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THE ROLE OF CLOUD COMPUTING TECHNOLOGY IN REDUCING PRODUCT DEVELOPMENT AND DESIGN COSTS-AN APPLIED STUDY IN WASIT GENERAL COMPANIES FOR TEXTILE INDUSTRIES

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Abstract
After the great industrial revolution that occurred in developed countries, the great need for technology appeared in the work of companies. several technologies have emerged, and one of these important technologies is cloud computing technology, which will have a significant impact in the field of reducing product costs. The research aims to know the extent of the role of cloud computing technology in reducing the costs of design and development. Products The importance of the research focused on identifying the concept and importance of cloud computing in industrial companies and its role in reducing product costs. The study stipulated several hypotheses and it has It was completed Choose the General Company for Textile Industries in Wasit as a sample for research And it was done Reliance on Questionnaire form Its component from Two axes40 were distributed Questionnaire And use program spss For the purpose of investigation Goals Research and verify its hypotheses Through this study, several conclusions were reached, the most important of which is the lack of application of modern technologies, the most important of which is cloud computing technology in the research sample company. The research came out with a set of recommendations, the most important of which is industrial companies adopting cloud computing technology because it helps provide many competitive advantages.

Keywords: cloud computing technology, product development and design costs.

Introduction

The business environment at the present time is characterized by continuous development and modernity. Competition has increased in addition to the great and rapid technological development, which has led to the necessity of developing modern administrative methods that help management in companies understand the nature of the problems they face, help in solving and avoiding them, and enhance the competitiveness of those companies through attention. With the quality of products and others, and with this progress that has occurred, several technologies have emerged, including the automation of information, the increased digitization of the economy, cloud computing, and others, which have had a large and important role in the modern production environment. Cloud computing technology is considered one of the methods of artificial intelligence, through which most companies have transformed their data and transferred it to cloud computing. An analogy to the work of cloud

computing technology lies in energy networks such as (electricity or natural gas), where instead of producing energy for each individual participant, they use it according to their actual need. therefore, the theoretical aspect was addressed to the concept of cloud computing, as well as the role of cloud computing in reducing costs. The costs of developing and designing the product, and then the practical aspect in which the questionnaire for the research was analyzed, and through this, several conclusions and recommendations were reached.

First: research methodology

Research problem: Technology developments and the development of product design always require modeling processes in their various forms to select and evaluate products and systems. Traditional methods are still used in selecting industrial products, and thus will increase the costs incurred in the design processes. Therefore, the need has emerged to use modern and advanced technologies such as cloud computing technology that It contributes significantly to reducing the costs of designing and developing the product. Considering this, we are able to formulate the research problem as the following question:

To what extent does cloud computing technology contribute to reducing product development and design costs?)

Research Aims:

The research aims to achieve several objectives, the most important of which are:

1- Identify what cloud computing is, its basics and components

2-Knowing the challenges and advantages of cloud computing

3-Knowing the role of cloud computing technology in reducing product development and design costs

Research Importance:

The importance of the research focuses on the importance of technological development through the use of modern digital technologies, production robots, artificial intelligence, and smart electronic devices, and how to benefit from the application of cloud computing technology in industrial companies and use it in managing costs and reducing the costs of product development and design.

The research is based on the following hypotheses.

1-There is a statistically significant effect between cloud computing technology and reducing the costs of developing and designing products

2-There is a correlation between cloud computing technology and reducing the costs of developing and designing products

The theoretical side:

First: The concept of cloud computing technology

The Encyclopedia Britannica defined it as the technology through which data is stored in central computer systems With the ability of customers and users to access it via the Internet,

which in turn helps (Cloud computing, 2019, 3159-3161) reduce the costs of developing and designing products, The term cloud computing technology is a relatively modern term, as its use dates to the late sixties. The term cloud computing was inspired by the cloud symbol, which was often used to represent the Internet through maps and graphs (Makawi, 2013, 21). However, the definition The most widely used is the definition that was defined by the scientific research team at the National Institute of Standards and Technology(Nist, 2011, 84), It is a model used to access resources (shared technologies) such as (networks, servers, applications, services, etc.) through the use of the Internet, which can be provided quickly and with minimal administrative effort or interaction by the service provider. It has also been defined as the ability to use computer resources. (Software) via Internet networks, which is provided in the form of a service, that is, the service is used without caring about the form in which this service works, how it communicates with each other, and the software installed on it (Abu Asaad, Dream of Libraries and Government Houses, 2014)

Second: The benefits of applying cloud computing technology in industrial companies:

There are several benefits to applying cloud computing technology, as follows: (Ibrahim, 2019, 10-11)

1- It enables customers and users to access files and applications through the cloud without the need to provide an application on the user's device and thus will reduce security risks.

