

The Impact of Applications of Internet of Things on Practice of Knowledge Management in Organizations: the Mediating Role of Employees' Engagement

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Summary

The study aimed to identify the impact of Applications of Internet of things on practice of knowledge management in organizations: the mediating role of employees' Engagement. A quantitative questionnaire survey is conducted. The study population consisted of all senior and middle administrations in small and medium enterprises in Jordan. The study sample consisted of (350) senior and middle administrations. The study sample was selected by random stratified method. The results revealed that There is an impact of Applications of Internet of things on the practice of knowledge management at ($\alpha \leq 0.05$) in the small and medium enterprises in Jordan. Furthermore, there is an impact of Applications of Internet of things on the employees' Engagement. The current study provided some important insights into an issue that requires further research. Understanding the applications of the Internet of Things and their impact on improving knowledge management is of paramount importance in raising the quality of products and improving the company's image, as shown in this research.

Keywords:

Applications of Internet Of Things, Practice Of Knowledge Management, Employees' Engagement.

1. Introduction

Technological development is an opportunity to facilitate our lives and make it more exquisite. One of these notable developments is the Internet of Things, which in turn contributed to link devices and making them interact, send and receive data of all kind (Oforji, Ibegbu & Okey, 2018). Moreover, David et al. (2021) have come together for an opinion that the Internet of Things will change the way of dealing around the world by expanding within different sectors, especially businesses, as it will change the way consumers and companies' transaction with in terms of quality and speed. From their side, Andreas, Victor and Alexander (2021) expects that the impact of the Internet of Things will be great in the future, especially in the economic, environmental and business dimensions, therefore attention must be paid to how it should be managed.

On the other hand, knowledge management also has gained priority and attention in the field of business

management, to help it reformulate and organize important information as it is considered the basic database system (Gilaninia, Askari & Dastour, 2013). Furthermore, John (2015) believed that knowledge management a logical strategy to take correct information and use it in the best interest of the institution and employees to improve its job performance.

Particularly, Gabriele, demetries, alkis & louca thinks that the Internet of Things is a supporting technology for knowledge management in terms of organizing, listing, and transferring data. Besides, Purna (2021) adds that organizations can be completely based on the Internet of things because it works with high quality to increase productivity with flexibility, accuracy and raise the efficiency of the data that is used in the knowledge management system. In support of the above, Artur and Malgorzata(2018) said that because of the ability of the Internet of Things to respond and interact with data, it provides the capabilities of support in transforming information into knowledge management.

In addition, the concept of employee engagement has emerged as an organizational principle, which is considered as the employee's primary participation in the company's decisions. (Budrienė& Diskienė, 2020). Likewise, Melanie (2014) shows that this participation develops a sense of responsibility, dedication and focus among employees towards their organization. Consequently, Walden and Mohamad (2017) assume that what is mentioned above will affect the extent of the employee's commitment and this will be in the interest of the organization and its success.

This study is organized as follows after the introduction and explanation of the research background. Section 2 describes the literature review. We explore definitions of variables and build relationships between variables. Five hypotheses will be tested in this study. In Section 3, we explain the methodology, research design, research strategy for answering research questions, and the data collection process. Hypothesis testing was performed

using structural equation modeling (SEM). The next section consists of data analysis, explanation of findings, and discussion of the real context. Finally, in Section 5, we conclude and make recommendations for future research.

2. Literature review

2.1 Internet of things

Possessing knowledge is one of the most important resources that organizations today, including information institutions, seek to realize the importance of adopting the concept of knowledge management through the role played by the human element in these institutions and related to activating this knowledge, which contributes to improving their activities and services (MACHADO & ELIAS, 2020). In addition to the various Internet applications, information and communication technologies play a vital role in knowledge management (Abualoush, et al., 2018). Therefore, information institutions are concerned with keeping pace with these changes and responding to the changing and evolving conditions witnessed by the ICT sector and the Internet sector (Raudeliūnienė, et al., 2018). Organizations in the current era are witnessing a tremendous development due to the rapid technological and scientific development, which requires all those in charge of managing organizations to use modern means and strategies to keep pace with these developments (Nauman et al., 2020). The concept of the Internet of Things is one of the most important emerging concepts and used by modern organizations as one of the strategies that help employees exchange information and experiences that enhance their abilities and skills in completing the tasks assigned to them in the best possible way (Dai et al., 2019). The Internet of Things revolves around the use of the Internet and modern means of communication to facilitate the completion of work, save information and data, and access them in an easy way (Ali et al., 2018).

