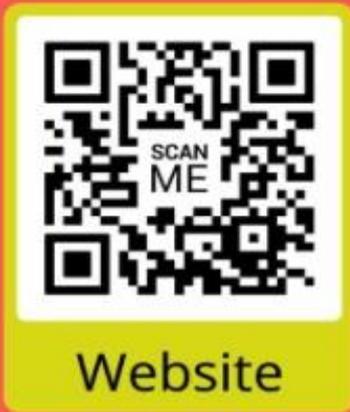


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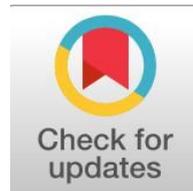
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## The Influence of Information Technology Architecture on the Innovative Performance of Employees: A Survey Conducted in Iraqi University Libraries

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### Abstract

**General Background:** University libraries operate in dynamic knowledge environments that require technological systems capable of supporting information services and organisational activities. **Specific Background:** Information technology architecture, including hardware and equipment, software and databases, communications networks, and human resources, provides a framework that supports employees in performing their tasks and generating innovative ideas. **Knowledge Gap:** Empirical research integrating information technology architecture and employee innovation performance in the context of Iraqi university libraries remains limited. **Aims:** This study examines the relationship between information technology architecture and employee innovation performance in the libraries of the University of Karbala. **Results:** Using survey data from 87 employees and structural equation modelling analysis, the findings show a statistically significant relationship between information technology architecture and employee innovation performance ( $\beta = 0.796$ ,  $p < 0.001$ ), explaining 68.6% of the variance in innovation performance. **Novelty:** The study integrates multiple dimensions of information technology architecture with indicators of employee innovation performance within the organisational context of university libraries. **Implications:** The findings indicate that strengthening technological resources, communication networks, software systems, and staff development is associated with improved innovative work practices in knowledge institutions.

### Highlights:

- Information Technology Architecture Dimensions Show Significant Relationships With Employee Innovative Capabilities.
- Structural Equation Modelling Explains 68.6 Percent of Innovation Performance Variance in Libraries.
- Technological Resources and Staff Development Support Creative Work Practices in Knowledge Institution.

**Keywords:** Information Technology Architecture, Employee Innovation Performance, University Libraries, Information Systems Infrastructure, Organizational Innovation.

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## 1- Research Methodology

### 1-1- The Research Problem

Ongoing technological advancements and the growing volume and quality of global information resources provide difficulties that overshadow several organisations, especially those reliant on knowledge. This requires that leaders of these institutions refine their competencies and methodologies for executing their responsibilities, particularly in light of the constrained financial resources available to these entities, which may hinder their capacity to adapt to swift advancements in information resources and the evolving demands of beneficiaries for information resources and services. The innovation performance factor of personnel serves as a crucial instrument for maximising investment in existing technology, hence assuring superior performance and service delivery. The primary research issue is encapsulated in the endeavour to address the research question: How can information technology architectures influence the innovation performance of employees? Several sub-questions arise from this primary inquiry, specifically:

- 1- To what degree is the information technology architecture adequate for the operations conducted by the libraries in question?
- 2- What is the innovation performance level of the personnel in the studied libraries?
- 3- What is the link between information technology architecture and the innovation performance of staff in the studied libraries, both at the aggregate level and concerning the dimensions of information technology architecture

### 1-2- The importance of the research

The importance of the research emerges from two directions:

**The first direction:** The scientific significance of the study, which stems from the following points:

- 1- The importance of the research variables is among the critical variables at the level of knowledge and information institutions, especially university libraries, which are the primary supporters of scientific research in universities and research centers.
- 2- The research attempts to complement the previous cognitive efforts of researchers to ensure the achievement of new results.
- 3- At the local level, there is a limited scope for studying research variables within the library environment in general, particularly university libraries. Therefore, this research represents a modest contribution to bridging this knowledge gap.

**The second direction:** The practical importance of the research stems from the following points:

1. The results obtained can serve as a roadmap for the researched libraries and their counterparts to activate the role of information technology in enhancing the innovation performance of staff, ensuring the highest levels of performance, and improving the quality of services provided to beneficiaries.
2. Drawing the attention of senior management in the researched libraries to the importance of technology and its effectiveness in influencing staff performance.

### 1-3- Research Objectives

1. Shed light on the information technology architecture in the researched libraries.
2. Study the reality and trends of staff innovation performance.
3. Explore the influence of information technology architecture on the innovation performance of staff in the researched libraries at the overall level and the dimensions of the information technology architecture.

### 1-4- Hypotheses and Hypothetical Plan of the Research

#### 1-4-1- Research Measures

The measures shown in Table (1) were adopted to achieve the research objectives, which indicate the specific measure for each variable and its associated dimensions.

**Table 1** illustrates the measures adopted to determine the dimensions of the research variables.

	Variable	Dimensions	Scale
1	IT Infrastructure Variable	Hardware and Equipment	Yassin, 2012 [1]
		Software	
		Communications and Networks	
		Human Resources	

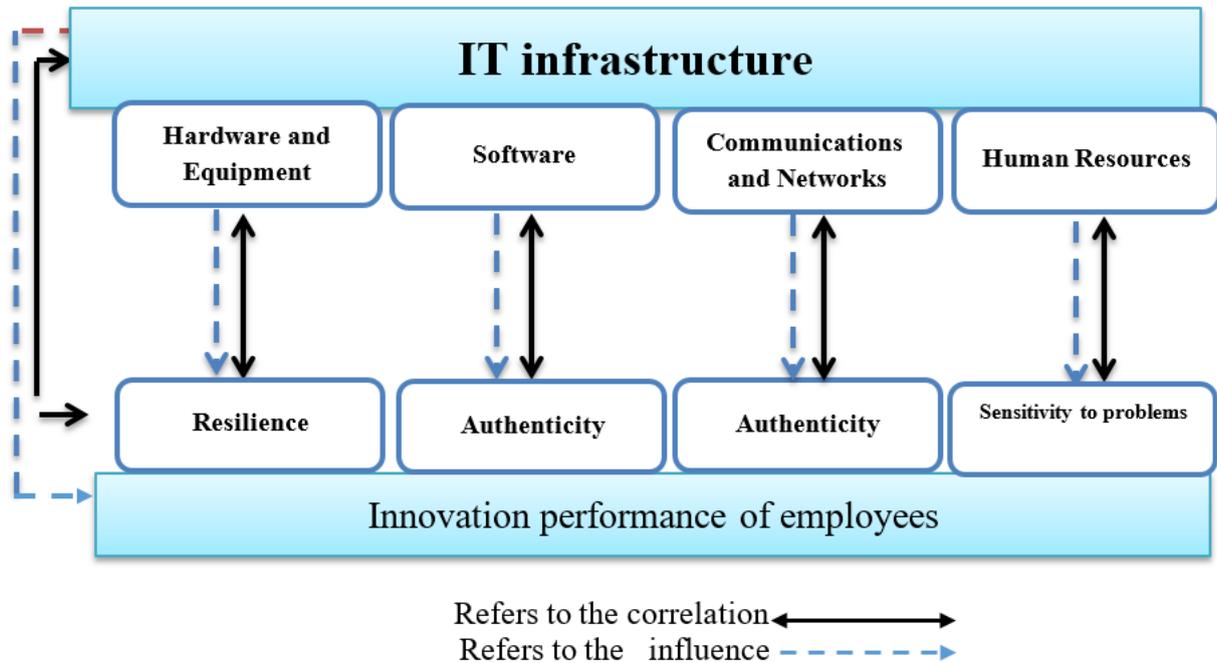
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	Variable	Dimensions	Scale
2	Innovation performance	<b>Resilience</b> <b>Fluency</b> <b>Authenticity</b> <b>Sensitivity to problems</b>	Purnomo, 2019 [2]

"Source prepared by the researcher based on the literature mentioned in the table."

