

## PROVIDING THE OPTIMAL FRAMEWORK OF KNOWLEDGE MANAGEMENT IN CONSTRUCTION PROJECTS WITH META SYNTHESSES AND SHANNON ENTROPY METHOD

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### ABSTRACT:

Lack of knowledge management in construction projects leads to knowledge dispersion and loss of organizational learning. In this study, we try to provide a clear and comprehensive picture of feasibility and deployment of knowledge management in construction projects using Meta syntheses and Shannon entropy methods. Using the meta syntheses method, 475 books and articles were studied in the field of knowledge management and by content analysis, the conceptual framework suggested in this study consist of 62 components or codes and 14 concepts in four categories or dimensions were organized and extracted. The identified dimensions are: manpower resources, structure, infrastructure, and strategy that each of them explains what, how and why knowledge management is in project-based organizations. Based on findings, crisis management codes in recruiting, rules and regulations, holding meetings to incorporate knowledge, documenting experiences, trust in teamwork, the existence of knowledge software for employee communication (dynamic engagement), use of documents in order to incorporate knowledge and care for individual development in the teamwork have the highest importance coefficients and highest rating among the codes meaning that in the field of feasibility study and effective deployment of knowledge management in construction projects these topics are more considered and studied.

### 1. INTRODUCTION

Knowledge should be regarded as one of the most important sources of competitiveness over the last two decades (Pemsel and et.al., 2016). Knowledge and knowledge processes are the most important assets and learning is one of the most important organizational capabilities that provide the necessary context for the development and improvement of business performance. Accordingly, successful organizations constantly invest in the field of learning and acquisition of new knowledge as a means of improving performance and protecting their competitive advantages (Imran Ali and et.al, 2018). According to the necessity of leading growing investors in the field of knowledge management and exploiting its strategic advantages in order to create new avenues for development and organizational innovation in recent years, another approach has been proposed to underscore the coordination of knowledge processes involving the

creation, integration, sharing and use of knowledge with macro-objective organizational goals through a set of structures and mechanisms (Foss, 2013).

Although knowledge management is recognized as a new research and applied field, it still recognizes some theoretical and empirical gaps that can be traced to the influence of different organizational structures in choosing the procedures and mechanisms of knowledge management (Pemsel & Müller, 2012). This is particularly important in construction projects because from one side the structure of many modern organizations has a project in nature. On the other side, the temporal nature of projects along with distinctive values and processes of different learning and knowledge in each of them greatly increases the degree of dynamics and flexibility of these structures, causing knowledge processes, organizational learning and competences in most of them face a serious challenge (Pemsel and et.al, 2018).

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However, despite the significant potential to improve knowledge and learning processes in construction projects, the challenges facing such organizations are not addressed adequately in knowledge management approaches and existing procedures are inappropriate or inadequate to cover knowledge processes in project based organizations (Pemsel and et.al., 2014), (Swan & Scarbrough, 2010). Accordingly, a detailed review of the concept of knowledge management and its different dimensions in construction projects was considered as the main issue of this study.

## 2. THEORETICAL FOUNDATIONS

### 2.1. Knowledge Management

Knowledge management is an indication of activities and processes of an organization that is guided by improving the effectiveness and efficiency of knowledge resources aimed at releasing the intellectual potential of the organization. The importance of knowledge management for organizations is clear and its contribution towards provision of services and production, thus improving the organizational performance, is the key to the competitiveness of the organization (Saqib, 2017). Knowledge management allows organizations to effectively plan, create and organize, using the knowledge resources of employees to incite them.

### 2.2. Knowledge Management in Construction Projects

In most project based organizations, the temporary property of projects causes the weakness of memory, neglect of valuable experiences and lessons learned and causes them to work again, increase time, cost and waste of resources (Zainpour & Asadi, 2011). It is known that most of the problems faced by projects have a common and repetitive form, and if projects beyond their achievements have become a base for knowledge integration that they have in their organization, they will promote competency in their organization (Boh, 2007). The knowledge and experience from implementing projects is an important source for future projects, as projects can provide innovative solutions to conduct activities (Disterer, 2001). The temporary and customized nature of each project makes it difficult for an organization to learn and deploy knowledge capabilities from a project to another (Meyerson and et.al., 1996). Each project has customized and differs from other projects with other projects as projects are transient, a particular effort is required to be transferred between projects. Employees tend to start the next project and have no incentive to focus on past mistakes. However, joint failures among these projects occur that effective sharing of knowledge can reduce corporate costs, rework and find repetitive solutions. Firms that share knowledge successfully between individuals and projects have found that the ideas and experiences of a project can frequently address the problems of the other project (Davies & Brady, 2000).