The Internet of Things can be defined as the network of devices capable of collecting and sharing data with other devices on the same network, as this allows things to be sensed and controlled remotely through the existing network infrastructure (Nauman et al., 2020).

The Internet of Things can also be defined as any smart item connected to the Internet; from lighting to thermostats, TVs, etc. In general, the Internet of Things can be considered as a far-reaching expansion of Internet technology through an ever-growing network of products, devices, and systems integrated with sensors, software and other electronic

systems, and joining an interconnected system like this allows the creation of data Share and make it more useful (Srinivasan et al., 2019).

In the world of technology revolution we live in, the Internet of Things helps people to live and work in a smarter way, as well as to have complete control over their lives and possessions (Srinivasan et al., 2019).. In addition to the fact that the Internet of Things contributes greatly to linking smart devices to home automation, it is very important and necessary for businesses, companies and factories (Hossein Motlagh et al., 2020).

The Internet of Things helps reduce working time for companies and factories, improves the performance of machinery, supply chain and logistics, and automates operations, and reduces the cost of human labor (Sisinni et al., 2018). These features make the Internet of Things desirable, as it contributes to improving the services that are provided to customers, and thus improving the performance of companies and the strength of their brand (Stoyanova et al., 2020).

2.2 knowledge management

The concept of knowledge management is one of the newly developed concepts that has been very popular with researchers and decision-makers in the field of management (Abubakar, et al., 2019). In the last half of the last century, the subject of knowledge management became one of the most controversial topics in the production of ideas for the field of business management in particular, and led to an important intellectual development in the field of business (Yu et al., 2019). Many companies have also translated the results of research on knowledge management into practical reality, which has had a positive impact on these companies, as it led to an increase in their revenues and production operations, enhanced their capabilities, and supported their competitiveness (Ceptureanu et al., 2018).

In addition, managers who use knowledge management in their work and manage their business using knowledge, this matter will be positively reflected in their decisions and strategic choices, especially since the decision-making process is considered one of the most important processes that maintain the company's continuity in the labor market, a sensitive and influential process (MACHADO & ELIAS, 2020).

To achieve better corporate performance, entrepreneurs need to use knowledge management to improve the quality of their decision making, and knowledge management is also dynamic and

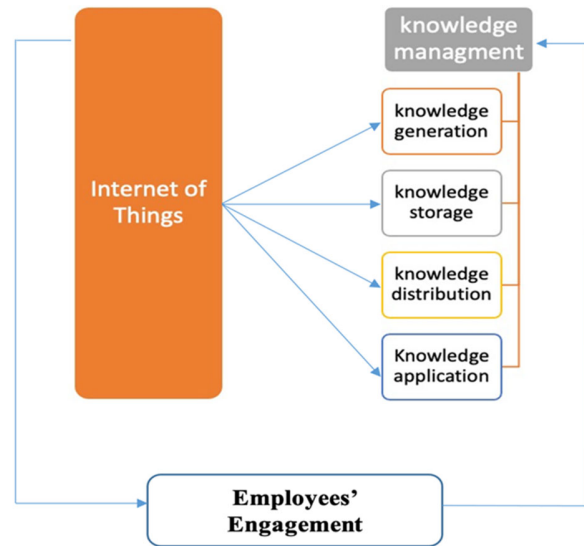
multidimensional, covering most aspects of corporate knowledge activities, including knowledge creation, knowledge accumulation and knowledge sharing, and it is expected that the focus will remain on innovation (Ode & Ayavoo, 2020). The future knowledge of knowledge management and company performance, even in an international context, is expected to continue to focus on knowledge creation, accumulation and sharing and its impact on decision quality and company performance (Levitt et al., 2012).