### 1-4-2- Hypothetical diagram and research hypotheses

"Figure (1) The hypothetical model of the research"



"\*Source: Prepared by the researcher based on the mentioned sources".

**The research is based on a main hypothesis:** "There is a significant influence between the information technology architecture variable and its dimensions on the innovation performance variable of employees." From this, four sub-hypotheses branch out as follows:

1. (H1-1): There is a "significant influence between" hardware and equipment and the innovation performance of employees in the libraries studied.
2. (H1-2): There is a "significant influence between" software and the innovation performance of employees in the libraries studied.
3. (H1-3): There is a "significant influence between" communications and networks and the innovation performance of employees in the libraries studied.
4. (H1-4): There is a "significant influence between" human resources and the innovation performance of employees in the libraries studied.

### 1-5- Research Boundaries

- Spatial Boundaries / University of Karbala.
- Temporal Boundaries / September 1, 2024 - February 1, 2025

### 1-6- Research Community and Sample

The research community is represented by the employees of the General Secretariat of the Central Library of the University of Karbala and its affiliated branch libraries (college libraries and research centers), which are represented by:

- 1- The University's Central Library (42 employees).
- 2- Branch Libraries consist of 20 branch libraries for 17 colleges and three research centers. These branch libraries include 51 employees, meaning the total population was 93 employees, and the research sample was 87 respondents, as the entire population was studied.

## 1-7- Research Methodology and Data Collection Tools

The survey method was adopted to conduct the research and arrive at the final results. The following data collection tools were also used:

- Literature related to both the topics of information technology architecture and employee innovation performance.
- Questionnaire: A three-part questionnaire was prepared, including the following:

**Axis One:** Description of the research sample.

**Axis Two:** Paragraphs related to the independent variable of the research (information technology architecture) included (20) paragraphs prepared based on the sources mentioned in Table No. (1).

**Axis Three:** Paragraphs related to the dependent variable (employee innovation performance) included (20) paragraphs prepared based on the criteria in Table No. (1).

(93) questionnaires were distributed to the research population of (93), of which (87) were returned and valid for research purposes, representing a percentage of (94%).

## 1-8- Previous Studies

Numerous studies have examined the research factors, but often in isolation, associating them with other variables and occasionally within disparate sectors beyond the realms of libraries and office environments. Relevant studies analogous to the present research will be examined. The research paper by Asanti (2013) sought to examine the effects of technology on organisations concerning business expenses, customer happiness, quality, risk management, human resources, management functions, and implementation duration [3]. The research conducted by Kimani (2015) sought to assess the extent of information technology utilisation and its correlation with employee performance inside the Kenyan Population Services Corporation [4]. The research demonstrated a favourable correlation between the utilisation of information technology and organisational success. The research advocated for the enhancement of information technology architecture to get optimal performance and innovation in the workplace. Alttahir (2018) study examined the essential creative and innovative abilities required for librarians in the twenty-first century to attain maximum performance in academic libraries and provide superior services to users amidst adversities [5]. Libraries encounter problems necessitating essential modifications in their everyday operations and a reassessment of their roles and aims. The achievement of this goal necessitates the investment of library personnel in technology to enhance their creative and inventive capabilities, hence transforming their methods of engagement with beneficiaries. Kahfi (2022) examined the influence of digital technology on employee adaptation and performance inside organisations. To sustain job progression, it is essential to comprehend the influence of information technology on personnel [6]. The findings demonstrate that technology usage enhances employee productivity, efficiency, and flexibility in the workplace. Consequently, the institution may enhance its overall performance through the utilisation of technology. Employees have challenges in adapting to technology, necessitating appropriate change management strategies, including training and assistance. The research (Prasetyanto et al., 2024) investigates how technology advancements facilitate the enhancement of information sharing, absorptive ability, skills, and innovation among employees, hence improving efficiency in attaining organisational objectives. The study determined that the incorporation of artificial intelligence enhances the relationship between innovation and employee performance in innovation. Nonetheless, it does not fundamentally affect the link between information sharing and capability, understanding, skills, and innovative performance. The study provides both theoretical and practical insights to enhance decision-making in technology policy for the creative industry. The current study profited from prior research by utilising its findings to pick the dimensions of the research variables and to determine suitable statistical procedures for analysing the sample's replies [7].

Moreover, it enhanced the theoretical dimension of the research. This study distinguishes itself from other research by integrating two variables—information technology architecture and staff creativity performance—and examining them within the context of office construction. To the researcher's knowledge, this subject has not been previously examined within the field of specialisation at the local level.

## 2- The Theoretical Aspect of the Research

### 2-1- Information technology architecture (Concept / Importance / Dimensions / Challenges Facing It)

#### 2-1-1- The Concept of Information technology architecture

UNESCO characterises information technology as "the utilisation of contemporary technology, encompassing computers, satellites, and other sophisticated technologies, to generate, store, retrieve, disseminate, and transmit both analogue and digital information across various locations" [8]. It may also be described as "a collection of methodologies, production techniques, software, and technical resources that integrate into a technological chain, facilitating the collection, storage, processing, output, and dissemination of information to diminish labour intensity in the utilisation of information resources, while enhancing their efficiency and reliability" [9].

Information technology architecture is described as a collection of components that function cohesively to facilitate technology-driven services within organisations" [10].

The contemporary research perspective defines information technology architecture as the array of modern technological resources employed to facilitate organisational operations, encompassing smart devices, computers and their peripherals, software, artificial intelligence systems, expert systems, extensive information and communication networks, and skilled human resources to effectively leverage these assets for the enhancement of organisational methodologies and communication with service beneficiaries.

## **2-1-2- The Importance of Information technology architecture in Information Institutions**

The significance of information and communications technology is evident in all operations of information institutions, as delineated by Jude and Doris (2015) [11]:

1- Technical Work: Information technology architecture can facilitate technical operations in information institutions, such collaborative indexing of information resources with analogous institutions or the classification of information resources. These infrastructures can also facilitate the completion of the supply chain for conventional or electronic information resources, serving as a crucial instrument for conducting yearly or monthly inventories of information resources.

2- Supporting Administrative Functions: IT infrastructures facilitate administrative functions within information institutions, including planning, implementation, monitoring, evaluation activities, and decision-making processes, by delivering precise information regarding the organization's overall operations and activities.

3- Auxiliary Information Services IT infrastructures can facilitate information services for users, including lending, reference services, selective broadcast of information, translation, abstracting, and indexing.

4- Supporting Organisational Resources: IT infrastructures may serve as a vital instrument in mitigating the significant budget deficits encountered by most information institutions, as well as the consequent effects on the acquisition and processing of information resources and the delivery of services to users. It also significantly contributes to alleviating the human resource deficit confronting several information organisations worldwide.

5- Regulating global intellectual output to the greatest extent feasible: Information institutions encounter significant challenges in acquiring and selecting suitable information sources for their users, especially given the unparalleled surge in intellectual output published worldwide, both in traditional and electronic formats. This requires information institutions to invest in their information technology infrastructure to identify suitable solutions to this issue.

