

Digital Experience Quality as a Key to Enhancing E-Entrepreneurial Innovation: An Analytical Study of the Opinions of Employees at the Digital Transformation and Automation Center at the Ministry of Higher Education and Scientific Research

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Abstract

This study aims to analyze the impact of digital experience quality on enhancing e-entrepreneurial innovation among employees at the Digital Transformation and Automation Center at the Ministry of Higher Education and Scientific Research. The study's importance stems from the growing role played by integrated digital experiences in supporting e-entrepreneurial initiatives within government institutions, particularly in light of comprehensive digital transformation. The study relied on a descriptive analytical approach, with data collected using a questionnaire designed according to a five-point Likert scale and distributed to a sample of (90) employees from the total study population (252) . The sample was taken based on the table (Krejcie & Morgan, 1970). The data were analyzed using SPSS to apply appropriate statistical methods such as averages, standard deviations, and simple and multiple regression analysis.

The results concluded that digital experience quality has a statistically significant positive impact on enhancing e-entrepreneurial innovation, and that the dimensions of the digital experience (well-being, social cohesion, time, and efficiency) represent key determinants of the success of digital entrepreneurial initiatives. The study recommended the adoption of an institutional strategy to improve the quality of the digital experience for employees and beneficiaries by investing in the development of interactive systems and customized experiences supported by artificial intelligence, which contributes to enhancing digital innovation and sustainability within the ministry.

Keywords : Digital Experience Quality, E-Entrepreneurial Innovation, Ministry of Higher Education , Digital Transformation, Automation Center.

Introduction

Over the past two decades, the world has witnessed a radical transformation in work systems and service delivery mechanisms due to the rapid development of digital technologies. This has brought digital

experience quality as the foundational pillar of organizational success and agility in the new normal. As government organizations continue to rely more and more on electronic systems, there is an emerging need to understand the elements that make the digital experience more productive, specifically the factors that stimulate innovation and entrepreneurship.

Within the latter part, quality of digital experience has a key role for more productive work and creative thinking as well as to think digitally and developing new technology based solutions. The digital experience is not just about ease of use or system availability: it is now understood as a holistic concept that relates to the well-being of users, to social interactions in the digital environment, and to effective utilization of time to complete tasks.. This makes it a significant factor in building a work environment that encourages innovation.

Methodology

First: Problem Statement

With the accelerating trend towards digital transformation within government institutions, and societal related issues at least within the Ministry of Higher Education and Scientific Research, there is a requirement for development of digital tools that can enable not only performance effectiveness but also serve as enablers of e-entrepreneurial innovation in the same breath. Although the Ministry has been pushing some digital agendas, the actuality behind them is that these agendas face organisational, technical and human resistance, so it's not possible to completely carry them out.

These disparities are resulting in a rather inconsistent digital work experience product for the employees, both in terms of the user friendliness of electronic systems, the degree to which they are integrated, and also psychological and organizational ramifications for the employees. According to long-time users, some digital systems, even if they are easily accessible, do not lead to enhancing e-entrepreneurial creativity, on the contrary, sometimes they may add to the work load and/or hinder communication and cooperation among the working team.

The Ministry also faces challenges in managing its time as well as with its digital systems' effectiveness. Some of the procedures are undoubtedly still too cumbersome as to get people to actually invest their own intellectual energies into thinking up new digital projects. It was also noticed that there is a meager enthusiasm towards interactive digital gadgets to boost digital social interaction and knowledge sharing within the Institution, a core tenet to formulating a spirit-based framework, for pursuing e-entrepreneurship. Nonetheless, the influence/utilization of employees' digital experience quality on e-entrepreneurial innovation in the Ministry of Higher Education and Scientific Research has not been particularly studied in practical prior research, despite the significance of these factors within the context of the perceived DTA center as the principal body spearheading institutional digital transformation. Therefore, the problem of this study attempts to investigate different levels of quality of digital experience (digital well-being, social interaction, time, and efficiency) that its concepts having relationships with the encouragement of e-entrepreneurial innovation in employees. In doing this, it contributes to offering the scientific perspective that allows to serve the Ministry in considering the existing challenges and in leading digital transformation to further effective and sustainable innovation ends.

