

Digital Literacy and its Effect on Employees' Innovation in Egyptian Official Tourism Organizations

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Abstract

This study aims to assess the effect of digital literacy on employees' innovation in the official tourism organizations in Egypt, and to examine if being digital literate facilitates and supports the innovation attempts, and to examine if digital literate employees are more innovative than other employees. Data were obtained from 304 employees working in the Ministry of Tourism and Antiquities and the Egyptian Tourism Promotion Board who are the official bodies in charge of Egypt's tourism business. According to the findings, digital literacy has a beneficial impact on employees' innovation. This study provides several contributions to the digital literacy by complementing previous studies and introducing new outcomes. The practical implications of this study also benefit tourism and official tourism organizations in Egypt in assessing their employees' innovation and digital literacy level.

Keywords: Digital literacy; employees; innovation; innovative organizations; official organizations; Egypt

Introduction

The modern world is witnessing an increase in the use of digital devices as well as a transformation from paperwork toward digital dependency (Salama, 2020). Technology is changing the workplace, and as a result, employees must develop their skill sets in order to continue their careers successfully. The skills that comprise the abilities of how to use technology have been grouped together under the umbrella term "digital literacy" (Paul et al., 2017). Digital literacy refers to the "awareness, attitude, and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, synthesize, and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in order to enable constructive social action and to reflect upon this process" (Martin & Grudziecki, 2006: 255).

Being digitally literate has become the need of the hour (Jonathan, 2020), and fostering the digitalization of contemporary work and organizations has become a norm, where the importance of innovation and employees' innovative behavior has increased to adopt these new methods of work (Pilav-Velic et al., 2021). Employees' innovation is identified as "a departure from traditional thinking and knowledge, which may result in the discovery of new, advanced,

acceptable ideas, theories, or methods of work that are appropriate to the conditions and capabilities of the organization in a way that helps adapt and interact with all variables, improve productivity, and develop employees' performance level" (Reda, 2003:30). Employees' innovation becomes one of the important elements in the conduct of any business and activities, in the completion of any operation, and in solving many work problems (Amabile & Michael, 2016), it is also identified as a critical factor in organizational success (Tohidi & Jabbari, 2012), and organizations' employees are in need of innovation to overcome work challenges and obstacles.

Since digital literacy acts as a predictor of one's performance, and digitally literate employees are expected to adjust better in the ever-changing business environment and therefore potentially exhibit higher levels of innovation (Pilav-Velic et al., 2021), this study attempts to explore the effect of digital literacy on employees' innovation in the Egyptian official tourism organizations that are in charge of the tourism industry in Egypt (Ministry of Tourism and Antiquities and the Egyptian Tourism Promotion Board). In light of this; this study aims to: 1) assess the impact of digital literacy on employees' innovation, 2) identify the impact of ICT literacy, media literacy and information literacy on employee's innovation, and 3) explore if digitally literate employees are more innovative than other employees in the Egyptian official tourism organizations.

Conceptual framework and hypothesis development

Digital literacy

Digital literacy is defined according to Sivrikaya (2020:118) as "an ability to correctly and efficiently access, analyze, apply, and handle data and data sources covering knowledge, media, and information and communication technology (ICT) literacy." There are three dimensions of digital literacy suggested by Wardhani et al. (2019). Information and communication technology (ICT) literacy refers to people's capacity to manage information, solve issues, and think critically about information (Katz, 2005). Media literacy is defined as the ability to use and evaluate information obtained from mass media (Kellner & Share, 2007). Information literacy refers to an individual's ability to operate efficiently in an information society, which includes critical thinking, an awareness of personal and professional ethics, the ability to identify an information need, information evaluation, interaction with information professionals, and efficient use of information in problem-solving and decision-making processes (Bruce, 1999). Pool (1997) proposed that to be digitally literate, a person should be able to find and evaluate information on the internet, and that such a person's skills should include the use of email and search engines, as well as the ability to evaluate a web site and other information resources.

A digitally literate person possesses the cognitive and technical abilities necessary to find, understand, evaluate, create, and communicate digital information in a variety of formats. A digitally literate person has the capacity to search for and obtain information using various technologies, analyze search results, and assess the quality of the information retrieved. Furthermore, a digitally literate individual can use relevant tools to communicate and cooperate with work colleagues as well as actively participate in a digital environment (Shrestha, 2018).

