

**Contributions of information and communication technology
to achieving quality health services in Algerian public hospitals
– with a forward-looking reference to the category
of people with special needs**

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Received: 05/10/2025

Accepted: 31/12/2025

Published: 31/12/2025

Abstract:

The study aimed to diagnose the dimensions of information and communications technology (ICT) and its contribution to achieving digital quality in public hospitals, particularly for people with special needs. The study was based on the following question: Does digital infrastructure, in all its dimensions, affect the quality of health services in Algerian public hospitals? To answer this question, the descriptive analytical approach was adopted, along with a questionnaire distributed to workers at a public hospital in Annaba. Using the SPSS analytical program, several results were reached, the most important of which was the role of the human and organizational elements in improving the quality of digital health services for people with special needs. The study also recommended the need to develop the efficiency of medical staff and organizational structure, without neglecting other dimensions.

Keywords

Digital transformation - Quality of health services - Health infrastructure - Public hospitals - People with special needs.

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1. INTRODUCTION

It has become evident in the reality of countries' economies that there is an increasing reliance on information and communication technologies. Business organizations and government agencies are increasingly utilizing some aspects of digital transformation, seeking to increase their productivity and service efficiency, thus increasing their competitiveness in serious efforts to improve the quality of life for employees and citizens in general. The use of modern digital technologies provides organizations with an opportunity to experiment with the advantages of artificial intelligence and big data. However, this can only be achieved through massive investments in digital infrastructure and the establishment of digital policies that rely on continuous training of technical personnel, keeping pace with global technological developments.

Global statistics indicate the increasing importance of the digital economy to countries' gross domestic product (GDP). It contributes 10% to economies such as Germany and Japan, 12% to the United States and India, and as much as 45% to China. This contribution does not stop at GDP, but also contributes to increasing productivity and creating quality job opportunities based on software development and data analysis within the framework of entrepreneurial opportunities. The digital economy contributes to enhancing the quality of healthcare, increasing hospital operational efficiency, and reducing costs (Alves, Seringa, & Silvestre, 2024) (Santamato, et al. 2024).

This is achieved through systems that track various resources, including medicines and equipment, enhancing transparency and governance through effective oversight systems, and working to improve the quality of services provided to patients and the community by opening direct interactive channels. (Mayo Clinic, 2024) People with special needs are among those in great need of care, comfort, and fairness. This is achieved through digital methods that facilitate access to healthcare services through remote appointment booking and telemedicine services. This takes into account communication methods based on spoken or translated interfaces, and everything that contributes to promoting equality and social inclusion for this group. (Majinge, & Msonge, 2020) (Kaur, Tiwari, Ram, Budha, & Thakur, 2025)

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Like other developing countries, Algeria is developing a national strategy for digital transformation that relies primarily on digital infrastructure and digitization of healthcare administration and services. This is within the framework of a government awareness that places digitization among the essentials of the healthcare sector.

1.1. Study Questions:

The study builds on the above to answer the following main question: Does the digital infrastructure, in all its dimensions, affect the quality of health services in Algerian public hospitals?

This main question gives rise to five sub-questions related to the dimensions of digital infrastructure, which are arranged in order as follows:

- Does the communication network have an impact on the quality of health services in Algerian public hospitals?
- Does the website have an impact on the quality of health services in Algerian public hospitals?
- Does databases and applications have an impact on the quality of health services in Algerian public hospitals?
- Does the human structure have an impact on the quality of health services in Algerian public hospitals?
- Does the organizational structure have an impact on the quality of health services in Algerian public hospitals?

1.2. Study Hypotheses:

To answer the study questions, the following hypotheses were formulated:

1.2.1 Main Hypothesis:

- There is no statistically significant impact at the significance level ($\alpha < 0.05$) of infrastructure of all types on the quality of health services in Algerian public hospitals.

1.2.2 Sub-hypotheses:

- There is no statistically significant effect at a significance level of ($\alpha < 0.05$) of the communication network on achieving the quality of health services in Algerian public hospitals.
- There is no statistically significant effect at a significance level of ($\alpha < 0.05$) of the website on achieving the quality of health services in Algerian public hospitals.
- There is no statistically significant effect at a significance level of ($\alpha < 0.05$) of databases and applications on achieving the quality of health services in Algerian public hospitals.
- There is no statistically significant effect at a significance level of ($\alpha < 0.05$) of human structure on achieving the quality of health services in Algerian public hospitals.
- There is no statistically significant effect at a significance level of ($\alpha < 0.05$) of the organizational structure on achieving the quality of health services in Algerian public hospitals.

