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The role of knowledge management in improving the quality of projects: Research from Iraq

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Abstract

The current study aimed to explain the reality of knowledge management and its concepts, and the extent of its application in Iraq. The aim is to study the dimensions of knowledge management and explain the role of knowledge management determinants in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges, to reach a set of recommendations that. If applied, the recommendations could contribute to activating the determinants of knowledge management in improving the quality of projects. A descriptive-analytical method was used in the study. A questionnaire was designed and distributed to the study sample, and the data was entered into the SPSS program and analyzed.

Keywords: Knowledge, Improvement, Quality, Projects

1. Introduction

The advanced and continuous development in information and communications technology was the main reason for focusing on knowledge and highlighting its role with the aim of reaching precious knowledge and truth among the many forms and types of knowledge. Consequently, companies and institutions began to seek to pay attention to the knowledge stored and hidden in their various human and material resources until they reached the goal of innovation where the value and importance of the organization is in the importance of its human resources and the knowledge that has a role in the progress of the organization. In addition to the emergence of several advanced scientific concepts that include knowledge of the nature of knowledge management, knowledge societies, and others as a result of the huge expansion of Internet applications in conjunction with the massive information and communications revolution. This has made institutions focus their full attention on knowledge management to confront any challenge or obstacle they are exposed to and take sound solutions. For all problems, and introducing the concepts, theories, and technologies that are considered the basis for building knowledge management systems and their organizational structures, to use management solutions and the processes of developing and establishing these solutions [1]. The research problem can be expressed in the following main question: what is the role of knowledge management determinants in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges?

It results in a set of the following sub-questions:

- Is there a role for generating knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges?
- Is there a role for storing knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges?
- Is there a role for distributing knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges?
- Is there a role for applying knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges?

2. Significance of the study

Theoretical importance: Focusing on providing a scientific addition to the research by focusing on the determinants of knowledge management and its dimensions that have not been focused on in its current form in previous studies related to the Ministry of Construction and Housing, and shedding light on the role and importance of knowledge management. In addition to studying the relationship and degree of influence and interconnection between management knowledge and improvement of the quality of projects in the Ministry of Construction and Housing Department of Roads and Bridges. Practical importance: It focuses on the importance of clarifying methods for measuring the determinants of knowledge management and its impact on the quality of projects. The results of the research can contribute to activating the concept of knowledge management among those in charge of the Ministry of Construction and Housing and the Department of Roads and Bridges, and focus on studying the impact of knowledge management on improving the quality of projects. The research will present recommendations that will contribute to improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges, based on achieving knowledge management.

2.1. Purposes of the study

The research objectives are as follows:

- Explaining the reality of knowledge management and its concepts, and the extent of their application in the Ministry of Construction and Housing, Department of Roads and Bridges.
- Studying the dimensions of knowledge management in the Ministry of Construction and Housing, Department of Roads and Bridges.
- Explaining the role of knowledge management determinants in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges.
- Reaching a set of recommendations that, if applied, could contribute to activating the determinants of knowledge management in improving the quality of projects.

2.2. Hypotheses of the study

The research starts from a set of main and sub-hypotheses that can be formulated as follows:
The main hypothesis: There is no significant effect of knowledge management in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges. It revolves around the following sub-hypotheses:

- The first sub-hypothesis: There is no significant effect of generating knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges.
- The second sub-hypothesis: There is no significant effect of storing knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges.
- The third sub-hypothesis: There is no significant effect of distributing knowledge on improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges.

- The fourth sub-hypothesis: There is no significant effect of applying knowledge in improving the quality of projects in the Ministry of Construction and Housing, Department of Roads and Bridges.

3. Research community and sample

The research community is represented by administrators and engineers in the Ministry of Construction and Housing, Department of Roads and Bridges, and since the community is specific and heterogeneous, a regular random sample will be relied upon in distributing the questionnaire.
The sample size will be determined according to the following law [2]:

$$n1= z^2.p.q/d^2$$

$$n1= (1.96)^2.(50\%)(50\%)/(0.05)^2 = 184$$

The Republic of Iraq is represented by the sample distributed among administrators and engineers in the Ministry of Construction and Housing, Department of Roads and Bridges. Time limitations are for the period between 2022 to 2023.

