services to the community. The university library is the portal that provides information sources of various forms and types, and it is an important center for learning and training [15].

Ibrahim [16] defines it as a cultural, scientific, and educational institution that works to serve the university community of students, faculty members, and researchers by providing necessary information sources that have been organized, classified, indexed, and catalogued for ease of access, and it is therefore an essential part of the educational institution it belongs to.

VI. Related Works

The research in intellectual production published on the subject of information security in university libraries resulted in the existence of a number of studies and research that dealt with various aspects of the status quo of information security in university libraries, and in educational institutions, in addition to other studies that dealt with certain aspects related to information security and transparency in light of technological developments. The following are those studies:

A. Studies Related to Information Security in University Libraries

Aslam et al. [17] conducted a study on academic libraries in Pakistan to find out the degree of awareness of those working in academic libraries regarding digital information security management and the policies followed in managing them. The study used quantitative research on fifteen libraries, utilizing an interview tool. The results of this study showed that information specialists and library staff did not show interest in the issue of digital information security management, which was the reason for their lack of enrollment on training courses related to information security.

The study conducted by Alsereihy [18] aimed at highlighting the issue of security and the safety of libraries, their technologies, staff, and patrons, through a case study applied to King Abdulaziz University Library in Jeddah. The study adopted the interview method, and the study sample consisted of administrative and technical officers at the library. The findings of the study showed that libraries and information systems are exposed to security and safety risks, and that the solutions proposed to maintain the security of libraries are possible by adapting modern technologies and developing appropriate policies. The study also showed that the library collections at King Abdulaziz University Library lack good follow-up, which exposes them to security risks. In addition, there were some issues

in the written library policies and there was lack of a specialized team supervising the automated library systems. Furthermore, the research showed that the new library building does not suffer from the same problems the old one had, such as water leakage from the ceiling and the obsolescence of electrical wiring and extensions.

Bamofleh [19] conducted a study that aimed to measure the adequacy of the security measures in the network of Umm Al-Qura University libraries. The interview method was implemented, and the study sample consisted of the library director, the staff in the computer department, and the staff in charge of networks in the Information and Computer Center at the university. The study findings showed that the Deanship of Library Affairs was interested in applying various methods to protect the information security on its own network, namely: securing the material aspect by following procedures related to location and extensions. On the other hand, it lacks some necessary protection methods, such as implementing a firewall, supporting power failure devices and an encryption system. The study revealed some negative aspects in applying the used protection methods, such as the failure to update virus protection software regularly, the time of each consequence backup, the failure to train employees on some information security issues and the failure to consider the password protection rules.

The study of Alzeheimi and Albadi [20] aimed to recognize the status quo of information security systems in Omani libraries. It focused on the main library at Sultan Qaboos University as a model for Omani libraries. The study sample consisted of those concerned with automated systems in the main library and in the information systems center at Sultan Qaboos University. The study findings showed the absence of centralization in the security supervision of the library's automated systems, and a weakness in the comprehensiveness of the protection procedures followed by the library. It also reported that the information systems center at the University follows a specific policy to address some of the expected risks such as hacking and loss or damage to the database, but there were no procedures available to address any expected threats such as a sudden power interruption. The results also showed that the library suffers from problems related to data safety in its automated library system (Symphony). Also, the study showed that the library does not have a written policy for the safety and security procedures of its automated systems.

The study of Maidbiono and Zainab [21] aimed to assess university library security management. The study sample consisted of 60 staff members from 4 university libraries in Nigeria. The findings showed the absence of information security policies and plans in these libraries, and the weakness of some physical security measures, such as the absence of alarms to prevent theft, in addition to the weakness in security awareness among staff members. The study highlighted the need for observant library staff and users as a critical issue for the security of the public group.

The study conducted by Osayandy [22] aimed to uncover the situation of electronic security systems in academic libraries in three universities in southwestern Nigeria. The study sample consisted of (109) university librarians, heads of technical services departments, and other staff members in academic libraries in three universities (Covenant University, Babcock University, and University of Lagos) where (81) individuals responded. The study findings showed that academic libraries suffer from security issues, therefore libraries should improve security services to maintain their information systems. Also, the study findings indicated that the three said universities have electronic systems installed in their libraries. The study sample individuals at Babcock University confirmed that CCTV cameras in the library were working effectively, and the study sample individuals at Covenant University and the University of Lagos confirmed that cameras installed on the gates of the security systems work effectively, this means that the three universities use electronic security systems installed in their libraries. Also, findings showed that there are different ways in which office materials are taken illegally.

The aim of the study conducted by Akor [23] was to identify security management and prevent book theft from university libraries through a case study applied to Benue State University in Nigeria. The study population consisted of all (48) library staff members, although only (30) responded. The find-

ings revealed that books in the university library are subject to theft and distortion due to insufficient security measures, insufficient office materials and financial restrictions.

B. Studies Related to the Status Quo of Information Security in Educational Institutions

Al Aqili and Albayaty [24] conducted a descriptive study on the library and information science departments in Iraqi universities to study the degree of students' awareness of information security and its relationship to academic courses. A questionnaire was used as the tool to collect data. The results of this study showed that the computing course curricula lack basic concepts of information security. It also showed issues with students' awareness of protection measures, but despite that, the students used protection measures on average.

The study of Aldanaf [25] aimed to identify the status quo of information systems security management at technical colleges in the Gaza Strip. The study population consisted of (180) staff members employed in information systems in technical colleges. The study findings revealed that information systems infrastructure is presented at an average degree, and that there were no clear information security policies in technical colleges. In addition, technical colleges vary in the degree of commitment towards the use of information systems. Moreover, the study revealed the existence of statistically significant differences in the perspective of the study sample on the status quo of information systems security in technical colleges.

The study conducted by Ammar [26] aimed to define the means and procedures for the protection of main networks and their sources of information, or those transferred, and verify their loss. The study population consisted of staff of computer networks and their protection, and department heads and information centers in governmental and private educational institutions in Riyadh. The sample of the study consisted of (105) engineers, administrators and technicians working in the management and operation of hardware and software for the protection of computer networks. The findings of the study revealed that institutions that rely on information technology to run their business provide devices to protect their networks, such as proxy and firewalls. Institutions also provide central distributors, wireless network points, anti-virus systems, and internet usage monitoring. Findings also showed that half of the institutions have specific plans for firewalls, servers, routers and are updated periodically. These institutions do not have an integrated system dedicated to managing information security issues. The weak points through which networks could be hacked were represented in the failure to regularly update firewall operating systems, the poor performance of some devices that could not fight viruses, the lack of experience in information security staff, the lack of professionalism among users, and the absence of an information protection policy. The study recommended the need to have specialists in information security to develop and review security policies, it also recommended training staff working with system security to help them perform their duties optimally, and to provide work procedures for information technology and to increase the income of staff.

