E-management as a Mechanism to Improve the Educational Service Quality in Algerian Universities During COVID-19: An Applied Study at Saida University.

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Abstract :
This study aims to identify the contribution of e-management on improving the educational service quality in Algerian Universities during COVID-19. To achieve the objectives of this study, the descriptive analytical method was adopted and conducting a practical study at Saida University by distributing an electronic questionnaire to PhD students.
The results of the study found that there is a statistically significant impact of e-management (as a whole) on improving the educational service quality. Moreover, the stepwise regression resulted in formulating two models to predict the relationship between e-management and educational service quality. The first model depended on one variable (communication networks) which alone explained 34.6% of the variance in educational service quality at the University. However, the second model was based on both (communication networks and computer hardware), which together explained 38.5% of the variance in educational service quality at Saida University.
***Key Words*:** E-management, Service quality, Educational service quality, Computer hardware, Communication networks.

JEL Classification : I23, M12.

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Introduction :

Nowadays, the usage of ICT (Information and Communication Technologies) is necessary due to the changes that the world is witnessing in various fields especially during the recent critical period (COVID-19). COVID-19 could influence education, among other fields, to revert to online communication as a coping mechanism and the safest tool to reinforce the required social distancing protocols.

With the already existing issues in higher education when it comes to educational service quality, universities are faced with new challenges during the pandemic. These challenges require special attention to reviewing the educational processes, especially that the traditional methods of education are inaccessible

during this period. Therefore, a modern approach based on the technological and informational dimension is required. For this reason, universities around the world have shown a growing interest in the adoption of e-management systems in both developed or developing countries, as e-management applications allow universities to offer their services online through the digital platforms (e.g., Moodle), complete many internal transactions distantly and provide its staff with new opportunities for communication away from the complicated bureaucratic procedures.

Based on the above, the research problem can be formulated as:

To what extent does e-management contribute to improving the educational service quality at Saida University from the perspective of PhD students?

Research Questions : The study will mainly try to answer the following questions:

- What is the extent of applying e-management at Saida University?
- What is the extent of achieving the quality of educational service at Saida University?
- Is there an impact of e-management on improving the educational service quality at Saida University?

Research Hypotheses :

First Hypothesis : The University of Saida applies e-management from the perspective of PhD students.

Second Hypothesis : The University of Saida achieves educational service quality from the perspective of PhD students.

Third Hypothesis : There is a statistically significant impact of e-management on improving the educational service quality at Saida University from the perspective of PhD students.

Out of this hypothesis, many sub-hypotheses were derived:

- There is a statistically significant impact of computer hardware on improving the educational service quality at Saida University from the perspective of PhD students.
- There is a statistically significant impact of computer software on improving the educational service quality at Saida University from the perspective of PhD students.
- There is a statistically significant impact of communication networks on improving the educational service quality at Saida University from the perspective of PhD students.
- There is a statistically significant impact of Knowledge makers on improving the educational service quality at Saida University from the perspective of PhD students.

Objectives of the Research : The key objectives of the research include:

- To identify the level of applying e-management at Saida University.
- To determine the degree of achieving the quality of educational service at Saida University.

- To explore the impact of e-management on achieving the quality of educational serviceat Saida University during the COVID-19 pandemic.
- To provide some important recommendations based on the results of this research.

Previous Studies :

In a study done by Ammari (2018) about "The role of electronic management in improving the performance of higher education institutions, a case study of a sample of university institutions". The study aimed to measure the contribution of e-management in developing the performance of higher education institutions. The study sample consisted of deans and heads of scientific departments, besides their assistants with a number of (867) individuals. The most important results revealed that there is a statistically significant relationship that explains the contribution of e-management in developing the performance of the Algerian Universities.

The study by Suresh and Sridevi (2018) is one of the most important theoretical studies, that aimed to highlight the role of information and communication technologies in higher education. The results showed that ICT integration in higher education brings a change in student and teacher learning behavior and develops higher order skills, such as collaborating across time and place and solving complex real world problems. The study suggested that ICT in higher education is not a technique for educational development but also a way of socio-economic development of the nation.

