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Internet of things application in digital marketing to improve the efficacy of a company

Abstract. The expansion of digital marketing at the international level has been so fast and the benefits associated with it are clearly increasing day by day that developing countries are strongly encouraged to use it and each of them has specific programs to implement it. After telecommunication networks of computer, Internet and mobile phone, Internet of things (IOT) is considered as the third development in the global information industry, which has attracted the attention of many organizations and customers. This technology, relying on the intelligentization of objects and the use of internet platforms, is able to create wide and diverse services in e-commerce. This is while the demands of users for more diverse and better-quality services through the Internet are increasing. In this paper, application of IOT in digital marketing has been introduced and the effects of using it to increase efficiency and create innovation in the company have been discussed. The statistical sample in this research included all the managers of small and medium companies in Baghdad, which was determined as the statistical sample size of 275 based on the Krejcie Morgan table. Data analysis was done by the method of structural rates, which was used in this article by the method of least squares. The results showed that the use of IOT and electronic commerce had a positive and significant impact on the performance of companies (financial, internal processes, customers, development and innovation). The results of this research show that IOT technology has provided the basis for improving performance and providing better services in digital marketing by creating an integrated and strong database of suppliers, manufacturers, distributors, customers and products. Also, in the last part of the article, the implementation framework of this technology in e-commerce for the use of the country's managers in various industries is presented.

Keywords: Digital Marketing; IOT; Company Efficacy; Costumer; Innovation

JEL Classifications: E24; E41; E64; I18; J28; J31

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1. Introduction

No society and company can expect success and continued presence in competitive markets without paying attention to technological developments and developments. One of the prominent phenomena in modern business is the correct use of information and communication technology, which, although its history is not long, is rapidly developing and expanding. It seems that today's world market consists of two parts, the traditional market and the electronic market, and many companies in both fields shape their activities according to the latest phenomena and techniques (Lo & Campos, 2018; Gapsalamov et al., 2023). Of course, the degree of tendency towards electronic business is not the same in different societies, but the growth of

the use of this phenomenon has been very impressive. Therefore, companies and groups will be more successful who are looking for investments in different dimensions, identifying successful models and implementing factors related to business and e-commerce in their organizations (Ravindran et al., 2023, Gong, 2016). In the current e-business model, information circulation in most business exchanges is done one-way and the scope of collected information is very limited, which will lead to three problems in organizations' information systems: (1) information contradiction, (2) complexity of applications and (3) additional information. In this model, final consumers do not have access to integrated and diverse information about their demand when purchasing, so their decision-making process suffers.

IOT technology is one of the most up-to-date technologies in the field of e-commerce (Tightiz & Yoo, 2022). The concept of IOT refers to the interaction between all the objects of the physical world, using internet platforms. This technology uses equipment such as RFID, infrared sensors, global positioning systems, and other equipment sensors in networks connected to the Internet to make things smarter (Lee & Lee, 2015). The IOT technology deals with the intelligent identification, location tracking, management and monitoring of smart objects based on the agreed protocol for exchanging information and communication (Kannan & Li, 2017). In today's world, where information systems are growing rapidly, the use of Internet-based technologies expands with multiple acceleration. Therefore, the application of IOT technology as a comprehensive information system in e-commerce will be of particular interest to organizations and researchers. In this research, by introducing the IOT technology and examining its applications, its role in the development of digital marketing of companies has been investigated.

2. Methods

The concept of IOT

IOT refers to a wide network of objects in which all objects are connected to each other through various intelligence equipment and Internet connection (Oklander et al., 2018). The IOT technology makes it possible for the objects around us to exchange information with each other virtually and by creating synergy, they can cause a significant growth in the quality of human life. IOT technology is considered the third wave of the global information industry after the connection of remote networks of the Internet, computers and mobile phones. As this technology spreads, traditional thinking about infrastructure will be shattered. In traditional thinking, physical infrastructures such as airports, roads, buildings, etc. were considered separate from information technology infrastructures such as data centers, computers, personal broadband, etc. but with Internet thinking, all these infrastructures are used to provide services and various customers are considered integrated.