Phelps [27] conducted a study with the aim of measuring the self-efficacy of the information security system in libraries in Florida. It examined the relationship between the educational readiness of library staff (librarians) and the effectiveness of implementing information security systems. The study explored the relationship between the training on information technology and the effectiveness of information system security across intermediate variables, to experiment with information system security, self-efficacy of the information system, launch the information system security mission, and the continuity of the information system security mission. Participants in this study were staff in academic and public libraries in Florida. 56 viable responses were obtained. The study found that librarians with prior training in information technology were more effective in implementing information system security compared to those without training. Although the study did not fully support the model, the findings showed an important relationship between the existence of previous training in the field of information systems security and the self-efficacy of the information system, tied to the effectiveness of the implementation of the information security system. Gender showed a weak correlation between the two variables, while regression analy-

sis showed no predictability. Work experience was a better predictor of effectiveness than IT training, but not as strong as self-efficacy. The study recommended training library staff and providing them with the required expertise regarding information systems security.

The study conducted by Ismail [28] aimed to assess information security management in Malaysian academic libraries. The study sample consisted of (39) staff members in charge of information systems or information technology in Malaysian academic libraries. Five standards were developed to assess security, including technological measures, information security policies, security procedures, means of security and security awareness activities. The findings showed that the most common security threats in Malaysian academic libraries were security threats to devices, with a percentage of (70%), human risks (66%), and environmental threats (51%). The findings also revealed errors in the maintenance of devices, the use of unauthorized devices and the exposure of library devices to viruses and showed the presence of differences among libraries in the application of security measures in relation to budget and the availability of information systems and the number of staff. The study recommended that organizational measures should be implemented in libraries since relying on technology alone is insufficient for effectively solving the problem of information security.

The Ismail and Zainab [29] study, conducted in Malaysia, aimed to identify the status quo of information systems security in public and private libraries. The study sample consisted of (50) staff members in charge of information systems security in private and public libraries in Malaysia. The study findings showed that (95%) of libraries reached a high level in achieving electronic security for library information systems. The findings also indicated that (54%) of libraries suffer from poor organizational measures, such as: the lack of appropriate security measures, and the failure to provide administrative tools that would help with the security of information systems, in addition to the lack of awareness-raising activities, and this may be due to the excessive focus on technology as the only solution for all security agencies.

C. Studies that Dealt with Information Security and Transparency Aspects

Gohary and Hassan [30] conducted a theoretical study to identify the status quo of risks and threats in information security. The researchers dealt with the theoretical, material, and legislative aspects of information security at national and international levels. The study concluded that there are risks threatening information security in the digital environment and that legislation in regard to this aspect is weak at both national and international levels.

Al-Hadi [31] conducted a theoretical study aimed at identifying the status quo of information security and transparency in light of electronic government. The study discussed the requirements of natural security for information systems, and further dimensions and considerations related to information security. It provided standards for information security and transparency, in addition to methods for implementing information security. The study recommended; the need for establishing political, regulatory, and legal frameworks to confront information security risks, developing information security policy, and adapting it to e-government programs, in addition to spreading awareness of the importance of information security, and the need to protect information systems.

The study conducted by Allozi [32] aimed to identify the opinions of staff working in civil service authorities in Jordan regarding the difficulties facing the application of electronic services. Such difficulties included infrastructure, legislation, regulatory policies, information security and confidentiality, financial resources, and management and social awareness. A questionnaire was used to collect data from the study sample that consisted of (413) public officials, chosen randomly. The study findings showed that respondents' attitudes indicate that management is one of the most prominent difficulties facing the application of electronic services, followed by, the field of financial resources, legislation and regulatory policies, information security and confidentiality, social awareness, and finally the field of infrastructure. It also revealed that there were no statistically significant differences between the opinions of staff members as to the difficulties they face in the application of electronic services, attributed to the variables of gender, aca-

demic qualification, and experience. Contrastingly, there were significant differences attributed to the variables of age and nature of work. The study recommended taking an interest in preparing human and administrative resources in government agencies and improving the infrastructure and legislative environment of electronic services in Jordan.

Alaraby [33] conducted a descriptive and analytical study that aimed to analyze the (ISO/IEC 27002) standard for the management of information security systems issued by the International Organization for Standardization (ISO), and identify the policies and trends included in the standards, in addition to the extent to which the best Arab universities adhere. The study adopted the descriptive method and content analysis. The study sample consisted of the best (20) Arab universities according to the Webometrics Ranking of World Universities. The study findings revealed that all the universities covered by the study were keen to apply (11) basic ISO standards for the management of information security systems. King Abdulaziz University ranked first, as it applied (95) standards with a percentage of (71.43%), followed by King Fahd University with (58.65%), followed by Umm Al-Qura University with (52.62%), then the University of Jordan with (51.88%). The study showed that (80.95%) of the universities under study failed to achieve 50% of the sub-standards. It recommended developing information security policies in Arab universities and specifying tasks and responsibilities of the university units in terms of implementing the provisions of the information security policy and providing a high level of training on information security procedures. Furthermore, the study emphasized the importance of keeping backup copies of data.

Comments on Previous Studies

It is evident through the presentation of previous studies that:

a. There is a research gap in the field of information security in the libraries of Jordanian universities.

b. The studies that agreed with this study in regard to the subject of information security in university libraries were the Al-Alsereihy study [18], the Bamofleh study [19], the Alzeheimi and Albadi study [20], the Maidabino and Zainab study [21], the Osyande study [22], and Akor study [23].

c. Due to the lack of direct studies on the subject of information security in university libraries, previous research included other studies related to the topic of information security in educational institutions, such as; Ammar [26], Aldanaf [25], Phelps [27], Ismail [28], Ismail and Zainab [29], and further studies that dealt with the aspects related to the security and transparency of information in light of technological developments, such as; Al-Hadi [31], Allozi [32], and Alaraby [33].

d. This study differs from previous studies in terms of its context.

VII. Methodology of the Study

This study is based on the use of the survey descriptive method, as it is appropriate to the nature of the study and for reviewing the most prominent literature related to “information security in the Jordanian universities libraries from the perspective of IT staff and the difficulties they face”. This method has a broad and flexible umbrella that may include several sub-methods such as surveys, and field case studies. This methodology is based on identifying the characteristics of the phenomenon and describing its nature, and the quality of the relationship between its variables, causes and trends, and this approach depends on the interpretation of the existing situation and determining the conditions and relationships between the variables. This approach does not merely collect descriptive data about the phenomenon, but rather it analyzes, links, interprets, classifies, measures, and draws conclusions from it [34].

VIII. Population of the Study

The study population consisted of all information technology staff members in all of the public and private Jordanian university libraries. This number was (96) staff members (directors, department heads, and staff). Due to the small size of the study population, the study sample is considered its population. (96) questionnaires were distributed to the entire population, and after retrieving the questionnaires, (12) questionnaires were excluded due to

their invalidity for statistical analysis purposes as they were incomplete or blank. Based on the aforementioned, the sample of the study was represented by (84) staff members in Jordanian universities libraries, which represents (87.5%) of the main population.

IX. Tool of the Study

The study implemented a questionnaire as its study tool. It was developed in light of the questions and objectives of the study, and by referring to theoretical literature and previous studies such as: [19], [25], [20] and [27]. It aimed to measure the status quo of information security from the perspective of IT staff in Jordanian university libraries and the difficulties they face.