1.3. Study Objectives:

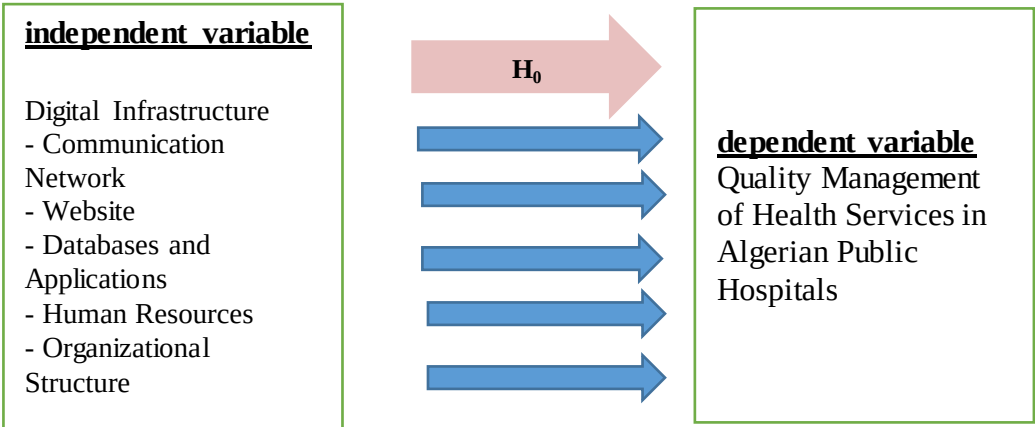
- In general, the study sought to analyze the impact of digital infrastructure of all types on the quality management of health services in Algerian public hospitals.
- Focus on the health sector by diagnosing the various policies of the Algerian digital government, particularly those related to people with special needs.
- Presenting digital relationships for the various dimensions of hospital digital infrastructure and measuring the extent of their connection to the quality of health services provided.
- Monitoring the requirements of digital transformation and the various difficulties facing Algerian hospitals in enhancing their digital infrastructure.
- Proposing practical recommendations that would improve the quality of health services provided, particularly for people with special needs, thus strengthening national government policies aimed at achieving

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social inclusion within the framework of the Sustainable Development Goals.

1.4. Study Model:

The study model was developed by proposing five independent sub-variables within the dimensions of digital infrastructure and the extent of their impact on the dependent variable, represented by the quality management of health services in Algerian public hospitals.



1.5. Significance of the Study:

The study derives its importance from the position of issues related to digital transformation in national policies, alongside the Sustainable Development Goals related to the health sector and social inclusion.

1.5.1 Theoretical Importance:

- Contributing to enriching the literature on health economics and social inclusion in developing countries, with Algeria as a model.

- Focusing on digital infrastructure as an important factor in the equation of health sector quality, given that this research gap still deserves significant attention and study.
- Developing a valid measuring tool for development, responsive to the requirements of the reality of Algerian public hospitals, and supporting future proposals for people with special needs.

1.5.2 Practical Importance:

- This study helps decision-makers in the Algerian health sector pay greater attention to investing in digital infrastructure to meet the needs of social inclusion.
- Enhancing the quality of digital health services based on patient satisfaction in public hospitals.
- Establishing the direction of government agencies towards achieving the 2030 Sustainable Development Goals, particularly with regard to the third goal related to health and well-being.

2. Theoretical Framework

2.1 Previous Studies

1. Mohamed Kossai's study:

"Information and Communication Technologies (ICTs), Human Capital, Organizational Change, and the Performance of PME Manufacturers"

The factors adapting to ICTs were analyzed, particularly those related to human capital. Linear regression and several statistical tests were used to establish a relationship between the adoption of ICTs and performance improvement. The possibility of a relationship between ICTs and human capital, organizational change, and other performance measures was also investigated. While previous studies focused on large organizations and developing economies, this study

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used the Tunisian economy as a model by addressing the issue of investment in modern technologies and human capital. (Kossai, 2013)

2. Ahmed Ibrahim Nasser Saadi's study,

"The extent of satisfaction of the disabled with the social services provided in government hospitals in the Jizan region" "A field study on a sample of the disabled in government hospitals in the Jizan region" Supplementary research submitted for a master's degree in social work, International Journal for Publishing Research and Studies, Volume: 2, Issue: 15

The study aimed to shed light on the role of government hospitals in providing social services to people with disabilities, in addition to clarifying cooperation between hospitals and relevant authorities. A descriptive approach was used, relying on a questionnaire for a random sample of disabled patients visiting the hospital. The study concluded that social workers play an important role in accelerating the pace and success of treatment. It also recorded satisfaction among the disabled respondents. The study recommended the need to open new channels between doctors and social workers to integrate job performance, and emphasized the need to pay attention to visits and events held for people with special needs. (Saadi, 2021)

3. Study: Dr. Qasem Saeed Al-Zubi

The Reality of Disability "Functional Difficulties" in Jordan, based on data from the General Population and Housing Census 2015

The study aimed to identify the category of persons with disabilities aged five years and older, by examining realistic indicators of disability in Jordan, identifying the types of these disabilities, their geographical distribution, and linking them to demographic, social, and economic characteristics. A descriptive approach was used for families living in traditional housing. The study highlights the importance of applying a global methodology, the Washington Group for Disability Statistics. Ajloun and Tafilah governorates recorded the highest rates of hearing impairment. (Al-Zubi, 2015)

4. Rebecca Mgunda Majinge, Vincent Tilubuzya Msonge

The integration of special needs for people living with disabilities into Tanzania's LIS curriculum, (2020)

The study sought to diagnose the reality of training academics and library science staff to integrate special needs into library science curricula. The study was conducted in five university institutions distributed across three administrative regions in Zambia. A mixed method was used, relying on a qualitative approach, while data collected through interviews was subjected to objective analysis. The study concluded that staff and professors are unprepared to deal with people with special needs, in addition to a lack of adequate equipment and funding. The study recommended the need to conduct numerous training courses and raise awareness among government agencies about providing more facilities. (Majinge, & Msonge, 2020)

5. Vijey Thayananthan's Study

Healthcare Management Using ICT and IoT Based on 5G (2019)

This study focused on diagnosing the problem of treatment facilities and finding an effective way to manage healthcare records. Despite the availability of 5G and IoT technology, many elderly visitors to hospitals are dissatisfied with the level of services provided and are demanding more. This requires a reconsideration of customer relationship management. The study concluded that it is necessary to improve the quality of services provided and to seek lower-cost solutions. (Thayananthan, 2019)