The study by Assoul (2016), entitled "the role of Information and Communication Technologies in improving the quality of higher education, a case study of some university institutions". The study aimed to identify the role of ICT in improving the quality of higher education in Algerian Universities. A questionnaire was designed and developed to collect data and distribute it to the sample units of (262) professors. The study concluded that the level of applying ICT was high, and there is a statistically significant impact of ICT on improving the quality of higher education in Algerian Universities.

The study by Hajaia and Roud (2014), entitled "The obstacles of applying e-administration in Tafila Technical University (TTU) from the faculty staff members' perspectives". The study aimed to recognize the obstacles of applying e-administration in (TTU), the sample consisted of (130) professors. The results indicated that the degree of the obstacles of applying e-administration was high. Moreover, the results showed that there are statistically significant differences from the professors for the obstacles of applying e-administration attributed to the academic rank in the human, financial and organizational obstacles domains and for the favor of associate professor and higher.

The present study differs from the others mentioned above in two respects. First, evaluating service quality through the receiver's perspective (i.e., students), not the providers (i.e., professors), given that students are the aptest choice to test the value of service provided (Degtjarjova, Lapina, and Freidenfelds 2018; Latif et al. 2017; Ozdemir, Kaya, and Turhan 2019; Santos et al. 2020). Second, our study

was conducted during the COVID-19 pandemic, the period in which e-management applications were relied on to improve the educational service quality.

I. Theoretical Framework :

1. Electronic Management :

E-management is one of the most important and latest scientific terms developed in the field of modern science, it first appeared in the USA as a result of the development of information and communication networks (Abusef and Kumar Tarofder 2021, p. 41).

1.1. Electronic Management Definition :

There is no universally accepted definition of e-management between specialists and researchers in academics, different terms have been used among specialists in different considerations when mentioning e-management. Some specialists refer to it as smart administration or administration of the future (Khadim, Makki, and Mahmood 2018, p. 80). Generally, we tend to associate e-management with different concepts such as: e-government, electronic administration, public e-services and cyber administration (Bouzidi and Boulesnane 2015, p. 229).

According to Onuigbo and Eme (2015, p. 20), e-administration or e-management, refers to any of several mechanisms which convert what in a traditional office are paper processes into electronic processes, with the goal being to create a paperless office. Khlif and Ziadi (2020, p. 32) defined e-management as a management mode integrating information and collaboration technologies. Alsakarneh and Hong (2015, p. 186) considered e-management as an integrated electronic system that depends on ICT to transform the administrative manual labor work carried out by digital and modern technology.

Regarding the e-management at the university, it has defined as the universities use of ICT to carry out its activities through the transformation of electronic work to improve performance and administrative processes, achieve services quality and university objectives with the least time, effort and cost. (Ismael and Abbas 2019, p. 397).

1.2. Electronic Management Tools (Dimensions) :

The e-management activities use four management tools: (Almutairi 2014, p. 61)

- **Computer Hardware**: It is the mechanical part of the computer networks and accessories.
- **Computer Software**: It is the invisible and the untouchable part installed in the computer hardware. It is divided into system software for example network management, and OS and software applications such as e-mail, web browsers, electronic scale etc.
- **Communication Networks**: These are the transmitters of information for example extranet, intranet and internet.
- **Knowledge Makers**: These are the information technology literate leaders, managers and analysts of cognitive resources and the capital to install the IT technologies in a firm.

2. Educational Service Quality : Concepts and Measurement

2.1. The Concept of Educational Service Quality :

Research on service quality gained a major push forward in the early 1980s (Yousapronpaiboon 2014, p. 1098), in this regard researchers have established different definitions of service quality (Tiglao et al. 2020, p. 03). Some prominent definitions refer to service quality as “the extent to which an organization meets customer expectations consistently” (Parasuraman, Zeithaml, and Berry 1985, p. 42). In the same context, Gronroos (1984, p. 37) describes service quality as "a perceived judgment resulting from an evaluation process where customers compare their expectations with the service they perceive to have received”.