## **2-1-3- Dimensions of the IT infrastructure variable**

The dimensions of the IT infrastructure variable were established using the scale proposed by Yassin (2012), which encompasses four components: computers and accessories, software and databases, information and communications networks, and human resources. The dimensions can be delineated as follows [1]:

1- Computers and accessories: This denotes the "physical hardware," encompassing the several sorts of computers utilised by organisations, ranging from mainframes to tablets. Smartphones may presently be incorporated, since they can serve to receive or deliver services to beneficiaries. It comprises major processing and storage equipment, whereas peripheral devices encompass all input, output, and secondary storage techniques and technologies.

2- Software and Databases: This encompasses several software categories, including system software, which serves as the fundamental instrument for controlling computer resources, and application software, which offers a range of services from general to specialised and utility software. Databases are a specific and unique category of software application, serving as a crucial instrument for organising the resources of knowledge-based information organisations.

3- Information and Communications Networks: This encompasses all resources utilised for communication or data exchange, including physical communication and networking devices, data transfer protocols, and various information networks (the Internet, intranet, extranet), each dependable based on its designated purpose.

4- Human Resources: This dimension may signify a unique level of importance relative to the preceding dimensions, since it serves as the principal mechanism for optimising the investment in those dimensions, as previously noted. These resources encompass technical experts and specialists specialising in computers, software, and networks, tasked with developing the organization's initiatives and digitising its services. They are also responsible for teaching personnel on the projects they undertake and are crucial in overseeing the continuous development and maintenance of each project.

## **2-1-4- Challenges Facing an Information technology architecture**

Institutions, notably information institutions, encounter difficulties in implementing contemporary technology to perform their functions and deliver services to beneficiaries. These difficulties are especially pertinent to information technology architecture and the factors influencing its investment and use in the workplace. The researcher posits that these issues may be categorised based on each element of the information technology architecture, as follows [12] :

1- Computers and Accessories: Computers and their peripherals have difficulties, notably the obsolescence of these machines and their related equipment. The rate of advancements in processing speed and storage capacity is increasing, along with the differing endurance of gadgets. Institutions have challenges in adapting to these advancements, whether through the procurement of new technology or the enhancement of old ones, owing to the constrained financial resources  
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assigned to them. These organisations encounter challenges in managing the storage of information resources due to the extraordinary volume of intellectual activity, which has greatly beyond conventional levels. This necessitates acquiring greater virtual storage capacity or procuring supplementary external storage devices.

2- Organisations have issues associated with the rapid succession of remarkable advancements in diverse software kinds. These advancements, particularly in artificial intelligence capabilities, provide cost obstacles for acquiring software licenses. The primary problem is the retraining of personnel to utilise these software packages whenever the firm freely adopts them or when mandated by external circumstances. Moreover, data security concerns have emerged as a significant challenge across all sectors that employ information technology.

3- The primary issues confronting information organisations in the realm of Information and Communications Networks pertain to the obsolescence of communications and networking apparatus, as well as the routine maintenance of these devices. Moreover, there exists a concern regarding the sufficiency of data transfer velocities for the operations of information organisations. In this context, financial, administrative, and technical allocations are significant, directly influencing the quality of the implemented networks.

4- Human Resources: The obstacles confronting human resources in the domain of information technology architecture encompass the following:

- There is a significant shortage of specialized technical competencies in hardware maintenance, software, or information and communications networks.

- There is an urgent need to retrain technical specialists, as the capabilities of specialists are rapidly becoming obsolete with the emergence of new technologies.

- In conjunction with each new technology adopted, the need for continuous training for employees in information institutions entails financial obligations for such training.

- Technological illiteracy: [12] This challenge relates to the lack of technological knowledge and expertise among employees and the beneficiaries to whom services are provided. The institution needs to adopt an effective strategy to address this challenge.

- Resistance to change: Resistance to change also represents a major challenge for information institutions, whether this resistance comes from the institution's employees or its beneficiaries.

## **2-2- Innovation performance (Concept/Importance/Dimensions/Challenges Facing It)**

### **2-2-1- The Concept of Employee Innovation Performance**

The idea of performance pertains to an individual's capacity to fulfil work objectives within the company, the output generated when executing assigned duties, and the interaction of their behaviour. Interaction is influenced by effort, ability, and focus on responsibilities, obligations, and tasks [13].

The concept of innovation encompasses the generation of novel ideas, the exploration of contemporary work methodologies, the pursuit of distinctive value, and the capacity to address challenges. It signifies a thorough, integrative procedure encompassing an interrelated array of systems and processes inside the company [14]. Employee innovation performance denotes the capacity of individuals to conceive and produce novel ideas that benefit organisations, their procedures, processes, and work environments [15]. It is an individual-level phenomena embraced by organisations to generate distinctive, innovative ideas that enhance work practices and service delivery [16].

According to the aforementioned, and in alignment with contemporary research perspectives, employee innovation performance is characterised as the remarkable capacity of workers to conceive and develop novel, creative, and unconventional ideas to fulfil their designated duties and assignments. These concepts enhance value, hence favourably influencing the organization's overall success. This talent frequently differs across individual employees; nonetheless, they can finally be merged to create the desired good end.

### **2-2-2- The Importance of Employee Innovation Performance**

The innovative performance of employees is a crucial aspect in the advancement of any firm. This performance's significance may be encapsulated as follows: The researcher examines employee creativity in the following manner [17]:

1- The significance of innovation performance for organisations: Innovation enables organisations to sustain a proactive competitive edge through ongoing enhancement strategies rooted in staff innovation performance. It may assist organisations in resolving workplace issues through scientifically researched methods by implementing innovative solutions. It enhances organisational adaptability to changes in the work environment and optimises the allocation of organisational resources.

2- The significance of employee innovation performance: Employee innovation performance enhances employees' capacity to learn and evolve from the existing creative work methodologies and culture inside the workplace. These strategies enhance the environment for executing assigned tasks and responsibilities, consistently inspiring individuals to perform at their highest capacity.

3- The Significance of Innovation Performance by Beneficiaries: Employee innovation performance serves as a crucial instrument that enhances the quality of services delivered to the organization's beneficiaries. This guarantees that beneficiaries constantly obtain superior service quality, while varying the delivery modalities and enhancing their satisfaction with the services provided.

## **2-2-3- Dimensions of Employee Innovation Performance**

The Purnomo (2019) scale was utilised to ascertain the aspects of employee innovation performance, owing to its alignment with the aims and context of the present research. This scale has four dimensions: flexibility, fluency, inventiveness, and sensitivity to challenges, which the present research may articulate based on their use in information institutions as follows [2]:

1- Flexibility denotes employees' capacity to integrate innovative concepts with existing ideas and methodologies to enhance job value. This encompasses employees' capacity to shift between concepts and interconnect ideas both individually and collectively, perpetually innovating work methodologies, problem-solving techniques, and delivering information services to beneficiaries at the highest standard.

2- Fluency: This denotes employees' capacity to produce a maximum quantity of innovative ideas by analysing the organization's requirements for development or enhancement strategies, subsequently exercising the autonomy to suggest suitable solutions and potential alternatives for each scenario, thereby facilitating a transition to an improvement paradigm and the effective implementation of such enhancements.

3- Originality: This pertains to employees' capacity to present distinctive and valuable concepts to enhance existing work practices, devise solutions to current challenges in the field, or discover unconventional approaches to optimise the management and utilisation of organisational resources, thereby ensuring their optimal investment.

4- Sensitivity to Problems: This denotes employees' capacity to thoroughly comprehend the existing work environment both within and outside the organization, as well as their ability to connect the reciprocal influences between these environments and the degree of their impact on work methodologies and service provision to beneficiaries. This comprehension enables workers to foresee forthcoming changes and issues that pose organisational obstacles.

