



## Internet of things and efficient use to management information systems: A field study at the University of Baghdad

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### Keywords:

Internet of things; efficiency of management information systems; technical competence; human competence; financial efficiency; University of Bagdad.

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**Abstract:** The aim the research at the resulting: To identify the perception of the Internet of Things and its components, and to clarify the concepts and components of the efficiency of management information systems and their measurement, as well as to measure the influence of the Internet of equipment on the efficiency of management information systems at the University of Baghdad. The descriptive analytical approach has been used in the search, and a questionnaire, consisting of 184 forms, was planned and dispersed to a sample of administrative workers at the University of Baghdad at the higher and medium administrative levels. The documents been composed and analyzed by SPSS program. The most significant of which is the next: There is a direct impact of the Internet of things on raising the efficiency of management information systems at the University of Baghdad.

Internet of things (IoT) components are moderately available at the University of Baghdad. Also, the human element efficiency is moderate at the University of Baghdad. Therefore, they must have more training programs and their capabilities and skills must be improved for technical transformation and fitting up with the use of modern technologies.

Moreover, the high efficiency of the senior and middle administrative staff at the university, the efficiency of electronic and technical human resources, equipment and technologies which are available, and the efficiency of workers in the financial department and their use of techniques in financial transactions. The Search reached a set of results and recommendations, the most important of which are: There is a direct influence of the Internet of Things on raising the efficiency of management information systems at the University of Baghdad. Improving the reality of the Internet of Things at the University of Baghdad. This can be done according to the following methods: By focusing on infrastructure and providing the necessary material capabilities.

## انترنت الأشياء واستخدام الكفاءة لنظم المعلومات الإدارية: دراسة ميدانية في جامعة بغداد

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### المستخلص

هدف البحث إلى ما يلي: التعرف على مفهوم إنترنت الأشياء ومكوناتها، وتوضيح مفاهيم ومكونات كفاءة نظم المعلومات الإدارية وقياسها، وكذلك قياس تأثير إنترنت الأشياء حول كفاءة نظم المعلومات الإدارية في جامعة بغداد. استخدم في البحث المنهج الوصفي التحليلي، وتم استخدام استبيان مكون من 184 استمارة وتوزيعها على عينة من العاملين الإداريين في جامعة بغداد في المستويات الإدارية العليا والمتوسطة. تم جمع البيانات وتحليلها بواسطة برنامج SPSS توصل البحث إلى مجموعة من النتائج أهمها ما يلي: هناك تأثير مباشر لإنترنت الأشياء في رفع كفاءة نظم المعلومات الإدارية في جامعة بغداد.

مكونات إنترنت الأشياء (IoT) متوفرة بشكل معتدل في جامعة بغداد. كما ان كفاءة العنصر البشري معتدلة في جامعة بغداد. لذلك، يجب أن يكون لديهم المزيد من البرامج التدريبية ويجب تحسين قدراتهم ومهاراتهم من أجل التحول التقني والتكيف مع استخدام التقنيات الحديثة. علاوة على ذلك، الكفاءة العالية لكادر الإدارة العليا والمتوسطة بالجامعة، وكفاءة الموارد البشرية الإلكترونية والفنية، والمعدات والتقنيات المتوفرة، وكفاءة العاملين في الإدارة المالية واستخدامهم للتقنيات في المعاملات المالية

توصل البحث إلى مجموعة من النتائج والتوصيات من أهمها: هناك تأثير مباشر لإنترنت الأشياء في رفع كفاءة نظم المعلومات الإدارية في جامعة بغداد. تحسين واقع انترنت الأشياء في جامعة بغداد، من خلال التركيز على البنية التحتية وتوفير الإمكانيات المادية اللازمة.

**الكلمات الدالة:** إنترنت الأشياء، كفاءة نظم المعلومات الإدارية، الكفاءة الفنية، الكفاءة البشرية، الكفاءة المالية، جامعة بغداد.

### **Introduction:**

Internet of Things is a developed concept of the Internet, when all things in our lives have the ability to connect to the Internet or to each other in order to send and receive data for performing certain functions on the network. This is dependent on things interaction via the Internet to make the best services available for people. It means things have the ability to communicate with each other or with the Internet to perform specific functions or transfer data between each other through some special sensors associated with it (Ahmed, 2016: 13) Things connect to the Internet by using a recent technology to link to networks, such as Zig Bee, Bluetooth, Wi-Fi, 4G or others, and the radical transformation of those technologies in building wireless devices networks (WSNs) that provisions the work of the Internet of Things. Reports issued by Cisco, Ericsson and other principal establishments in the field of information technology imply that it is expected that there will be 38 billion devices connected to the Internet by

2024, meaning that its growth rate exceeds the potential growth of the world population by more than seven times (Qin, 2018: 17)

The improvement of the modern information systems has donated to supporting the managerial decision-making method inside managerial organizations of various kinds and objects, as the decision-making method is mere a transaction founded primarily on the quality of data to be used in facing problems or commerce with development and making appropriate changes in the organization.