2- Reducing the costs spent on purchasing the software that users need, as all they need is a computer connected to a fast Internet line and connected to one of the sites they need.

3- Reducing costs by reducing the number of infrastructure devices and saving the number of employees who work in maintaining devices and software in companies.

4- Providing the number of workers who maintain the system and software

5-Saving time

6-Computing technology ensures the provision of data centers that provide services to customers

Third: Using cloud computing technology to improve operations (Narayanan,2013,75-76)

1- Big data helps in understanding others' perception of companies' products, so companies can modify these products as required.

2-By analyzing social media content and knowing customers' opinions

3- Enables big data to quickly test thousands of computer-supported designs, so that it helps in selecting minor changes in one factor that affects the results, such as a slight change in materials that may affect the cost, time of introduction to the market, and performance.

Fourth: The role of cloud computing technology in reducing product development and design costs Product development and design costs are all costs incurred by industrial companies as part of product costs and the total costs incurred by companies to obtain products (Al-Nashar, 2005, 15) believes that the life cycle of the product when it is integrated (Govindarajan,2012,548) With strategic cost management tools, it helps to reduce costs and increase the effectiveness of cost information in the field of decision-making, taking into account the marketing and production point of view. Cloud computing technology works to give a multi-dimensional view of how a physical asset will perform by simulating, predicting, and communicating decisions based on the conditions of the real or physical environment.

this technology provides multiple possibilities to improve performance and productivity in many industrial companies (Autodesk, 2021, 25), This technology also provides a variety of advanced decisions from simulations and complex and advanced models with high predictive capabilities. (Gabor etal, 2016, 347-379) Cloud computing technology has been used in many industrial fields (Cimino et al., 2019, 113)

1-Work to improve the product life cycle

2-Develop a system for planning and evaluating automated production

3- Redesigning industrial processes

4-Planning and controlling production operations to improve and automate the decision-making support process

5-Forecasting and managing maintenance operations

Cloud computing technology contributes to the design adopted by designers in the early stages of the product life cycle by discovering and evaluating decisions considering reducing costs, reducing process implementation time, and improving quality and performance. (Jones et al., 2019, 20), Cloud computing technology also contributes to helping designers to produce cost models automatically from information extracted from data throughout the product's life cycle by capturing cost data and automating the flow of data to estimate the cost while identifying opportunities to reduce costs throughout the product's life cycle effectively and thus reduce the cost. Total over the product life cycle.

In the design and production engineering phase, computing technology is relied upon (Erkyunca etal, 2020, 145-148). Cloud by using a combination of building information modeling and wireless sensor networks to provide designers with real-time information during design Cloud computing technology is characterized by producing many effective solutions for many (Al-Sehrawy etal, 2021, 832-862), of technical problems, increasing efficiency and quality, and then discussing proposed future expectations and improvement. When new technologies are integrated within the stages of this design process, (Kritzinger et al., 2018, 1016)

It will help enhance many of the preliminary processes and steps that the designer needs to see how realistic the product is. Cloud computing technology is considered an effective tool to support the decision-making process to improve. (Zidek et al., 2020, 12) Reliability and safety in design, which then contribute to improving and developing performance (Persian etal., 2021,506)

Third: The practical aspect

Analysis of questionnaire results: -

a-the introduction:-

Testing the main research hypothesis, which is (the extent to which cloud computing technology contributes to reducing costs Aims at the practical side Product development and design for industrial companies in the Iraqi environment) where It was completed Reliance on Forms The questionnaire that distributed to Soft Of the employees working in the company the public c For textile industries In Wasit, as shown in Table (1). distribution40QuestionnaireonemployeesEmployees of the General Company for Textile Industries in Wasit

B-Methods Statistics Used: -

It was completed use many of Methods Statistics In order to analyze the data of the questionnaire forms in order to reach to Results desired The program was relied upon Statistician (SPSS).

T-Sections Questionnaire form: -

The questionnaire form was divided to Two agencies:

Section the first: Includes personal information for people To whom questionnaire forms were distributed.

Section The second: It consists of Two axis agencies Y:

The first axis: It represents cloud computing technology It in cludes six Questions.