Second: Significance of the Study

The significance of this study stems from several aspects:

- **Scientific Significance:** It contributes to enriching the current literature on the relationship between the quality of the digital experience and e-entrepreneurial innovation in the governmental context.
- **Practical Significance:** It provides practical indicators for decision-makers at the Ministry of Higher Education on how to develop a digital environment that fosters innovation.
- **Strategic Significance:** It supports national digital transformation efforts by focusing on improving the digital experience for employees, thereby enhancing organizational performance and creativity.

Third: Study Objectives

1. The study aims to:
1. Determine the quality of the digital experience among employees at the Digital Transformation and Automation Center.
2. Measure the level of e-entrepreneurial innovation in the work environment.
3. Analyze the impact of the quality of the digital experience on promoting e-entrepreneurial innovation.
4. Provide practical recommendations to improve the quality of the digital experience in a way that supports entrepreneurial initiatives within the Ministry.

Fourth: Study Hypotheses

Based on the study problem and objectives, the following hypotheses were formulated:

Main Hypothesis: There is a statistically significant impact between the quality of the digital experience and e-entrepreneurial innovation among employees at the Digital Transformation and Automation Center.

Sub-hypotheses:

1. There is a statistically significant impact of well-being on promoting e-entrepreneurial innovation.
2. There is a statistically significant impact of social cohesion on promoting e-entrepreneurial innovation.
3. There is a statistically significant impact of time and efficiency on promoting e-entrepreneurial innovation.

Fifth: Study Hypothetical Framework

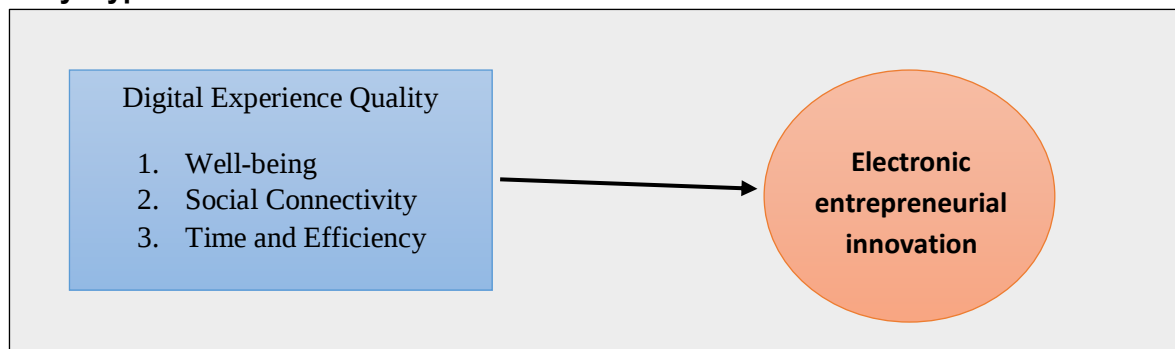


Figure (1)

Hypothetical study plan

The study's hypothetical model can be represented as follows:

Independent variable: Quality of digital experience, encompassing the dimensions of well-being, social connection, time, and efficiency. This was determined using the Witowska et al. (2025) scale.

Dependent variable: E-entrepreneurial innovation. This was determined using the Abdelfattah et al. (2025) scale.

Sixth: Study Population and Sample

The study population consisted of all employees at the Digital Transformation and Automation Center within the Ministry of Higher Education and Scientific Research . The study relied on a descriptive analytical approach, with data collected using a questionnaire designed according to a five-point Likert scale and distributed to a sample of (90) employees from the total study population (252) . The sample was taken based on the table (Krejcie & Morgan, 1970).

Due to the limited population size, all employees were included in the study sample (a total sample).

Data were collected using a questionnaire designed according to a five-point Likert scale, which included two main axes:

- Quality of digital experience (independent variable).
- E-entrepreneurial innovation (dependent variable).

Seventh: Statistical Methods Used

After data collection, it was entered and analyzed using SPSS software, employing the following methods:

Descriptive Analysis: to extract frequencies, percentages, arithmetic means, and standard deviations.