6. Daniel Nasef et al.'s study,

"Integrating artificial intelligence in clinical practice, hospital management, and health policy: A literature review" (2025). The study focused on clinical practice, hospital management, and health policy, and the application of artificial intelligence. The study relied on publications relevant to the impact of artificial intelligence on healthcare, with a focus on hospital management and health policy. The study demonstrated the ability of artificial intelligence to improve

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performance through accurate diagnosis of medical conditions, optimal allocation of resources, the ability to govern medical data, and the achievement of health equity. Although recent technological developments have fundamentally transformed the delivery and management of healthcare, ethical issues related to data privacy and the potential for errors during diagnosis necessitate greater coordination between physicians and AI experts. It also calls for the development of health training programs based on AI-based educational themes. (Nasef, et al. 2025)

2.2Research Gap

This study integrates the health quality requirements of individuals with special needs by utilizing various dimensions of technological infrastructure and artificial intelligence specifications, and applies this to the situation of Algerian public hospitals. It also focuses on selected dimensions of digital infrastructure to identify the most important and influential.

3. Applied study

3.1 Methodological Framework of the Field Study:

3.1.1Study Tools:

This study relied on a questionnaire to highlight the role of technology and digital transformation in providing higher-quality healthcare services. The focus was on digital infrastructure as the independent variable, while the quality of healthcare services was included as a dependent variable based on the hypothesized relationship between it and the independent variable. The following will explain the structure of the questionnaire, which was divided into two sections.

Section One: General Data: The study focused on only two aspects of personal information, primarily related to age and gender.

Section Two: The Role of Infrastructure in All Its Aspects (Financial, Human, Organizational) in Managing the Quality of E-Health Services: This section includes 33 statements divided between the independent and dependent variables. The independent variable was divided into five sub-variables: the communication network, the website, databases, human infrastructure, and, fifthly, the organizational structure. Each variable includes a set of statements expressing the expected role and many important details, while the dependent variable focused on those details related to the quality of health services, divided into 13 statements.

3.1.2 Study Population and Sample:

The study population consists of employees and workers in the health sector, with particular attention paid to this category belonging to public hospitals. To determine the study sample, 49 questionnaires were randomly distributed, three of which were excluded due to inadequacy.

3.1.3 Testing the Study Tool:

The validity of the tool was based on personal assessment, with advice from other researchers interested in the topic. Using Cronbach's alpha coefficient, the reliability and validity of the questionnaire were verified as follows:

Table (1): Cronbach's alpha coefficient to measure the reliability and validity of the questionnaire

Alpha Crombach	Number of elements
,916	33

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The table above shows that the Cronbach's alpha coefficient for the questionnaire as a whole is 91.6%, which is a high and acceptable value to confirm that the study tool is characterized by validity and reliability.

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3.2 Descriptive Analysis of Respondent Characteristics and Responses

3.2.1 Respondent Characteristics

The study was limited to demonstrating the importance of age and gender in analyzing sample specifications.

3.2.1.1 Distribution of Respondents by Gender Variable: Males and females were distributed in the sample as follows:

Table (2): Distribution of respondents according to gender variable

Sex	frequency	percentage
male	34	73.91
Female	12	26.09
the total	46	100

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The health sector appears to attract more women than men, with the study sample recording approximately three-quarters of its size as female. This can also be attributed to the nature of health services, which require a high female presence.

3.2.1.2 Distribution of respondents by age:

The study sample was divided into four age groups, taking into account employment and retirement ages. The distribution was as follows:

Table (3): Distribution of respondents according to age variable

Age group	frequency	percentage
Under 30 years old	14	30.43
Between 30 and 40 years old	23	50
Between 40 and 50 years old	6	13.04
More than 50 years	3	6.52
the total	46	100

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It can be considered that the youth group dominates the operation and management of public hospitals, accounting for up to 80% of the total population. This gives a particular sense of the need to seize this opportunity to spread the ideas of digital transformation in an environment receptive to this change.

3.3 Analysis of sample responses to the questionnaire axes:

The responses of the sample members will be analyzed according to the study variables. The independent variable includes five axes or sub-variables, while the dependent variable includes one axis.

3.3.1 Analysis of sample responses to all types of infrastructure:

Both the arithmetic mean and standard deviation were used to study each sub-independent variable, while analyzing the importance of each statement within the statements comprising the sub-independent variable.

3.3.1.1 Analysis of the results of the sample's opinions on the communication network dimension:

The traditional and modern communication networks, their availability, and their quality in Algerian public hospitals were examined. The results of the sample survey are summarized in the following table:

Table (4): Trends of sample opinions about the communication network dimension

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	X11	3.57	1.223	1	high
2	X12	1.89	1.339	4	low
3	X13	2.37	1.100	3	medium
4	X14	2.72	1.377	2	medium
weighted	arithmetic mean	2.63			medium

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Examining the infrastructure results, it appears that the results were generally average. Respondents tended toward public hospitals relying primarily on traditional communication networks through telephones that are answered. The first statement in this regard yielded a high mean of 3.57. However, they did not rely on providing a free Wi-Fi network for all. The results supported the prevailing view of this weakness through the second statement, which yielded a mean of 1.89. Regarding the presence of a vigilance cell and computers in each office, the results were average.

3.3.1.2 Analysis of the results of the sample's opinions on the website:
The website is the virtual interface of any organization, and paying attention to it improves the quality of health services provided, particularly with regard to speed and reducing the cost of frequent trips to the hospital for simple information.