The second axis: -It represents the cost of developing and designing the product and includes 8 questions.

A Likert scale was used (Likert Scale: five agencies:

Table (1) Show Weighted arithmetic mean.

Strongly Disagree	not agree	neutral	OK	Strongly Agree	Degree of approval
1	2	3	4	5	the weight
20%	40%	60%	80%	100%	Percentage weight

W – measurement Resolution stability: -

that one the important issue in the questionnaire is measuring the degree of reliability The questionnaire which I have stability questions And they contradict each other where It was completed Procedure Reliability test for questionnaire questions and dependence On the Cronbach coefficient (Cronbach's Alpha) where the results were shown as in the table following

Table (2) It shows the results of the questionnaire's reliability using Cronbach's coefficient

Honesty	Consistency	Number of phrases	the hub
0.990	0.961	6	the first
0.96	0.921	8	the second
1.95	1.882	14	the total

This means Meter stability and not is contradiction with Himself, that is that it Give same a for results If it is returned T Application On the same sample The stability was high**.**

C- analysis Paragraphs of the questionnaire form: -

1- Distribution Individuals Sample by gender

Table (3) Shows the distribution of the sample by gender.

percentage	the number	Sex
80%	32	male
20%	8	feminine
100%	40	Hunger

The form was distributed to 40 employees where reach Number of males 32A person represents this number80% of sample size, as for number Females It reached 8 people Which is a ratio of 20% of sample size

1- Distribution Individuals Sample according to age.

Table (4) Shows the distribution of the sample according to age.

percentage	Repetition	the age
40%	16	30-39
25%	10	40-49
35%	14	50 or more
100%	40	the total

Table No. (4) shows that People Which range Their ages From (30to39 years old) representing 40%, As for People Who ranged Their ages From (40-49 years old)Like himarate25%,As for People Who ranged Their ages More than 50, so that was their percentage35%.

2- distribution Individuals Sample by job

Table (5) Shows the distribution of the sample by occupation.

percentage	the number	Function
3%	1	A managerM
5%	2	Director of the Department
92%	37	employee
100%	40	the total

The questionnaire was distributed According to the table above on directors who represent a director One year, 3%, and two director sections whose percentage was 4%As for The number of employees was 37 employees, making up 93%.

4- distribution Individuals Sample according to educational attainment

Table (6) It shows the distribution of the sample according to educational attainment.

percentage	Repetition	Certificate
12.5%	5	institute
%57.5	23	Bachelor's
%20	8	Higher Diploma
%10	4	Masters
%100	40	the total

Through the table above Show that The number of employees who obtained the institute's certificate was 5 people, and their percentage was 12.5% in Panama People the number of holders of a bachelor's degree was:23 people, their percentage was 57.5%Thus, their opinion can be relied up on as for those holding a higher diploma, they were:8 people constituted 20%friendsMaster's degree, so it was We 4 people and like a ratio10%.

5- distribution Individuals Sample by years of service

Table (7) Shows the distribution of the sample according to years of service.

percentage	the number	Years of service
%10	4	less than5
%30	12	from5-10 years
%35	14	from11-20 years
%25	10	bigger20
%100	40	the total

Schedule above Show that number People those whose service is less than 5 years represent 4 people, representing 10%, while those whose service is 5-10 years represent 12 people, representing 30%. And people whose years of service ranged from 11 to 20 years, were 14 people, while People Which is their servicemore20 years ago, their number was 10 people and they constituted 25%..

d- Normal distribution test: -

In order to know what I fit was the axes The three Whether or not a normal distribution is followed test (Kolmogorov-Smirnov)(KS) The results were as in the table following:-

Table (8) Shows the normal distribution test for the two axes

The probability value of the test) p.value)	Test value Z	Number of paragraphs	the hub
0.768	3.644	6	the first
0.538	2.855	8	the second

Through the table above it turns out that Probability values of the test) p. value)For the axis the first the second is(0.768) (0.538)respectively, which is greater than the level of significance (0.05) that means that Both axis the first and the second They follow a normal distribution.