The knowledge produced from a project can be included in two categories: The best way to learn about how to perform tasks in the most efficient way and negative learning that have been achieved from pernicious methods and the slow pace of project progress. The ability to manage knowledge and "perform repetitive tasks" produced from projects

(which include the knowledge of the project and subsequent transmission), not only can help prevent the replication of similar errors, but also as a basis for creativity and general improvement. The knowledge and especially learned lessons practically comes from both positive learnings and the mistakes that have cost for the organization. Nevertheless, recent evidence suggests that knowledge acquisition ability is critical during the project, but it is difficult to achieve (Kamara and et.al, 2003).

In a project, everyone knows only a part of the entire project story (Cross & Baird, 2000). The knowledge created in a project is fragmented in the memory of all members of the project team, but there is no complete set of knowledge created and maintained. However, the success of post project is often undermined by lack of adequate time to lead them, as some team members may be transferred to other parts and engage in new projects. The re - appointments of individuals or even the entire project team are carried out from the project to the other in line with the transfer of knowledge gained. This will make organizations vulnerable when the rate of manpower resource is high (Kamara and et.al, 2003). Project team members have less desire to share knowledge and this could arise from commercial sensitivities, company constraints regarding information and knowledge sharing as well as the fact that associate organization in a project may actually be competing in other cases (Barson and et.al, 2000).

The knowledge map is defined as a tool or means to be aware of existing intellectual assets identify and track the position and relationships among these assets in the organization and as a result the knowledge mapping process is achieved. Hence, providing an illustration of the status quo of knowledge assets of an organization ranging from implicit and explicit prior to the design and implementation of knowledge management plans is a fundamental and fundamental step (Yasin & Egbu, 2010). Drawing of knowledge map is a necessary prerequisite for any knowledge management initiative. The process of drawing the knowledge map is first made by deciding which particular field to do the job and what is the goal of mapping knowledge as well as determining the level of detail of the knowledge map. The knowledge mapping involves the use of different approaches. Based on these approaches, a variety of knowledge maps can be drawn, including a competency map, such as a list or chart of existing professionals, a conceptual map, such as a map of key concepts, strategy map, such as the organization or group goals, the causal map, such as maps of the project processes and the cognitive map, such as maps of the research or work (Zainpour & Asadi, 2011), (Habibpour-Gabbati & Safari Shali, 2015).

The balance among approaches is very important, and the amount of knowledge assets on each category will vary depending on the importance of each approach (Habibpour-Gabbati & Safari Shali, 2015).

## 3. LITERATURE REVIEW

Concerning the diversity and prevalence of studies conducted in the field of knowledge management and the models presented in regard to this issue in international fields, the study of Oufkir, Fredj, & Kassou at the University

of Morocco can be made in 2017 by presenting an article entitled "Performance Measurement for Knowledge Management: Design of the Reference Model" by examining knowledge management models that satisfy performance measurement requirements. This research discusses two issues: First, designing a reference model with emphasis on quality assessment can be an important step towards existing models and Second, filling the gap of literature related to performance measurement and model proposal that can assess all knowledge management models.

Another research entitled "The Impact of Knowledge Management on Organizational Performance in Today's Economy" conducted by Saqib, Zulkifli and Nazim, in 2017, Although the goal of each organization is the ability to grow and ensure that the capital returns to its stakeholders, the prerequisite of achieving this goal is superior to the organizational performance.

These researchers have considered knowledge management as one of the most important determinants in organizational performance in today's economic conditions. In this paper, researchers have been exploring the models of knowledge management in Siemens in the field of communications, HSBC Bank in the banking and banking sectors, and the results of their studies show that these organizations have achieved benefits such as upgrading and improving effectiveness, improving communication, recording and documenting knowledge, using new and creative approaches to knowledge transfer, reducing the time of carrying out processes, and understanding faster in responding to environmental changes.