Digital Marketing

Digital marketing is a general concept that describes a range of technologies that are used to increase the effectiveness of trade flows (Tightiz & Yoo, 2023). The use of e-commerce is carried out in the following steps; a) creating and streamlining innovations in electronic money exchange, b) supply chain management, c) internet marketing, d) online transaction processing, e) electronic data exchange, f) inventory management system, g) automated collection systems Data collection (Khargh et al., 2023). Therefore, in order to maintain their competitiveness in the market, companies need to implement new technologies in this field, which regular decisions with the strategy of new technologies in e-commerce include the following: technology intelligence - technology selection - new technology introduction timing - technology acquisition methods - Horizontal technology strategy - project selection, evaluation, resource allocation and control - organization of technology management. Due to the fact that internet technology is based on the IOT, this technology is able to support all sectors of digital marketing. With the creation of proper infrastructures and the intelligentization of all goods in the near future, we should expect countless applications of this technology in e-commerce. The implementation of IOT technology in all major areas of e-commerce will be covered.

Since the main purpose of this research is to investigate the impact of IOT on digital marketing in the performance of small and medium-sized companies; In terms of purpose, it is practical and in terms of data collection, it is survey and field research. In terms of data analysis, it is correlational descriptive research. In this method, to obtain data, a questionnaire has been distributed among the statistical community, which included 270 small and medium companies with at least

10 employees in Baghdad. According to the statistical population, the sampling method was random, and the data analysis was done using structural rates and the method of least squares. The conceptual model of the research shown in Figure 1 includes the independent variable: IOT and digital marketing; Dependent variables: financial performance, customers, intra-organizational relations and development; and the moderator variable: innovation have been considered.

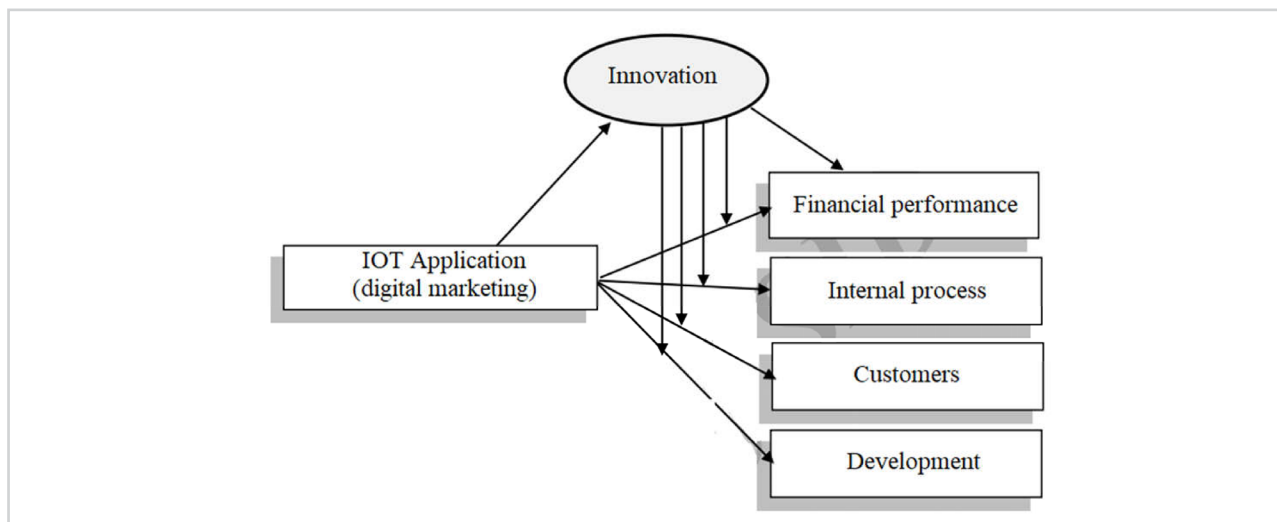


Figure 1:
Conceptual model of IOT application in digital marketing
Source: Compiled by the author

Data management: The IOT provides the possibility for customers to have complete product information from raw materials to production through the Internet and use them to make purchasing decisions. This information can include ingredient information, production process information, information related to the manufacturing company, distributor information, product warranty, or other information required by the customer. Through the application of IOT technology, comprehensive information such as product information, production information, manufacturer company information, and other information in the supply chain is easily accessible to customers through the Internet.

Follow up and tracking of orders: One of the important aspects of digital marketing is the ability to make small transactions and track orders in real time. The IOT has covered this field of e-commerce by coding each order and embedding the required information in it. Therefore, customers are able to track their orders in real time and know the fate of their order. Also, companies can benefit from this information to identify the bottlenecks and weak points of their system so that the overall quality of services can be effectively improved (Badica & Mitucă, 2021).

Transportation and handling of goods: One of the most important parts of e-commerce is the transportation and movement of goods. By making the goods intelligent and equipping the vehicle system with a geographic location, IOT technology will be able to determine the amount of goods being transported as well as the origin and destination of the order. This technology makes the delays in the delivery of goods to a minimum or even if there is a delay, the customer is aware of the non-delivery of his goods.