4. Literature review

Organizations of all kinds search for excellence, which is represented by innovation and creativity, to keep pace with the course of the times, represented by various changes and developments. Knowledge management is considered one of the modern trends that have received great attention from management science, as it is an effort that works to perform several tasks: acquiring and communicating knowledge, interpreting knowledge, employing it, and investing it, which is an important resource for development as a method that aims to expand the qualifications of individuals and develop their capabilities towards progress and development [3]. Defined as the process through which knowledge is identified, collected, organized, sorted, organized, stored, shared, disseminated, and accessed in an organization [4]. It is the transfer of information and expertise that the organization possesses, which is necessary and important for various administrative activities such as decision-making, problem-solving, strategic planning, or learning [5]. It is also defined as the systematic management of an organization's knowledge assets to create value and achieve the organization's strategic goals, including documenting the organization's distinctive processes and retaining knowledge for use by appropriate individuals [6]. It is also considered to be the optimal exploitation of data and information by employing the skills, abilities, desires, and ideas of individuals. Knowledge is the known amount of knowledge that results from scientific research or applied studies that may be used in a specific field [7]. It is the systematic and clear management of knowledge and the processes associated with it and its creation, collection, organization, dissemination, use, and exploitation. One of its requirements is the transformation of personal knowledge into collaborative knowledge that can be shared positively in the organization [8]. The researcher believes that knowledge management is several processes aimed at transforming intellectual resources and data into tangible values by focusing primarily on intangible assets.

4.1. Concept of project quality

Quality, in its general sense, seeks to achieve the basic requirements for a work, so that it is demonstrated in the smallest details and with the highest possible qualities so that it can enter competitive markets for work. It measures the degree of excellence of the work to achieve permanent satisfaction of the customer’s needs and expectations. Quality is a main characteristic that must be present in every business. The business should be appropriate for the purpose, be invested, and gain the trust and satisfaction of its users [9]. The project: It is the integrated and interconnected activity that contains the start and end times through which a unique product or new service is applied and implemented so that it is led by the project manager or the planning director, as the project includes a set of procedures and decisions before the final investment and exploitation decision, which includes all activities. The tasks that lead to developing and approving solutions to several needs, desires, or problems of stakeholders or the beneficiary party, so that the design process begins by identifying all the needs

related to the stakeholders and then works on translating them into standards, developing them, then implementing them and finally delivering them in a way that satisfies the beneficiary party of the project [10].

Projects: are temporary organizations, with an intentional end purposefully designed to deliver benefits to a permanent organization or some stakeholder through complex problem-solving processes [11]. The project is a temporary endeavor that has a start and end date so that it is implemented to create a unique product within specific restrictions and ends when the goals set for it are achieved. The following must include a unique, non-recurring endeavor, so that the start and end times are set, in addition to the methods of inception and delivery of the project in a clear and specific manner, and it is implemented. In a temporary team, the presence of a project manager is the one who is responsible for the success or failure of the project, its goals, and the objectives that must be achieved in a previously agreed upon manner [12]. Project management: It is the main system for starting work in terms of planning, implementing, monitoring, and controlling all events and activities related to the project by working with the project team to achieve specific project goals and requirements for success. Project management includes defining requirements, setting achievable goals, and balancing the competing demands for quality, scope, time, and cost, as well as adapting specifications, plans, and approaches to the different interests and expectations of stakeholders [13]. Project quality management: It is the process that helps to ensure that the project will work to meet all the needs of the beneficiaries quality is defined within this field as the extent of commitment to providing and displaying the outputs of the project. According to the desire of the beneficiaries, quality is ultimately determined by them, as it represents fulfilling the pledge made by the project manager at the beginning in terms of delivery on time and its suitability to the circumstances and level of benefit from the project. This process is explained in the form of standards related to the project at the beginning of the negotiation stage between the project management and the beneficiary party [14]. Project quality management is a process that includes all management activities, to ensure the achievement of the quality policy, management responsibilities, and project objectives, through the processes of planning and quality improvement that are achieved through project quality assurance and control, quality planning, and improvement of project operation quality [15].