Employees' innovation

Employee innovation in the workplace is of great importance to the effectiveness and survival of an organization (Bani-Melhem et al., 2018; Gu et al., 2017; Scott & Bruce, 1994; Tichaawa, 2017). It represents a process in which individuals conceive novel ideas or create new problem-solving approaches in their work roles and then seek to actualize those ideas (Amabile, 1988).

Individuals' innovation is identified as the degree to which an individual is relatively earlier in adopting new ideas than other members of a social system (Pilav-Velic et al., 2021).

There are four dimensions of employee innovation suggested by De Jong (2007). Opportunity exploration: it refers to the stage of identifying the performance gaps, which is the difference between existing and potential performance. The realization of something new begins with a person spotting opportunity (Basadur, 2004). The beginning of the innovation process is frequently dictated by chance: the discovery of an opportunity, the emergence of an issue, or the solution to a problem. Idea generation: it refers to behaviors that aim at producing concepts for the goal of improvement. Ideas may be generated in relation to new goods, services, or processes; the entry of new markets; improvements in present work processes; or more broadly, solutions to identified issues (Amabile, 1988; Van de Ven, 1986). Championship or idea communication: it refers to the stages in which champions put effort into developing innovative ideas. They are individuals who drive creative ideas beyond organizational barriers (Shane, 1994). Innovative people who assume responsibility for the introduction of innovations are those who have a strong personal commitment to certain ideas and can sell them to others. Idea implementation/application: it refers to doing what is required to turn ideas into reality. This typically involves significant effort from employees; it also encompasses behaviors such as designing new goods or work procedures and testing and adjusting them (Kanter, 1988; Nicolades, 2014; Van de Ven, 1986).

There are some characteristics of innovative organizations, such as seeing bureaucracy as a major enemy of achievement, supporting organizational values that lead to innovation and change, and encouraging all employees to innovate (Afsar & Badir, 2017; Cabello et al., 2005; Molose & Ezeuduji, 2015; Tefera & Dlamini, 2020). Innovative organizations have a number of innovative individuals with a passion to generate innovative ideas to solve the organizations' problems, those innovative individuals are usually well educated and digital literates (Arthur, 1994; Tefera & Dlamini, 2021). Furthermore, innovative organizations usually have modern and advanced technological devices and capabilities that help in the completion of work easily and in a way that saves time. This encourages employees to think innovatively and come up with new ideas and digital solutions to problems (Pilav-Velic et al., 2021).

Digital literacy and its effect on employees' innovation

Digital knowledge has recently gained the attention of organizations because of its tangible results at various administrative levels. Digital knowledge contributes to increasing productivity, raising the efficiency of employees, solving problems that hinder workflow and helping employees complete their tasks in a modern way, saving time and effort and keeping pace with the technological development around them (Matikiti-Manyeverere & Rambe, 2022; Molose & Ezeuduji, 2015; Santoso et al., 2019; Tichaawa & Kimbu, 2019).

According to Paunov (2017), there is an effect of digital transformation and digital literacy on employees' innovation in various sectors of organisations. He also discovered that the technological development occurring in the world has led business organizations to qualify their employees to keep pace with this development and train them to use modern digital devices and applications. It was also found that firms with significant financial resources might devote a portion of their budget to bring new digital technologies to their organizations and educate their staff to use them at work. Then, firms start to recruit digitally literate individuals as a consequence of their recognition of the value of digital skills in increasing employees' innovative behavior and accomplishing their organization's goals with high efficiency.

Innovation is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Pilav-Velic et al., 2021). Therefore, individuals' attitudes towards the use of digital technologies in innovation processes

are related to their personal innovativeness (Gaafar et al., 2021; Gough, 1979; Kirton & De Ciantis, 1986). More precisely, attitude towards the use of digital technologies is the next step in understanding digital literacy and reflects an individual trait that explains "the degree to which an individual is willing to try out any new digital technologies" (Agarwal & Prasad, 1998; Gu et al., 2013). Hence, attitude towards the use of digital technologies plays a significant role in defining one's behavioral intentions (Jackson et al., 2013; Yi et al., 2006).