Numerous learning and university organizations in the established world have initiated to recognize the significance of presenting and participating technology, particularly the Internet of Equipment in their educational techniques and organization. Moreover, there is a necessity to participate the Internet of Things into the everyday events of colleges, universities and schools, and in tracking key resources and linking them primarily with management information systems. Here comes the importance of the current study in linking the conception of the Internet of Things with the management info systems in universities.

The study included three basic topics, which are as follows: The first topic contains the methodological framework for the research, in addition to the second topic, which includes the theoretical framework and concepts for the study variables. In the third topic, the applied practical study was conducted, hypotheses were tested, and conclusions and recommendations were reached.

### **The first topic: Previous studies and research methodology:**

#### **1. Previous studies:**

**1-1. A study by (Aishoush, 2018)** entitled: The impact of the efficiency of information systems on decision-making, a standard field study of Saidal Center during 2015-2016

The study has aimed at the following: To clarify the reality of the management information system and to know its impact on decision-making process in the organization by analyzing the correlation and impact between the study variables, through studying the administrative officials' views in the Soydal center. The descriptive approach has been relied on in the study, and a questionnaire has been distributed to a sample of workers in the study area. The study reached the following results: There is a correlation between the information system and management in order to increase the managers' ability to make decisions, extrapolate the future, and

face the challenges of the organization's internal and external environment. The way of the departments' intercommunication is good, but not excellent, which sometimes affects some of the decisions made. The possibility of collecting and circulating data is estimated high and tainted by some deficiencies such as the human expertise.

**1-2. A study by (Hamdi and others, 2020)** entitled: The impact of the Internet of things on the integration of business strategy of the value chain, a field study of a group of foreign joint stock companies in Algeria

The study has aimed: to discover how foreign joint stock companies in Algeria keep up with the digital economy phenomenon, the IoT applications used to support their operations, and the critical problems they face during adaptation. An electronic questionnaire has been sent to manufacturing and logistics companies to verify the IoT applications used and the problems they face. The descriptive approach has been relied on in the study, and a questionnaire was distributed, classified and analyzed using a number of statistical methods (SPSS).

The study has reached the following results: Companies using this technique were evaluated as having a higher level of logistic service and more efficient operations with their partners, improved cooperation between logistic functions, higher financial performance and competitiveness, and the application of more efficient production processes may lead to better productivity and size abundance, and to increased economic sustainability in the future. Moreover, we found that companies have started developing digitally, making such kinds of investments.

**1-3. A study by (Al-Salmi et al., 2020)** entitled: The role of the Internet of things in knowledge management in information institutions.

The study aimed to: Clarify the correlation features among the Internet of things and libraries, determine the benefit of the Internet of equipment in knowledge management in information institutions, and highlight the part of Internet of Things presentations in associate information organization activities in information institutions and thus educating their services. The study adopts the descriptive approach in order to achieve this goal. It is done by the examination and investigation of the intelligent output printed in the Arab world and abroad, for extrapolating the connection fields among the Internet of Things and information organization events in information institutes.

The revision has likewise touched a set of outcomes, the most significant of which are the next: Information institutions have greatly promoted from the Internet of Equipment in tracking entirely the physical and moral objects available in these companies, and companies have become more capable to follow the number of invitees and know the peak hours and required services.

#### **1-4. The difference between the present research and preceding research:**

The existing research is like to previous ones by focusing on one of the research variables, the Internet of Things or the efficiency of management information systems. On the further, the existing study is different from preceding ones since the research public is different on the one hand, in addition to its focus on researching the variables of Internet of things and efficiency Management information systems in universities.

## **2. Research methodology:**

**2-1. Research Problem:** From the exploratory Search conducted by the researcher on a sample of 12 administrators at the University of Baghdad, where a set of questions were asked about management information systems and the Internet of Things as follows:

- ❖ Do you rely on the Internet and technology in management information systems.
- ❖ Does the use of technology affect the efficiency of administrators?
- ❖ Is technology used efficiently at the University of Baghdad?
- ❖ The response of the preliminary survey sample was as follows:
- ❖ There is an acceptable reliance on techniques and technology in management information systems.
- ❖ Technology and the Internet of things affect the efficiency of administrators
- ❖ Available technologies are not used with the required efficiency in some places in the university.