Consistent with general service quality, educational service quality could be considered “the difference between what a student expects to receive and his/her perceptions of actual delivery” (Zhang et al. 2016, p. 83)**.**

2.2. Measuring Service Quality in Higher Education Sector :

Measuring service quality has aroused the interest of many scholars since 1980s (Ding et al. 2020, p. 01). However, the consensus on the best way to define and measure service quality has not yet been reached, each actor has a different vision of quality according to their specific needs (Munthiu et al. 2014, pp. 1237-1238)

Following the same line of thought, in higher education contexts. Ali et al. (2016, p. 73) asserted that the quality of higher education is dependent on various stakeholders who experience the different services provided by higher education institutions, and students are the main stakeholders of any higher education institution. Notably, the definition of higher education customers includes not only students but also non-teaching staff, lecturers, and society at large, etc., each having its own expectations and perceptions (Santos et al. 2020, p. 04).

As a result of the difficulty in defining quality, its measurement has also turned to be a controversial issue (Brochado 2009, p. 176). In terms of measurement methodologies, the most prevalent service quality measurement model in the literature is SERVQUAL (Ozdemir, Kaya, and Turhan 2019, p.07). The SERVQUAL instrument has attracted the greatest attention to measuring perceived quality in the higher education sector (Karavasilis et al 2016, p. 19). This instrument compares the differences between consumers expectations and consumers perceptions, and there is a set of five gaps (Assurance, Responsiveness, Empathy, Reliability and Tangibles) (Parasuraman, Zeithaml, and Berry 1994, p. 202).

Notwithstanding its growing popularity and widespread application, SERVQUAL has been subjected to two major criticisms. First, SERVQUAL has been inappropriately based on an expectations' disconfirmation model rather than an attitudinal model of SQ. Second, it does not build on extant knowledge in economics, statistics and psychology (Buttle 1996, pp. 10-11). In the same vein, (Karavasilis et al 2016, p. 19) state that it would not make sense to measure something that is constantly changing. As a result, a performance-only-based measure of service quality models was introduced, this approach labelled

SERVPERF. SERVPERF is a variant of the SERVQUAL scale, is based on the perception component alone (Abdullah 2006a, p. 32).

Over time, other scales have been proposed to measure service quality e.g., HEdPERF, the one we adopt in this paper (It has been modified to suit Algerian universities). As, according to the researchers, the generic scales presented before may not be suitable for the research purpose.

The HEdPERF instrument (Higher Education PERFormance) developed by Abdullah (2006c, p. 572), considered better than SERVQUAL and SERVPERF as they focus on the education sector. This instrument covers academic and environmental aspects (Abbas 2020, p. 02).

The table below evinces the various scales (instruments) to measure service quality for educational services.

Table 1 : «Scales to measure service quality for educational services »

Scales	Quality Dimensions
SERVQUAL	Assurance. Responsiveness. Reliability. Tangibles and Empathy.
SERVPERF	Assurance. Responsiveness. Reliability. Tangibles and Empathy.
HEdPERF	Non-academic aspects. Academic aspects. Reputation. Access. Understanding.
EDUQUAL	Learning results. Reaction capacity. Physical endowment. Personality. development and University professors.
SQM-HEI	Teaching methodology. Environmental change in studio factor. Taken disciplinary measure. Set activities. and in general services quality evaluation and of satisfaction level
EDUSERVE	Empathy. School facilities. Faith. Responsibility and Discipline insurance.

Source : Prepared by the researchers according to (Munthiu et al. 2014, p1240)

The first two measurement scales, i.e., SERVQUAL and SERVPERF, are generic measurement scales applied in all sectors, both instruments have been applied in the educational sector with modifications of elements done to match the situation and the context of the study. While the other scales have been developed especially for the educational sector (Munthiu et al. 2014, p. 1239). In this regard, Abdullah (2006b, p. 73) proposed HEdPERF (Higher Education PERFormance only), a new and more comprehensive performance-based measuring scale that attempts to capture the authentic determinants of service quality within higher education sector.