Table (5): Trends of sample opinions about the website dimension

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	X21	2.50	1.295	2	low
2	X22	2.70	1.297	1	medium
3	X23	2.26	1.219	3	low
4	X24	2.00	1.033	4	low
weighted arithmetic mean		2.36			low

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Public hospitals did not pay attention to the attractiveness of their websites, and it can be said that they neglected it despite its existence. The arithmetic mean recorded a low score of 2.36. The second statement came in first place, despite recording an average score of 2.70. This led to the conclusion that social media pages were preferred

over the official website, which lacked updated information and interaction with the public.

3.3.1.3 Analysis of the results of the sample's opinions on databases and applications:

Health services may be affected by the quality of digital databases and the applications used, as this often helps in making the right and timely decisions, whether related to the size of drug inventory or patient waiting times and distribution across various departments and services.

Table (6): Trends of sample opinions about the databases and applications dimension

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	X31	3.17	1.338	3	medium
2	X32	3.26	1.124	2	medium
3	X33	2.72	1.486	4	medium
4	X34	3.67	1.156	1	high
weighted	arithmetic mean	3.20			medium

spss27 output

It appears that hospital management's focus remains traditional, focusing primarily on financial and accounting management issues, prioritizing the digital management of the administrative and financial database. This was expressed in Statement 4, with a mean score of 3.67. However, the study sample expressed reservations about the hospital's reliance on health card management, which contains all patient data, given the confidentiality and sensitivity of this process.

3.3.1.4 Analysis of the results of the sample's opinions on the human structure:

Human resources play a significant role in the management of health services, as there is constant interaction and communication between them. The quality of services provided depends on the levels of

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training of various types of human resources, including doctors, nurses, and administrators.

Table (7): Trends of sample opinions about the human structure dimension

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	X41	2.72	1.294	3	medium
2	X42	3.80	1.147	1	high
3	X43	3.26	1.389	2	medium
4	X44	1.61	0.930	4	Very low
weighted arithmetic mean		2.84			medium

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Overall, the results of the human resources variable analysis showed a moderate impact on health services. The respondent group was not convinced of the performance of human resources in improving the quality of e-health services, with only a moderate score of 2.84 as an overall average. The analysis confirmed the presence of many IT specialists, including engineers and technicians, with the sample's opinion trend being high at 3.80. However, the sample participants disagreed with the ability to communicate electronically with doctors and provide prescriptions electronically, with a very low score of 1.61.

3.3.1.5 Analysis of the results of the sample's opinion trends regarding the organizational structure:

The electronic organizational structure includes the hospital's ability to manage its services efficiently based on digital data, electronic signage, and the digital distribution of tasks.

Table (8): Trends of sample opinions about the organizational structure dimension

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	X51	2.50	1.394	2	low
2	X52	2.67	1.477	1	medium

3	X53	2.11	1.016	3	low
4	X54	2.09	1.226	4	low
weighted arithmetic mean		2.34			low

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The hospital features numerous electronic signs that facilitate the smooth flow of patients, visitors, and various users. However, the results remain average, according to the sample's opinions (2.67), and require more focus and effort. The hospital's ability to provide digital task allocation for its various users was not approved, with results showing a weak average of 2.09.

3.3.1.6 Analysis of the results of the sample's opinions on the infrastructure and its sub-variables:

Table (9): Trends of sample opinions about the infrastructure and its sub-variables

Variable	Number	arithmetic mean	Order of importance	Trend
Network	46	2.63	3	medium
Website	46	2.36	4	low
Databases	46	3.20	1	medium
human structure	46	2.84	2	medium
organizational structure	46	2.34	5	low
infrastructure	46	2.674		medium

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The sample's opinions on infrastructure were generally average, which was explained by the independent variables. The hospital placed relative importance on both databases and human resources, compared to the website and organizational structure, which had lower ratings. This raises several questions about the readiness of public hospitals to embrace digital transformation in the near term.

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3.3.2 Analysis of sample responses to e-health quality management:

The dependent variable includes several statements that explain the performance and quality of health services, taking into account digital transformation and the use of information and communication technologies within the hospital environment.

Table (10): Trends of sample opinions about e-health quality management

The number	phrases	arithmetic mean	standard deviation	Order of importance	Trend
1	Y11	1.59	0.805	9	Very low
2	Y12	1.65	0.795	8	Low
3	Y13	1.59	0.717	9	Very low
4	Y14	1.63	0.878	11	Very low
5	Y15	2.96	1.246	4	medium
6	Y16	3.26	1.357	1	medium
7	Y17	1.72	0.911	7	Very low
8	Y18	1.85	1.135	6	low
9	Y19	1.65	0.994	8	Very low
10	Y110	1.61	0.774	10	Very low
11	Y111	2.50	1.426	5	low
12	Y112	3.02	1.437	3	medium
13	Y113	3.07	1.526	2	medium
weighted arithmetic mean		2.16			low

The quality of e-health services remains elusive, with a low score of 2.16. Not all dependent variable statements exceeded the mean, with some variations recorded for some activities that could be considered traditional, such as providing medication on time (statement 6) and answering the phone (statement 13). Meanwhile, activities related to digital transformation remain unconvincing, such as an effective electronic communication system (statement 10) and the use of email (statement 4).

3.4. Hypothesis Testing and Discussion of Results:

A single main hypothesis was adopted, from which five sub-hypotheses branched out, representing a hypothetical relationship between all types of technological infrastructure components and their contribution to achieving quality health services. These hypotheses were tested, and the results were subsequently discussed.

3.4.1 Testing the Study Hypotheses:

A simple linear regression model was used to test the sub-hypotheses, and subsequently the main hypothesis, as follows:

- Sub-hypothesis H1: Testing the impact of the communication network on the quality of health services.
- Sub-hypothesis H2: Testing the impact of the website on the quality of health services
- Sub-hypothesis H3: Testing the impact of databases and applications on the quality of health services
- Sub-hypothesis H4: Testing the impact of human structure on the quality of health services
- Sub-hypothesis H5: Testing the impact of organizational structure on the quality of health services
- Main hypothesis: Testing the impact of all types of infrastructure on the quality management of electronic health services.