Knowledge management can be defined as the systematic management of an organization's knowledge assets for creating value and satisfying tactical and strategic requirements; It consists of initiatives, processes, strategies and systems that support and enhance knowledge storage, assessment, sharing, refinement and creation. It is the process of identifying, collecting and mobilizing collective knowledge within a company or organization to help improve its competitiveness (Noor et al., 2020). Knowledge management can also be defined as the effort practiced by the company, which aims to constantly search for knowledge capital in organizations to benefit from it by elevating the company, in addition to working to provide an appropriate environment that stimulates continuous learning and knowledge sharing permanently (Fernandez & Sabherwal, 2014).

Companies have become more interested in knowledge management and scheduling within research and studies processes, as a result of developments and the speed of massive changes on the one hand (Levitt et al., 2012), and the increasing intensity of competition, and the multiplicity of requirements and customer needs on the other hand. Knowledge management has become the focus of these companies' attention through their reliance on information and knowledge and their use in designing and developing services, systems and technologies in order to renew their methods and methods in providing services efficiently and quickly to customers compared to their competitors from other companies (MACHADO & ELIAS, 2020). Where the Internet of things is closely related to knowledge management, as the Internet of things helps in preserving and storing knowledge in companies, which reflects positively on their competitiveness (Velásquez & Lara, 2021). On the other hand, the Internet of things helps to increase the employees' Engagement in the decision-making process, which increases their motivation towards work and encourages them to be creative in order to achieve

the strategic goals and objectives of the company (Bratianu et al., 2021).

3. Conceptual Framework



4. RESEARCH METHODOLOGY

4.1 The Research Method

In order to analyse The impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement the quantitative approach was used as it fits the purpose of the study. Quantitative approach is concerned with the gathering and examination of information in numeric shape from the chosen sample.

Table (1): Demographic characteristics for the study sample

		Frequency	Percentage
Gender	Male	236	67.30%
	Female	114	32.70%
	Total	350	100%
Educational Level	Bachelor's Degree	240	68.70%
	Master's Degree	66	18.80%
	Doctorate Degree	44	12.50%
	Total	350	100.00%
Years of Experience	Less than 5 year	39	11.10%
	5-10 years	108	30.900%
	11-15 years	148	42.30%

	More than 15 years	55	15.70%
	Total	350	100.00%
Job Position	Administration	273	78%
	Employee	77	22%
	Total	350	100.0%

From the table (1) it shows that the percent of males from the Sample was (67.3%) meanwhile it was for females (32.7%).

Regarding the Educational level demographics of the study sample. Participants were classified into 3 groups according to their academic degree. The first and the largest group is the bachelor's degree holders which makes up (68.7 %)(n=240) of the study sample the second group is Master's degree holders that makes up (18.8 %)(n=66) and finally doctorate degree holders group which makes (12.5 %) (n=44)of the study sample

Also years of experience demographics for the study sample (n=350) participants were divided into four category according to their experience the first category represent participants with the least experience who have less than five years .this category makes up (11.10 %) (n=39) while the second category represents whose experience ranged between 5 –10 years; this category makes up (30.9 %) (n=108) of the study sample. The third category whose experience ranged between11-15; this category makes up (42.3 %) (n=148) of the study sample. The last category who have more than 15 years of makes up (15.7 %) (n=55) of the study sample.

4. The Research Instrument

The instrument contains (45) questions that illustrate the impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement.

The questionnaire contains variables and questions represent study variables like the following:
please make use of the specified style "caption" from the drop-down menu of style categories The questionnaire contains variables and questions represent study variables like the following:

Independent Variable (Internet of Things): it is formulated into benchmarks or objectives to reach, into (4) fields with a total of (16) questions:

Technological factors: contains (4) questions.

Security: contains (4) questions.

Political: contains (4) questions.

Environmental factors: contains (4) questions.

Dependent Variable (knowledge management): it is formulated into benchmarks or objectives to reach, into (5) fields with a total of (20) questions:

Knowledge generating: contains (4) questions.