## **2-2-4- Challenges Facing Employee Innovation Performance**

There are several challenges facing employees' adoption of an innovation performance approach, which can be identified as follows:

### **1- Organizational Challenges: These challenges include:**

- Work environment conditions and requirements can sometimes be stressful for employees.
- Lack of financial resources to support the adoption and implementation of new ideas.
- Excessive bureaucracy and routine force employees to adhere to established work methods and refrain from deviating from them for any reason.
- Lack of motivational and encouraging tools adopted by senior management to increase employee innovation performance.

### **2- Individual Challenges: These include:**

- Fear of making mistakes or committing errors: Many creative employees try to avoid making mistakes, which often leads to reluctance to propose new ideas or implement unconventional creative ideas.
- Procrastination and postponement: These personality traits are evident in some creative individuals who often possess creative ideas but fall victim to procrastination and repeated postponement for personal reasons or fear of taking risks.
- Poor training and ongoing qualification of employees, as well as the resulting loss of experience, directly impact their innovation performance.
- Improper time management: Some creative individuals face the problem of allocating and investing their time optimally, which impacts their performance in implementing their proposed ideas.

## **3- Field-Based Research**

Data from the three axes of the questionnaire were analyzed: the first axis (description of the research sample), the second axis (information technology architecture with its dimensions: hardware and associated equipment, software, information and communications networks, and human resources), and finally, the third axis (innovation performance of employees with its dimensions: flexibility, originality, fluency, and sensitivity to problems) was analyzed. The following will be completed:

### **3-1- Description of the research sample**

**Table No. (2)** shows the description of the research sample.

	Description	Category	repetition	%
1	Gender	Males	25	%29
		Females	62	%71
2	Age Group	35-25	3	%3
		45-36	27	%31
		55-46	30	%34
		+56	27	%32
3	Educational Attainment	Technical Diploma	6	%7
		Bachelor's	54	%62
		Higher Diploma	2	%2
		Master's	23	%27
		Doctorate	2	%2
4	Years of Experience in the Library	5-1	9	%10
		10-6	12	%14
		15-11	35	%40
		+16	31	%36
5	Specialization	Office Worker	11	%13
		IT Specialist (Computers/Networks/Communications/Programming)	7	%8
		Other Specialties	69	%79

"Source: Prepared by the researcher based on field data."

Table Number The research sample's description indicates that females constituted 71% of the workforce, while males comprised 29%. The age group 46-55 constituted the largest percentage at 56%, indicating a significant representation in terms of benefiting from accumulated experiences. The age group 25-35 constituted the lowest percentage at 3%. The limited size of this category may result from the scant number of appointments allocated to the personnel of the studied libraries over the past decade, as these libraries experience a deficiency in human resources, exacerbated by retirements or transfers that are frequently unaddressed. The sample description indicates that the group of bachelor's degree holders constituted the greatest number at 62%. This indicates that over fifty percent of the employees in the studied libraries possess advanced academic qualifications suitable for enhancing the development of information services offered to beneficiaries, in contrast to the minimal percentage (4%) allocated to two categories (high diploma holders). It is frequently a scientific degree conferred by select specialisations and institutions, pertaining to the group of doctoral recipients. The limited amount of this group may result from the majority of university graduates choosing teaching roles and seeking to avoid administrative responsibilities. The research sample's distribution by years of library employment indicated that the biggest number, 40%, corresponded to the group of 11-15 years. This suggests that almost fifty percent of library personnel possess substantial experience, indicating their familiarity with the operational nature and functions of the studied libraries. This experience enhances their capacity for job analysis and information gathering, as well as their ability to propose ideas and recommendations conducive to planning improvements in their work methodologies with a high performance standard. The sample analysis revealed that a significant majority (69%) of workers lacked specialisation in library or technology fields, underscoring the critical need for ongoing training in library services and functions, as well as the technological competencies that enhance library operations. Regarding the two lowest categories, professionals with Library qualifications are sometimes inaccessible due to the rarity of this specialisation in the local context. In the realm of information technology specialisations, there is frequently intense competition among university departments to recruit this demographic, complicating library management's efforts to acquire new specialists.

### 3-2- Scale Reliability and Normal Distribution Tests:

Cronbach's alpha test was employed thereafter to ensure the internal consistency of the questionnaire, so validating the reliability of the study instrument. Sekaran & Bougie (2016) assert that a Cronbach's alpha score of 0.70 or above is acceptable. This score ensures robust internal consistency of the questionnaire, indicating that if the instrument is re-administered under same conditions, the collected data will be consistent and replicable, hence reducing the probability of errors and enhancing the validity of the results.

Furthermore, their distribution was examined using skewness and kurtosis metrics to ensure that the collected data accurately represents the research population. The guidelines established by Hair et al. (2010) delineate acceptable values within the interval (+1.96, -1.96). The data conformed to a normal distribution, as seen by the skewness and kurtosis coefficients for the research variables falling within the acceptable range. This type of statistics necessitates the presumption of a normal distribution of data. Consequently, parametric statistical methods may be utilised in the analysis [18].

**Table [3]** Normal distribution of dimensions and objects and reliability coefficient

Variables	Dimensions	Number of paragraphs	stability coefficient	Skewness	Kurtosis
IT Infrastructure	Hardware and Equipment	5	79.5%	1.654	-1.675
	Software	5	86.2%	1.432	-1.430
	Communications and Networks	5	89.3%	1.922	-1.897
	Human Resources	5	88.6%	0.975	-0.899

<b>All paragraphs of the IT infrastructure dimensions</b>		<b>20</b>	<b>83.6%</b>	<b>0.601</b>	<b>-0.575</b>
<b>Innovation performance</b>	<b>Resilience</b>	<b>5</b>	<b>89.9%</b>	<b>1.007</b>	<b>-1.102</b>
	<b>Fluency</b>	<b>5</b>	<b>92.8%</b>	<b>1.219</b>	<b>-1.197</b>
	<b>Authenticity</b>	<b>5</b>	<b>91.1%</b>	<b>1.769</b>	<b>-1.654</b>
	<b>Sensitivity to problems</b>	<b>5</b>	<b>86.6%</b>	<b>0.653</b>	<b>-0.569</b>
<b>All paragraphs of the dimensions of the innovation performance of employees</b>		<b>20</b>	<b>83.6%</b>	<b>0.601</b>	<b>-0.575</b>

"Source prepared by the researcher based on the SPSS program".

- Cronbach's alpha test revealed that all research axes attained suitable degrees of dependability at each axis's individual and scale levels. This suggests that the questionnaire is marked by excellent internal consistency and that the questions fairly and consistently measure the intended topics.

- All values of these coefficients lie within the reasonable bounds (+1.96, -1.96), according to data distribution analysis employing skewness and kurtosis coefficients. This suggests that every object and measurement of the research variables has a normal distribution. Consequently, it may be said that the data have a symmetrically distributed nature, which facilitates parametric statistical techniques supposing this kind of distribution.

### 3-3- Sample Response Descriptive Analysis

This section summarises the study's results by examining the views and preferences of 87 library staff members. Descriptive statistical analyses (arithmetic mean, standard deviation, relative importance, level, and direction of response) are employed for each variable examined to assess the consensus of the appropriateness of the measuring method for their attitudes. A five-point Likert scale may be utilised to categorise and evaluate the research sample's responses to the study items. The categories are established by calculating the range (5-1=4), dividing by the number of categories (5) (4/5=0.80), and adding 0.80 to the minimum value. Table 4 illustrates the extent of heterogeneity between response level and direction. The proportional significance is ascertained by dividing the lowest and highest categories by the maximum gradation on the five-point Likert scale (5).