Being digitally literate encourages participation in the learning process and enhances one's learning outcomes (Lee et al., 2015). Digitally literate employees are expected to adjust better in the ever-changing business environment and therefore potentially exhibit higher levels of innovation (Pilav-Velic et al., 2021; Kang et al., 2010; Kang et al., 2011; Lee et al., 2015). Torkzadeh and Doll (1999) discovered that there is a relationship between technology and task innovation. Technology facilitates innovation in the workplace, and employees use technology to enrich and widen their occupations. Many forward-thinking businesses are utilizing this technology and experimenting with new methods to interact with clients.

H1: Digital literacy affects the employees' innovation in Egyptian official tourism organizations.

Hempell (2005), and Hempell and Zwich (2008) found that ICT literacy fosters product and process innovations by facilitating employee participation and communication. They also confirmed the existence of relationship between digital technology and innovation processes. ICT is strongly associated with innovation and productivity (Hall et al., 2012).

H2: ICT literacy affects the employees' innovation in Egyptian official tourism organizations.

Information and knowledge fuel innovation. In some cases, they assist in invoking new ideas; in others, they help innovators translate an idea into a concrete solution, may it be an object or a process. Therefore, many forms of innovation require media and information literacies that involve searching capabilities, scanning masses of data, and understanding the data that was found. The latter is also known as turning information into knowledge. Thus, the Internet as such promotes innovation, and media and information literacies become a condition for innovation (Ramos et al., 2016).

H3: Media literacy affects the employees' innovation in Egyptian official tourism organizations.

Abbas et al. (2019) stated that there is a centrifugal relationship between innovation and digital transformation. They also found that the more the company adapts to modern technologies, the more it increases its opportunities for creativity and innovation. Ahmad et al. (2020) also found that information literacy (which is part of digital literacy) has a positive effect on the development of organizational innovation in small and medium-sized enterprises (SMEs), and that it enhances innovation in organizations and helps enhance an individual's capability to perform effectively in the working world. They also confirmed that having a workplace that is more in tune with the digital culture makes it easier for employees to innovate and create valuable products and services for their customers.

H4: Information literacy affects the employees' innovation in Egyptian official tourism organizations

Methodology

Data was obtained from the employees of the Ministry of Tourism and Antiquities and the Egyptian Tourism Promotion Board as Egyptian official tourism organizations during January and February 2022. A total of 350 questionnaires were delivered to a convenient sample of employees in both organizations. A total of 328 questionnaires were returned from the 350 distributed questionnaires. Sixteen questionnaires were exempted from the analysis, because they did not complete most of the sections in the questionnaires, and eight questionnaires were classified as outliers. All these respondents were excluded from the study. Finally, 304 valid questionnaires with 86.9 percent response rate were valid for statistical analysis. The researcher distributed the questionnaires in person, and the researcher assured the confidentiality of the provided data and information. All respondents were volunteers and were not compensated in any way.

For digital literacy (DL), the Wardhani et al. (2019) twenty-item scale was used. For measuring employees' innovation, the nineteenth-item scale that created by De Jong (2007), De Jong and Hartog (2005), and Lukas and Stephan (2017) were adapted.

Table 1. Demographic profile of the sample

Demographic and work information	Freq.	%	
Gender	Male	175	57.6
	Female	129	42.4
Age	From 21 to 30 years	59	19.4
	From 31 to 40 years	153	50.3
	Over 40 years	92	30.3
Educational Level	High school	49	16.1
	University education	213	70.1
	Postgraduate studies	42	13.8
Work experience	From 1 to 5 years	54	17.8
	From 6 to 10 years	98	32.2
	From 11 to 15 years	102	33.6
	More than 15 years	50	16.4
Position	Managerial level	23	7.6
	Employee level	281	92.4

Table 1 indicates that out of 304 respondents, 129 (42.4%) were female and 175 (57.6%) were male. Regarding the age of respondents, the age segments from 21 to 30 years had the greatest number of respondents with 59 (19.4%) respondents, followed by the age segments over 40 years with 92 (30.3%) respondents, and finally, the age segments from 31 to 40 years with 153 (50.3%) respondents. Additionally, the table reveals that the majority of respondents (213 respondents) were university educated by 70.1%, followed by those who have a high school education by 49 (16.1%) respondents, and finally those who have a postgraduate degree by 42 (13.8%) respondents. Finally, regarding the years of work experience, the majority of respondents have from 11 to 15 years of job experience by 33.6% (102 respondents), followed by those who have from 6 to 10 years of job experience by 32.2% (98 respondents), followed by those who have from 1 to 5 years of experience by 17.8% (54 respondents), and finally, those who have over 15 years by 16.4% (50 respondents). As for the position of respondents, there are 281 respondents who are working at the employee level, 92.4%, and there are 23 respondents who are working at the managerial level.