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Before testing the validity of the previous hypotheses, the following null hypothesis was tested:

Null hypothesis H0: The data from the sample drawn from the hospital user community follows a normal distribution.

Alternative hypothesis H1: The data from the sample drawn from the hospital user community does not follow a normal distribution.

If the probability value (sig) is greater than or equal to the significance level (0.05), the hypothesis of a normal distribution is accepted.

Table (11): Normal distribution test for study variables

variable	Kolmogorov-Smirnov		Shapiro-Wilk	
	Statistics	Sig	Statistics	sig
X1	0.144	0.018	0.965	0.177
X2	0.136	0.032	0.914	0.002
X3	0.128	0.056	0.969	0.246
X4	0.136	0.33	0.966	0.190
X5	0.118	0.112	0.932	0.010
X (independent variable)	0.087	0.200	0.982	0.702
Y (dependent variable)	0.093	0.200	0.980	0.602

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From the previous table, which examined the distribution normality test, the probability values (sig) are greater than 0.05 for both proposed tests, whether related to the independent variable (X) or the dependent variable (Y). Therefore, the null hypothesis that the sample data follow a normal distribution is accepted.

3.4.1.1 Testing the First Sub-Hypothesis:

The first hypothesis examines the presence or absence of a statistically significant effect between the communication network and the quality of e-health services.

The following model can be written for the previous relationship:

$$Y = B_0 + B_1 x_1 + \varepsilon$$

The hypotheses for Relationship 1 are written as follows:

Null Hypothesis: There is no significant relationship $H_0: B_1 = 0$

Alternative Hypothesis: There is a significant relationship $H_1: B_1 \neq 0$

The following table shows the results of the simple linear regression test for the first sub-hypothesis

Table (12): Results of simple linear regression to test the first sub-hypothesis

dependent variable	independent variable	sig	T	$\bar{R}^2$	R^2	R
Quality of health services	Network	0.000	4.480 (variable)	0.298	0.313	0.560
			3.453 (constant)			
		Y= 0.962+0.455x ₁ + ε				

spss27 output

From the previous table, the following results can be extracted:

- There is a statistically significant effect of the communication network on the quality of health services, with (sig = 0.000) less than (0.05).
- The correlation coefficient ($R = 0.560$), indicating a medium to high correlation between the communication network and the quality of health services.
- The coefficient of determination (CDE) value was (0.313), meaning that (31%) of the variance in the dependent variable (y), which represents the quality management of electronic health services, can be explained by the communication network, i.e., the independent variable (x_1).

3.4.1.2 Testing the Second Sub-Hypothesis:

The second hypothesis examines the presence or absence of a statistically significant effect between the website and the quality of electronic health services.

The following model can be written for the previous relationship:

$$Y = B_0 + B_2x_2 + \varepsilon$$

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The two hypotheses for the relationship can be written as follows:
 Null hypothesis: There is no significant relationship $H_0: B_2=0$
 Alternative hypothesis: There is a significant relationship $H_1: B_2\neq 0$
 The following table shows the results of the simple linear regression test for the second sub-hypothesis

Table (13): Results of simple linear regression to test the second sub-hypothesis

dependent variable	independent variable	sig	t	$\bar{R}^2$	R^2	R
Quality of health services	Website	0.001	7.264 (variable)	0.212	0.229	0.479
			3.619 (constant)			
		Y= 1.483+0.286x ₂ + ε				

spss27 output

From the previous table, the following results can be extracted:

- There is a statistically significant effect of the website on the quality of health services, with (sig = 0.001) less than (0.05).
- The correlation coefficient ($R = 0.479$), indicating a moderate to weak correlation between the website and the quality of health services.
- The coefficient of determination (CDE) value was (0.229), meaning that approximately (23%) of the variance in the dependent variable (y), which represents the quality management of electronic health services, can be explained by the website, i.e., the independent variable (x_2).

3.4.1.3 Testing the Third Sub-Hypothesis:

The third hypothesis examines the presence or absence of a statistically significant effect between databases and applications and the quality of electronic health services.

The following model can be written for the previous relationship:

$$Y = B_0 + B_3x_3 + \varepsilon$$

The three hypotheses for the relationship are written as follows:

Null Hypothesis: There is no significant relationship $H_0: B_3 = 0$

Alternative Hypothesis: There is a significant relationship $H_1: B_3 \neq 0$

The following table shows the results of the simple linear regression test for the third sub-hypothesis.

Table (14): Results of simple linear regression to test the third sub-hypothesis

dependent variable	independent variable	sig	T	$\bar{R}^2$	R^2	R
Quality of health services	Databases	0.000	3.263 (variable)	0.264	0.280	0.529
			4.139 (constant)			
		Y= 0.967+0.372x ₃ + ε				

spss27 output

From the previous table, the following results can be extracted:

- There is a statistically significant effect of databases and applications on the quality of health services, with (sig = 0.000) less than (0.05).
- The correlation coefficient ($R = 0.529$), indicating a medium to high correlation between databases and applications and the quality of health services.
- The coefficient of determination was (0.280), meaning that (28%) of the variance in the dependent variable (y), which represents the quality management of electronic health services, can be explained by databases and applications, i.e., the independent variable (x_3).

3.4.1.4 Testing the Fourth Sub-Hypothesis:

This hypothesis will test the possibility of a statistically significant effect between human interface and the quality of electronic health services.