**Table (4)** Study variable availability standard

Answer scale	Answer direction	weighted average		Weights	
Very Good	Strongly agree	4.21	5	84.2%	100%
Good	Agree	3.41	4.2	68.2%	84%
Average	Neutral	2.61	3.4	52.2%	68%
Weak	Disagree	1.81	2.6	36.2%	52%
Very Weak	Strongly disagree	1	1.8	20%	36%

Akadiri O. P. (2011), Development of Multi-Criteria Approach for Selection: Wolver Hampton, U.K.[19]

The characteristics were ordered and prioritized by relative relevance to analyze the primary dimensions and variables, reflecting the library's highest availability and interest.

#### 3-3-1- Information technology architecture Variable: -

The subsequent table and graphic present a comprehensive summary of the findings related to IT infrastructure factors. It achieved a relative significance of 60.3%, a mean of 3.02, an average status, and a tendency towards neutrality with a standard deviation of 1.58. The findings indicate that the studied libraries had a moderate interest in IT infrastructure. Regarding the dimensions, it was predominantly neutral, as indicated by the following:

- With an arithmetic mean of 2.73 and a standard deviation of 1.60, it ranked last in terms of availability and interest among the surveyed libraries for computers and accessories. The research indicates that the examined libraries allocate standard attention to computers and their peripherals. The sufficient supply of printers and accessories to meet job demands plainly demonstrates this. It also disclosed that libraries are keen to consistently update these instruments and accessories. Moreover, libraries has a sufficient capability regarding the availability of advanced computers to manage their operations effectively.

- With a relative relevance of 60.4%, an arithmetic mean of 3.02, and a standard deviation of 1.69, it scored third in terms of availability and interest among the analysed libraries, behind software and databases. The findings indicate that the examined libraries had a moderate interest in the characteristics of databases and software. The application's consistent communication with clients demonstrates a similar level of flexibility and its inherent ability to meet customer demands promptly.

- With a relative relevance of 63.4%, an arithmetic mean of 3.17, and a standard deviation of 1.50, it ranked second in availability and interest among the tested libraries, behind information and communication networks. The existence of an internal information network (Intranet) to ensure the cohesive execution of job tasks suggests that the examined libraries exhibit a moderate level of attention to information and communication networks. Libraries rely on a standard of effective communication that connects their many divisions and departments.

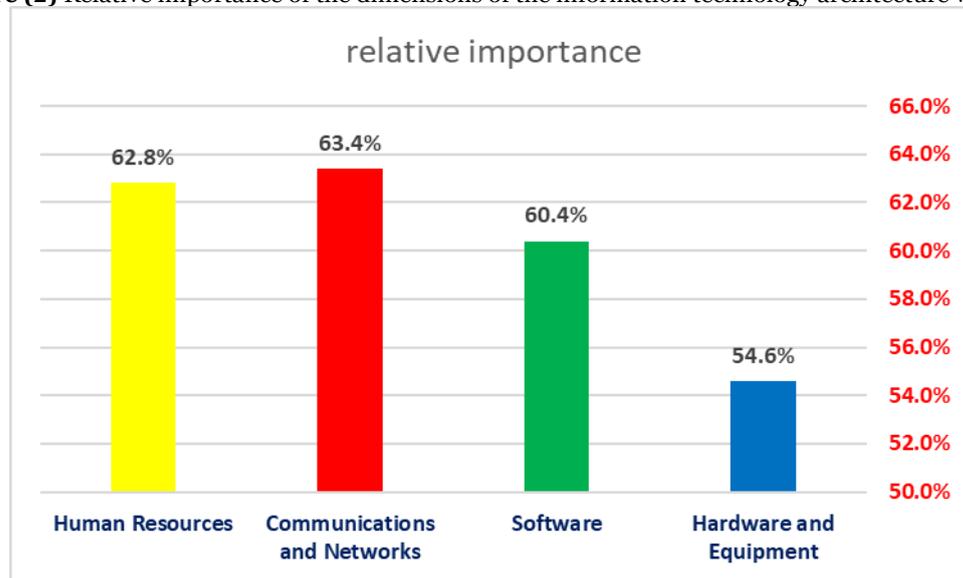
• With an arithmetic mean of 3.14 and a standard deviation of 1.51, it was placed second in terms of availability and interest among the evaluated libraries, behind human resources. The findings indicate that the examined libraries have a moderate level of human resource interest. The library management's commitment to addressing staff obsolescence in technological knowledge and skills is evident via the implementation of continuous seminars and training. Moreover, the libraries have an average ability to attract proficient and specialised experts in information technology.

**Table 5:** Descriptive criteria for the dimensions of the information technology architecture variable

	Dimensions of IT infrastructure variables	MEAN	Answer direction	S.D	Agreement rate	Answer level	No.
1	Hardware and Equipment	2.73	I disagree	1.60	54.6%	middle	4
2	Software	3.02	Neutral	1.69	60.4%	middle	3
3	Communications and Networks	3.17	Neutral	1.50	63.4%	middle	1
4	Human Resources	3.14	Neutral	1.51	62.8%	middle	2
	<b>IT infrastructure variable</b>	<b>3.02</b>	<b>Neutral</b>	<b>1.58</b>	<b>60.3%</b>	<b>middle</b>	

"Source: SPSS V.28 outputs"

**"Figure (2)** Relative importance of the dimensions of the information technology architecture variable"



"SOURCE: SPSS V.28 OUTPUTS"

### 3-3-2 Variable for Innovation performance

The results of the innovation performance variable are succinctly shown in the subsequent table and graphic. The standard deviation is 1.22, and the relative significance is 69.8 percent, indicating an overall mean of 3.49, which is high, very near to the average, and suggests a tendency toward agreement. The findings indicate that the examined libraries possessed an interest in and access to resources pertinent to the innovation performance of their personnel, which was around average. The results indicated a broad spectrum from neutrality to elevated levels.

• With an arithmetic mean of 3.86 and a standard deviation of 1.16, it achieved the highest ranking in terms of availability and interest among the libraries examined, after flexibility. The results indicate that the staff of the analysed libraries has a significant level of autonomy. Their unwavering willingness to adapt their methodologies for optimal outcomes and to scrutinise ideas that challenge their convictions in a straightforward and unbiased manner demonstrates this. In addition to their ability to provide innovative and effective solutions, they also recognise the importance of change and the necessity for adaptation. They are enthusiastic in evaluating innovative concepts without of biases.

• With a relative significance of 73.2%, an arithmetic mean of 3.66, and a standard deviation of 1.18, it ranked second in terms of availability and interest among the examined libraries, behind fluency. The results indicate that personnel of the examined libraries possess considerable job security and self-assurance. Their flexibility and optimism in assisting colleagues with tasks clearly demonstrate this, as does their ability to respond swiftly and positively to varying work settings and requirements. They motivate management to adopt novel and new concepts, since they consistently pursue them. In addition to their ability to provide rapid solutions for daily difficulties, they are keen to make recommendations that meet work requirements and identify the necessary talents for implementing each notion.

• With an arithmetic mean of 3.09 and a standard deviation of 1.38, it rated lowest on the availability and interest of the examined libraries in relation to authenticity. The results indicate that the average level of distinctiveness in the performance of the analysed libraries characterises their personnel. Their enthusiasm to propose ideas commensurate with the library's potential for swift implementation and to generate many solutions tailored to the nature of the challenges is evident. In addition to eschewing traditional responses to job challenges, they are also keen to reconfigure their approach

and explore novel concepts that have not been previously employed, endeavouring to fulfil their responsibilities in an innovative manner.