Based on the survey study, the main problem can be formulated with the following question:

- A. Is there any role for the Internet of Things in raising the efficiency of management info systems at the University of Baghdad. A set of sub-questions emerge from it
- B.b. Is there any effect of the Interneting of things on the administrative efficiency at the University of Baghdad?

C.c. Is there any effect of the Interneting of Things on the technical efficiency at the University of Baghdad?

D.d. Is there any effect of the Interneting of Things on the financial efficiency at the University of Baghdad?

E. e. Is there any effect of the Internet of things on the human efficiency at the University of Baghdad?

**2-2. Research Objectives:** The objectives of the Search can be defined as follows:

- ❖ Recognizing the Internet of Things concept and its components.
- ❖ Clarifying the concepts and components of the efficiency of organization data systems and measuring them.
- ❖ Measuring the influence of the Internet of Things on the efficiency of management information systems at the University of Baghdad.
- ❖ Reaching a set of results and recommendations that could develop the reality of the efficiency of management info systems at Iraqi universities depending on the Internet of Things.

**2-3. Research Importance:** The importance of the study can be scientifically determined, as it is one of the few studies that focused on linking the concepts of the Internet of Things with the efficiency of management info systems in Iraqi universities, as it is almost one of the rare studies that dealt with the two variables in Iraqi universities. The practical importance of the study is also characterized by focusing on Iraqi universities and illustrating the way of measuring the Internet of Things and its impact on the efficiency of management information systems according to administrators' points of view at the University of Baghdad. The study may reach to a set of important outcomes that will take part in developing the work reality

**2-4. Research Hypotheses:**

**The Main hypothesis:** There is statistically insignificant relationship among the Internet of Things and the efficiency of management information systems at the University of Baghdad. A set of sub-hypotheses derived from it:

- ❖ **First sub-hypothesis:** There is statistically insignificant relationship between the Internet of Things and the administrative efficiency at the University of Baghdad.

- ❖ **Second sub-hypothesis:** There is statistically an insignificant relationship between the Internet of Things and the technical efficiency at the University of Baghdad.
- ❖ **Third sub-hypothesis:** There is no statistically a significant relationship between the Internet of Things and the financial efficiency at the University of Baghdad.
- ❖ **Fourth sub-hypothesis:** There is statistically an insignificant relationship between the Internet of Things and the human efficiency at the University of Baghdad.
- ❖ **the second hypothesis:** There is no statistically Impact between the Internet of Things and the efficiency of management information systems at the University of Baghdad

**2-5. Research Methodology:** The analytical method has been used in the revision, which is one of the suitable methods that illustrate the search's problem clearly, as well as help understand the search by descriptive and explanation the relationship among its variables.

**2-6. Research tool:** The search tool was planned as three portions. The first part comprised the demographic data about the linked education sample participants (gender, age, academic level). The second part included the dimensions of the Internet of things (electronic infrastructure, electronic cloud, communication network, user interface). The third part included the most efficient management information systems (administrative efficiency, technical efficiency, financial efficiency, human efficiency).

**2-7. Statistically methods:** The suitable analysis process is based mostly on the sort of documents to be analyzed. The statistically package (SPSS) is used to analyze the composed information for accomplishing the study objects and testing hypotheses. The following test methods have been used:

- ❖ Testing the validity and reliability of the study tool.
- ❖ t-test and mono- variance analysis.
- ❖ Analyzing the impact of the association between the independent variable and the dependent one.

**2-8. Research Limits:** The search spatial limits are represented by the University of Baghdad in Iraq including the administrators of the middle and higher administrative levels in various colleges, while the spatial limits are characterized by 2022, the year of concluding investigation and allocating of the survey to the study sample. The limits of the search were

confined to the two variables of the Internet of Things, and the efficiency of management info systems.

**2-9. the Community and Sample of Research:** The search community is characterized by the administrative workers of the University of Baghdad. Since the community is specific and heterogeneous, the proportional class sample was depending on. The study model has been designed using the following statistical law:

The sample size will be determined according to the following law: (Khalil, 2013: 62)

$$n_1 = z^2 \cdot p \cdot q / d^2$$

Where  $n_1$  is the initial sample size.

$z$  is a tabular value under the normal distribution curve, which equals to 1.96.