The following is a model that illustrates this relationship:

$$Y = B_0 + B_4x_4 + \varepsilon$$

The following is a review of the hypotheses of this model:

Null Hypothesis: There is no significant relationship. $H_0: B_4 = 0$

Alternative Hypothesis: There is a significant relationship. $H_1: B_4 \neq 0$

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The results of this test are shown in the following table:

Table (15): Results of simple linear regression to test the fourth sub-hypothesis

dependent variable	independent variable	sig	t	R ²	R ²	R
Quality of health services	human structure	0.000	3.409 (variable)	0.371	0.385	0.621
			5.249 (constant)			
		Y= 0.873+0.452x ₄ + ε				

spss27 output

From the previous table, the following results can be extracted:

- There is a statistically significant effect of human structure on the quality of health services, with (sig=0.000) less than (0.05).
- The correlation coefficient (R=0.621), indicating a medium to high correlation between human structure and the quality of health services.
- The coefficient of determination (CDE) value was (0.385), meaning that (38%) of the variance in the dependent variable (y), which represents the quality management of electronic health services, can be explained by human structure, i.e., the independent variable (x4).

3.4.1.5 Testing the Fifth Sub-Hypothesis:

Organizational structure was proposed as the fifth sub-independent variable, and an equation was constructed to demonstrate the relationship between it and the dependent variable, which represents the quality management of electronic health services.

Below is the model that illustrates this relationship:

$$Y= B_0+B_5x_5+ \varepsilon$$

The following is a review of the hypotheses of this model:

Null Hypothesis: There is no significant relationship H0: B5=0

Alternative Hypothesis: There is a significant relationship H1: B5≠0

The following are the most important test results

Table (16): Results of simple linear regression to test the Fifth sub-hypothesis

dependent variable	independent variable	sig	T	$\bar{R}^2$	R^2	R
Quality of health services	organizational structure	0.000	7.050 (variable)	0.343	0.358	0.598
			4.950 (constant)			
		$Y= 1.315+0.361 x_5+ \varepsilon$				

spss27 output

The figures in the previous table showed the following results:

- There is a statistically significant effect of organizational structure on the quality of health services, with (sig=0.000) less than (0.05).
- The correlation coefficient (R=0.598), indicating a medium to high correlation between organizational structure and the quality of health services.
- The coefficient of determination was (0.358), meaning that approximately (36%) of the variance in the dependent variable (y), which represents the management of the quality of electronic health services, can be explained by the organizational structure, i.e., the independent variable (x5).

3.4.1.6 Testing the Main Hypothesis:

The main hypothesis examines the presence or absence of a statistically significant effect between infrastructure in all its aspects and the management of the quality of electronic health services at a significance level of $0.05 < \alpha$.

The following is the model that illustrates this relationship:

$$Y = B_0 + Bx + \epsilon$$

The following is a review of the hypotheses of this model:

Null Hypothesis: There is no significant relationship $H_0: B = 0$

Alternative Hypothesis: There is a significant relationship $H_1: B \neq 0$

The following are the most important test results

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Table (17): Results of simple linear regression to test the main hypothesis

dependent variable	independent variable	sig	t	R ²	R ²	R
Quality of health services	Infrastructure of all kinds	0.000	1.479 (variable)	0.534	0.544	0.738
			7.246 (constant)			
		Y= 0.376+0.666x+ ε				

spss27 output

The figures in the previous table showed the following results:

- There is a statistically significant effect of all types of infrastructure on the quality of health services, with (sig=0.000) less than (0.05).
- The correlation coefficient (R=0.738) indicates a high correlation between all types of infrastructure and the quality of health services.
- The coefficient of determination was (0.544), meaning that approximately (54%) of the variance in the dependent variable (y), which represents the quality management of electronic health services, can be explained by infrastructure, i.e., the main independent variable (x).

4. RESULTS AND DISCUSSION

4.1Discussion of the Sample Responses Regarding Infrastructure and Quality Management of Healthcare Services:

Algerian public hospitals prioritize databases and human resources, as confirmed by the sample responses to these two sub-variables. These two variables are traditional variables through which the digital transformation process in the healthcare sector can begin (Shamsi, 2024). Establishing central databases using electronic medical records is achievable, in addition to the ability to connect healthcare applications to patient devices, such as blood pressure or blood sugar monitoring. These applications also help access medical history, thus

enabling clinical decisions that are less prone to medical errors. (Mayo Clinic, 2024)(Alves, Seringa, & Silvestre, 2024) (Bhagat, & Kanyal, 2024) (Derrington, 2017) (Goetz, 2024) (Nasef, et al. 2025)

As for human resources, they rely on employees' skills in using the latest digital technologies (Santamato, et al. 2024). This skill is usually the result of personal efforts. In order to make them more effective in improving the quality of healthcare services, efforts must be made to establish data governance through specialized data security teams, and to establish a clear digital vision that works to sustain development, led by senior management and heads of departments and divisions. (Kaur, Tiwari, Ram, Budha, & Thakur, 2025) (Kossai, 2013) (Majinge, & Msonge, 2020)

The health record allows physicians to access patient data and learn about their specific hearing aid needs and protocols. The use of sign language interpretation applications can lift psychological and practical barriers within hospitals. Direct connections with the Ministry of National Solidarity's agencies also enable the monitoring of rehabilitation programs for various groups.