Reliability Testing: using Cronbach's alpha coefficient to verify the consistency of the questionnaire items.

Theoretical Aspects of the Study

First: The Quality of Digital Experience

1. The Concept of the Quality of Digital Experience

The quality of digital experience is a relatively new concept in technological and behavioral studies, and it has garnered significant attention due to its importance in determining user satisfaction with digital services. Studies indicate that the quality of digital experience is not limited to the technical performance of the digital service, but also encompasses the user's overall impression and emotional and cognitive engagement with the digital environment. For example, (Witowska , 2025: 1) developed two psychological scales to measure the quality of digital experience: the "Digital Life Engagement Scale" and the "Quality of Digital Experience Scale." The first assesses the extent of employees' engagement with digital life, while the second evaluates the impact of digital use on essential aspects of life, emphasizing that digital engagement affects users' overall well-being. In the context of digital education, (Berceanu , 2023: 1235) highlighted that the quality of digital experience is linked to the clarity of content, accessibility, effective interaction, and ease of use of technology, asserting that a well-designed digital environment enhances student well-being and increases their active participation. In the area of digital customer experience, a

study by(Kim , 2025: 3501) demonstrated that the quality of digital systems, information, and services directly impacts customer satisfaction and brand loyalty, highlighting that the emotional impression of the user is an integral part of evaluating the digital experience.

Furthermore, (Leguina , 2025: 235) indicated that digital experiences influence customers' future engagement intentions, going beyond traditional replacement effects, thus emphasizing the role of digital experience quality in shaping future digital behavior. In the digital health sector, a study by (Rigo , 2025: 276) showed that evaluating the quality of digital services using standardized tools contributes to improving the effectiveness of digital health solutions and enhances user satisfaction.

2. Dimensions of Digital Experience Quality

(Witowska et al. , 2025: 328) identified three dimensions of digital experience quality:

1) **Well-being:** The well-being dimension refers to the impact of digital interaction on the user's psychological and emotional health and their overall satisfaction with digital life. (Witowska , 2025: 3) defines digital well-being as the extent to which employees feel psychologically satisfied and comfortable while using digital applications or platforms, including reduced stress and increased happiness. Berceanu (2023: 1236) explains that the quality of the digital experience directly affects the user's digital well-being, promoting a balance between digital use and psychological comfort. This dimension reflects the importance of designing digital experiences in a way that supports the user's psychological health and avoids digital burnout or psychological stress resulting from intensive use of digital technologies.

2) **Social Connectedness:** The social connectedness element describe to what degree digital experiences strengthen social ties and communication between users. Social connectivity is characterized by reciprocal assistance, dissemination of information, and positive interactions among peers in the context of digital platforms (Chen et al., 2014: 457).

Yoo & Gretzel (2011: 124) further purport that social connectivity cultivates a user's sense of belongingness in a digital community and promotes engagement and involvement on a digital platform or service. Since it improves the user experience (UE) of the platform by creating a feeling of social connection and exposure to others and leads to an increase in platform loyalty, this factor is extremely important even in social applications or cyber learning platforms.

3) **Time and Efficiency:** Dimension effectiveness of time and efficiency means to what extent a user can complete his/her job quickly and efficiently, rather than wasting the effort or time in the digital experience. Enhancing time and efficiency (i.e., simplify the process, speed up information access and enable finishing digital transactions) is among the keys of improvement in Kim (2025: 3502). (Rigo, 2025: 276) additionally points out that time-saving digital services are perceived as highly efficient ones, thus they increase users' satisfaction and the continuance intention to use the services. This factor is so critical in the

fields of digital business and digital commerce that it could be noted that the entire concept of time efficiency directly correlates with a business owner's perceived value of his customer as well as the business owner's perceived value of customer satisfaction and the ability of the business owner to provide ever more value for his or her digital services relative to the competition in the field.