The tool of the study (questionnaire) consisted of three parts:

The first part: includes respondents demographic information, including: experience, type of university, job level, and specialization.

The second part: included (49) items, all of which were related to information security from the perspective of IT staff in Jordanian university libraries, and they were divided into five themes as follows:

- The first theme: security infrastructure in libraries, it included the items (1-20), and consists of the following dimensions:
  - The first dimension, it addresses physical security, and included items (1-8).
  - The second dimension, it is related to the protection of individuals, and included items (9-12).
  - The third dimension, it is related to software security, and included items (13-20).
- The second theme: information security policy, it included items (21-25).
- The third theme: the protection of electronic data in libraries, it included items (26-31).
- The fourth theme: procedures for the protection of computer systems and networks in libraries, it included items (32-40).
- The fifth theme: access control to information systems, it included items (41-49).

The third part: included (11) items related to the difficulties facing IT staff in Jordanian university libraries. Accordingly, the number of questionnaire items in its final form reached (60), where the 5-point Likert scale was used as follows: (strongly agree, agree, neutral, disagree, strongly disagree).

X. Validity of the Tool of the Study

Validity of Content

The questionnaire in its primary form, which consisted of (69) items, was presented to (13) reviewers from the faculty members in the library and information science department and specialists in other fields such as information technology. Reviewers were tasked with reviewing the validity of its content, the affiliation of phrases to the scale, the suitability of the phrases to scale, the degree of their clarity, and to propose needed modifications. Based on the opinions of the reviewers, some items were modified in terms of wording to increase their clarity. Also, (9) items were deleted due to their similarity and the proximity of their meaning to other items, or due to their inappropriateness to the objectives of the study. As a result, the scale consisted of (60) items distributed on five main themes, in addition to the difficulties facing IT staff in libraries. The researcher considered the opinions of the reviewers and their modifications as an indication as to the validity of the content of the study tool and as evidence to its diversity and the appropriateness of its items.

XI. Reliability of the Tool of the Study

In order to identify the consistency of each of the scale items with the dimension to which it belongs, the researcher used the calculation of correlation coefficients between each of them by using the Cronbach Alpha coefficient. It is evident that the values of the Cronbach Alpha coefficient of the sub-themes of the scale ranged between (0.79 - 0.90), and the value of the reliability coefficient using the Cronbach Alpha for the total degree of the scale was (0.94).

Scale Correction Key

The five-point Likert scale was used, where the items used the following estimations: strongly agree

(5), agree (4), neutral (3), disagree (2), strongly disagree (1).

Based on the previous, the mean values found by the study were dealt with in accordance with the following equation:

Highest value - minimum value of answer alternatives, divided by the number of levels, i.e.:

$$\frac{(5-1)}{3} = \frac{4}{3} = 1.33$$ this value equals the length of the category.

So that the results are interpreted according to the values determined by the length of the period. Therefore, the length of the period at the low level of the value shall be (1.00 - 2.33), while the length of the period at the middle level of the value shall be (2.34 - 3.67), and the length of the period at the high level of the value shall be (3.68 - 5.00).

XII. Statistical Methods

The following descriptive statistical methods were used to answer the questions of the study:

- Extraction of the frequencies and percentages to describe the sample of the study individuals.
- The Cronbach Alpha test was used to measure the reliability of the tool of the study.
- Mean values, and standard deviations were calculated to answer the first and second questions.
- The four-way ANOVA test was used to answer the third and fourth questions.
- The Scheffe Post Hoc Test was adopted to measure the statistically significant differences according to the variables: years of experience, type of university, job level, and specialization.

XIII. Study Findings and Discussion

A. The Status Quo of Information Security from the Perspective of IT Staff in Jordanian University Libraries

The researchers calculated the mean values and standard deviations of the responses of the study population individuals on the items related to information security. They were divided into five themes: infrastructure security, information security policy, electronic data protection, systems and networks protection, and information systems access control. Table I to Table VIII illustrates the results of these themes.

The results in Table I show that the status quo of information security from the perspective of information technology staff in Jordanian university libraries were of medium level, as the procedures for computer systems and networks in the library were ranked first at a high level, followed by access control to information systems at a high level, while the infrastructure security was ranked third at a medium level, and protection of electronic data protection and information security policy were both ranked last respectively, at a medium level.

This result may be attributed to the fact that the most important factors in Jordanian university li-

TABLE I
Arithmetic Averages and Standard Deviations of the Responses of the Study Sample in Descending Order

No.	Theme	Mean	Standard Deviation	Ranking	Level
4	Procedures for computer systems and networks in the library	3.73	0.64	1	High
5	Access control to information systems	3.68	0.75	2	High
1	Infrastructure security in libraries	3.61	0.62	3	Medium
3	Protection of electronic data in the library	3.49	0.85	4	Medium
2	Information security policy	3.32	0.82	5	Medium
	Overall Mean	3.57	0.62		Medium

braries are the procedures for computer systems and networks due to the great interest in those issues, and the need to follow up on computer systems and networks to meet the needs of students. Likewise, universities have shown a clear interest in access control to information systems through programs and portals in which students infer the necessary information and references and review the issues of interest to students in the library.

Following is a discussion of the questionnaire items for each of the study themes:

The First Theme: Infrastructure Security in Libraries

The means and standard deviations were calculated for the responses of the study sample individuals to identify the level of infrastructure security in libraries from the perspective of IT staff in Jordanian university libraries, represented by (physical security, protection of individuals, and software security), results are discussed as follows:

1) The Status Quo of Physical Security

It is evident from Table II that the mean values of the status quo of the physical security in Jordanian university libraries from the perspective of IT staff ranged between (3.20-4.08), where the status quo obtained a mean value of (3.57), which is of medium level. (3) items reached a high level, while the rest of the items reached a medium level. It is noteworthy that the first three ranked items were (4), (8), and (2). Item No. (4) "fire detection devices and alarms are available" was ranked first with a mean value of (4.08), and a standard deviation of (0.98). This result is explained by the fact that university libraries are aware of the importance of this issue and the extreme danger it poses to the lives of students and staff, information sources, devices, and library facilities. It is also attributed to the fact that the nature of libraries and the flammable paper materials they contain necessitates the adoption of protection means. This result is consistent with the Bamofleh [19] study which indicated that the library is physically secured through the application

TABLE II
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE INDIVIDUALS TO THE ITEMS OF "THE STATUS QUO OF PHYSICAL SECURITY FROM THE PERSPECTIVE OF IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
4	Fire detection devices and alarms are available	4.08	0.98	1	High
8	Non-competent employee is prohibited from making any material modification to the equipment in the library	3.93	0.98	2	High
2	All electrical and communication cables that transmit data are protected from tampering or damage inside the library	3.68	1.16	3	High
5	Entrances and exits of the library are secured with electronic alarm devices	3.50	1.24	4	Medium
7	Continuous maintenance of the devices to ensure the continuity of their work is available	3.48	1.08	5	Medium
6	Library has adequate air conditioning and ventilation	3.38	1.23	6	Medium
3	Drainage and suction pumps are available when needed	3.29	1.11	7	Medium
1	A backup source of electricity is available in the library	3.20	1.42	8	Medium
	Overall Mean	3.57	0.74		Medium

of special related procedures such as alarms, fire detection devices, and others.