Research as the "Development of Knowledge Management Capabilities: Structured Methodology" in 2010 by Sanda Valia and Darren Dalcher with the purpose that knowledge management needs to develop capabilities to accelerate knowledge as an organizational resource in a systematic way, research results showed that when organizations implement knowledge management, knowledge management infrastructure and processes are developed. The results also showed that knowledge management infrastructure (information technology, organizational structure, organizational culture, etc.) and knowledge management processes (knowledge acquisition, knowledge distribution, knowledge storage and application of knowledge) have progressed uniformly, from the beginning to an advanced organizational state. In related to investigating the factors influencing knowledge management, Zheng Wei & et.al. (2010) in a research on the topic of "Linking Organizational Culture, Structure, Strategy and Organizational Effectiveness: Mediating Role of Knowledge Management" resulted in organizational culture having a positive effect on organizational effectiveness after strategy and structure and addition to this knowledge management as an intermediate role of organization and culture.

In another study Lindler and Wald, (2010) studied the impact of organizational, structural, cultural, and organizational factors on the success of knowledge management in the organization, according to a study conducted on a study on the 414 projects of the German project based organizations of various industrial, construction, information technology, using

The least squares method. The statistical population of their research has been to managers, employees and staff on their projects and their websites. They concluded that along with the information technology support factors, cultural factors in the organization have a significant effect in the success of knowledge management. Cultural factors also cover and compensate for the lack of traditional organizational practices and organizational memory.

After the study of previous studies, it was found that each of the studies has studied different aspects of knowledge management, but none have provided an optimal model or model of the feasibility and effective implementation of knowledge management in project - based organizations. Providing a comprehensive model of human resource dimensions, infrastructure, structure and strategy for feasibility and deployment of knowledge management is a way of differentiation and aspect of research innovation.

#### 4. RESEARCH METHODOLOGY

To identify and rank the dimensions and concepts of knowledge management in development projects, first by referring to the literature of different models presented in the field of knowledge management and then by identifying the dimensions, components and indices proposed in the studied models meta synthetic method is used in order to compare, interpret, translate and integrate them. Also after analyzing and combining the findings of the previous researches, the results are ranked by applying Shannon's entropy method.

##### a. Meta Synthetic

Since knowledge management models are generally presented with a qualitative approach, Meta synthetic method is a good way to obtain a comprehensive integration of knowledge management models based on the translation of vast qualitative studies.

Nobelt Hare (1998) presents the main phase, selection of studies, translations fusion, and integration for the Meta synthetic method. In this study, the seven steps of Barros and Sandelowski (2007) in Meta synthetic method which is summarized in Figure 1.

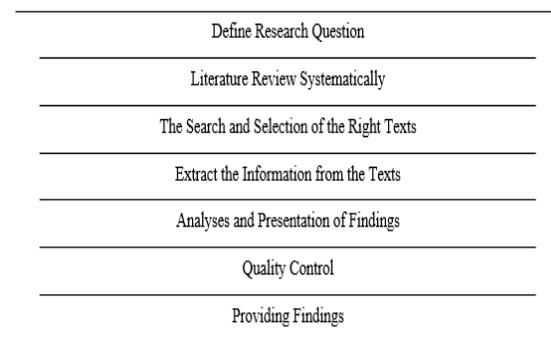


Figure 1. Meta Synthetic Steps

A) Define Research Question

In Table 1, the research questions along with the parameters are expressed.

Table 1. Parameters and Research Question

Parameters	Research Question
What	What factors include feasibility elements and the deployment of knowledge management in construction projects?
Who	What importance and weight for each of the components are in the feasibility and deployment of knowledge management?
When	How is the implementation of the knowledge management in construction projects?
How	

B) Research Literature Review

At this stage articles and books were identified by using key words like knowledge management, feasibility and deployment of knowledge management in Elsevier information banks and Scientific Information Database and 475 articles and books have been found.

C) The Search and Selection of the Right Texts

After reviewing the books and articles and given subject, questions and purpose of the research, 150 titles of articles and books were selected for study and review. In the next step, the articles and books selected and through them 123 articles and appropriate books were selected for information extraction.