Second: E-Entrepreneurial Innovation

1. The Concept of E-Entrepreneurial Innovation

E-entrepreneurial innovation is a notion related to the creation and application of new ideas and innovative solutions within the domain of digital business, where digital technologies are utilized for value creation and to gain a competitive position (Nambisan, 2017: 5). It can also be seen as a dynamic process of discovering new digital business opportunities, prototyping innovative business models, and deploying technology-enabled business solutions that can have an impact on the market (Autio et al., 2018: 22).

In terms of entrepreneurship, e-entrepreneurial innovation is continual renewal of digital products, services, and process so that digital tools are used to support this activity that increases its competitiveness and, ultimately, its growth (Schumpeter, 1934: 66). Some studies further claim that e-entrepreneurial innovation represents the fusion of entrepreneurship and digital technologies of today thus allowing enterprises to survive against rapid transformation in the digital world and providing innovative solutions that fulfill what the customers desires. (Berceanu, 2023: 1236).

2. The Importance of E-Entrepreneurial Innovation

E-entrepreneurial innovation contributes significantly to economic growth and job creation while using contemporary digital enabling technologies (Nambisan, 2017: 1029). It also greatly boosts organizational digital transformation in the productivity, resilience, and quality of service (Lusch & Nambisan, 2015: 155). In addition it allows entrepreneurs to create new answers to social and business problems - like e-learning, e-health, and digital financial services - making use of intelligent and scalable technologies (Li et al., 2018: 1130). Increased global competition allows digital entrepreneurs for their startups to sell internationally, more easily via online platforms. By increasing global competitiveness, digital entrepreneurship facilitates new ventures to enter global markets more quickly and cost-effectively (Autio et al., 2018:1). In addition, e-entrepreneurial innovation helps reduce operating costs and improve efficiency through automation, data analytics, and digital resource management (Zhao & Collier, 2021:2). It also provides opportunities to empower workers, enabling those with limited resources to innovate and scale their ideas globally (Sahut et al., 2021:4). Finally, it supports sustainable development by promoting environmentally friendly business models and improving resource utilization (UNCTAD, 2022:28).

Practical Aspects of the Study

First: Coding the Study Items

To analyze and interpret the statistical results, and to facilitate the statistical analysis process, the variables included in the study were replaced with a set of symbols and abbreviations. Table (1) shows the code for each variable and dimension, and specifies the number of items.

Table (1)
Description of the Questionnaire Instrument

Variables	Dimensions	Paragraphs	The symbol
The quality of the digital experience	Well-being	8	WB
	Social connection	8	SC
E-commerce entrepreneurial innovation	Time and efficiency	8	TE
	One-dimensional	9	EEI

Second: Reliability and Reliability of the Measurement Instrument

The purpose of this section is to measure the reliability of the assessment instrument developed to elicit the sample's responses to the study's dimensions. Therefore, to measure the reliability of the measurement instrument, Cronbach's alpha coefficient was used to assess the reliability and validity of the questionnaire. This necessitates that the resulting value be greater than (0.70) to demonstrate high acceptability and reliability. The table below shows the Cronbach's alpha coefficients for each dimension and variable, and for the study as a whole.

The results indicate that the questionnaire developed to test the responses of the studied sample is characterized by high reliability and validity. Based on the Cronbach's alpha coefficient for the entire study, which reached (0.978), it can be concluded that the developed questionnaire is characterized by high reliability and validity. The variable contributing to this is likely the excellent performance of the sample.

Table(2)
Cronbach's Alpha Coefficients for the Study's Dimensions and Variables

Variables	Cronbach's alpha for the variable	Dimensions	Paragraphs	Cronbach's Alpha for each dimension	Cronbach's Alpha for study
The quality of the digital experience	0.973	Well-being	8	0.975	0.978
		Social connection	8	0.979	
E-commerce entrepreneurial innovation	0.971	Time and efficiency	8	0.978	
		One-dimensional		9	

Statistical Description of Study Variables

The current study aims to identify the reality of the quality of digital experience and its impact on e-entrepreneurial innovation among the surveyed sample, based on employee responses. The study will rely on the frequency of responses, the percentages of items, the arithmetic mean, the standard deviation, the average relative weight, the ranking of importance, and the direction of responses to the opinions of the surveyed sample. The study employed a five-point Likert scale for the sample's questionnaire responses. Each variable will have four levels, ranging from 1 to 5. Two levels will be added if the value exceeds the hypothetical mean of 2.60 to 3.39: good if it ranges from 3.40 to 4.19, and very good if it exceeds 4.20 to 5. Similarly, two levels will be added if the value falls below the hypothetical mean of 2.60 to 3.39: weak if it ranges from 1.80 to 2.59, and very weak if it falls below 1 to 1.79.