Item No. (8), "non-competent employee is prohibited from making any material modification to the equipment in the library," obtained a mean value of (3.93), and a standard deviation of (0.98). This is attributed to the importance of the information contained in these devices, as no one, whether a staff member or a person specialized in maintenance, shall make any modifications to the devices, whether to add, modify or delete any program, or any procedure that may affect the performance of the devices. This result is consistent with the Aldanaf [25] study which indicated that non-specialized staff shall not make security modifications to devices within information systems, while Ismail [28] indicated that errors may occur during the maintenance of devices. Item No. (2), "all electric and communications cables that transmit data are protected from tampering or damage inside the library", obtained a mean value of (3.68), and a standard deviation of (1.16). This is a significant result, as this shall increase the level of security in libraries and reduce potential risks, which will increase confidence among students in the library and will make them feel safe as a result of preserving electric and communications cables. Furthermore, it will increase the number of visits to libraries. This result is consistent with the Alsereihy [18] and Bamofleh [19] studies which indicate that libraries take many procedures to secure electrical installations and communication lines.

Item No. (1), "a backup source of electricity is available in the library" came last in the order, with a mean value of (3.20) and a standard deviation of (1.42), which is of medium level. This is attributed to the fact that alternative sources are basically available in many universities to which these libraries belong, as Jordanian universities provide an alternative source of energy for all their facilities in the event of a power outage. It may also be attributed to the lack of interest of university management in the provision of an alternative source of energy due to the late working hours of the library and the resources it contains which makes it more susceptible to a power outage than other university facilities. This study is consistent with the Bamofleh [19] study which indicated the lack of devices in libraries which can provide power in case of an outage.

2) The Status Quo of the Protection of Individuals

It is evident from Table III that the mean values of the status quo of the protection of individuals in Jordanian university libraries from the perspective of IT staff ranged between (3.48-3.83), where the status quo obtained a mean value of (3.63), which is of medium level. Item No. (12) reached the highest mean value of (3.83), and a standard deviation

TABLE III
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE INDIVIDUALS TO THE ITEMS OF "THE STATUS QUO OF THE PROTECTION OF INDIVIDUALS FROM THE PERSPECTIVE OF IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCEN DING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
12	The employee who violates the information security procedures within the library shall be held accountable	3.83	0.94	1	High
11	Employees are required not to disclose security and control measures	3.69	0.88	2	High
10	The employee's responsibilities and duties towards information security in the library are defined	3.54	0.99	3	Medium
9	Users shall be monitored, and incidents related to information security shall be recorded within the library	3.48	1.06	4	Medium
	Overall Mean	3.63	0.76		Medium

TABLE IV
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE INDIVIDUALS TO THE ITEMS OF "THE STATUS QUO OF SOFTWARE SECURITY FROM THE PERSPECTIVE OF IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
13	Entered data should be validated	4.00	0.78	1	High
17	The system is protected by anti-virus software	3.87	0.85	2	High
19	All anti-virus, hacking and intrusion software are trusted and licensed	3.79	0.88	3	High
20	Anti-virus, anti-hacking, and anti-spyware software is constantly updated	3.61	1.05	4	Medium
14	Encryption mechanisms are used to protect data	3.57	0.92	5	Medium
16	Criteria for acceptance of any new or modified systems are available and tested before being implemented	3.52	0.98	6	Medium
18	Hacking and intrusion detection software are available	3.38	1.00	7	Medium
15	Instructions for secure encryption process are available	3.37	0.93	8	Medium
	Overall Mean	3.63	0.78		Medium

of (0.94), which is of a high level. The item states that "the employee who violates the information security procedures within the library shall be held accountable". This result may be attributed to the strict procedures followed by universities, especially libraries, to act as a deterrent for any employee who tries to violate the security procedures in the library, and thus preserving the security of library systems and resources, in addition to the privacy and confidentiality of staff and students. The accuracy and credibility of information have a great impact on students' confidence in revisiting libraries, and when any change, modification, of falsification of information takes place this will inevitably affect information security in libraries.

Item No. (11) came second with a mean value of (3.69) and a standard deviation of (0.88), which is of a high level. The item states that "employees are required not to disclose security and control measures". This is attributed to the fact that university libraries pose ethical standards and rules related to the non-disclosure of confidential information, in order to maintain security and confidentiality of information. When employees disclose or reveal security and control measures it becomes easy for anybody, whether an employee or non-employee, to hack networks, penetrate certain places, tamper with devices, disable devices, or post on library websites without being noticed. Therefore, this matter is considered of great importance from the perspective of the sample of the study.

In last place came item No. (9) with a mean value of (3.48) and a standard deviation of (1.06), which is of medium level. The item stated that "users shall be monitored, and incidents related to information security shall be recorded within the library". This result may be explained by the lack of awareness among library administration and IT staff as to the importance of documenting incidents related to information security in order to benefit from the errors that occur and to try to avoid them so they may never be repeated.

3) The Status Quo of Software Security

Table IV shows that the mean value of the status quo of software security in Jordanian university libraries from the perspective of IT staff ranged between (3.37-4.00), where the status quo obtained

an overall mean value of (3.63), which is of high level. Item No. (13) had the highest mean value of (4.00), and a standard deviation of (0.78) which is of medium level. The item stated that "entered data should be validated", due to the fact that, by nature, libraries need to review and audit data more than once in many cases, such as bibliographic data for information sources, databases, etc. This is an important and sensitive matter and is considered the basis for data as well as information or references that enlighten students and help in conducting research and studies. Therefore, such data and information should be correct and of high level because they serve as the basis of library content. In second place came item No. (17) with a mean value of (3.87) and a standard deviation of (0.85), which is of high level. The item stated that "the system is protected by anti-virus software". This is attributed to the importance of maintaining software security and the continuity of using software and websites without giving glitch the opportunity to affect the software or websites being hacked. In addition to the importance of such software in raising the information security level. This finding is consistent with the majority of findings offered by previous studies, such as [33], [25], [26], [20], [31], [19], [21], and [28], as these studies indicated that libraries and institutions are concerned with the existence of virus protection software due to their importance.

Item No. (19) reached a high level with a mean value of (3.79) and a standard deviation of (0.88). This item stated that "all anti-virus, anti-hacking and anti-spyware software are trusted and licensed". This can be attributed to the increasing emergence of pirated copies of this software in some countries which is counterproductive. University libraries are keen to provide trusted anti-virus, anti-hacking, and anti-spyware software to protect library devices, software, and networks from harmful materials.