Analysis and forecasting of competitive markets: With the implementation of IOT technology, companies are able to monitor all their products online and gather complete information about the processes that the goods go through. With a strong and integrated database, they not only monitor the information flow in business processes and share information between the transaction parties, are also able to analyze this business data accurately and in real time.

Production automation: One of the most important applications of IOT technology in production is the activation of the automation system, in which identification and tracking of materials and products becomes possible. As a result, this capability will significantly reduce the cost of manpower mistakes. This feature allows managers to identify bottlenecks and weak points in digital market.

Logistics and supply chain management: To optimize digital marketing, a strong supply chain management needs to be established in the company. One of the most distinct advantages

of IOT technology is supply chain management. In addition to optimizing time in the supply chain management processes, this technology makes resources to be used effectively during the processes, while the transparency of the supply chain will be greatly improved and ultimately lead to the dynamism and integrity of the chain.

3. Results

In this section, for data analysis, the impact of electronic business and IOT on the performance of various organizational variables has been analyzed and the impact on each of the variables has been investigated. First, the descriptive statistics of the data are presented in Table 1.

The statistical sample in this research included all the managers of small and medium companies in Baghdad, Iraq, which was determined as the statistical sample size of 275 based on the Krejcie Morgan table. Data regarding the effects of various factors (IOT, finance, internal process, costumers, development and innovation of the company) on company efficacy was collected by questionnaire from the mangers of the companies in 2022.

Table 1:
Statistical report of studied variables regarding IOT application at small and medium companies in Baghdad

	Minimum	Maximum	Mean	SD
IOT Application	2.00	5	3.54	0.83
Financial Performance	1.68	5	3.44	0.74
Internal Process	2.00	5	3.40	0.84
Costumers	1.98	5	3.82	0.69
Development	1.98	5	3.88	0.73
Innovation	2.00	5	3.67	0.77

Source: Author's own findings and calculations

According to the results in Table 1, it can be seen that the development variable is equal to 3.8 on average. Also, the standard deviation of this component is 0.72, which shows the high dispersion of this component in the Likert spectrum. It can also be seen that the lowest average in the internal processes' component is at the numerical value of 3.41, which has a deviation from the standard of 0.83. In fact, it can be inferred that more standard deviation indicates more changes in the data and calculated values for the studied component data. To check the correlation between variables, Spearman's correlation matrix method was used, the results of which are shown in Table 2.

Table 2:
Spearman's correlation matrix

		IOT	FP	IP	CO	DE	INN
IOT	Correlation Coef.	1	0.63	0.61	0.41	0.46	0.42
	Sig.	-	0.00	0.00	0.00	0.00	0.00
FP	Correlation Coef.	0.63	1	0.51	0.52	0.47	0.50
	Sig.	0.00	-	0.00	0.00	0.00	0.00
IP	Correlation Coef.	0.61	0.51	1	0.41	0.38	0.39
	Sig.	0.00	0.00	-	0.00	0.00	0.00
CO	Correlation Coef.	0.41	0.52	0.41	1	0.62	0.75
	Sig.	0.00	0.00	0.00	-	0.00	0.00
DE	Correlation Coef.	0.41	0.47	0.38	0.62	1	0.69
	Sig.	0.00	0.00	0.00	0.00	-	0.00
INN	Correlation Coef.	0.42	0.50	0.39	0.75	0.69	1
	Sig.	0.00	0.00	0.00	0.00	0.00	-

Source: Author's own findings and calculations

According to the results of Table 2, it can be said that the relationships between the components that have a significance level of less than 1% at the 99% level indicate the significance of the relationship between the components. Also, if the correlation coefficients are close to 1, they indicate a high correlation, while a correlation coefficient close to zero indicates a weak correlation of the components. The results showed that the use of electronic business IOT with the components of financial performance, internal process, customers, development and innovation with a significance level of less than 0.01 and a fine correlation level of 0.69, 0.61, 0.41, 0.46, 0.42 respectively in a significant relationship are. Finally, the external correlation condition of the studied components was confirmed in this part.

To test the conceptual model of the research, the PLS method, which is a variance-based path modeling method, has been used. This method provides the possibility of examining the relationships between variables and research components at the same time and generally provides high accuracy information for a limited and small statistical sample. The path analysis of variables in this research is presented in Figure 2 based on beta coefficients. Beta coefficients change in the range of 0-1 and naturally higher coefficients indicate greater correlation.