Reliability test

A high Cronbach's Alpha value reflects the reliability of the scale and indicates cohesiveness among scale items. According to Nunnally (1978) and Gaafar and Al-Romeedy (2022), a high Cronbach's alpha is an indirect indicator of convergent validity. Table 2 indicates values of



Cronbach's Alpha for all constructs. On the basis of the data presented in the table, there is sufficient evidence to suggest that the reliability of the constructs was acceptable given that the Cronbach's Alpha value is >0.60 (Nunnally, 1978; Mohamed et al., 2022). Therefore, it is concluded from this finding that the scale has high levels of internal consistency and is considered to be very reliable, where Cronbach's Alpha values are >0.826 . Thus, all the constructs and variables used in this study are based on well-established instruments with high reliability scores, and the internal consistency of each construct is substantiated to be very good.

Table 2. Reliability levels of instrument – Cronbach's Alpha

Variables	Cronbach's Alpha	No. of items
Attitudes towards applying digital literacy	0.947	20
<i>Information and communication technology ICT literacy (ICT)</i>	0.872	10
<i>Media literacy (MDL)</i>	0.880	4
<i>Information literacy (INL)</i>	0.893	6
The employees' innovation	0.919	19
<i>Idea exploration (IDE)</i>	0.826	5
<i>Idea generation (IDG)</i>	0.850	4
<i>Idea communication/ championing (IDC)</i>	0.864	4
<i>Idea implementation (IDI)</i>	0.854	6

Validity test

The first test is the composite reliability of each measure. This was assessed using Nunnally's (1978) guidelines for assessing reliability coefficients. The second test is average variance extracted (AVE) for each construct, which indicates the amount of variance in the item explained by the construct relative to the amount attributed to measurement error (Al-Romeedy & Ozbek, 2022; Farrell, 2010; Salem et al., 2022). The Fornell and Larcker criterion, which confirmed that the AVE should be $> .50$, was used to assess the AVE for all constructs. Some of the measures used for convergent validity include the reliability of each item, AVE, and composite reliability (Ab Hamid et al., 2017; Al-Romeedy et al., 2020, 2019). Tables 3 and 4 reveal that all the indicators were statistically significant for the proposed constructs, thereby providing strong evidence for convergent validity (MacKenzie et al., 2011; Al-Romeedy & Mohamed, 2022).

Table 3. Construct validity of digital literacy scale

Constructs	Factor loading	Composite reliability	AVE
ICT1	0.579	0.85	0.66
ICT2	0.616		
ICT3	0.549		
ICT4	0.626		
ICT5	0.682		
ICT6	0.603		
ICT7	0.710		
ICT8	0.649		
ICT9	0.786		
ICT10	0.707		
MDL1	0.595	0.73	0.59
MDL2	0.766		
MDL3	0.805		
MDL4	0.726		
INL1	0.731	0.87	0.64
INL2	0.566		
INL3	0.723		
INL4	0.680		
INL5	0.632		
INL6	0.738		

Table 4. Construct validity of employee innovation scale

Constructs	Factor loading	Composite reliability	AVE
IDE1	0.690	0.83	0.72
IDE2	0.633		
IDE3	0.674		
IDE4	0.658		
IDE5	0.596		
IDG1	0.575	0.75	0.68
IDG2	0.665		
IDG3	0.733		
IDG4	0.704		
IDC1	0.628	0.79	0.58
IDC2	0.675		
IDC3	0.671		
IDC4	0.728		
IDI1	0.690	0.80	0.69
IDI2	0.678		
IDI3	0.747		
IDI4	0.654		
IDI5	0.693		
IDI6	0.733		

The composite reliability value for ICT was (0.85), MDL was (0.73), and INL was (0.87). Additionally, these tables also indicate the composite reliability for IDE was (0.83), IDG was