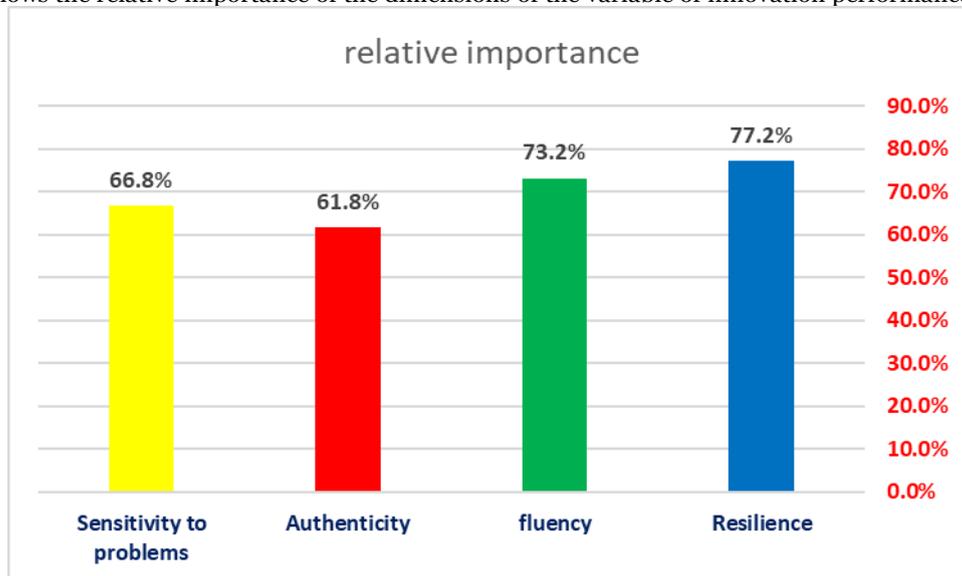
- With a relative relevance of 66.8%, an arithmetic mean of 3.34, and a standard deviation of 1.14, it ranked third on the degree of availability and interest among the studied libraries, after sensitivity to obstacles. The results indicate that the average level of knowledge and sensitivity to issues among personnel in the examined libraries characterises them. Their typical enthusiasm for collecting and analysing information on each problem before to making a decision illustrates this. It informs colleagues on the extent of employment issues and their potential impact on the library. In addition to their moderate enthusiasm for examining the topic from several perspectives, they have a typical ability to address work-related issues constructively and with enjoyment, as well as the capability to anticipate difficulties before they occur.

**Table 6:** Descriptive criteria for the dimensions of the innovation performance variable of employees

	Dimensions of the innovation performance variable	MEAN	Answer direction	S.D	Agreement rate	Answer level	No.
1	Resilience	3.86	Agreed	1.16	77.2%	High	1
2	fluency	3.66	Agreed	1.18	73.2%	High	2
3	Authenticity	3.09	Neutral	1.38	61.8%	Medium	4
4	Sensitivity to problems	3.34	Neutral	1.14	66.8%	Medium	3
	<b>The innovation performance variable</b>	<b>3.49</b>	<b>Agreed</b>	<b>1.22</b>	<b>69.8%</b>	<b>High</b>	

"Source: SPSS V.28 outputs"

"Figure (3) shows the relative importance of the dimensions of the variable of innovation performance of employees".



### 3-4- Testing research hypotheses

**1- 1- The main hypothesis (H1): The sixth main hypothesis states: ("There is no statistically significant effect" of information technology architecture on the innovation performance of employees).**

Sometimes known as structural equation modeling (SEM), this approach was used as the basis for confirmatory factor analysis (CFA) to ascertain how each item fits the dimension it was designed to measure. Dealing with many variables, confirmatory factor analysis (CFA) seeks to reduce them to a smaller set by evaluating the degree of alignment each item has with the theoretical dimension it was intended to measure. As shown in the following table, which summarizes the goodness-of-fit indicators based on the structural equation modeling approach, these variables need to meet goodness-of-fit criteria to guarantee correct interpretation of the confirmatory factor analysis of the study variables.

**Table (7)** Structural Modeling Equation Quality of Matching Indicators

Index	Rule
<b>Root Mean Square Error of Approximation (RMSEA)</b>	Less than (0.05) is acceptable, values between (0.05 - 0.08) are good, values between (0.10 - 0.08) are average, values greater than (0.10) are rejected.
<b>Item Saturation Ratio</b>	Greater than (0.40)
<b>Comparative Fit Index (CFI)</b>	The value range is between (0) - (1). Acceptance rule: greater than 0.90 and greater than 0.95 are acceptable.
<b>Tucker Lewis Index (TLI)</b>	
<b>Goodness-of-Fit Index (GFI)</b>	

"Source prepared by the researcher based on Hair et al." (2010) [18]

Table 7 shows that a structural model whose dependability and plausibility were tested exceeded the required indications based on (Hair et al., 2010) [18]. The goodness-of-fit indicators for the structural equation model show high congruence, with the GFI reaching (1.00), the chi-square ratio to the degree of freedom reaching (4.087), the root mean square error of approximation (RMSEA) reaching (0.076), and the regression weights exceeding the saturation threshold of (0.40), as shown

in the table below.

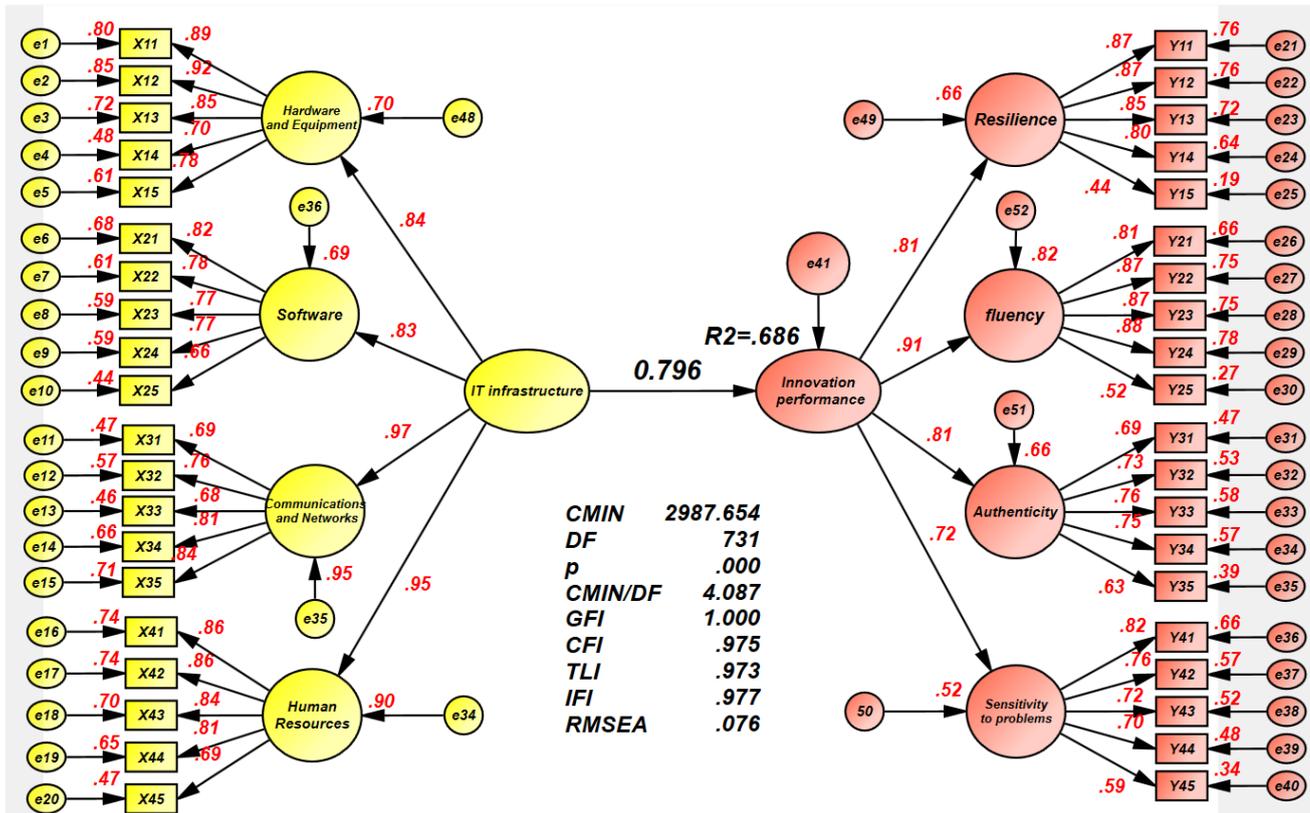
**Table 8:** Confirmatory factor analysis of research variables