Table(3)						
Arithmetic mean, standard deviation, coefficient of variation, and relative importance of study variables						
Variables	Dimensions	Mean	S.D	C.V	Relative importance	
The quality of the digital experience	Well-being	3.76	0.84	0.204	2	1
	Social connection	3.81	0.89	0.229	3	
	Time and efficiency	4.12	0.87	0.131	1	
The quality of the digital experience	One-dimensional	3.42	0.90	0.222	2	

Source: Prepared by the researchers based on SPSS program outputs .

Digital Experience Quality

The highest overall mean score was recorded for the Time and efficiency dimension, reaching (4.12), which is higher than the hypothetical mean of (3) and at a very good level, with a standard deviation of (0.87) and a coefficient of variation of (0.131). This dimension ranked first in terms of relative importance. The lowest overall mean score was recorded for the social connection dimension, with a mean of (3.81), a standard deviation of (0.89), and a coefficient of variation of (0.229). This dimension ranked third in terms of importance. This indicates that well-being is a prominent and significant dimension of digital experience quality compared to the other two dimensions. 2. Electronic Entrepreneurial Innovation.

The lowest overall mean score for this variable was (3.42), which is lower than the hypothetical mean of (3). However, it was considered very good, with a standard deviation of (0.90) and a coefficient of variation

of (0.222). This variable ranked last compared to the other two variables due to the environmental pressures faced by employees.

Hypothesis Testing

Main Hypothesis: There is a statistically significant relationship between the quality of the digital experience and electronic entrepreneurial innovation, as shown in Table (4). The coefficient of determination ($R^2 = 0.546$) indicates that the quality of the digital experience explains approximately (0.646) of the variance in the dependent variable (electronic entrepreneurial innovation). This is statistically significant because the F-value is (273.47), the p-value is < 0.05 , the β -value is (0.879), and the a-value is (0.492).

1. A statistically significant relationship exists between well-being and e-entrepreneurial innovation, as the coefficient of determination ($R^2 = 0.526$) indicates that well-being explains approximately 0.526 of the variance in the dependent variable (e-entrepreneurial innovation). This is statistically significant because the F-value is 166.73, $p < 0.05$, $\beta_1 = 0.667$, and $a = 1.197$.
2. A statistically significant relationship exists between social cohesion and e-entrepreneurial innovation, as the coefficient of determination ($R^2 = 0.490$) indicates that social cohesion explains approximately 0.490 of the variance in the dependent variable (e-entrepreneurial innovation). This is statistically significant because the F-value is 144.07, $p < 0.05$, $\beta_1 = 0.630$, and $a = 1.560$.
3. There is a significant relationship of influence between time and efficiency in electronic entrepreneurial innovation, as the value of the coefficient of determination ($R^2=0.390$) which refers to time and efficiency explains about (0.390) of the variance in the dependent variable (electronic entrepreneurial innovation), and it is significant because the value of ($F=96.03$) and ($p < 0.05$), and the value of ($\beta_1=0.614$) and ($a=1.592$).

Table (4) Analysis of the dimensions of digital experience quality in electronic entrepreneurial innovation								
Digital Experience Quality Enhancement	Dependent Variable	a	β	R2	Calculated value (F)	Tabular value (F)	Sig	Significance
Well-being	The quality of the digital experience	1.197	0.667	0.526	166.73	6.90	0.000	moral
Social connection		1.560	0.630	0.490	144.07		0.000	moral
Time and efficiency		1.592	0.614	0.390	96.03		0.000	moral
The quality of the digital experience		0.492	0.879	0.646	273.47		0.000	moral

Source: Prepared by the researchers based on the outputs of the SPSS program.