$P$  is the percentage of items number in which the property or properties in question are available. It can be assumed that:

$p = 50\%$  for the largest sample size

$$Q = 1 - p = 1 - 50\% = 50\%$$

$d$  is the permissible degree of error and is equal to 5%

Through the application we find that:

$$n_1 = (1.96)^2 \cdot (50\%) \cdot (50\%) / (0.05)^2 = 184$$

## 2-10. Research Model:

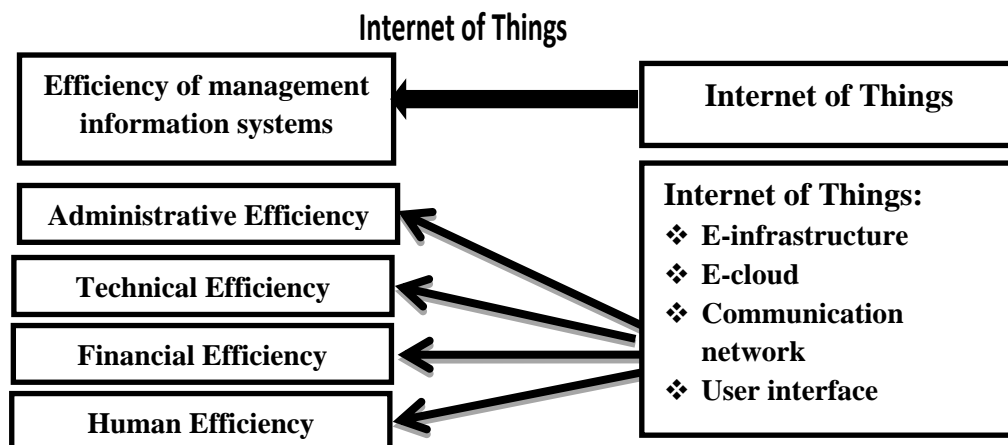


Fig. (1): Search Model

Source: prepared by the researcher

## The second topic: Theoretical Section:

**First: The concept of the Internet of Things:** The Internet of Things is a technical term that refers to the rapidly advanced and growing new generation of communication and information technology, which increases

the ability of physical objects and machines to communicate with each other, and organize the process of exchanging data among them by connecting them to the Internet, which in turn contributes to providing superior systems and technologies to enhance productivity, creating modern business models, and generating new sources of income.

The “Internet of Things” technology is one of the most important features of the Fourth Industrial Revolution, due to its great contribution in integrating all aspects of natural and digital life in the fields of commerce, industry, education, medicine and agriculture, as well as personal devices and tools. This had the greatest impact on changing the current lifestyle, as the three industrial revolutions had changed the lifestyle of humans before. (Rasmus, 2018: 16)

International Telecommunication Union (ITU) has well-defined the Internet of Things as “a global infrastructure of the information civilization that enables providing progressive services through (physical and virtual) interconnection between things, depending on current and advanced interoperable information and communication technologies. (Saladin, 2017: 6)

The Interneting of Things is a new technology that goals to link all electronic devices by the Internet so that they are accomplished of communicating with each other by distinctive protocols, as well as communicating with humans by guiding text messages. This technique includes device-to-device communication, device-to-human communication, or human-to-device communication, where human is often the end point. (Salah, 2017: 9)

**Second: The importance of the Internet of things at universities:** In the technological world in which we live, the Internet of Things helps people to live and work more smartly. The importance of the Internet of Things is summarized in the following points (Al-Hamami, 2016: 13):

- ❖ Education improves itself and contributes to improving the physical and structural environment.
- ❖ This technology delivers a rich and elastic platform for scholars, teachers, managers, and others to discover, study and co-operate with the scholastic system in super-intelligent surroundings.
- ❖ The Internet of Things helps reduce working hours in companies, factories and universities, and improve administrators’ performance, supply chains, logistic services and process automation, and reduce labor costs.

- ❖ It helps develop the educational services provided to students, thus enhance the performance of the university.
- ❖ It reduces costs and helps make dealing with students transparent.

The Internet of Things will help facilitate and develop the service delivery process, monitor the quality of work, reduce costs and effort, get data and statistics in a short time, and develop business and present it attractively that supports its continuity (Al-Kalbi, 2017: 27).

**Third: Internet of Things Dimensions:** The dimensions and components of the Internet of Things are defined as follows: (Al-Hariths, 2014: 5)

- **Electronic Infrastructure:** It comprises all necessary tangible and intangible tools and equipment, including computers, sensors, necessary software...etc.
- **Electronic Cloud:** The Internet of Things generates huge data of applications, devices and users that must be effectively achieved and that is done in a cloud. The cloud system participates billions of sensors, devices, gateways, data storage and protocols, and delivers prognostic analyses. Establishments use this analytical data to develop services and products, preventative processes of certain stages, and precisely build their novel business model. (Rot, 2018: 66)
- **Communication Network:** IoT constituents' usage an underwired or wireless network to interconnect and interact with each other in the IoT system.
- **User Interface:** Manager interfaces are the observable and palpable part of the IoT system that is accessible for managers. Engineers should be careful to design a good user interface, which can be easily used, and includes interactive options that is compatible with the common wireless standards. (Yan, 2020: 569)