item	path	The dimension	Estimate	S.E.	C.R.	P
X11	<---	<b>Hardware and Equipment</b>	.894			
X12	<---		.919	.033	28.315	***
X13	<---		.846	.036	23.612	***
X14	<---		.696	.039	16.756	***
X15	<---		.778	.041	20.142	***
X21	<---	<b>Software</b>	.824	.056	17.132	***
X22	<---		.779	.063	16.072	***
X23	<---		.768	.052	15.804	***
X24	<---		.771			
X25	<---		.662	.061	13.346	***
X31	<---	<b>Communications and Networks</b>	.687	.047	15.010	***
X32	<---		.758	.051	17.080	***
X33	<---		.681	.049	14.859	***
X34	<---		.813			
X35	<---		.840	.056	19.743	***
X41	<---	<b>Human Resources</b>	.857	.050	20.213	***
X42	<---		.859	.051	20.261	***
X43	<---		.839	.051	19.588	***
X44	<---		.807			
X45	<---		.687	.055	14.965	***
Y11	<---	<b>Resilience</b>	.872	.292	9.044	***
Y12	<---		.874	.305	9.050	***
Y13	<---		.847	.285	8.968	***
Y14	<---		.801	.273	8.814	***
Y15	<---		.440			
Y21	<---	<b>fluency</b>	.810	.214	10.743	***
Y22	<---		.866	.211	11.070	***
Y23	<---		.867	.202	11.074	***
Y24	<---		.881	.215	11.147	***
Y25	<---		.521			
Y31	<---	<b>Authenticity</b>	.687	.122	11.268	***
Y32	<---		.728	.106	11.758	***
Y33	<---		.763	.105	12.160	***
Y34	<---		.754	.101	12.063	***
Y35	<---		.628			
Y41	<---	<b>Sensitivity to problems</b>	.815	.117	11.689	***
Y42	<---		.756	.105	11.199	***
Y43	<---		.724	.109	10.907	***
Y44	<---		.695	.098	10.623	***
Y45	<---		.586			

"Source: AMOS Program Outputs"

These findings support the presence of a robust, statistically significant, favorable correlation between employee innovation performance and IT infrastructure. The structural model showed the robustness of this relationship: a one-unit increase in IT infrastructure significantly increases employee innovation performance by 0.796 ( $p < 0.001$ , critical value = 8.654, standard error = 0.065). These findings clearly show that the alternative hypothesis was accepted and the null hypothesis was disproved, based on which more attention to library IT infrastructure is strongly linked to higher employee innovation performance.

**"Figure (4)** The structural model of information technology architecture in the innovation performance of employees"



"Source: The researcher used "AMOS.V.26" statistics package results".

The findings show that IT infrastructure plays a major role in improving employees' innovation performance. However, this factor only accounts for 68.6% of the improvement, leaving room for additional, as-yet-unstudied, variables to influence 31.2% of employees' innovation performance.

**Table 9:** Final results of the direct impact of information technology architecture and employees' innovation performance

PATH		direct impact	standard error	critical value	R <sup>2</sup>	Sig.
Information technology architecture	←	0.796	0.065	8.654	68.6%	0.000

"Source: The researcher used "AMOS.V.26" statistics package results".

From the table below for analyzing the sub-hypotheses, the following is clear:

**1. (H1-1): Equipment significantly affects library staff innovation.**

An evaluation of the analytical results in the table indicates a considerable correlation between the variables. Alpha=1.54 and beta=0.671 were the fixed effect coefficients. The interpretation coefficient was 62.3 percent, and the impact is significant because the computed (F) value was greater than the tabular (F) value. The finding validates the idea. Libraries that pay attention to equipment, provide a specialized technical support department for computer and accessory maintenance, use cloud computing to manage their work, and provide printers and peripherals appropriate to their tasks will increase staff innovation.

**2. (H1-2): The innovation performance of staff members in the investigated libraries shows a noteworthy correlation with software.**

Reviewing the table's analytical figures helps us deduce a notable correlation between the two variables. With a=1.32, the fixed effect coefficient alpha had a value; b=0.589 was the value of the beta effect level. The interpretation coefficient has a value of 48.6%. The influence is noteworthy as the computed (F) value exceeded the tabular (F) value. This outcome verifies this theory. This shows that the more libraries pay close attention to software, embodied in their keenness to monitor and repair software malfunctioning and provide technical support, their possession of a comprehensive database with backup copies to ensure data integrity, and their dedication to provide and update licenses for protection and data security software, this favorably results in increased innovation performance among their employees.

**3. (H1-3): The innovation performance of staff members in the libraries under observation shows a clear link**

**between communications and networks.**

Reviewing the table's analytical figures helps us deduce a notable correlation between the two variables. With  $a=1.56$ , the fixed effect coefficient alpha had a value;  $b=0.587$  was the value of the beta effect level. The interpretation coefficient has a value of 46.9%. The influence is noteworthy as the computed (F) value exceeded the tabular (F) value. This outcome confirms the validity of this theory. This clarifies the reason libraries give communications and networks more importance.

Their eagerness to modernize their systems to guarantee speed and efficiency in communication and work, develop their capacities in using internet applications to support their work and serve their beneficiaries, and supply adequate internet lines to complete tasks and provide services shows this. The rise in their staff members' innovation performance reflects this favorably.

**4. (H1-4): There is a significant relationship between human resources and the innovation performance of employees in the libraries studied.**

From a review of the analytical values in the table, we conclude that there is a significant relationship between the two variables. The value of the fixed effect coefficient alpha was ( $a=1.43$ ) and the value of the beta effect level was ( $b=0.654$ ). The value of the interpretation coefficient was 64.2%. The effect is significant because the calculated (F) value was higher than the tabular (F) value. This result supports this hypothesis. This is explained by the greater attention paid by libraries to human resources. This is evident in their commitment to providing training and technical support to beneficiaries when launching computerization projects for their services, providing a specialized technical team to advise all employees, and the library management's commitment to involving all employees in the technology projects they adopt. This has led to a positive increase in their innovation performance.