4.2. The relationship between knowledge management and improving project quality

With the rapid development in the business world, knowledge management has emerged as one of the modern topics that has gained great attention and has many different applications. Indeed, it has become one of the assets that organizations seek to possess and develop. Knowledge management within the organization is considered one of the most important features that distinguish the organization from others, as it effectively affects the organizational performance of employees the organization at all administrative levels. Its impact also extends to the nature of production in productive organizations and to the services therein. This implies an impact on the quality of goods and services and an impact on the satisfaction of customers and clients, who constitute the main nerve influencing the success of businesses of various types. The higher the quality of the products, the higher their value. People's lives become easier, and livelihoods increase. Then production will improve, and this cycle continues upward in the nation. The more competition increases, the more skilled the workers become, and the competition for the best among them increases. The markets flourish, the state's income improves, and people live in luxury [16]. Quality is considered as old as human civilization, and the concept of quality in those civilizations was precision and mastery. The quality of services began to occupy the mind of contemporary man, and it became the first function of any organization, an administrative philosophy and a way of life to enable it to continue in light of successive environmental changes, which made quality a weapon. Strategically to gain a competitive advantage. To grow and develop, quality management and achieving customer satisfaction have become an obsession for organizations, as customer satisfaction has become the focus of their attention. They are constantly researching and identifying the needs and expectations of the customer, and providing a service that achieves his satisfaction and loyalty to the organization that provides it, especially since the revolution in communications and information technology has enabled the customer to be able to differentiate between services according to his desires and choices. For the organization to be able to

improve the quality of its services or raise them further, it constantly needs to develop its equipment and tools for providing these services, such as the development of technological techniques, and the advancement of human knowledge, but all of this must be preceded by the development of its human resources, which is considered as evaluation. Performance is the first core to understanding the strengths and weaknesses, the needs for training and development, and ways to deal with those situations to improve the quality of the service produced [16]. Most studies and research today confirm the existence of a strong correlation between knowledge management, which is key to managing all projects and raising and developing the quality of projects. Commitment to this knowledge management will lead the organization to achieve all its goals from establishing this project, as project integration is important in management. Integration of the project's events and activities to ensure comprehensiveness in the use of project standards, and to achieve quality in all events and stages of the project, as it is not possible to estimate the cost of a specific activity or event without managing the project time and the quality of this activity. If quality is achieved in the project, regardless of the diversity and differences, the project is considered successful and is working to achieve the goals of the organization for which it was established. One of the most important factors for the success of any project is the project managers' keenness to apply cooperation and harmony and exchange experiences, knowledge, and information among the many diverse aspects of the project through the project life cycle. The importance of project integration management lies in its ability to provide all the elements necessary to complete the project promptly [17]. The close relationship between managing the project scope and raising the quality of the project cannot be ignored, as managing the scope in a good manner and correctly identifying the required project needs contributes to its success. This is done through international standards and foundations that were agreed upon in advance. This will work to achieve quality in all stages. The project's basic and subsidiary activities, including achieving quality in the project as a whole, which in turn leads to the success of the project and the achievement of the organization's goals. Many studies have confirmed the existence of a strong relationship between increasing project quality and project time management, as these studies have confirmed that success in achieving results cannot be recognized. It is estimated that only if these results are achieved within the required time limits, good time planning is considered one of the factors that lead to achieving stakeholder satisfaction with the project outcomes. If we manage the project time well, each activity will take sufficient time for completion and thus quality will be achieved in all project activities, the project will succeed and the organization's goals will be achieved [18].

There is also a relationship between project cost management and increasing the quality of the project, as good and correct cost management will lead to the completion of activities to the fullest extent, and this will prevent the completion of activities at the expense of their quality. This will lead to quality in the project as a whole and thus the success of the project and the achievement of the organization's goals. There is also a clear relationship between managing the quality of inputs and increasing the quality of the project. If the parts involved in completing the project activities are of high quality, the organization will achieve its goal of establishing that project, by obtaining high-quality outputs, and thus the success of the project and the satisfaction of all parties [17-20].

5. Results and discussion

The validity of the questionnaire was calculated by calculating the correlation coefficients for each axis of the independent and dependent variables separately. This method is used to verify the validity of the axes in measuring the variable to be measured as in Table 1.

Table 1. The correlation coefficients for each axis of the independent and dependent variables

Link		Generation	Storage	Distribution	Applied	Knowledge Management	Project Quality
Variables	Link	0.922	0.897	0.931	0.924	0.942	0.946
	moral	0.000	0.000	0.000	0.000	0.000	0.000
	No.	7	7	8	7	29	13

It is clear that all values are highly interconnected, and therefore it is noted that the current tool has clear constructive strength. Cronbach's alpha coefficient was calculated to measure the degree of reliability of the questionnaire in terms of internal consistency, which measures the percentage of variance of answers and the extent of reliability and internal correlation of the questionnaire questions. The test results are presented in Table 2.