Multidisciplinary teams, composed of speech therapists and sign language interpreters in hospitals, facilitate access to targeted individualized treatments (Saadi, 2021). Multiple training programs also contribute to developing the knowledge of doctors and nurses in the use of various medical assistance devices resulting from cochlear implants. In some rehabilitation centers in Oran, medical staff have received specialized training in the use of devices that track speech development in children and store this data in the hospital's digital records. Hospital leadership is working to accelerate the adoption of digital records and stimulate digital applied research for people with special needs. Developing electronic health quality management naturally requires strengthening databases and applications by equipping various public hospitals with hearing-testing devices and cochlear implants, and shifting toward digital hearing and speech

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rehabilitation. This, of course, is accompanied by the collection of audio data into central digital records and its use in future development plans. Language and speech applications for people with disabilities, based on voice, text, images, and gestures, must also be provided by providing children with mobile phones and computers. Each of the three sub-independent variables experienced declining averages in ranking. The communication network was weak, due to frequent Wi-Fi outages and ineffective use of phones. The decline in website functionality may be due to poor access to self-booking services and smooth access to files. The electronic organizational structure also exhibits some fragility due to the absence of electronic data management systems in most cases and the lack of attention to establishing an organizational structure that takes into account all responsibilities and relationships within hospitals. (Thayananthan, 2019) For people with special needs, we may encounter difficulties accessing social media, utilizing remote consultation platforms or sign language applications, and the lack of real-time video streaming technologies for sign language translation and audio reading. These facilities typically require significant expenditures at public hospitals. We also frequently observe that many websites do not adhere to digital accessibility standards, such as text enlargement and screen reader support, especially for visually impaired visitors. Much of the content, such as videos translated into sign language or simplified text, appears to be unsuitable for specific audiences. Regarding the organizational structure, there was a near-total absence of staff specializing in sign language, speech therapy, and orthophony. Current hospital policies are still somewhat deficient in establishing clear rules for hiring and defining specific tasks and responsibilities for people with special needs. There is also a lack of effective integration between various departments, which prevents the timely provision of services, such as delays in transferring pediatric patients

to ear, throat, and mouth departments, for audiometry, for example, or for in-depth procedures related to cochlear implants.

The slope in the regression equation (0.666) indicates that each improvement in the infrastructure quality measure across all its dimensions will lead to an increase of (0.666) units in the quality of e-health services. This effect is considered substantial and strong. Meanwhile, the constant (0.736) indicates the expected level of quality of e-health services without taking infrastructure into account. This can be attributed to the presence of other dimensions and variables not taken into account, such as medical expertise, legislation, and laws. Through the results of the correlation and linear regression equation, it is noted that improving infrastructure in all five dimensions is a key driver in improving the quality of e-health services, particularly those targeting people with special needs. The strong correlation coefficient (0.738) and the regression coefficient (0.666) support public hospital management in making decisions that increase investments in infrastructure across all dimensions, especially as this will benefit the quality of health services provided and increase customer satisfaction, particularly those with special needs.

Investments in communication networks support remote technologies for transferring medical data, along with the provision of servers and audiovisual equipment that respond to the logic of digital transformation. The process must also include the provision of integrated health information systems that include electronic records, while working to train staff specialized in digital health technologies in general and people with special needs in particular. From an organizational perspective, it is clear that greater emphasis on integration between various departments and divisions will lead to improved management of health services, according to the results of the correlation and the correlation coefficient.

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4.2 Discussion of Hypothesis Testing

Using a linear regression model, we found a significant relationship between public hospital infrastructure in all its dimensions and digital health quality. This is a significant effect, as both human and organizational structure significantly impact the quality of services provided, and therefore require greater attention.

The first sub-hypothesis indicates a moderate effect of the telecommunications network. Although this is important, it is not the most decisive factor.

The second hypothesis revealed that the website is the weakest dimension, as the availability of a website alone is insufficient unless it is supported by the human and organizational dimensions.

As for databases and applications, this effect is moderate and requires human support.

Meanwhile, human structure ($\bar{R}^2 = 0.371$) emerged as the dimension with the highest impact, reinforcing the hypothesis that training and qualification play a crucial role in improving the quality of digital health services.

Finally, the organizational structure is also a crucial factor affecting the quality of digital health services, and this must also be addressed.

5. CONCLUSION

The results of this study are consistent with numerous studies that place great importance on the role of the human factor and organizational governance in the digital health transformation process. Other research indicates the need to train medical staff and develop programs for services for people with special needs.

The study concluded:

- The importance of the human element in determining the quality of digital health services.
- Adopting organizational governance in any practical research will lead to improved service quality.

- There is a near-perfect match between the requirements of people with special needs and the need to address the human and organizational elements.

The study recommended the need to:

- Develop human competencies by including specialized training programs for people with special needs.
 - Adopt flexible governance by relying on clearer regulations that utilize visual or auditory assistive technologies.
 - Attention to other dimensions, particularly investment in databases.
- Despite their moderate impact, this does not negate their crucial role in many circumstances.

6. Bibliography List

Alves, M., Seringa, J., & Silvestre, T. (2024). Use of artificial intelligence tools in supporting decision-making in hospital management. *BMC Health Services Research*, 24(1282). <https://doi.org/10.1186/s12913-024-11602-y>

Al-Zubi, Q. (2015). *The reality of disability “functional difficulties” in Jordan, based on the data of the General Population and Housing Census* [Doctoral thesis, University not specified].

Bhagat, S. V., & Kanyal, D. (2024, February 20). Navigating the future: The transformative impact of artificial intelligence on hospital management—A comprehensive review. *Cureus*, 16(2), e54518. <https://doi.org/10.7759/cureus.54518>

Derrington, D. (2017). *Artificial intelligence for health and health care*. JASON – The MITRE Corporation.