**Fourth: The concept of the efficiency of management information systems:** Management information systems are a systematic computerized system characterized by its ability to integrate data from different sources for a primary goal, which is to provide the necessary information to users. These systems focus on use in management and business. However, Management information systems are mainly related to planning for development, managing and using information technology tools to support individuals in accomplishing and managing all their tasks related to information processing. So, management information techniques are mainly focused on all kinds of techniques used in administrative work for

achieving their supervision, organization and decision-making goals. (Wang, 2017: 183)

Businesses focus heavily on management information systems nowadays. Because of the management information systems importance, their efficiency and its measurement methods has become a concern matter for a lot of people, as the measurement methods varied, and most of them focus on four basic axes (human, material, financial, technical).

**Fifth: Dimensions of the efficiency of management information systems:** (Zhang, 2020: 3) (El-Ebiary, 2016: 167-169)

- ❖ **Administrative Efficiency:** It means the efficiency of the administration in conducting works and organization, communication with employees, decision-making, seizing opportunities and facing challenges. They are all standards that the organization management must have in order to be able to lead the organization and achieve the goals and competition.
- ❖ **Technical Efficiency:** It means the furthest degree of making use of the available equipment and software, continuously update and develop them in line with global changes and developments, quick technical troubleshooting, and relying on international standards and protocols in this field.
- ❖ **Financial Efficiency:** It means the best implementation of financial work depending on technologies and fitting in with the technical structure of the organization. Furthermore, it relies on computerization in financial operations, in order to provide the best financial internal and external services, in accordance with the organization's digital transformation processes.
- ❖ **Human Efficiency:** It means the availability and ability of human cadres to deal with the necessary technologies and software on the one hand, in addition to the possibility of training and developing workers' skills and capabilities, and attracting specialists in the field of electronic transformation

**Sixth: The association between the Internet of things and the efficiency of administration information systems:** Information has become the best important reserve for differentiating today's administrations, comprising information institutions that have recognized the significance of accepting the conception of information management in order to stimulate their knowledge, through the methods linked with producing, organizing and involvement this knowledge, which donates to educating service events in these institutes. The appearance of progressive presentations of the Internet

of Things, and the progress of info and communication technologies, so it can be using in information administration, since Internet of things technologies are able to connection physical objects, support communication with the social component, and highlight the part of Internet of Things submissions in supporting information management events of information institutions and thus improve their service area (Gallier, 2019: 22).

Thus, it can be said that there is a strong association between the Internet of things and organization information systems, which depends primarily on knowledge management. This relationship is based on the notion that management information systems depend on techniques and software credited by the Internet of things. Also, the efficiency of management information systems is directly connected with Internet of things measures nowadays.

### **The Third topic: Section of Practice:**

**First: The validity and reliability of the search tool:** After conniving the questionnaire in order to quantity the variables and measurements of the search and the influence between the independent and dependent variables, and to confirm the validity of the questionnaire, the questionnaire was refereed by a number of specialists. So, some questions were fused and others were removed before allocating the questionnaire to the search sample. The form was distributed to a sample (class and organized sample) consisting of 184 administrators at the University of Baghdad, and it was fully recovered. These documents were entered into the SPSS program for analyzing. The Alpha Cronbach test was accompanied in order to know the degree of internal constancy and permanency between the questions. The test has the following results:

Table (1): Evaluating the internal constancy and stability of the questionnaire questions

<b>Alpha stability test values</b>	
<b>Cronbach's Alpha</b>	<b>N of Items</b>
.932	31

Source: assembled by the researcher depending SPSS program.

This means that if the questionnaire, comprising its diverse pointers, is dispersed at different times to another sample of university employees, who are not the study sample, there is a 93% probability of obtaining the results that have been reached.

The five-point Likert scale was accepted in answering the questions focused to the study sample as follows:

Agree strongly	Agree	Neutral	Disagree	Disagree strongly
5	4	3	2	1

The arithmetic mean of the Likert scale is  $1+2+3+4+5=15/5=3$ , which is the value by which the arithmetic mean is compared for each question.