Item No. (15) was last ,with a mean value of (3.37) and a standard deviation of (0.93), which is of medium level. The item stated that "instructions for secure encryption process are available", which is an unexpected result. This result can be attributed mainly to university libraries' lack of reliance on data encryption. It may also be attributed to the lack of awareness regarding the presence of instructions that use appropriate encryption processes, as encryption may not be effective if it was not used properly. Encryption could be weak and worse than non-encryption in the absence of instructions as it may give a false sense of security. This result is consistent with the study in [19], which indicated a lack of interest in some necessary security methods, the most important of which is the encryption system.

The Second Theme: The Status Quo of Information Security Policy

Table V shows that the mean values ranged between (3.14-3.56), where the status quo obtained an overall mean value of (3.32), which is of medium level, and item No. (22) obtained the highest mean value of (3.56), and a standard deviation of (0.88) which is of medium level. This item stated that "this policy defines the responsibilities and powers, such as user denied access to the network". This result may be attributed to the fact that most of the staff or network users in libraries use passwords or pass codes that cannot be deleted or modified upon the occurrence of a problem unless through certain procedures. Such procedures require persons in charge to inform the account owner of the denied access to use the service or the network, this may hinder work inside the library and cause disruptions.

Item No. (21) came in second place with a mean value of (3.33) and a standard deviation of (1.06), which is of medium level. The item stated that "the library has an approved written information security policy". This result is attributed to the fact that university library administrations may not be aware of the importance of information security policy, in addition to the absence of security awareness resulting from the lack of interest in this policy, which is considered one of the most important means to maintain the security of information in libraries. This policy is not limited to the prevention of crime only as it involves reserving work time of staff and the non-use of materials irrelevant to work, such as the internet and others, in addition to defining frameworks for work procedures, roles, responsibilities and general duties. This result is consistent with [18], [21], [29], [31], [26], [20], [33], and [25] studies, as these studies pointed out the lack of interest on the part of libraries and educational institutions in having a concise written information security policy.

TABLE V
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE TO THE ITEMS OF "THE STATUS QUO OF INFORMATION SECURITY POLICY IN IT DEPARTMENTS IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
22	This policy defines the responsibilities and powers, such as user denied access to the network	3.56	0.88	1	Medium
21	The library has an approved written information security policy	3.33	1.06	2	Medium
23	This policy includes risk prevention measures	3.29	0.90	3	Medium
24	This policy includes procedures to follow when problems arise	3.27	0.96	4	Medium
25	Information security policy is discussed and developed periodically	3.14	1.08	5	Medium
	Overall Mean	3.32	0.82		Medium

TABLE VI
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE TO THE ITEMS OF "THE STATUS QUO OF THE PROTECTION OF E-DATA IN LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
26	Backup service for the protection of data on computers is available	3.65	1.09	1	Medium
30	Electronic data media shall be stored in secure external locations	3.61	0.99	2	Medium
29	Backups are classified according to the copying period for easy reference	3.55	1.02	3	Medium
27	The backup process is monitored to ensure that it is done correctly	3.51	1.06	4	Medium
28	Confidential information stored on backup media shall be encrypted according to the applicable policy	3.35	1.02	5	Medium
31	Backup storage media shall be destroyed in a safe manner to avoid being reused	3.29	0.93	6	Medium
	Overall Mean	3.49	0.85		Medium

Item No. (25) ranked last with a mean value of (3.14) and a standard deviation of (1.08), which is of medium level. The item stated that "information security policy is discussed and developed periodically." This is attributed to the lack of interest in security policy, and confirms the previous result, which is the lack of interest in a written concise information security policy to be adopted by university libraries, which becomes an obstacle in the face of the administration as it seeks to achieve a high level of security and to maintain information security.

The Third Theme: The Status Quo of the Protection of E-Data in Libraries

The results in Table VI show that the mean value of the status quo of the protection of electronic data in Jordanian university libraries from the perspective of IT staff ranged between (3.29-3.65), where it obtained an overall mean value of (3.49), which is of medium level. Item No. (26) scored the highest mean value of (3.65), with a standard deviation of (1.09), which is of medium level. The item stated that "backup service for the protection of data on

TABLE VII
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE TO THE ITEMS OF "THE STATUS QUO OF PROCEDURES FOR THE PROTECTION OF COMPUTER SYSTEMS AND NETWORKS IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
33	Passwords to access the network shall be set and given to authorized persons	4.08	0.78	1	High
37	Consent should be obtained before modifying devices and protection software	3.87	0.85	2	High
34	Devices to support internal network protection, such as detection and anti-spyware systems, firewalls, and others are available	3.80	0.86	3	High
35	Settings for devices on networks are set to operate in a safe manner	3.79	0.95	4	High
32	Operating systems are updated if necessary (hacking, failure in special protection elements)	3.68	0.88	5	High
40	Errors in information systems are recorded in reports and corrective actions taken are documented	3.68	1.05	5	High
38	The library maintains records about the component assets of each information system	3.64	0.98	7	Medium
39	In the event of a business failure or interruption, a plan to return the business to normal within a planned time frame should be available	3.61	0.97	8	Medium
36	Encountered security problems should be periodically reported	3.45	0.86	9	Medium
	Overall Mean	3.73	0.64		High

computers is available". This result could be related to the fact that IT staff need to be more aware of the urgent need to protect data and computers. This is important in the case that a computer crashes while being used by a student for some reason or due to misuse or mechanical or electrical failure, which will cause loss of data. Therefore, IT staff should consider the backup service seriously and save data on customized media so that data can be restored, when necessary, without any difficulties. This result is consistent, to some extent, with the study in [33] which indicated that educational institutions lack backup copies of data, and the study in [20] which indicated the absence of some security measures such as backup services. Item No. (30) came in second place, with a mean value of (3.61), and a standard deviation of (0.99), which is of medium level. The item stated that "electronic data media shall be stored in secure external locations". This is attributed to the lack of awareness to preserve these copies securely for restoration in cases where the library may be exposed to danger, and if this action was not performed, then all data stored on this media will be subject to potential damage or risk, therefore the storing of such important data media should receive attention.

The Fourth Theme: The Status Quo of Procedures for the Protection of Computer Systems and Networks in Jordanian University Libraries

Table VII shows that the mean value of the status quo of procedures for the protection of computer systems and networks in Jordanian university libraries from the perspective of IT staff ranged between (3.45-4.08), where the status quo obtained an overall mean value of (3.73), which is of high level. Item No. (33) had the highest mean value of (4.08), and a standard deviation of (0.78), which is

of high level. The item stated that “passwords to access the network shall be set and given to authorized persons”. This result is attributed to the fact that most Jordanian university libraries work to uphold this issue, in order to preserve and protect computer systems and networks. Passwords ensure that websites related to libraries and dissertations are safe from hacking. Item No. (37), came next, with a mean value of (3.87), and a standard deviation of (0.85), which is also of high level. The item stated that "consent should be obtained before modifying devices and protection software". This is due to the importance of the issue from a procedural and practical perspective. When modifying devices and protection software, staff will have a thorough understanding of new operational methods or the use of software and sites. This will be beneficial to the protection of systems and networks in Jordanian university libraries.