D) Extract the Information from the Texts

In this stage, appropriate research articles and books for extracting information were studied and extracted from among the different feasibility models and knowledge management deployment as codes for investigation. According to the literature selected for the study, 123 knowledge management models were identified and based on them in four dimensions of human capital, structure, infrastructure, and strategy were categorized and extracted in literature.

E) Analyses and Presentation of Findings

In this study, first for all the factors extracted from previous studies, code was considered and then we classified them in a similar concept by considering the concept of each code. In this way, the concepts of research were determined. For example six issues of discipline, Additive Property, Crisis Management, Proficiency, Monitor Ability and Adaptation that have had a high frequency of iteration in the previous studies were considered as six choice codes, considering that at the level of man power resource in the organization, the concepts of the core knowledge approach were considered in the recruitment and implementation together with empowerment, they formed the level of knowledge, motivation, knowledge, teamwork, and knowledge culture. Analyses were conducted using content analysis method on

123 articles and final books, with a total number of four categories, fourteen concepts and sixty two codes for feasibility components and knowledge management deployment in this study were found and labeled. The results of this step indicate that in previous studies, such a systematic study has not been carried out and any of the studies were considered only in a specific aspect of the feasibility study and the deployment of knowledge management and the multiple dimensions were not considered coherent in the framework of a systematic framework. In Table 2, the final codes relating to each category and concept are shown in Figure 2.

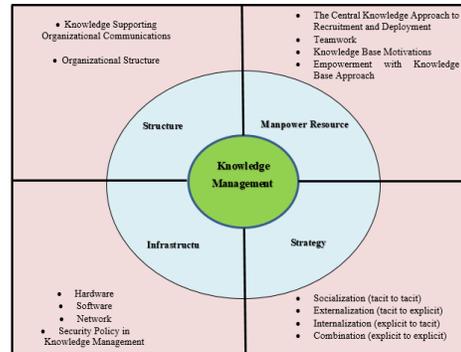


Figure 2. Conceptual Model of Research

Table 2. Classification of Research Findings

Category	Concepts	Code
<b>Manpower Resource</b>	The Central Knowledge Approach to Recruitment and Deployment	Discipline, Additive Property, Crisis Management, Proficiency, Monitor Ability, Adaptation
	Empowerment with knowledge base approach	Teaching Knowledge Management Bases, Teaching to Use a Knowledge Management System, Problem Solving and Creativity Trainings, Teaching Knowledge Transfer Methods, Employee's Participation in Training Inside and Outside the Organization, Use of Teacher Training System
	Knowledge Base Motivations	Reward for Self Education, Group Rewarding, Reward for Creativity and

Category	Concepts	Code
		Innovation, Reward for Knowledge Creation, Reward for Transfer of Knowledge
	Teamwork	Trust, Mutual Understanding, Personal Development, Conflict Resolution, Collaborative Decision Making, Clear Leadership, Obligation
Structure	Knowledge Supporting Organizational Communications	Communication Style, Communication Channel, Communication Path, Communication Content
	Organizational Structure	Trust Based Relationship, An External Interaction Relationship, A Pervasive Emotional Relationship
Infrastructure	Hardware	Knowledge Management Tools and Systems, Technical Maturity, Computers, Hardware Availability
	Software	Quick Information Search, Employee Communication (Dynamic Interaction Creation), Decision Making Tools and Software, Tailored to the Needs of the Users, User Friendly
	Network	Popularity of Technological Tools (Internet and Intranet), Access to Network

Category	Concepts	Code
Strategy	Security Policy in Knowledge Management	Users, Information, Rules and Regulations, Maintenance
	Socialization (tacit to tacit)	Career Rotation, Conferences, Brain Storm Sessions, Meetings, Team Issues
	Externalization(tacit to explicit)	Modelling and Prototyping, Documenting Experiences
	Combination (explicit to explicit)	Cellphones, Documents, Meetings, Providing New Articles
	Internalization (explicit to tacit)	In-Service Trainings, Learning Through Observation

A) Quality Control

The kappa index is used when two bidders rank the respondents and plan to measure the degree of agreement between the two voters (Gholizadeh, 2010). To control the extracted concepts, it has been used to compare the researcher's idea with an expert's idea. The kappa index varies between 0 and 1, and the closer the measure is closer to the number one, it represents a greater agreement between the number of voters (Mohaghar and et.al, 2013). Using spss22 software, there were significant numbers of 0.000 and index values of 0.672 that had been calculated, as shown in Table 3. According to the smaller number of 0.05 the assumption of independence of the extracted codes is rejected. Then, it is possible to claim that the codes have a proper reliability.