The criteria of judging average responses according to Likert scale:

Category Length = (highest response degree – lowest response score)/number of response categories

Category Length =  $(5-1) / 5 = 0.8$

Accordingly, the closed classification was approved, and the following areas were identified:

Table (2): Likert's five-point scale of answers

Domain	Agreement Degree	Relative Importance
1.8-1	Very weak	36-20
2.60-1.81	Weak	52-36.1
3.40-2.61	Moderate	68-52.1
4.20-3.41	Strong	84-68.1
5-4.21	Very strong	84.1-100

Source: collected by the researcher depending on (Asaad, 2020)

If the arithmetic mean value of the inquiry or appearance is inside the range (1-1.8), it resembles to the answer degree “very weak”. If it is within the range (1.81-2.60), it resembles to the answer degree “weak”, while if it is within the range (2.61-3.40), it resembles to the answer degree “moderate”. If it is within the range (3.41-4.20), it corresponds to the answer degree “very strongly”, and if it is within the range (4.21-5), it corresponds to the answer degree “very strongly”.

**Second: Description of Variables in the Search:** The Search has depended on the average mean process in assembling information. The arithmetic mean has been designed for each question, then for each independent sub-variable, and after that for the independent and dependent variables. The arithmetic means results and standard deviation of all variables were as in the following table:

Table (3): description documents for all study variables

Variable	Arithmetic Mean	Standard Deviation (Std)
Administrative Efficiency	3.49	0.570
Technical Efficiency	3.45	0.875

Variable	Arithmetic Mean	Standard Deviation (Std)
Human Efficiency	3.27	0.749
Financial Efficiency	3.47	0.830
Management Information Systems Efficiency	3.42	0.684
Internet of Things	3.17	0.570

**The preceding table (3) displays the following:** The arithmetic means of the dependent sub-variable (human efficiency) is within the range (2.61-3.40) that is correspondent to the answer degree “moderate” on the areas of the five-point Likert scale, with a significant difference. The relative importance of this independent implies that the sample members see that the efficiency of the human element is moderate at the University of Baghdad. Therefore, they must be trained more and have better skills and capacities for technical transformation and fitting in with the use of modern technologies.

Also, the arithmetic average of the dependent sub-variables (administrative efficiency, technical efficiency, financial efficiency) is within the range (3.41-4.20), which is correspondent to the answer degree “strong” on the areas of the five-point Likert scale, and with a significant difference. The relative importance of these independent variables indicates that the sample members agree strongly on the high efficiency of the upper and middle administrative staff at the university, in addition to the efficiency and distinction of electronic human technical resources, equipment and available technologies, the efficiency of workers in the financial department and how much they use techniques in financial transactions.

The arithmetic means of the dependent variable (management information systems efficiency) is within the range (3.41-4.20), matching to the answer degree “strong” on the areas of the five-point Likert scale, and with a significant difference. Furthermore, the relative importance of this variable indicates that the sample members agree strongly on the reality of management information systems and its high efficiency and ability to deal with the Internet of Things.

The arithmetic means of the independent variable (Internet of things) is within the range (2.61-3.40) corresponding to the answer degree “moderate” on the arenas of the five-point Likert scale, with a significant difference. Furthermore, the relation significance of this independent

means that the Internet of things are available moderately at the University of Baghdad.

**Third: Hypothesis Test:** To confirm the validity of the hypotheses, the correlation between variables has been studied, in order to study the independent variable correlation and effect on the dependent variable, by using the simple Pearson correlation coefficient to study the strength or consistency of the relationship between the two variables. Its value ranges between (-1, +1) and is symbolized by R. Its value is studied in two ways:

1. **Algebraic Sign:** If the sign of the correlation coefficient is positive, then this indicates to a direct relationship between the two studied variables, but if it is negative, the relationship between them is inversive.
2. **Absolute Value:** The absolute value of the correlation coefficient refers to the strong association between the two variables and can be classified as follows:

Table (4): Correlation coefficient values

Correlation coefficient value	Degree of relationship
$R > 0.90$	Very Strong
$0.90 > R > 0.80$	Strong
$0.80 > R > 0.70$	Good
$0.70 > R > 0.60$	Accepted
$0.60 > R > 0.50$	Weak
$0.50 > R$	Very Weak

Source: assembled by the researcher depending on (Asaad, 2016).

**Main Hypothesis:** There is statistically insignificant relationship among the Internet of Things and the efficiency of management information systems at the University of Baghdad.