Goetz, G. (2024). *Artificial intelligence in health care with a focus on hospitals: Methodological considerations for health technology assessment* (AIHTA Project Report No. 164). HTA Austria – Austrian Institute for Health Technology Assessment.

Majinge, R. M., & Msonge, V. T. (2020). The integration of special needs for people living with disabilities into Tanzania’s LIS curriculum. *South African Journal of Libraries and Information Science*, 86(1). <https://doi.org/10.7553/86-1-1830>

Contributions of information and communication technology to achieving quality health services in Algerian public hospitals

Kossai, M. M. (2013). *Information and communication technologies (ICTs), human capital, organizational change, and the performance of PME manufacturers* [Doctoral dissertation, University of Paris Dauphine–Paris IX]. France.

Nasef, D., Nasef, D., Sawiris, V., Weinstein, B., Garcia, J., & Toma, M. (2025). Integrating artificial intelligence in clinical practice, hospital management, and health policy: Literature review. *Journal of Hospital Management and Health Policy*, 9. <https://doi.org/10.21037/jhmhp-24-138>

Kaur, P., Tiwari, S., Ram, S., Budha, G., & Thakur, R. (2025). Utilization of artificial intelligence in hospital administration: Enhancing operational efficiency and patient care. *International Journal of Research Publication and Reviews*, 6(5), 17862–17866.

Saadi, A. (2021). The extent of satisfaction of the disabled with the social services provided in government hospitals in the Jazan region: A field study on a sample of the disabled in government hospitals in the Jazan region. *International Journal for Publishing Research and Studies*, 15(2), 160–222.

Santamato, V., Tricase, C., Faccilongo, N., Iacoviello, M., & Marengo, A. (2024). Exploring the impact of artificial intelligence on healthcare management: A combined systematic review and machine learning approach. *Applied Sciences*, 14(10144). <https://doi.org/10.3390/app142210144>

Shamsi, M. (2024). Integrating artificial intelligence for prediction and optimization in hospital management systems (Case study: Iranian Hospital in Dubai). *Journal of Business and Future Economy*, 4(1), 1–9.

Thayananthan, V. (2019). Healthcare management using ICT and IoT based 5G. *International Journal of Advanced Computer Science and Applications*, 10(4). <https://doi.org/10.14569/IJACSA.2019.0100450>

Mayo Clinic. (2024). *The future according to Mayo Clinic: How AI is transforming the hospital*. CB Insights – Bionaut Funding Insights. <https://businessdevelopment.mayoclinic.org/wp-content/uploads/2024/11/The-future-according-to-Mayo-Clinic-How-AI-is-transforming-the-hospital-CB-Insights.pdf>

7. Appendices

Questionnaire

Best regards,
This research focuses on the contributions of information and communication technology to achieving quality health services in Algerian hospitals. To support theoretical concepts, we ask you to complete this questionnaire by placing a check mark (X) in the appropriate place.
Finally, we thank you for your cooperation and assure you that these answers will be used for purely academic purposes.
Please accept our sincere appreciation and respect.
General information: (Tick (X) in front of your choice)

Gender Male ☐ Female ☐

Age:
Under 30 years old ☐
Between 30 and 40 years old ☐
Between 40 and 50 years old ☐
More than 50 years ☐
the total ☐

Statement		totally disagree	I disagree	neutral	I agree	I totally agree
Section 1	Infrastructure					
Firstly	Network					
1	The hospital has phone numbers					
2	There is a wifi network					
3	The hospital has a vigilance cell.					
4	Computers are available in every office.					
secondly	Website					
5	The hospital has a website.					
6	The hospital has official pages					

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7	The website contains the latest information.					
8	The website includes areas that allow for interaction.					
Third	Databases and Applications					
9	The hospital has various local databases for all clinical and pharmaceutical health activities.					
10	The local database provides the ability to store a large volume of data that can be exchanged between doctors.					
11	The hospital has an electronic registry that records all incoming patients and creates a registration card with all the data.					
12	The hospital has an administrative and financial database for managing bills.					
Fourth	human structure					
13	All administrative staff, nurses and doctors have basic computer skills.					
14	The hospital has specialists in information technology, whether engineers or senior technicians.					
15	In the event of any malfunction in the technical systems, they are repaired by specialists within the hospital.					
16	You can communicate electronically with doctors, and you can submit your prescription remotely.					
Fifth	organizational structure					
17	The patient's electronic data is confidential.					

18	The hospital has electronic signs to facilitate the movement of visitors.					
19	The list of nurses and doctors working daily is identified on electronic signs.					
20	There is an electronic organizational structure that clarifies the responsibilities of each party and their distribution across all departments and interests of the hospital.					
Section 2	Electronic Health Services Quality Management					
1	Various administrative tasks with the patient are carried out from the website.					
2	Medical appointments and laboratory test results are determined directly from the website and email.					
3	Appointments are determined based on social media pages.					
4	Hospital staff use email to communicate with patients.					
5	The database is used to determine the hospital stay bill.					
6	The patient obtains all his prescription medications from the hospital pharmacy in a timely manner and before the expiration date.					
7	The medical file is transferred from one doctor to another smoothly and electronically without the need for a paper file and the creation of another file by the patient.					

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8	An electronic system is used to help reduce the patient's waiting time before undergoing medical examinations.					
9	Patients are electronically and efficiently assigned and distributed to various medical specialists.					
10	The hospital has an electronic system that allows direct interaction with patients and immediate responses to their inquiries without delay.					
11	An electronic system is being adopted to manage data related to radiological services.					
12	There is coordination between radiological services systems, laboratory analysis, and medical records.					
13	Phones are answered 24 hours a day.					