Considering this, the HEdPERF scale could be used by HEIs, to understand the students' point of view and conduct initiatives to improve the service delivered, (Silva et al. 2017, p. 420) The scale dimensions are: (Karavasilis et al2016, p. 19-20)

- **Non-academic aspects:** Consists of items that are essential to enable students to fulfil their study obligations, and it relates to duties carried out by non-academic staff.
- **Academic aspects:** The items are solely the responsibilities of academics.
- **Reputation:** Items that suggest the importance of higher learning institutions in projecting a professional image.
- **Access:** Items that relate to such issues as approachability, ease of contact, availability and convenience.
- **programs issues:** Items emphasize the importance of offering wide ranging and reputable academic programs/specializations with flexible structure and syllabus.
- **Understanding:** Items related to understanding students' specific need in terms of counselling and health services

3. Electronic Management and Service in Higher Education:

Since e-management is important for the development of administrative work and improving the different institutions, universities always seek to keep up on recent changes and use e-management in decision making processes. Here are some examples of administrative applications of e-management and the services it provides within universities: (Waswas and Jwaifell 2019, p. 54)

- **Field of Student affairs:** Among the services provided by electronic management is distributing students to the departments, following up on students' attendance and absence, and extracting students' results to analyze and evaluate them.
- **Field of Personnel affairs:** It helps in dealing with personnel files in terms of entering, organizing and maintaining their data and addresses, providing the different types of services needed by staff at all levels in the university, and following up the employees' evaluation through performance monitoring programs.
- **Field of managing university affairs:** The role of e-management appears through its applications concerning following up various university affairs, identifying its coming needs.

Additionally, the e-management system has many advantages for all the main stakeholders in higher education, which are summarized in the table below.

Table 2 : «Benefits of e-management in education to the main stakeholders»

Stakeholders	Quality Dimensions
Students	- Increased access. - The flexibility of content and delivery. - Combination of work and education. - Learner-centred approach. - Higher-quality of education and new ways of interaction.
Employers	- High quality, cost-effective professional development in the workplace. - Upgrading of employee skills, increased productivity. - Developing of a new learning culture. - Sharing costs and training time with the employees. - Increased portability of training.
Governments	- Increase the capacity and cost effectiveness of education and training systems. - To reach target groups with limited access to conventional education and training. - To support and enhance the quality and relevance of existing educational structures. - To ensure the connection of educational institutions and curricula to the emerging networks and information resources. - To promote innovation and opportunities for lifelong learning.

Source : (Pavel, Fruth, and Neacsu 2015, p. 709).

II. Research Methodology:

1. Research Population and Sample :

The research population consisted of all PhD students in all the faculties of Saida University for the academic year 2020/2021 with a sum of (245) students, upon information taken from the Vice Rectorate of Development, Foresight and Orientation (Statistics and Foresight Service). While the sample consisted of (150) students who form a ratio of 60% of the total number, were chosen randomly to ensure an adequate representation.

2. Research Approach :

The researchers adopted the descriptive analytical approach, since it is fit for this study.

3. Data Collection Instrument :

Primary data for this research were collected from 150 respondents using an electronic questionnaire out of 200 questionnaires distributed, which forms a ratio of 75% from the sumnumber. The questionnaire consists of two basic parts, as follows:

The first part includes (16) items distributed into four main dimensions of electronic management, as follows:

- Computer hardware dimension which includes (4) items.
- Computer software dimension which includes (4) items.

- Communication networks dimension which includes (4) items.
- Knowledge makers dimension which includes (4) items.

The second part includes (22) items related to the dependent variable (educational service quality).

The questionnaire was developed based on administrative literature related to the study. Where we used the Likert quintet Scale, which consists of the following points: (1=totally agree, 2=agree, 3=neutral, 4=disagree, 5=totally disagree).

III. Results and Discussion:

1. Reliability of the Study Tool :

The reliability of the tool was estimated by the coefficient of internal consistency (Cronbach Alpha), and its results are illustrated in Table (3)

Table 3 : «The validity and reliability of the measurement tool»

Variable	Dimensions	Items Number	Cronbach's Alpha
E-management	Computer hardware	04	0.484
	Computer software	04	0.533
	Communication networks	04	0.596
	Knowledge makers	04	0.630
Total		16	0.815
Educational service quality		22	0.893
The tool as a whole		38	0.911

Source : Prepared by researchers using IBM SPSS V26 outputs.

It is clear from Table (3) that the internal consistency estimate (Cronbach Alpha) of the study instrument is high, with value (0.815, 0.893) for the dependent and independent variable successively, while the tool as a whole (0.911). Thus, it is evidence that the study tool is suitable for research purposes.