(0.75), IDC was (0.79), and IDI was (0.80). These values of composite reliability exceeded the desired threshold of 0.70 in accordance with Fornell and Larcker's proposal. Also, the following tables clarify that AVE values for ICT were (0.66), MDL was (0.59), and INL was (0.64). As well, these tables also reveal the AVE for IDE was (0.72), IDG was (0.68), IDC was (0.58), and IDI was (0.69), which exceeded the suggested value (0.50). So, the model seems to possess adequate convergent validity. In detail, table (3) indicates that composite reliability exceeded the desired threshold of 0.70. This table also shows that the AVE for ICT, MDL, and INL scale exceeded the suggested value (0.50). Additionally, this table indicates that the factor loading for all items on the digital literacy scale is greater than 0.5. Table 4 illustrates that composite reliability exceeded the desired threshold of 0.70. Furthermore, this table shows that the AVE for IDE, IDG, IDC, and IDI scale exceeded the suggested value (0.50). Additionally, this table demonstrates that the factor loading for all items on the employee innovation scale is greater than 0.5.

Discriminant validity

Hair *et al.* (2014) and Al-Romeedy (2019) have clarified that the square roots of AVE should surpass the highest squared correlation with any other construct. On the basis of Table 5, it can be noted that the square root of AVE for a given construct is greater than the absolute value of the standardization correlation of the given construct with any other construct in the analysis ($AVE > correlations^2$).

Table 5 Discriminate validity for the study variables*

	ICT	MDL	INL	IDE	IDG	IDC	IDI
ICT	<i>0.81</i>						
MDL	0.55	<i>0.77</i>					
INL	0.63	0.48	<i>0.80</i>				
IDE	0.57	0.44	0.56	<i>0.85</i>			
IDG	0.70	0.62	0.29	0.63	<i>0.82</i>		
IDC	0.59	0.35	0.45	0.55	0.44	<i>0.76</i>	
IDI	0.53	0.63	0.41	0.72	0.67	0.47	<i>0.83</i>

*Bold and italic values indicate the square roots of AVE

Descriptive statistics

Table 6 indicates the results of descriptive analysis for the digital literacy test. The results showed that employees of the Egyptian official tourism organization have a high level of digital literacy, with its three dimensions ($M = 3.82$, $SD = 0.774$). The results in this table show that "ICT literacy" was ranked first ($M = 3.90$, $SD = 0.677$). "MDL" had the lowest ranking ($M = 3.75$, $SD = 0.973$). Table (6) also indicates the results of the descriptive analysis for the employees' innovation. The findings revealed that employees of Egypt's official tourism organization have a high level of individual innovation across all four dimensions ($M = 3.91$, $SD = 0.680$). The results in this table show that the dimension "IDE" was ranked first ($M = 3.95$, $SD = 0.713$). While the dimension "IDC" was the lowest in the ranking ($M = 3.89$, $SD = 0.804$).

Table 6. Mean and SD of constructs

Variables	Mean	SD
ICT	3.90	0.677
MDL	3.75	0.973
INL	3.81	0.829
Attitudes towards applying digital literacy	3.82	0.774
IDE	3.95	0.713
IDG	3.93	0.759
IDC	3.89	0.804
IDI	3.89	0.722
The employees' innovation	3.91	0.680

Test of hypothesis

To test the hypotheses in the conceptual research model using SEM, the results are given in Table 7. Hypotheses 1, 2, 3, and 4 postulate that digital literacy and its three dimensions (ICT literacy, MDL, and INL) affect the employees' innovation in Egyptian official tourism organizations. The results show that digital literacy has a significant and positive effect on employees' innovation ($\beta = 0.945$ and $P < 0.01$), as well as ICT literacy ($\beta = 0.854$ and $P < 0.01$), MDL ($\beta = 0.884$ and $P < 0.01$), and INL ($\beta = 0.947$ and $P < 0.01$) affect significantly and positively employees' innovation. Therefore, H1, H2, H3, and H4 are supported. The paths from digital literacy and its three dimensions (ICT literacy, MDL, and INL) to employees' innovation and its four dimensions (idea IDE, IDG, IDC, and IDI) are depicted in Figure 1.