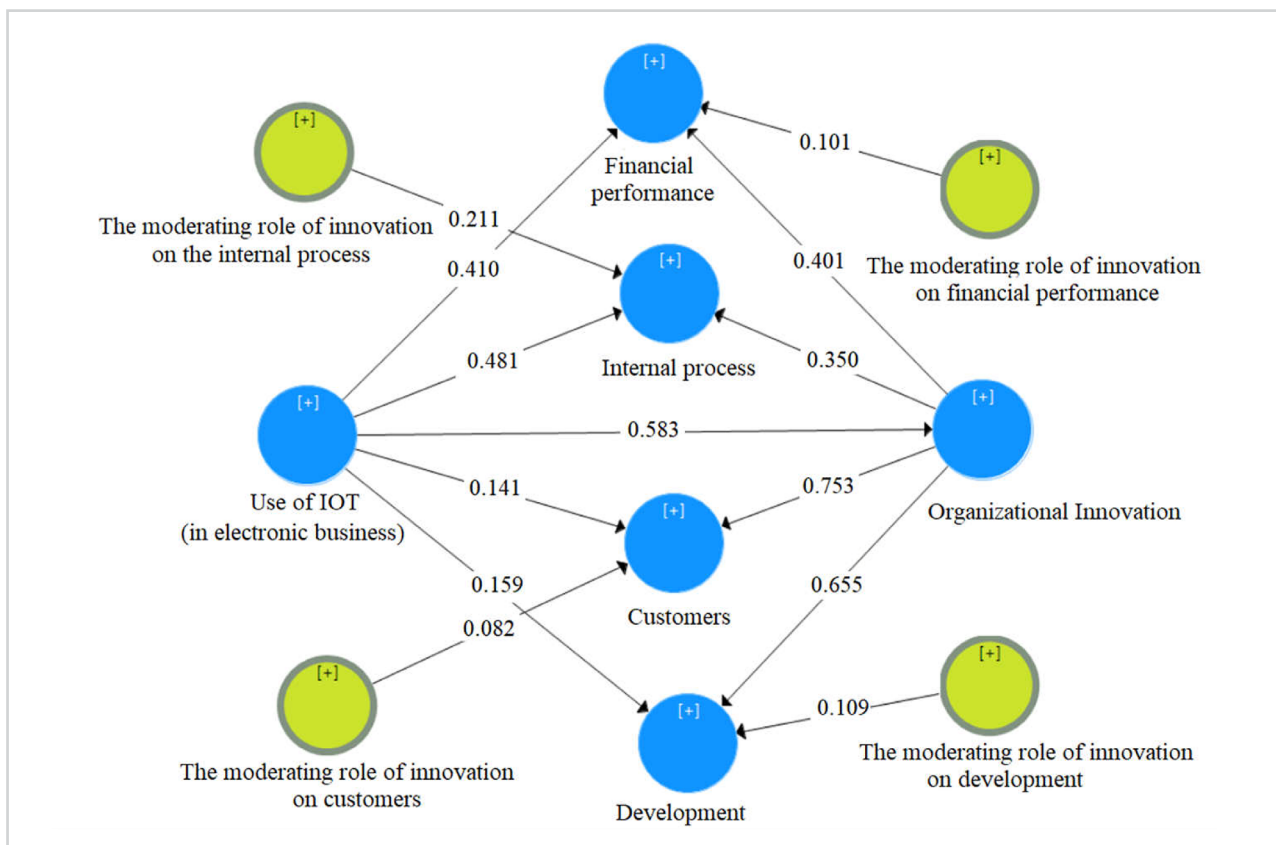


Figure 2:
**Correlation of variables model based on beta coefficients
for IOT application by small and medium companies in Baghdad**
Source: Author's own findings and calculations

The results showed that the variable effects of innovation in the relationship between development, customers, internal process and financial performance have beta coefficients of 0.10, 0.082, 0.21 and 0.11 respectively. In other words, it can be said that the innovation component has a moderating role on the company's components. It can also be seen that the IOT has significantly affected the company's performance in financial, organizational, customer and development fields. According to the obtained results, the use of IOT in digital marketing, due to the increase in speed, accuracy and improvement of communication between the internal and external departments of the company, reduces operational costs and can also reduce marketing and advertising costs. Also, the use of IOT with a beta coefficient equal to 0.45 has an impact on the company's internal processes. In addition, the use of IOT with a beta coefficient equal to 0.129 has an impact on the company's customers. Using this technology, companies can enter global markets, which changes the customers' view of the geographical boundaries of available services and changes the nature of business.