Table 2. Cronbach's alpha coefficients

Link		Generation	Storage	Distribution	Applied	Knowledge Management	Project Quality	Total
Variables	Link	0.816	0.812	0.911	0.823	0.846	0.884	0.898
	No.	7	7	8	7	29	13	42

It turns out that the total value of Cronbach's alpha coefficient was 0.898, showing that there is a probability of 0.89% in obtaining the same results when redistributing for a second time at any time under the same society and surrounding conditions. Therefore, we say that the tool has the necessary capacity for final distribution. For the main hypothesis, there is no statistically significant relationship between knowledge management and project quality.

Table 3. Model of knowledge management and project quality indicators

Model Summary Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.872[a]	.761	.760	.29644

a. Predictors: (Constant) knowledge management

Table 4. The impact of knowledge management on project quality

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.302	.124		2.440	.016
	Knowledge Management	.902	.037	.872	24.083	.000

a. Dependent Variable: Project quality

It is clear from the results of the simple linear regression model that there is a statistically significant effect. An R-value of 0.872 indicates a clear, strong, positive relationship in prevalence. In addition, a coefficient of determination R2 of 0.761 indicates that 76% of changes in project quality can be analyzed with knowledge management, while 24% is due to various factors outside the scope of the current research. It is important to note that a sig value of 0.000 is considered lower than the usual level of opacity a=0.05, which means that the main hypothesis is rejected, and the one that denies it is accepted. In other words, there is a statistically significant relationship between knowledge management and project quality.

The first sub-hypothesis: There is no statistically significant relationship between knowledge generation and project quality

Table 5. Model of knowledge generation and project quality

Model Summary Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.792[a]	.627	.625	.37033

a. Predictors: (Constant), Knowledge generation

Table 6. The impact of knowledge generation and project quality

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.683	.148		4.603	.000
	Knowledge generation	.784	.045	.792	17.499	.000

a. Dependent Variable: Project quality

It turns out that the model used has good significance, based on the R-value of 0.792, which indicates an acceptable and clear correlation in the spread. In addition, the R2 value of 0.627 indicates that 62% of the changes in project quality can be directly explained by knowledge generation, while 38% of them are explained by various reasons outside the scope of the current research. On the other hand, it is clear from the results that a P-value of 0.000 indicates rejection of the existing hypothesis in its current form and acceptance of its opposite. Based on this, we can conclude that there is a statistically significant relationship between knowledge generation and project quality.

The second sub-hypothesis: There is no statistically significant relationship between knowledge storage and project quality.

Table 7. Knowledge storage model and project quality

Model Summary					
Model	R	R Square	Adjusted R Square		Std. Error of the Estimate
1	.834[a]	.695	.694		.33477

a. Predictors: (Constant), knowledge storage

Table 8. The effect of storing knowledge on the quality of projects

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.531	.135		3.938	.000
	Knowledge storage	.829	.041	.834	20.383	.000

a. Dependent Variable: project quality

It is clearly shown that the significance required to represent the model is present, based on the R-value of 0.834. This value indicates that there is some acceptable correlation with a positive spread at the same time. In addition, the R2 value of 0.695 shows that 69% of changes in project quality can be mainly explained by knowledge storage, while 31% can be explained by various causes outside the scope of the current research. On the other hand, it turns out that the Sig value of 0.000 indicates rejection of the hypothesis presented in its current form, meaning that there is a statistically significant relationship between knowledge storage and project quality.

The third sub-hypothesis: There is no statistically significant relationship between knowledge distribution and project quality.

Table 9. Knowledge distribution model and project quality

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.872[a]	.760	.759	.29714

a. Predictors: (Constant), Knowledge distribution

Table 10. The impact of knowledge distribution and project quality

Coefficients[a] Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.406	.120		3.391	.001
	knowledge distribution	.871	.036	.872	24.007	.000

a. Dependent Variable: Project quality

The applied model indicates significance, based on the R-value of 0.872. This value indicates the presence of acceptable correlation and positive spread at the same time. In addition, the R2 value of 0.760 shows that 76% of the variations in project quality can be explained by knowledge distribution, while 24% can be explained by various other reasons. In addition, a Sig value of 0.000 indicates that this hypothesis is rejected, and its contradiction is accepted, and thus there is a statistically significant relationship between knowledge distribution and project quality.