**Table 10:** Results of the influence relationships between the dimensions of information technology architecture and the innovation performance of employees

variable	Indicators	Recorded value	variable	Indicators	Recorded value
<b>Hardware and Equipment</b>	<i>F-Cal</i>	54.165	<b>Software</b>	<i>F-Cal</i>	32.454
	<i>P</i>	0.000		<i>P</i>	0.000
	<i>R<sup>2</sup></i>	0.623		<i>R<sup>2</sup></i>	0.486
	<i>α</i>	1.54		<i>α</i>	1.32
	<i>β</i>	0.671		<i>β</i>	0.589
<b>Communications and Networks</b>	<i>F-Cal</i>	36.309	<b>Human Resources</b>	<i>F-Cal</i>	31.143
	<i>P</i>	0.000		<i>P</i>	0.000
	<i>R<sup>2</sup></i>	0.469		<i>R<sup>2</sup></i>	0.642
	<i>α</i>	1.56		<i>α</i>	1.43
	<i>β</i>	0.587		<i>β</i>	0.654

$F(0.05) = 3.84$   $F(0.01) = 6.63$

## 4- Conclusions and Recommendations

### 4-1- Conclusions

1- Considering that the majority of respondents expressed neutral to agreeable sentiments across most categories, the interest in the components of IT infrastructure was limited. This indicates that the libraries being examined ought to prioritise IT infrastructure.

2- The majority of responses from the research sample indicated a neutral to high level of interest in the innovation performance of personnel. This indicates that the innovation performance of the library personnel under investigation need enhancement.

3- Enhancing the IT infrastructure significantly correlates with improved innovation performance among people in the observed libraries.

4- The superior innovative performance of workers in the examined libraries is positively connected with substantial investment in office equipment and technology.

5- Significant emphasis must be devoted to securing and upholding the necessary software and data security, consequently enhancing the creative output of library professionals.

6- The creative output of the analysed libraries is enhanced by a focus on modernising and expanding communications and networks, along with a broader utilisation of internet technology.

7- Through training, support, and engagement in technology projects, a deliberate focus on human resource development leads to improved innovation performance among the personnel of the examined libraries

### 4-Recommendations

Some ideas and suggestions for libraries under research that will improve staff innovation performance in three different spheres using IT infrastructure:

- 1- Regularly update hardware to high standards, ensure a comfortable workplace, and provide quick technical assistance for hardware and accessories.
- 2- Software and databases: Supply modern, specialised tools; establish comprehensive databases, inclusive of backup copies and up-to-date licensing.
- 3- Modernise network architecture, enhance online applications, provide sufficient internet connectivity, and establish secure networks.
- 4- Engage personnel in technology projects, foster a creative culture, and provide opportunities for professional development through customised training and ongoing technical support.

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Appendix No. (1) Transcription of the research community's answers  
First: Transcribing the answers to the independent variable (information technology architecture)

	A. Hardware and Accessories	I totally agree	I agree	neutral	I disagree	I totally disagree
1	The library possesses advanced computers sufficient for the nature of its work.	45	3	2	2	35
2	The library regularly updates its computers and accessories.	13	2	6	20	46
3	The library provides sufficient printers and accessories for the nature of its work.	30	9	15	33	0
4	The library relies on cloud computing to support its work.	10	6	33	13	25
5	The library provides a technical support department for the maintenance of computers and accessories.	18	3	12	15	39
	B. Software	I totally agree	I agree	neutral	I disagree	I totally disagree
6	The library relies on specialized software for office work.	40	2	3	40	2
7	The library keeps abreast of updates and developments in various software fields, particularly in its field of work.	35	2	17	13	20
8	The library is keen to provide software licenses for protection and data security programs and continuously strives to update them.	6	9	5	29	38
9	The library possesses a comprehensive database for all its work and is keen to provide backup copies of its contents to ensure they are not lost.	42	6	0	15	24
10	The library is keen to monitor work interruptions resulting from various software malfunctions and provides technical support.	41	2	0	13	31
	C. Information and Communications Networks	I totally agree	I agree	neutral	I disagree	I totally disagree
11	The library has an effective communications system that connects all its departments and branches.	35	7	8	37	0
12	The library provides an internal information network (intranet) to ensure the integrated completion of work tasks.	38	2	0	32	15
13	The library provides sufficient internet connections to carry out administrative and technical tasks, as well as to provide services to users.	20	15	5	33	14
14	The library is developing its capabilities to expand its use of internet applications to support its work and support the information services provided to users.	39	19	3	25	1
15	The library is committed to updating its communications and networking system to ensure speed, efficiency, and effectiveness in communication and work.	12	6	13	37	19
	D. Human Resources	I totally agree	I agree	neutral	I disagree	I totally disagree
16	The library attracts qualified and specialized individuals in the field of information technology.	3	6	22	39	17
17	The library administration is committed to addressing the obsolescence of the technological expertise and skills of its staff through ongoing courses and workshops.	38	2	7	18	22
18	The library administration is committed to involving all its employees in the technology projects it adopts.	64	12	6	5	0
19	The library provides a specialized technical support team to provide advice to all library staff.	3	6	15	51	12
20	The library is committed to providing training and technical support to its service users when launching a computerization project for one or more of its services.	41	2	3	34	7

Transcribing the research community's responses to the dependent variable (innovation performance of employees)

	A/ Flexibility	I totally agree	I agree	neutral	I disagree	I totally disagree
1	I possess the ability to propose new, more effective ideas to accomplish work.	49	22	3	13	0
2	I am keen to experiment with new, positive ideas and do not prejudge them.	23	12	33	4	15
3	I believe in the importance of change and the necessity of adapting to it.	32	18	37	0	0
4	I am keen to discuss opinions that differ from my own beliefs in an objective and neutral manner.	54	12	19	2	0
5	I am constantly keen to implement changes in work methods to ensure optimal ones.	22	19	27	17	2
	B/ Fluency	I totally agree	I agree	neutral	I disagree	I totally disagree
6	I possess the ability to suggest the fastest solutions to daily work problems.	33	31	12	11	0

7	I am keen to present ideas to meet work requirements while identifying the capabilities required to implement each idea.	18	29	17	12	11
8	I constantly seek new and creative ideas and encourage management to adopt them.	41	26	20	0	0
9	I possess the ability to think quickly and positively under various work conditions and pressures.	17	22	32	14	2
10	I am flexible and positive in helping colleagues accomplish their assigned tasks.	22	13	27	15	10
	C/ Originality	<b>I totally agree</b>	<b>I agree</b>	<b>neutral</b>	<b>I disagree</b>	<b>I totally disagree</b>
11	I am keen to complete the tasks assigned to me in a fresh approach.	35	12	26	14	0
12	I avoid re-implementing common solutions to work problems.	17	22	2	25	21
13	Ensure you reshape your work style and experiment with new, previously untested solutions.	15	22	3	31	16
14	Ensure you develop multiple alternatives to solve problems based on the nature of each problem.	12	18	5	33	19
15	Ensure you propose solutions that fit the library's capabilities to ensure immediate implementation.	19	13	27	28	0
	D/ Sensitivity to Problems	<b>I totally agree</b>	<b>I agree</b>	<b>neutral</b>	<b>I disagree</b>	<b>I totally disagree</b>
16	Ensure you examine the problem from multiple perspectives.	12	22	39	12	2
17	Have the ability to anticipate work problems before they occur.	9	21	44	13	0
18	Confront work problems with positivity and enthusiasm to address them.	21	13	11	33	9
19	Ensure you inform your colleagues of the dimensions of work problems and their potential impact on the library.	25	28	4	24	6
20	Ensure you collect and analyze data for each problem before making a decision.	19	21	36	9	2