2. Descriptive Statistics :

Table 4 : «The descriptive statistics of the study variables»

Variables	Mean	Standard Deviation	Degree
Computer hardware	3.2183	0.62074	Medium
Computer software	3.2067	0.70873	Medium
Communication networks	2.8117	0.65790	Medium
Knowledge makers	3.1500	0.69574	Medium
E-management	3.0967	0.52494	Medium
Educational service quality	3.0324	0.56683	Medium

Source : Prepared by researchers using IBM SPSS V26 outputs.

Table (4) indicates the means and the standard deviations of the student's answers about the level of e-management and the educational service quality. The averages of the e-management dimensions (computer hardware, computer software, communication networks and knowledge makers) reached the values of

(3.2183, 3.2067, 2.8117, 3.1500), successively, which corresponds to the medium agreement degree in all dimensions. Whereas the e-management as a whole (independent variable) reached a medium degree, with a whole mean of (3.0967) and a standard deviation of (0.52494). This indicates that there are positive attitudes towards all items related to e-management at Saida University.

Followed by educational service quality (dependent variable) with a mean of (3.0324) and a standard deviation of (0.56683). This indicates that there are positive attitudes towards all items related to educational service quality at Saida University.

3. Testing the Study Hypotheses :

3.1. The First Hypothesis :

H_0: The University of Saida does not apply e-management from the perspective of PhD students.

H_1: The University of Saida applies e-management from the perspective of PhD students.

Table 5 : «Results of T-Test for applying e-management »

	Mean	Standard Deviation	df	Sig
Applying e-management	3.0967	0.52494	149	0.026

Source : Prepared by researchers using IBM SPSS V26 outputs.

The table above shows that the average responses about applying e-management is (3.0967), which is greater than the hypothesized mean (3), and the result is statistically significant at ($\alpha \leq 0.05$). This means that the University of Saida applies e-management with an average degree.

Resulting in the rejection of the null hypothesis and acceptance of the alternative hypothesis that "The University of Saida applies e-management from the perspective of PhD students."

3.2. The Second Hypothesis :

H_0: The University of Saida does not achieve educational service quality from the perspective of PhD students.

H_1: The University of Saida achieves educational service quality from the perspective of PhD students.

To test this hypothesis, the researchers used the one sample T-Test, Table (5) present the results of this test.

Table 6 : «Results of T-Test for achieving educational service quality»

	Mean	Standard Deviation	df	Sig
Achieving educational service quality	3.0324	0.56683	149	0.048

Source : Prepared by researchers using IBM SPSS V26 outputs.

The results in the previous table show that the average responses about achieving educational service quality is (3.0324), which is greater than the hypothesized mean (3), and the result is statistically significant at ($\alpha \leq 0.05$). This

implies that the University of Saida achieves educational service quality with an average degree.

Resulting in the rejection of the null hypothesis and acceptance of the alternative hypothesis that "The University of Saida achieves educational service quality from the perspective of PhD students."

3.3. The Third Hypothesis :

H_0: There is no statistically significant impact of e-management on improving the educational service quality at Saida University from the perspective of PhD students.

H_1: There is a statistically significant impact of e-management on improving the educational service quality at Saida University from the perspective of PhD students.

To identify the impact of e-management on improving the educational service quality at Saida University, multiple linear regression and stepwise regression were used by including all the independent variables in the linear regression equation.

Table 7 : «Results of multiple regression analysis »

	R	R^2	F	Sig	Dimensions	β	T	Sig
Educational service quality	0.633	0.401	24.270	0.000	(Constant)	1.055	4.780	0.000
					Computer hardware	0.165	2.218	0.031
					Computer software	0.044	0.648	0.518
					Communication networks	0.358	4.845	0.000
					Knowledge makers	0.096	1.395	0.165

Source : Prepared by researchers using IBM SPSS V26 outputs.