For testing the association between the dependent and independent variables and testing the main hypothesis, the Pearson correlation coefficient was applied and the results were as in the following tables:

Table (5): The study of the correlation among the Internet of things and the efficiency of organization information systems

Correlations			
		effective of management information system	internet of thing
effective of management	Pearson Correlation	1	.842
	Sig. (2-tailed)		.000

Correlations			
		effective of management information system	internet of thing
information system	N	184	184
	Pearson Correlation	.842	1
internet of thing	Sig. (2-tailed)	.000	
	N	184	184

According to the previous table: It is clear that the value of  $R = 0.842$ , which indicates to a strong and direct correlation between the two variables, and the value of the probability  $P(\text{Sig}) = 0.000 < \alpha = 0.05$ , so the correlation is significant. Since the value of  $P$  is less than the significance level  $\alpha = 0.05$ , we throwaway the chief hypothesis and agree another one which state: There is a statistically significant relationship between the Internet of Things and the efficiency of management information systems at the University of Baghdad.

**First sub-hypothesis:** There is no statistically significant relationship between the Internet of Things and the administrative efficiency at the University of Baghdad.

To test the association between the secondary independent and dependent variable and to test the main hypothesis, the Pearson correlation coefficient was applied and the results were as in the following tables:

Table (6): The study of the correlation between the Internet of things and the administrative efficiency

Correlations			
		internet of thing	effective of administration
	Pearson Correlation	1	.819
internet of thing	Sig. (2-tailed)		.000
	N	184	184
effective of administration	Pearson Correlation	.819	1
	Sig. (2-tailed)	.000	
	N	184	184

Source: organized by the examiner depending on SPSS program.

According to the previous table: It is clear that the value of  $R = 0.819$ , which refers to a strong and direct correlation between the two variables, and the value of the probability  $P(\text{Sig}) = 0.000 < \alpha = 0.05$ , so the

correlation is significant. Since the value of P is less than the significance level  $\alpha = 0.05$ , we reject the first sub-hypothesis and accept the alternative one which state: There is a statistically significant relationship between the Internet of Things and the administrative efficiency at the University of Baghdad.

**Second sub-hypothesis:** There is statistically insignificant relationship between the Internet of Things and the technical efficiency at the University of Baghdad.

To test the association between the secondary independent and dependent variable and to test the main hypothesis, the Pearson correlation coefficient was applied and the results were as in the following tables:

Table (7): the study of the correlation between the Internet of things and the technical efficiency

Correlations			
		internet of thing	effective of technology
internet of thing	Pearson Correlation	1	.825
	Sig. (2-tailed)		.000
	N	184	183
effective of technology	Pearson Correlation	.825	1
	Sig. (2-tailed)	.000	
	N	183	183

Source: the researcher prepared by depending on SPSS program.

According to the previous table: It is clear that the value of  $R = 0.825$ , which refers to a strong and direct correlation between the two variables, and the value of the probability  $P(\text{Sig}) = 0.000 < \alpha = 0.05$ , so the correlation is significant. Since the value of P is less than the significance level  $\alpha = 0.05$ , we throwaway the second sub-hypothesis and agree another one which state: There is a statistically significant relationship between the Internet of Things and the technical efficiency at the University of Baghdad.

**Third sub-hypothesis:** There is no statistically significant relationship between the Internet of Things and the financial efficiency at the University of Baghdad.

To test the relationship between the secondary independent and dependent variable and to test the main hypothesis, the Pearson correlation coefficient was applied and the results were as in the following tables:

Table (8): the study of the correlation between the Internet of Things and the financial efficiency

Correlations			
		internet of thing effective of finance	
internet of thing	Pearson Correlation	1	.821
	Sig. (2-tailed)		.000
	N	184	184
effective of finance	Pearson Correlation	.821	1
	Sig. (2-tailed)	.000	
	N	184	184

Source: the researcher prepared by depending on SPSS program.

According to the previous table: It is clear that the value of  $R = 0.821$ , which refers to a strong and direct correlation between the two variables, and the value of the probability  $P(\text{Sig}) = 0.000 < \alpha = 0.05$ , so the correlation is significant. Since the value of  $P$  is less than the significance level  $\alpha = 0.05$ , we throwaway the third sub-hypothesis and agree the alternative one which state: There is a statistically significant relationship between the Internet of Things and the financial efficiency at the University of Baghdad.

**Fourth sub-hypothesis:** There is no statistically significant relationship between the Internet of Things and the human efficiency at the University of Baghdad. In order to test the association between the secondary independent and dependent variable and to test the main hypothesis, the Pearson correlation coefficient was applied and the results were as in the following tables:

Table (9): the study of the correlation between the Internet of Things and the human efficiency

Correlations			
		internet of thing	effective of HR
internet of thing	Pearson Correlation	1	.741
	Sig. (2-tailed)		.000
	N	184	184
effective of HR	Pearson Correlation	.741	1
	Sig. (2-tailed)	.000	
	N	184	184

Source: the researcher prepared by depending on SPSS program.