Knowledge storage: contains (4) questions.

Knowledge sharing: contains (4) questions.

Knowledge application: contains (4) questions.

The effect of knowledge: contains (4) questions.

Mediating Variable (Employee Engagement): it is formulated into benchmarks or objectives to reach, into (3) fields with a total of (9) questions:

Social Equality: contains (3) questions.

Sense Of Belonging: contains (3) questions.

Performance Development: contains (3) questions.

5. Data Analysis and Interpretation

To examine the hypotheses to examine the impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement. Statistical Package for Social Sciences (SPSS) in processing the following statistical techniques and tests in data analysis:

1. **Reliability Test**
2. **Linear Regression**
3. **Hierarchal Regressio**

5.1 Validity and reliability of the instruments

The test gave to experts to judge the extent to which the test is valid and reliable. For this reason, the test would be designed to meet such requirements as the validity of the test. The experts will be chosen according to their broad experiences in the field.

To get to the degree of reliability of the test, the researcher used the reliability test for the instrument's measurement. Which lead us to the study goal of the impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement. The reliability of a measure highlights the stability of

consistency with which the instrument is measuring the concept and helps to assess the 'goodness' of a measure to reach the research goal which is to examine the impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement.

Table (2): Cronbach's alpha For the study fields

Field number	Field	Value of (α)
Independent Variable: Internet of Things		
F1-1	Technological factors	0.808
F1-2	Security	0.765
F1-3	Political	0.806
F1-4	Environmental factors	0.690
Dependent Variable: Knowledge management		
F2-1	Knowledge generating	0.775
F2-2	Knowledge storage	0.733
F2-3	Knowledge sharing	0.773
F2-4	Knowledge application	0.661
F2-5	The effect of knowledge	0.824
Mediating Variable: Employee Engagement		
F3-1	Social Equality	0.825
F3-2	Sense Of Belonging	0.781
F3-3	Performance Development	0.823

As shown from the table above that the total Cronbach's alpha For the study fields was above than (0.60) which will lead to the stability of the results for this study.

5.2 Hypothesis Testing

To analyze the data and to explore the impact of Applications of Internet of things on practice of knowledge management in organizations: An empirical investigation: the mediating role of employees' Engagement, Simple regression is used to test the main research hypothesis and all its sub-hypotheses as shown in Table ().

First Hypothesis (H01). There is no impact Applications of Internet of things on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan. We used Simple Regression test to check the direct effect of Applications of Internet of things on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan shown in the tables below:

Table (3): Simple Regression test to check the direct effect of Applications of Internet of things on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan

DV	R	R ²	F	DF	Coefficients			
					Predictor	B	T	Sig
practice of knowledge management	.444	.197	85.353	1	Internet of things	0.575	9.239	0.00
				34				
				8				
				34				
				9				

As it shown from the table above that the effect of Internet of things on practice of knowledge management in the Small and medium enterprises in Jordan , the result shows that there is significant effect for Internet of things on practice of knowledge management in the Small and medium enterprises in Jordan, because the significant value was (0.000) less than (0.05), the value of R is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable was (0.444) and The coefficient of determination R² (0.197) therefore, about 19.7% of the variation in practice of knowledge management in the Small and medium enterprises in Jordan explained by Internet of things. Restriction Parameter (F) was (85.353) of the practice of knowledge management in the Small and medium enterprises in Jordan will be caused from Internet of things, and thus we will reject the hypotheses “There is no impact Applications of Internet of things on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan.

Second Hypothesis (H02). There is no impact Applications of Internet of things on the employees' Engagement at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan.