Item No. (34) obtained a mean value of (3.80), and a standard deviation of (0.86), which is of high level. The item states that “Devices to support internal network protection, such as detection and anti-spyware systems, firewalls, and others are available”. This is attributed to the fact that university libraries are keen to protect their systems and networks from undesired access or disruption and manipulation through intrusions that may occur, or the use of malware or any behaviors that may violate library systems and networks. This is consistent with the study in [26], which indicated that institutions that rely on information technology to run their business provide devices for the protection of their networks such as proxies and firewalls. However, this result is inconsistent with the study in [19] which indicated that libraries lack some necessary protection methods such as firewalls. In last place came item No. (36) with a mean value of (3.45), and a standard deviation of (0.86), which is of medium level. The item stated that “Encountered security problems should be periodically reported”. This is an unexpected result as reports should be submitted in order to address errors or any problems that may occur in library systems and networks, as passwords and protection software are insufficient, and problems may arise during their application. Moreover, libraries should identify these problems through periodic reports in order to modify and adjust them.

The Fifth Theme: The Status Quo of Access Control to Information Systems

Table VIII shows that the mean values of the status quo of the procedures for controlling access to information systems in Jordanian university libraries from the perspective of their staff ranged between (3.46-4.04), with an overall mean value of (3.68) a standard deviation of (0.75), with an average overall level. Item No. (41) obtained the highest mean value of (4.04) and a standard deviation of (0.95), which is of high level. The item stated that “a set of access permissions are granted to each user according to their administrative level”. This result may be attributed to granting a set of access permissions to each user to act as they deem appropriate whenever a problem occurs and to solve it appropriately within information systems. These access permissions, granted to groups, require special cards that prove that the user has the authority to address errors, or change some data and transfer them from one place to another within the site, in addition to publishing some articles or recent information on university websites through libraries, in order to raise the level of the status quo of access control to information systems. This result is consistent with the study in [19] which indicated the lack of identification of the access permissions of staff users according to their actual work in the library, in addition to the study in [18]. In second place came item No. (46) with a mean value of (3.76) and a standard deviation of (0.99), which is of high level. The item stated that "reports on user activities are available". This result confirms the keenness of libraries to follow up on access permissions and to address errors that may appear. In last place came item No. (47) with a mean value of (3.46) and a standard deviation of (1.12), which is of medium level. This item stated that “instructions for creating strong passwords are available”. This is attributed to the lack of interest and awareness on the part of library administrations and IT staff as to the preservation of the privacy of library staff, especially systems administrators, and the time and effort the said instructions save for users. This result is inconsistent with the study in [25] which confirmed the availability of instructions for creating strong passwords.

TABLE VIII
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE TO THE ITEMS OF "THE STATUS QUO OF ACCESS CONTROL TO INFORMATION SYSTEMS IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
41	A set of access permissions are granted to each user according to their administrative level	4.04	0.95	1	High
46	Reports on user activities are available	3.76	0.99	2	High
42	Each user is given an ID as there are no general powers for multiple persons	3.75	0.98	3	High
45	The operation performed by the patron is recorded after its execution	3.69	0.94	4	High
43	User permissions are closed for information security reasons	3.62	1.05	5	Medium
44	Periodic reviews of users' access permissions to information are available	3.61	0.97	6	Medium
49	Performance logs are used to save user activities for information security reasons	3.61	0.99	6	Medium
48	Some sensitive information systems are isolated in independent local networks	3.56	1.07	8	Medium
47	Instructions for creating strong passwords are available	3.46	1.12	9	Medium
	Overall mean	3.68	0.75		High

B. The Second Question: What are the difficulties facing IT staff in Jordanian university libraries in relation to Information Security?

To answer this question, mean values and standard deviations were extracted to identify the responses of the study sample individuals as to the difficulties facing IT staff in Jordanian universitylibraries, as shown in Table IX below:

Table IX shows that the mean values of (the difficulties facing IT staff in Jordanian university libraries) ranged between (3.94-3.42), where the overall mean value reached (3.59), which is of medium level. This indicates that IT staff in Jordanian university libraries are facing difficulties in performing their duties in general, and in the field of information security in particular, this shows that university libraries do not keep pace with the required developments in the field of information security and do not achieve the desired aspirations in this field.

Hereafter, an analytical presentation of the most prominent difficulties facing IT staff, at their discretion. Item No. (52) was ranked first, with high level, and a mean value of (3.94), and a standard deviation of (0.52), it states: "the lack of specialized staff in information security". This result may be attributed to the fact that Jordanian universities believe that the number of IT staff is sufficient in light of the budgets currently allocated to staff salaries, and it may also be attributed to the lack of awareness of the need for having specialized and competent staff in the field of information security, or related technical specialties, in order to raise the level of security and protection in these libraries. This result was consistent with the study of Maidabino and Zainab [21], and the study in [18], which indicated that there is no specialized team that supervises the automated systems in the library despite its importance. It was also consistent with Ammar's study [26], which pointed out to the lack of experience in information security among the staff of educational institutions.

Item No. (58) obtained a mean value of (3.87), and a standard deviation of (0.72), which is of high level. It stated, "the lack of sufficient time to discuss new methods for information security protection". While item No. (56) obtained a mean value of (3.81), and a standard deviation of (0.67) which is of high level. It stated " Occasionally, there are

TABLE IX
MEANS AND STANDARD DEVIATIONS OF THE RESPONSES OF THE STUDY SAMPLE INDIVIDUALS TO THE ITEMS OF "THE DIFFICULTIES FACING IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES" IN DESCENDING ORDER

No.	Item	Mean	Standard Deviation	Ranking	Level
52	The lack of specialized staff in information security	3.94	0.75	1	High
50	The lack of budget allocated to information security in the library	3.87	0.72	2	High
58	The lack of sufficient time to discuss new methods for information security protection	3.81	0.67	3	High
56	Occasionally, there are difficulties in determining the losses resulting from various incidents of breach	3.67	0.73	4	Medium
60	Poor training on the skills required in the field of information security	3.54	1.10	5	Medium
57	Difficulties exist in relation to determining the adequacy or insufficiency of the current security measures	3.48	1.00	6	Medium
59	The administration lacks interest in the observations made	3.48	1.15	6	Medium
51	There is difficulty in providing effective information security protection programs	3.46	1.21	8	Medium
53	There is an increased possibility of exposure to information security risks	3.44	1.01	9	Medium
54	The difficulty of keeping up with innovations and modern methods in the field of information security	3.43	1.01	10	Medium
55	Necessary tools to enable information security professionals to develop their work are not available	3.42	1.09	11	Medium
	Overall Mean	3.59	0.66		Medium

difficulties in determining the losses resulting from various incidents of violation". The two aforementioned items confirm what was mentioned in the previous item, where the researcher believes that IT departments in Jordanian universities libraries do not have enough time to discuss new methods for information security protection. This is due to the fact that most staff make no arrangements to hold meetings after or during their working hours. This is further related to the number of staff, as the increased number of staff shall provide sufficient time for other staff to hold meetings to discuss new methods of information security protection while the remaining staff are performing their duties. Therefore, the coordination between staff shall result in clear results. Consequently, the lack of sufficient time to discuss new protection methods will lead to difficulty in determining the loss resulting from various incidents of breach, and in assessing the security situation in general. In this regard, this item is consistent with Allozi [32] study, which indicated that financial resources are among the most prominent difficulties facing information security.