According to the previous table: It is clear that the value of  $R = 0.741$ , which refers to a strong and direct correlation between the two

variables, and the value of the probability  $P(\text{Sig}) = 0.000 < \alpha = 0.05$ , so the correlation is significant. Since the value of P is less than the significance level  $\alpha = 0.05$ , we throwaway the fourth sub-hypothesis and agree the alternative one which state: There is a statistically significant relationship between the Internet of Things and the human efficiency at the University of Baghdad.

**The second hypothesis:** There is no statistically Impact between the Internet of Things and the efficiency of management information systems at the University of Baghdad.

In order to test the effect of the independent variable on the dependent variable, simple regression analysis was used, which measures the effect of the received variable on the dependent variable. The results were as shown in the following tables:

Table (10): regression analysis between the Internet of Things and management information systems

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.788 <sup>a</sup>	.620	.618	.42269

a. Predictors: (Constant), enternet of thing

Source: prepared by the researcher based on the SPSS program.

Table (11): ANOVA analysis of the impact of the Internet of Things on management information systems

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	53.100	1	53.100	297.191	.000 <sup>b</sup>
	Residual	32.518	182	.179		
	Total	85.618	183			

a. Dependent Variable: effective of management information system  
b. Predictors: (Constant), enternet of thing

Source: prepared by the researcher based on the SPSS program.

Tables 10 and 11 show that the regression model is significant and indicates the existence of a direct and good relationship between the Internet of Things and management information systems, as the value of the corrected coefficient of determination was (0.620), and it explains that 62% of changes in management information systems are due to the Internet of Things.

Table (12): regression parameters for the impact of the Internet of Things on management information systems

Model	Coefficients <sup>a</sup>			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
1 (Constant)	.424	.177		2.404	.017
1 internet of thing	.944	.055	.788	17.239	.000

a. Dependent Variable: effective of managment information system

The probability value  $P = 0.000 < \alpha = 0.05$ , and therefore the correlation is significant. Hence, we reject the second hypothesis, which states: There is no statistically Impact between the Internet of Things and the efficiency of management information systems at the University of Baghdad. We accept the alternative hypothesis which states: There is statistically Impact between the Internet of Things and the efficiency of management information systems at the University of Baghdad

**Conclusion:** Finally, it can be said, although its evaluation is moderate according to the sample's view, the reality of the Internet of Things available at the University of Baghdad has a direct impact on the efficiency of the management information systems at the university. So, the higher the level of technology, communication and software used at university is, the more efficient and advanced management information systems at the University of Baghdad are.

**Search Conclusions:** Through the analytical Search, the most important results of the Search can be identified as follows:

1. The efficiency of the human element is moderate at the University of Baghdad. Therefore, more training programs should be established and their skills and abilities should be enhanced for technical transformation and fitting in with the use of modern technologies.
2. The high and middle management efficiency is high at the university, electronic human technical resources, equipment and techniques available are efficient and distinctive, and the financial department workers have high efficiency in using techniques in financial transactions.
3. The sample members agree strongly with the reality of management information systems and their high efficiency and ability to deal with the Internet of Things.
4. IoT components are moderately available at the University of Baghdad.
5. There is a direct influence of the Internet of Things on raising the efficiency of management information systems at the University of Baghdad.

6. There is a direct influence of the Internet of Things on raising the administrative efficiency at the University of Baghdad.
7. There is a direct influence of the Internet of Things on raising the technical efficiency at the University of Baghdad.
8. There is a direct influence of the Internet of Things on raising the financial efficiency at the University of Baghdad.
9. There is a direct impact of the Internet of Things on raising human efficiency at the University of Baghdad.
10. There is statistically Impact between the Internet of Things and the efficiency of management information systems at the University of Baghdad

**Recommendations:** According to the study findings, the following recommendations can be made:

1. Improving the reality of the Internet of Things at the University of Baghdad. This can be done according to the following methods:
2. Improving the existing infrastructure by expanding the communication network and relying on faster speeds.
3. Improving the reality of existing software and attracting the best software in different fields.
4. Focusing on better design and program interfaces to be various including all student services.
5. Improving the reality of the electronic cloud and using advanced equipment of sensitivity.
6. Promoting the level of human cadres working at the University of Baghdad and preparing them to deal with the components of the Internet of Things and the technical transformation at university, by increasing training, developing capabilities and skills, and attracting specialists in the field of Internet of things (design, safety factors. etc.).
7. Providing the necessary funds for continuously improving the necessary technologies and software related to the Internet of Things.
8. Focusing permanently on measuring the efficacy of the efficiency of management information systems at the university and making improvements based on the efficiency measurement results.

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