We used Simple Regression test to check the direct effect of Applications of Internet of things on the employees' Engagement at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan shown in the tables below:

Table (4): Simple Regression test to check the direct effect of Applications of Internet of things on the employees’ Engagement at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan

DV	R	R ²	F	DF	Coefficients			
					Predictor	B	T	Sig
employees’ Engagement	.453	.205	89.874	1	Internet of things	0.730	9.480	0.000
				34				
				8				
				34				

As it shown from the table above that the effect of Internet of things on employees’ Engagement in the Small and medium enterprises in Jordan , the result shows that there is significant effect for Internet of things on employees’ Engagement in the Small and medium enterprises in Jordan, because the significant value was (0.000) less than (0.05), the value of R is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable was (0.453) and The coefficient of determination R² (0.205) therefore, about 20.5% of the variation in employees’ Engagement in the Small and medium enterprises in Jordan explained by Internet of things. Restriction Parameter (F) was (89.874) of the employees’ Engagement in the Small and medium enterprises in Jordan will be caused from Internet of things, and thus we will reject the hypotheses “There is no impact Applications of Internet of things on the employees’ Engagement at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan.

Third Hypothesis (H₀₃). There is no impact Employees’ Engagement on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan. We used Simple Regression test to check the direct effect of Employees’ Engagement on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan shown in the tables below:

Table (5): Simple Regression test to check the direct effect of Employees’ Engagement on the practice of

knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan

DV	R	R ²	F	DF	Coefficients			
					Predictor	B	T	Sig
practice of knowledge management	.845	.714	869.169	1	Employees’ Engagement	0.957	29.482	0.000
				34				
				8				
				34				

As it shown from the table above that the effect of Employees’ Engagement on practice of knowledge management in the Small and medium enterprises in Jordan , the result shows that there is significant effect for Employees’ Engagement on practice of knowledge management in the Small and medium enterprises in Jordan, because the significant value was (0.000) less than (0.05), the value of R is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable was (0.845) and The coefficient of determination R² (0.714) therefore, about 71.4% of the variation in practice of knowledge management in the Small and medium enterprises in Jordan explained by Employees’ Engagement. Restriction Parameter (F) was (869.169) of the practice of knowledge management in the Small and medium enterprises in Jordan will be caused from Employees’ Engagement, and thus we will reject the hypotheses “There is no impact Employees’ Engagement on the practice of knowledge management at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan.

Forth Hypothesis (H₀₄). There is no impact of Applications Internet of things on the practice of knowledge management in the presence of employees’ Engagement as a mediating variable at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan. We used hierarchal regression test to check the effect of Applications Internet of things on the practice of knowledge management in the Small and medium enterprises in Jordan in the light of employees’ Engagement as a mediating variable as shown in the tables below:

Table (6): Model Summary

Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.470	.216		6.800	.000
	Internet of things	.575	.062	.444	9.239	.000
2	(Constant)	.693	.132		5.258	.000
	Internet of things	.099	.041	.077	2.402	.017
	Employees' Engagement	.651	.026	.810	25.374	.000

a. Dependent Variable: Practice of knowledge management.

c. Dependent Variable: Practice of knowledge management

Table (7): Coefficients

As shown in the tables above that there is a significant the direct effect for Internet of things on Practice of knowledge management because the significant value was (0.0.00) less than (0.05), the value of R was (0.444) and R² (0.197) and the restriction Parameter (F) was (85.353) this is all shown in Model^a.

While in the light of Employees' Engagement as a mediating variable, shown in model b, significant value was (0.0.00), the value of R was (0.848) and R² (0.719) and the restriction Parameter (F) was (443.425), and this leads to an improvement in Practice of knowledge management in the umbrella of Employees' Engagement and thus we will reject the hypotheses "There is no impact of Applications Internet of things on the practice of knowledge management in the presence of employees' Engagement as a mediating variable at ($\alpha \leq 0.05$) in the Small and medium enterprises in Jordan.

Table (6): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F	F Change	df1	df2	Sig. F Change
Direct effect ^a	.444	.197	.195	.68845	.197	85.353	85.353	1	34	.000
Mediating effect ^b	.848	.719	.717	.40800	.522	443.425	358.07	1	34	.000

a. Predictors: (Constant) Internet of things.

b. Predictors: (Constant), Internet of things, Employees' Engagement

6. Discussion and conclusion

This study aimed to analyze the impact of the Internet of Things on knowledge management through the effect of employee engagement as a mediating variable. In concluding it, we can say, by and large, that it achieved its goal by confirming this effect. The specific context of this research reveals some points that require further attention. This is not only due to the fact that this study was limited to small and medium companies, but it included companies from all sectors.