C. The Third Question: Are there any significant statistical differences at the significance level ($\alpha \leq 0.05$) between the mean values of the estimation of IT staff in Jordanian university libraries of the status quo of information security attributed to the variables (years of experience, type of university, job level, and specialization)?

To answer this question, the Four Ways ANOVA was used to identify the estimation of IT Staff in Jordanian university libraries of the status quo of information security attributed to (experience, type of university, job level, and specialization), as shown in Table X below:

TABLE X
ANALYSIS OF VARIANCE (FOUR WAYS ANOVA) TO IDENTIFY THE DIFFERENCES IN THE ESTIMATION OF IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES OF THE STATUS QUO OF INFORMATION SECURITY ATTRIBUTED TO (EXPERIENCE, TYPE OF UNIVERSITY, JOB LEVEL, AND SPECIALIZATION)

	Source	Sum of Squares	Df	Average of Squares	F	Statistical Significance
Infrastructure Security	Corrected Model	5.155[a]	7	.736	2.062	.058
	Intercept	289.122	1	289.122	809.457	.000
	Experience	.646	2	.323	.904	.409
	Type of University	.131	1	.131	.368	.546
	Job Level	1.016	2	.508	1.422	.248
	Specialization	2.519	2	1.260	3.527	*.034
	Error	27.146	76	.357		
	Total	1128.875	84			
	Corrected Total	32.301	83			
Information Security Policy	Corrected Model	7.920[a]	7	1.131	1.815	.096
	Intercept	238.946	1	238.946	383.367	.000
	Experience	1.847	2	.923	1.481	.234
	Type of University	1.197	1	1.197	1.920	.170
	Job Level	.433	2	.217	.348	.708
	Specialization	2.991	2	1.496	2.400	.098
	Error	47.370	76	.623		
	Total	980.640	84			
	Corrected Total	55.290	83			
Electronic Data Protection	Corrected Model	13.362[a]	7	1.909	3.145	.006
	Intercept	298.065	1	298.065	491.034	.000
	Experience	3.592	2	1.796	2.959	.058
	Type of University	.037	1	.037	.061	.805
	Job Level	4.442	2	2.221	3.659	*.030
	Specialization	3.244	2	1.622	2.672	.076
	Error	46.133	76	.607		
	Total	1083.833	84			
	Corrected Total	59.495	83			
Procedures for the Protection of Computer Systems and Networks in the Library	Corrected Model	7.771[a]	7	1.110	3.163	.005
	Intercept	318.697	1	318.697	907.959	.000
	Experience	1.190	2	.595	1.695	.190
	Type of University	.014	1	.014	.040	.842
	Job Level	1.599	2	.799	2.277	.110
	Specialization	4.234	2	2.117	6.032	*.004
	Error	26.676	76	.351		
	Total	1204.889	84			
	Corrected Total	34.447	83			

TABLE X
ANALYSIS OF VARIANCE (FOUR WAYS ANOVA) TO IDENTIFY THE DIFFERENCES IN THE ESTIMATION OF IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES OF THE STATUS QUO OF INFORMATION SECURITY ATTRIBUTED TO (EXPERIENCE, TYPE OF UNIVERSITY, JOB LEVEL, AND SPECIALIZATION) (*Continued*)

	Source	Sum of Squares	Df	Average of Squares	F	Statistical Significance
Access Control to Information Systems	Corrected Model	8.522[a]	7	1.217	2.440	.026
	Intercept	317.130	1	317.130	635.709	.000
	Experience	.958	2	.479	.961	.387
	Type of University	.075	1	.075	.150	.699
	Job Level	2.848	2	1.424	2.855	.064
	Specialization	3.591	2	1.796	3.599	*.032
	Error	37.913	76	.499		
	Total	1182.296	84			
	Corrected Total	46.435	83			

* Statistically significant at the level (0.05)

The results showed that there were no statistically significant differences according to the variable (years of experience), as the value of the statistic (F) was (0.904, 1.481, 2.959, 1.695, 0.961) for the following fields respectively: infrastructure security, information security policy, electronic data protection and procedures for the protection of computer systems and networks in the library, and access control to information systems. Whereas all of these values were not statistically significant at the level (α≤0.05).

The results also showed that there were no statistically significant differences according to the variable (type of university), as the statistic value (F) was (0.368, 1.920, 0.040, 0.061, 0.150) for the following fields respectively: infrastructure security, information security policy, electronic data protection, procedures for the protection of computer systems and networks in the library, and access control to information systems). Whereas all of these values were not statistically significant at the level (α≤0.05).

This result may be attributed to the fact that staff, whether of much or little experience in public or private universities, have the same estimation for the status quo of information security due to the similarity of roles in university libraries and private libraries, in addition to the recent experiences of this group of staff and their need to prove their capabilities and enhance their skills.

Also, the results showed that there were statistically significant differences according to the variable (job level) in (electronic data protection), where the value of (F) was (3.659), and this value is significant at the level (α≤0.05).

Moreover, the results showed that there were no statistically significant differences according to the variable (job level), where the value of (F) was (1.422, 0.348, 2.277, 2.855) for the following fields respectively: infrastructure security, information security policy, procedures for the protection of computer systems and networks in the library, and access control to information systems. Whereas all of these values were not statistically significant at the level (α≤0.05).

The results also show that there were statistically significant differences according to the variable (specialization) in the fields: infrastructure security, procedures for the protection of computer systems and networks in the library, and access control to information systems), where the static value of (F) was (3.527, 6.032, 3.599) and these values are significant at the level (α≤0.05). In addition, the results showed that there were no statistically significant differences according to the variable (specialization), as the statistic value

TABLE XI
SCHEFFE TEST FOR DIMENSIONAL COMPARISONS TO IDENTIFY DIFFERENCES IN ELECTRONIC DATA PROTECTION AT DIFFERENT JOB LEVELS

	(I) Job Level	(J) Job Level	Difference between Mean Values	Statistical Significance
Electronic Data Protection	Manager	Head of Department	.84866	.230
		Employee	1.24466*	.040
	Head of Department	Manager	-.84866-	.230
		Employee	.39600	.114
	Employee	Manager	-1.24466*	.040
		Head of Department	-.39600-	.114

* Significant at the level (0.05) or less

(F) reached (2.400, 2.672) for the following fields respectively: information security policy and electronic data protection, and these values were not statistically significant at the level (α≤0.05).

In order to identify the source of the differences in the protection of electronic data according to the job level, and the source of the differences in infrastructure security, procedures for the protection of computer systems and networks in the library, and access control to information systems according to specialization, the Scheffe test was used, and the results were as shown in Table XI.

It is evident from Table XI that the source of the differences in the protection of electronic data was in favor of the category of managers, according to the difference in the job level of the study population individuals, which means that this category of the study population individuals consider that data is protected more than heads of departments and employees do. This could be attributed to the nature of work of managers as it involves supervision and guidance, but application may differ from guidance which results in the differences between this category and other categories.