Table 7. Hypothesis test results

Hypothesized path	Estimate	C.R	Result
H1: Digital literacy → Employees' innovation	0.945	16.293	Supported
H2: ICT literacy → Employees' innovation	0.854	16.113	Supported
H3: MDL → Employees' innovation	0.884	22.667	Supported
H4: INL → employees' innovation	0.947	17.868	Supported

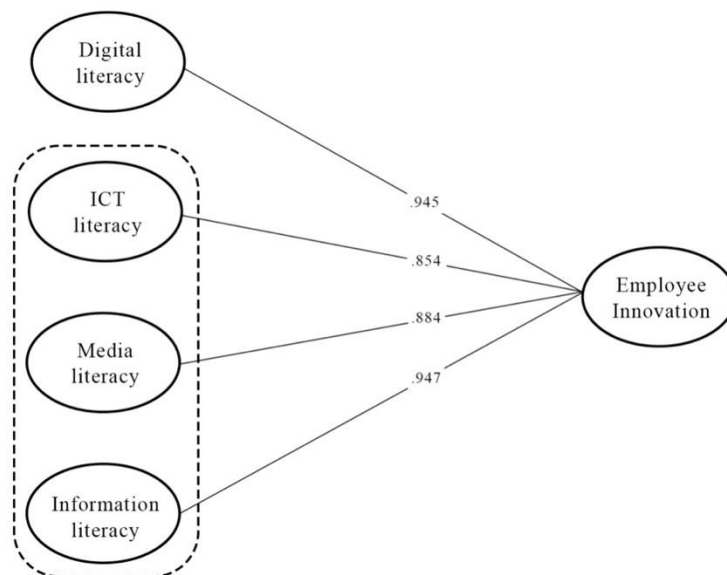


Figure 1. The study model

Discussion

The aim of this study is to explore the effect of digital literacy on employees' innovation in the Egyptian official tourism organizations. To achieve this goal, an integrating model indicating the effect of digital literacy on employees' innovation was developed and tested based on employees of the Ministry of Tourism and Antiquities and the Egyptian Tourism Promotion Board. The results support the proposed model and prove that there is a significant and positive effect of digital literacy on employees' innovation in the Egyptian official tourism organizations. This result is in line with Pilav-Velic et al. (2021) and Abbas et al. (2019), who concluded that there is a positive effect of digital literacy on employees' innovation and performance. The result also highlighted that there is a role for digital literacy in supporting employees' innovation, and highlighted that being digitally literate and having the current digital skills enhance the ability to explore and generate new innovative ideas. This result is consistent with Santoso et al. (2019), who mentioned that digital literacy can influence and

support innovative work behavior to achieve better performance in the workplace. The results also highlight that the digitally literate employees have more ability to explore, generate, communicate and implement innovative ideas, which means that they have a higher level of innovation in comparison with other employees in the Egyptian official tourism organizations. Finally, the results show that employees of the official tourism organizations in Egypt have a good level of digital literacy which reflects on their good innovation level.

Theoretical and practical implications

The study's result hold important implications, theoretically, digital literacy was found to be relevant in the official tourism organizations in Egypt. This is due to the efforts of the Egyptian official tourism organizations management to enhance their employees' digital skills seeking better performance and higher innovation level. Practically, the results hold important implications for the Egyptian official tourism organizations' employees. Digital literacy was discovered to be an effective tool helps employees get their work done easier and faster, giving them more time to develop and thereby fostering innovation in these firms. Hence, the Egyptian official tourism organizations management should continue to adopt new technologies at work, and should pay attention to building a strong training system for all employees in different demonstrative levels to train them on all new technological tools and devices that are required to accomplish their tasks, and should cope with technological advancements occurring in the world. That would help reach better performance level and let them have proper time to think innovatively and search for new ideas to solve work problems. There is also a need to develop more effective innovation system followed by innovation assessment tests to measure their organizations' efforts in fostering their employees' innovative behavior. Finally, the study recommends the necessity of preparing a guide for digital skills required for work and also the necessity of attracting digitally literate candidates who have the skills that match their guide, in addition to keeping training the current employees on the latest technologies. Also, the official tourism organizations in Egypt should consider the adoption to new technologies as a part of their organizational culture which everyone should emphasize to foster innovation.

Limitations and future studies

While the study offers valuable information, there are a number of limitations to this study. First, the study sample was drawn from employees of Ministry of Tourism and Antiquities and the Egyptian Tourism Promotion Board. As a result, it is recommended that future research expand the area of the research and the population by engaging the private sector organizations. Second, this research explored the effect of digital literacy on employees' innovation. Future research is suggested to investigate the effect of digital literacy on the organizational outcomes such as organizational reputation, sustainable performance, and other outcomes that may affect the employees' continuity. Since this study is applied to the official tourism organizations in Egypt, the future research could be applied to other countries and a comparative study could be conducted.

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