First: Conclusions

1. The quality of the digital experience is a pivotal factor in fostering e-entrepreneurial innovation. The results showed a statistically significant positive impact between the quality of the digital experience

and e-entrepreneurial innovation among employees at the Digital Transformation and Automation Center.

2. The dimensions of digital experience quality (well-being, social connection, time, and efficiency) are key determinants that contribute to improving the digital environment and enhancing employees' ability to be creative and innovative in entrepreneurial initiatives.
3. The time and efficiency dimension had the greatest impact among the three, reflecting the importance of facilitating digital procedures and simplifying access to information in supporting innovation within the ministry.
4. The digital well-being facet was positively correlated with e-entrepreneurial innovativeness, suggesting that employees' psychological and professional well-being in the digital context positively influences their productivity and willingness to accept new entrepreneurial concepts.
5. The social interaction aspect made a significant contribution in Terms of facilitating digital cooperation and knowledge exchange leading to greater team work and a joint working support for innovation; 6. The $R^2 = 0.646$ statistical result confirms that the quality of the digital experience explains a non-trivial variance in e-entrepreneurial innovativeness, reinforcing the need for institutions to invest in fostering such quality.
6. It was revealed that employees had a very good level of digital experience but additional institutional contributions are required to raise it to exceptional levels that would match those of the national digital transformation.
7. e-entrepreneurial innovativeness was identified as still in its slow growth stage in the ministry, which needs continuous administrative and technical support in order for it to take root more institutionally.
8. The findings suggest that an enhancement in the digital experience quality of employees itself results in superior quality services being offered to the beneficiaries, contributing to a benefit multiplier effect in terms of both the ministry and the community.
9. The findings suggest that the full potential of digital transformation will not be realized if the influence of the internal user (employee) experience is ignored because this is the main source of institutional innovation and creativity.

Second: Recommendations

1. The study advises the Ministry of Higher Education and Scientific Research's Digital Transformation and Automation Center to enhance the quality of the digital experience for its employees by revising and developing the extant electronic systems to conform to the actual work related needs and to contribute to the formation of a digital work environment that encourages e-entrepreneurial innovation.
2. The survey suggests that the center's management and technical personnel ensure that employees' digital well-being is the first priority by delivering a digitally-balanced work environment that alleviates digital-induced stress. This will have a positive impact on performance and creativity in e-entrepreneurial work.
3. It is recommended that the center management improve the internal digital communication with the employees by introducing electronic channels and platforms that facilitate collaboration, knowledge and information sharing. This will allow teamwork and innovation to flourish in the digital working environment..

4. The study suggests a Digital Transformation and Automation Department should be tasked with simplifying the e-procedures and minimizing the working hours to carry out e-tasks by innovating and upgrading the working mechanisms. This can empower employees to better allocate their time and focus on entrepreneurial and innovative activities.
5. It is suggested that the Ministry and the Center collaborate to promote the applicability of smart technologies, including but not limited to artificial intelligence solutions and data analysis, to foster the advancement of digital systems and increase user satisfaction and experience, which can support e-entrepreneurial innovation at institutional levels.
3. 6The study recommends that the top management of the MoHESR consider including e-entrepreneurial innovation as one of the areas of focus within the national digital transformation plan, and to seek to correlate digital transformation initiatives with the quality of digital experience endowed to Centre staff digitally.
6. It is the necessity to set up an organizational structure at the DTA Center level for assisting employees' e-entrepreneurial ideas freedomed within individuals and teams by means of the formation of technical and administrative support enablers into practical applications.
7. It is further recommended that the training section concerned in the Ministry continue to create advanced training modules for training employees in digital entrepreneurship and creative thinking in accordance with the digital transformation's needs, strengthening capacity to develop creative e solutions.
8. The study recommends that the Center's management stresses the need to regularly assess the quality of the employees' digital experience by implementing periodic performance measurement indicators that assist in detecting areas of strength and opportunities for the latter of using the findings to enhance the digital performance, and to stimulate the e-entrepreneurial innovation..

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