The fourth sub-hypothesis: There is no statistically significant relationship between the application of knowledge and the quality of projects.

Table 10. Model of knowledge application and project quality

Model Summary Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.864[a]	.746	.745	.30556

a. Predictors: (Constant) knowledge application

Table 11.The impact of applying knowledge on the quality of projects

Coefficients[a] Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.433	.123		3.518	.001
	knowledge application	.863	.037	.864	23.133	.000

a. Dependent Variable: Project quality

It is clearly shown that the chosen model has a significant representation, based on the R-value of 0.864. This value indicates the presence of an acceptable correlation and positive spread simultaneously. In addition, the R2 value of 0.746 shows that 74% of the changes in project quality can be explained by the application of knowledge, while 26% can be explained by various reasons. On the other hand, it was found that the P-value of 0.00 indicates rejection of the hypothesis, and the following is accepted, which states that there is a statistically significant relationship between the application of knowledge and the quality of projects.

Knowledge management as well can make the project quality enhanced more and more as in cloud computing, IoT, fog computing, e-government, projects documentations of microstrip filters and antenna in communication applications using by which it is easy to share the expertise, best practices and lessons learned. Through smart application of knowledge, organizations can spark innovation, enhance decision-making, and result in the successful completion of projects in these key areas [21-31].

6. Conclusions

For knowledge generation, management is still not sufficiently interested in motivating its employees and pushing them to show new, distinct, and creative ideas from other competing organizations. The role of creative people is limited to developing new products and improving the administrative and organizational aspects of work. The respondents confirm that project management does not seek to pay attention and give the necessary role to creative and distinguished human cadres, through their participation in the decision-making process or the development of future strategic plans in the necessary manner. The management's focus is still limited to the role of the distinguished in improving the services and products provided or focusing on presenting new creative ideas that distinguish the organization from other competitors in the markets. For knowledge storage, the administration focuses well on collecting and classifying data and using information technology and cloud computing means to maintain this data, as the goal of this is to benefit from the benefits of central data. The administration pays reasonable attention to obtaining experienced experts capable of extracting saved data and information, which enhances this interest by employing specialists with experience in the fields of analysis, strategy, and artificial intelligence. There is an acceptable impact of the process of analyzing and studying projects in improving the quality of projects submitted by the Ministry, as these results provide valuable insights and good strategic information that helps in making decisions. The administration emphasizes well the importance of providing the necessary information to all departments that contribute to improving the efficiency of the projects undertaken by the ministry, which reflects this good vision of the administration regarding distributing the necessary information acceptably and effectively. The administration is interested in granting appropriate licenses to access previous data according to needs and competencies, as this interest reflects the good vision of the administration regarding the necessity of facilitating access to valuable information. The administration emphasizes the adoption of modern technologies to distribute knowledge represented in data among the many departments. This emphasis demonstrates the management's strong vision and orientation towards innovation in the use of modern technologies. The application of knowledge contributes to creating new knowledge through educational processes, whether individually or in teams. Through the application of knowledge, existing knowledge and personal experiences are used to create concepts and solve problems. Modern technologies and knowledge have an acceptable impact in enhancing the efficiency and quality of projects in the Ministry, as advanced systems and technological tools can be used to improve the performance and management of projects. For project quality, management focuses on exploiting advanced technologies in the context of working well to achieve cost reduction goals, as modern technologies are used to analyze operations and identify areas that require improvement. The administration focuses on using modern technical models and standard methods as tools to measure the quality of projects in the Ministry, as this includes the use of analysis techniques and advanced standard measures to evaluate the performance of projects and determine the extent to which they achieve the specified standards.

6.1. Recommendations

- The culture of participation and continuous learning must be encouraged and enhanced among members of the project teams and employees in the Ministry of Construction and Housing. This can be achieved by creating virtual knowledge-sharing platforms and organizing internal workshops and training sessions.
- A central database should be created to store previous projects and related information, including experiences, analyses, and lessons learned. An appropriate content management system can be used to ensure organization and ease of access to information.
- Communication and knowledge exchange should be enhanced between project teams within the Ministry of Construction and Housing, whether through regular meetings or the use of electronic communication means. Employees should be encouraged to share knowledge and experiences gained by providing platforms for communication and interaction.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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