4. Conclusion

IOT is a part of the integrated Internet of the future, in fact, this means the existence and evolution of the Internet and developed networks in which objects and equipment act as active participants in business, information and social processes. With the introduction of these technologies in the field of trade, significant benefits and facilities have been provided in the production, product, customer and company sectors. With services and information provided through these

technologies, customers get product information, production information, and supply chain information. Therefore, information related to the distribution route plan, distribution schedule and local distribution, sales records, order changes, production status and sales status will be available to customers through the Internet. Also, the information related to logistics, including information on the transportation route, delivery time, customer information, and the location of the goods are also specified. Manufacturers will also get product information, production process information, logistics information, inventory information. Among other information in this field, it includes knowledge of marketing strategies, knowledge of new products, control of product production, and knowledge of customers' purchasing patterns. Achieving such facilities through IOT allows companies to spend less money on inventory maintenance, less time spent on operations, service levels are improved, and customers are protected from fraud. Therefore, IOT, in addition to increasing customer trust in e-commerce, will largely change the methods and styles of e-commerce and improve service and efficiency in digital marketing. Of course, it should be noted that in the business environment, increasing the security of data and user information are among the things that should be paid more attention to.

References

1. Badica, A. L., & Mitucă, M. O. (2021). IOT-Enhanced Digital Marketing Conceptual Framework. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 509-531. <https://doi.org/10.18662/brain/12.4/262>
2. Gapsalamov, A., Vasilev, V., & Bochkareva, T. (2023). Evolution of Centralized and Decentralized Industrial Governance in the USSR and Modern Russia: Historical And Economic Analysis. *Cadernos de Educação Tecnologia e Sociedade*, 16(2), 399-412. <https://www.brajets.com/index.php/brajets/article/view/1319>
3. Gong, W. (2016). The Internet of Things (IoT): What is the potential of the internet of things (IoT) as a marketing tool? [Bachelor's thesis, University of Twente]. <https://essay.utwente.nl/70018>
4. Kannan, P. K., & Li, H. A. (2017). Digital marketing: A framework, review and research agenda. *International journal of research in marketing*, 34(1), 22-45. <https://doi.org/10.1016/j.ijresmar.2016.11.006>
5. Khargh, S. V., Baghbani, S. M. Gh., Rojuee, M., & Titkanloo, S. J. (2023). Identifying The Stakeholders Of The Construction Industry Based On The Governing Values: Content Analysis Based On Semi-Structured Interviews. *Cadernos de Educação Tecnologia e Sociedade*, 16(2), 413-430. <https://www.brajets.com/index.php/brajets/article/view/1314>
6. Lee, I., & Lee, K. (2015). The Internet of Things (IoT): Applications, investments, and challenges for enterprises. *Business horizons*, 58(4), 431-440. <https://doi.org/10.1016/j.bushor.2015.03.008>
7. Lo, F.-Y., & Campos, N. (2018). Blending Internet-of-Things (IoT) solutions into relationship marketing strategies. *Technological Forecasting and Social Change*, 137, 10-18. <https://doi.org/10.1016/j.techfore.2018.09.029>
8. Oklander, M., Oklander, T., Yashkina, O., Pedko, I., & Chaikovska, M. (2018). Analysis of technological innovations in digital marketing. *Eastern-European Journal of Enterprise Technologies*, 95(5(3)), 80-91. <https://doi.org/10.15587/1729-4061.2018.143956>
9. Ravindran, D., Jaheer Mukthar, K. P., Zarzosa-Marquez, E., Pérez Falcón, J., Jamanca-Anaya, R., & Silva-Gonzales, L. (2023). Impact of Digital Marketing and IoT Tools on MSME's Sales Performance and Business Sustainability. In Al Mubarak, M., & Hamdan, A. (Eds.), *Technological Sustainability and Business Competitive Advantage* (pp. 65-77). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-35525-7_5
10. Tightiz, L., & Yoo, J. (2022). A Review on a Data-Driven Microgrid Management System Integrating an Active Distribution Network: Challenges, Issues, and New Trends. *Energies*, 22(15), 8739. <https://doi.org/10.3390/en15228739>
11. Tightiz, L., & Yoo, J. (2023). A novel deep reinforcement learning based business model arrangement for Korean net-zero residential micro-grid considering whole stakeholders' interests. *ISA transactions*, 137, 471-491. <https://doi.org/10.1016/j.isatra.2022.12.008>

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