Dr- analysis Answers the form: -
the hub the first: cloud computing technology

standard deviation	Arithmetic mean	questions	Paragraph
0.36	**4.01**	Cloud computing technology is easy to use	1
0.33	**3.98**	Cloud computing technology is characterized by the ease of obtaining available data and services	2
0.46	**2.8**	Cloud computing technology enables information to be shared with many users	3
0.45	**3.20**	The use of cloud computing technology reduces the burden of infrastructure maintenance	**4**
0.44	**2.83**	Cloud computing technology makes it possible to complete work quickly	**5**
0.49	**3.25**	Availability Cloud computing technology provides its services at low cost	**6**
0.42	**3.35**	**Total**	

The second axis: the cost of developing and designing the product.

standard deviation	Arithmetic mean	questions	Paragraph
0.35	**3.37**	Contribute Technique Cloud Computing in to support Designers who use structure data Adaptive And applications Ontology to produce model the cost in a way Adaptive from the information Extracted from data throughout turn. life the product from during Pick it up Data the cost and automation. flow data to estimate the cost in a way Adaptive	1
0.30	**2.95**	Contribute Technique Cloud Computing in to support Designers On specifying Opportunities scale down the cost on Orbit turn Product life in a way effective and from then discount the cost Total on Orbit turn life the product	2
0.45	**3.5**	Complete Accreditation on Technique Cloud Computing using A combination of Modeling building the information and network Sensor. Wireless To supply Designers With information Instant during the design	3

0.44	**3.13**	Contribute Technique Cloud Computing in appreciation the cost during phase the design Initial	**4**
0.42	**3.37**	Contribute Technique Cloud Computing Cognitive in to provide. information Selectivity For designers reduces Pregnancy Excess For information and improvement Efficiency	**5**
0.35	**2.89**	constribte in to choose to substitute the design that He investigates higher. value Current For money Invested on road discount. the value current for flows Costs in Stages Early from turn life the product	**6**
0.32	**3.90**	Contribute Technique Cloud Computing from during the design based on Reliability Designers in Stages Early Of course life the product on exploration and evaluation Decisions in a light discount Costs	**7**
0.25	**3.40**	Contribute Technique Cloud Computing from during the design based on Reliability Designers in Stages Early Of course life the product on reduction time to implement Processes	**8**
0.36	**3.31**	**Total**	

I- Testing research hypotheses

The first hypothesis

There is a statistically significant effect between cloud computing technology and reducing the costs of product development and design.

The analysis process requires the presence of two hypotheses: the null hypothesis and the alternative hypothesis:

H_0: nonexistence the impact of cloud computing technology on reducing the costs of product design and development.

H_1 : There is an impact of cloud computing technology on reducing the costs of product design and development.

By using Simple linear regression analysis, where the independent variables (X(represents cloud computing technology, either the dependent variable)YIt represents a reduction in product design and development costs, Where it reached value F Al-Mahasabha (381.36)The probability value of the test (p-value = 0.000) which is less than the level of significance (0.05).We are We reject the null hypothesis which states that there is no The impact of cloud computing technology on reducing the costs of product design and development We accept the hypothesis Alternative Which states that there Isa statistically significant impact of cloud computing technology on reducing product design and development costs .The value of the coefficient of determination (83%) This means that a variable Cloud computing technology He was able to explain his ratio (83%) of the changes that occur To reduce product development and design costs The rest are factors Other Outside the researcher's control

Second hypothesis

There is a trace Statistically significant between cloud computing technology and reducing development costs and product design.

The Pearson correlation coefficient was used (person) to measure the relationship between cloud computing technology and reduce development costs and product design between The value of the correlation coefficient was (0.91-) and the probability value of the test (p. value) Equal (0.000)It is less than the level of significance(0.05)Therefore, we accept the hypothesis which states that there is a strong and significant correlation between electronic management and financial fraud.

Conclusions and recommendations

First: conclusions

The following conclusions were reached by the researcher:

1-Cloud computing technology helps reduce product development and design costs and thus helps Iraqi industrial companies achieve competitiveness

2- Cloud computing technology helps achieve many benefits and returns when reducing maintenance costs and switching to preventive maintenance, which reduces keeping large quantities of inventory and incurring unnecessary costs .

3-Cloud computing technology offers promising opportunities for industrial companies to enhance their competitive capabilities in the modern business environment

4-Cloud computing technology provides many effective solutions to many technical problems and increases efficiency and quality

5-Cloud computing technology works to achieve digital models that help improve planning, control, and performance evaluation processes

Second/ Recommendations

1-The study recommends the importance of industrial companies adopting cloud computing technology because it helps provide many competitive advantages

2- It is recommended to implement cloud computing in companies because it helps reduce costs and provide technical and non-technical innovation

3-Helps automate operational processes

4-Cloud computing performs preventive maintenance before malfunctions occur, in addition to predicting future changes

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