The results shown in Table XII show that the source of differences in infrastructure security, procedures for the protection of computer systems and networks in the library, and access control to information systems was in favor of computer science staff in Jordanian university libraries. This may be attributed to the fact that their knowledge of technical issues is greater than their knowledge in the fields of libraries and information and other specializations, as computer science is closer to technical issues which makes their perspectives differ in some areas of the study.

D. The Fourth Question: Are there any statistically significant differences at the level of significance (α≤0.05) between the mean values of estimations of IT staff in Jordanian university libraries to the difficulties they are facing in addressing electronic violations in Jordanian universities libraries attributed to (years of experience, type of university, job level, and specialization)?

To answer this question, analysis of variance (Four Ways ANOVA) was used to identify the difficulties facing IT staff in Jordanian university libraries attributed to the variables (experience, type of university, job level, and specialization). Table XIII illustrates this.

The results showed that there were statistically significant differences according to the variable (specialization) in (the difficulties facing IT staff in Jordanian university libraries), where the value of (F) was (3.325), and this value is significant at the level (α≤0.05). However, the results showed that there were no statistically significant differences related to the difficulties facing IT staff in Jordanian university libraries according to the variables (experience, type of university, job level), as the value of (F) reached (0.095, 0.122, 0.568), and all of these values were not statistically significant at the level (α≤0.05). As to the variable of experience, the result was unexpected, as it is assumed that staff with greater experience are less likely to ex-

TABLE XII
SCHEFFE TEST FOR DIMENSIONAL COMPARISONS TO IDENTIFY DIFFERENCES IN INFRASTRUCTURE SECURITY, PROCEDURES FOR THE PROTECTION OF COMPUTER SYSTEMS AND NETWORKS IN THE LIBRARY, AND ACCESS CONTROL TO INFORMATION SYSTEMS ACCORDING TO SPECIALIZATIONS

	(I) Specialization	(J) Specialization	Difference between Mean Values	Statistical Significance
Infrastructure Security	Libraries and Information	Computer Science	-.28762-	.293
		Other Specializations	.19936	.404
	Computer Science	Libraries and Information	.28762	.293
		Other Specializations	.48698*	.037
	Other Specializations	Libraries and Information	-.19936-	.404
		Computer Science	-.48698*	.037
Procedures for protecting computer systems and networks in the library	Libraries and Information	Computer Science	-.48765*	.035
		Oher Specializations	.10262	.790
	Computer Science	Libraries and Information	.48765*	.035
		Other Specializations	.59028*	.010
	Other Specializations	Libraries and Information	-.10262-	.790
		Computer Science	-.59028*	.010
Access control to information systems	Libraries and Information	Computer Science	-.46065-	.040
		Other Specializations	.03241	.856
	Computer Science	Libraries and Information	.46065	.040
		Other Specializations	.49306	.031
	Other Specializations	Libraries and Information	-.03241-	.856
		Computer Science	-.49306-	.031

* Statistically significant at the level (0.05)

perience difficulties. This result may be attributed to the fact that university libraries provide the same capabilities to all staff, which makes their estimations of difficulties close. This result is expected in relation to the variables type of university and job level, since public and private university libraries are similar in terms of organization, available services, and nature of work. Where administrators and staff are subject to the same conditions and hence the convergence of perspectives.

In order to identify the source of differences in the difficulties according to the specialization, the Scheffe test was used, and the results are shown in Table XIV:

It is evident from Table XIV that the source of differences in difficulties was in favor of staff of Jordanian university libraries within the category of other specializations, followed by the category of libraries and information. In other words, computer science specialists are less likely to experience difficulties, followed by library and information specialists, and lastly came specialists of other specializations. This is an expected result since computer science specialists are more capable of comprehending technical issues. This result is consistent, to a large extent, with the Phelps (2005) study, which indicated that staff of libraries with prior IT training were more effective in implementing information system security compared to those who received no training.

XIV. CONCLUSION AND RECOMMENDATIONS

In light of the findings reached in this study, the study offered the following recommendations:

- IT staff in university libraries should participate in the decision-making process in these librar-

TABLE XIII
ANALYSIS OF VARIANCE (FOUR WAYS ANOVA) TO IDENTIFY THE DIFFICULTIES FACING IT STAFF IN JORDANIAN UNIVERSITY LIBRARIES ATTRIBUTED TO (EXPERIENCE, TYPE OF UNIVERSITY, JOB LEVEL, AND SPECIALIZATION)

	Source	Sum of Squares	Df	Average of Squares	F	Statistical Significance
Difficulties	Corrected Model	3.676[a]	7	.525	1.230	.297
	Intercept	264.734	1	264.734	620.067	.000
	Experience	.081	2	.041	.095	.909
	Type of University	.052	1	.052	.122	.728
	Job Level	.485	2	.242	.568	.569
	Specialization	2.840	2	1.420	3.325	*.041
	Error	32.448	76	.427		
	Total	1120.579	84			
	Corrected Total	36.124	83			

* Statistically significant at level (0.05)

TABLE XIV
SCHEFFE TEST FOR DIMENSIONAL COMPARISONS TO IDENTIFY DIFFERENCES IN THE DIFFICULTIES FACING STAFF OF JORDANIAN UNIVERSITY LIBRARIES ACCORDING TO SPECIALIZATION

(I) Specialization	(J) Specialization	Difference between Mean Values	Statistical Significance
Libraries and Information	Computer Science	.42361*	.030
	Other Specializations	-.10480-	.501
Computer Science	Libraries and Information	-.42361*	.030
	Other Specializations	-.52841*	.008
Other Specializations	Libraries and Information	.10480	.501
	Computer Science	.52841*	.008

ies by discussing work problems and creating a common vision regarding information security.

- It is imperative to raise the level of infrastructure in public and private Jordanian university libraries. The focus should be on physical security, interest in used software, and determining the responsibilities of staff towards information security.
- Interest should be directed to establishing a clear written policy that includes all the necessary procedures to raise the level of information security in Jordanian university libraries and to develop it, when required.
- To show interest, follow up and organize the backup services in university libraries in order to raise the level of electronic data protection.
- To participate in internal and external conferences and seminars to explore the most prominent means and methods used to raise the level of information security in Jordanian university libraries and to overcome obstacles in this field.
- The number of human resources specialized in information security should be increased. Moreover, training courses for staff specialized in information security should be held, and the necessary resources should be provided.
- To lay down objective foundations when se-

lecting library and IT staff in general, in particular taking specialization into consideration. The high competence of such staff shall equip them with the capacity to implement information security standards in Jordanian university libraries.

- It is necessary to develop curricula in libraries and information science in Jordanian universities to include materials on the subject of information security, thus preparing human resources specialized in the field of libraries and capable of implementing information security.
- To work on conducting further studies related to the subject of this study, and to research other variables pertinent to information security in Jordanian university libraries, such as: management, planning, and procedures to raise the level of performance of Jordanian universities libraries.

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