Table (7) reveals that the impact of the independent variable (electronic management as a whole) on the dependent variable (educational service quality) is statistically significant, where the calculated F value was (24.270) with Sig=0.000, which is less than the significance level ($\alpha \leq 0.05$). Besides, the correlation coefficient was (R=0.633) indicates a positive relationship between electronic management and educational service quality at Saida University, and the determination coefficient was (R^2=0.401), this suggests that 40.1% of the variance in educational service quality at Saida University can be explained by the variance in electronic management as a whole, and the rest 59.9% was attributed to other factors. Furthermore, the results showed that the overall significance of the model attributed to only two dimensions (computer hardware and communication networks), with P-values (0.031, 0.000) respectively, which are less than the significance level ($\alpha \leq 0.05$).

These results provide enough evidence to reject the null hypothesis and to accept the alternative that "There is a statistically significant impact of e-management on improving the educational service quality at Saida University from the perspective of PhD students".

Based on the above mentioned, the multiple linear regression equation can be deduced as follows:

Educational service quality at Saida University =1,055+(0,165*Computer hardware) + (0,044*Computer software) + (0,358*Communication networks) + (0,096*Knowledge-makers).

To detect a meaningful subset of independent variables that efficiently explains the dependent variable, we resort to stepwise regression which mainly used to identify and include the fewest number of independent variables that can adequately predict the value of the dependent variable (Field 2009, p. 213)**.**

Table 8 : «Results of stepwise regression analysis »

Model		R	R^2	Adjusted R^2	Beta	Sig
1	Constant Communication networks	0.588	0.346	0.345	1.607 0.507	0.000 0.000
2	Constant Communication networks Computer hardware	0.377	0.385	0.621	1.222 0.444 0.213	0.000 0.000 0.000

Source : Prepared by researchers using IBM SPSS V26 outputs.

According to the table above, the stepwise regression resulted in two models to predict the relationship between the dimensions of e-management and educational service quality at Saida University, where we find that the first model relied on one dimension (communication networks), which alone explained 34.6% of the variance in the quality of educational service at Saida University. However, the second model relied on both (communication networks and computer hardware), which together explained 38.5% of the variance in the quality of educational service at Saida University, with P-values (0.000, 0.000) which are less than the significance level ($\alpha \leq 0.05$). Otherwise, the rest independent variables (i.e., computer software and knowledge makers) were excluded from the model due to their non-statistically significance at the significance level ($\alpha \leq 0.05$). In other words, computer software and knowledge makers individually have no impact on educational service quality. This indicates that any increases in those variables have no corresponding increases in educational service quality. Accordingly, we reject the second and fourth sub-hypotheses from the third main hypothesis that "computer software and knowledge makers, have a statistically significant impact on improving the educational service quality at Saida University from the perspective of PhD students".

These results indicate that the University of Saida is primarily interested in providing communication networks to satisfy university administration needs to improve the educational service quality, and to a lesser extent, computer hardware compared to the other elements of e-management.

According to the Beta value, we can formulate two prediction models using the MLR equation as follows:

Model 1:

Educational service quality at Saida University = 1,607 + (0,507*Communication networks).

Model 2:

Educational service quality at Saida University = 1,222 + (0,444*Communication networks) + (0,213*Computer hardware).

Conclusion :

To identify the reality of applying e-management and its role in improving the educational service quality in higher education institutions, we conducted a practical study at Saida University by distributing an electronic questionnaire to its PhD students, which includes a series of items that focus on four main elements of e-management and educational service quality.

Through hypotheses testing and discussion of results, the following conclusions were obtained:

- The University of Saida applies e-management with an average degree, from the perspective of PhD students.
- The University of Saida achieves educational service quality with an average degree, from the perspective of PhD students.
- There is a statistically significant impact of e-management (as a whole) on improving the educational service quality at Saida University from the perspective of PhD students.
- The significant impact of improving the educational service quality at Saida University, was attributed to (communication networks and computer hardware), as they jointly explained 38.5% of the variance in the educational service quality.
- There is no statistically significant impact of computer software and knowledge makers on educational service quality at Saida University from the perspective of PhD students.

Depending on the previous results, the study recommends the following:

- Hold training courses on the application of e-management for all concerned.
- Support the culture of transition from traditional management to e-management.
- Expanding regulations and managerial processes in line with digital practices imposed by the e-management application.
- Providing advanced software in line with technological developments.

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