The hypotheses reveal the need for systematic research into both IoT applications and knowledge management in SMEs and the possibility of considering these two processes together to improve corporate results and profits in the long run.

To this end, the study findings indicate definite evidence of the role that new technologies can play to create value and benefit from it in a sustainable way. The results showed that the use of the Internet of Things improves the user experience, improves operations, reduces the use of paper or plastic, and increases the efficiency of internal management processes. Thus, technology greatly influences value creation within the company's

management processes and increases the mastery of knowledge management processes, thus confirming H1. The results show that it is vital for companies to be capable to manage knowledge. As stated, we have demonstrated that effective knowledge management enables the sharing of knowledge required for the innovation process and improves the performance of the same innovation by developing new insights and innovation capabilities (Tomé, 2020). Knowledge management capabilities allow the promotion of innovative performance (Demir, Budur, Omer & Heshmati, 2021), which leads to the creation of new products/services or customized customer experiences (Ali & Anwar, 2021). Thus, knowledge management capabilities play a major role in the success of SMEs in obtaining competitive advantages. For this reason, and given the results presented by the rest of the companies mentioned here, H2a is accepted.

Employee engagement also supports revenue growth in organizations. As the involvement of older employees increases, it might also indicate increased revenue for the companies. The results of this study as well as previous studies confirmed that older employees are more engaged than younger employees, which can contribute to the organization's revenue growth and can support HR strategy in engagement older employees and benefiting from them through many of human capital management strategy. The increased of the participation leads to higher revenue development, which makes the contribution of older employees in the business dynamic to the bottom-line profits of the organization (Aon Hewitt, 2015). As these results are consistent in the remaining firms herein studied, and H3 are accepted.

6.1 Conclusion and Implications of the study

The Internet of Things has affected our lives in a very big way, especially at the level of communication and shortening of time, as companies have adopted the Internet of things in carrying out their tasks and at the same time communicating with the customers remotely outside the company without the need to organize reception protocols and coordinate appointments (Tarabasz, 2016). In addition to that, The ability of the Internet of Things to process and analyze data made it easier for managers and employees to complete their work. Moreover, raising the level of achievement through the rapid interaction of the Internet with all employees of the company and managers in addition to customers as well (.

Knowledge management is one of the most important sources of operations within companies in Jordan because of its practical applications that lead to raising the level and efficiency of the company. Moreover, providing employees and managers with experience and skills that contribute to supporting innovation. In addition, knowledge management positively affects the results of the organizational performance of the company and contribute to raising its level of production (Nowacki & Bachnik, 2016).

Employee's engagement is one of the matters that must be adopted within companies, because it is very important to keep constantly communication with employees, as this will make them feel more responsible for their work, and positively affects their productivity (Budrienė & Diskienė, 2020). Employee's engagement also affects the organizational performance of the company because the relationship between the employee and the company is a symbiotic relationship in which each of the two parties depends on the other (Zeidan & Itani, 2020).

From an academic point of view, the current study provided some important insights into an issue that requires further research, as noted by Alsharari (2021). Understanding the applications of the Internet of Things and their impact on improving knowledge management is of paramount importance in raising the quality of products and improving the company's image, as shown in this research. Moreover, the application of the Internet of Things contributes to expanding the horizons of administrators, and the company is working to enhance its role in the market and lead change towards sustainable development in the industry it manages.

6.2 Limitations and future lines of research

Our investigation has some limitations that could provide fruitful avenues for future research. Our investigation took place in a period of crisis. In a turbulent period, so the results are very volatile and the sample consists of Jordanian SMEs only. In future research, it is recommended that the research include SMEs that have a presence in international markets, and establish comparative terms with other non-international SMEs in terms of performance during the pandemic crisis. In the future, we should examine a different classification of industrial companies, such as transport companies, the food and beverage industry, and leisure and tour operators.

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