	Value	S.d.	Sig.
Kappa Amount of Agreement The Number of Valid Items	0.672	0.068	0.000
	62		

Table 3. Values of Agreement

b. Analysis of Findings

Content analysis is a stage of the information process by which the content of communication using the application of a set of classified rules and it becomes encapsulated and comparable to the data.

Shannon entropy method makes data processing very strong in the content analysis. Entropy in information theory is an indicator of uncertainty quantification, which is expressed by a probability distribution. There are several methods for determining the weight of indicators; one of the best of these methods is Shannon entropy (Azar and et.al, 2009). In the Shannon entropy method, the message is first counted in terms of categories to fit each respondent in a frequency format. The importance of each category is then calculated using the information overload of each category. In this study, Shannon entropy method has been used because of its power and the simplicity of computation. Based on this, the support level of the previous researches has been shown to be statistically significant. The relationship between 1 and 6 is used to compute the reliability and importance coefficients, respectively.

$$\text{Equation 1: } E_j = -S(P_1, P_2, \dots, P_n) = -K \sum_{i=1}^m [P_i * \ln P_i]$$

K is fixed and applied in order that E<sub>j</sub> is between 0 and 1. E is calculated from the probability distribution of P<sub>i</sub> based on the statistical mechanism, and the amount of which is calculated if P<sub>i</sub> is equal to one another (i.e., P<sub>i</sub> =  $\frac{1}{n}$ ), maximum possible amount will be calculated.

$$\text{Equation 2: } -K \sum_{i=1}^n [P_i * \ln P_i] = -K \left( \frac{1}{n} \ln \frac{1}{n} + \frac{1}{n} \ln \frac{1}{n} + \dots + \frac{1}{n} \ln \frac{1}{n} \right) = -K \left( \ln \frac{1}{n} \right) = -K \times \ln \frac{1}{n}$$

K as a fixed value is calculated as follows.

$$\text{Equation 3: } K = \frac{1}{\ln(m)}$$

In order to use Shannon entropy, first the index model matrix, which will be the bulk of the components is formed and the following steps are:

A) First Step

According to the literature selected for the study, 123 model of knowledge management and feasibility of knowledge management were identified, and the concepts and codes described in table 2 were categorized by the four - pronged approach.

B) Second Step

The Frequency matrix of the collected information table is normalized using the equation 4:

$$\text{Equation 4: } P_{ij} = \frac{F_{ij}}{\sum_{i=1}^m 1 \dots 123} \quad (i= 1, 2, 3, \dots, m; j= 1, 2, 3, \dots, n)$$

C) Third Step

Entropy values of each component is calculated using normalized data and the Eq. 2.

D) After calculating the entropy values of each of the components and using Eq. 5, the values of uncertainty or deviation of the collected information are calculated.

$$\text{Equation 5: } d_j = 1 - E_j$$

Table 4 presents the computed entropy values and the uncertainty or degree of deviations from the information collected for each of the components.

E) Forth Step

At this stage the importance coefficient of each component in the deployment and feasibility of knowledge management is based on aggregated data using Eq. 6. is calculated. Table 4 shows the weight and rank of each of the components.

$$\text{Equation 6: } W_j = \frac{E_j}{\sum_{j=1}^n E_j}$$

Table 4. The Dimensions and Components of the Feasibility Models and the Deployment of Knowledge Management Based on the Four - Pronged Approach

Concepts	Code	Frequency	Entropy (E <sub>j</sub> )	Uncertainty (d <sub>j</sub> )	Weight factor (W <sub>j</sub> )	Ranking in Concepts	Total Rank
The Knowledge Based Approach to Recruitment and Deployment	Discipline	1	0.9916	0.0084	0.009	3	45
	Additive Property	4	0.9945	0.0055	0.0059	6	59
	Crisis Management	4	0.98	0.02	0.0219	1	1
	Proficiency	1	0.9894	0.0106	0.0115	2	30
	Monitor Ability	1	0.9936	0.0064	0.0069	5	53
	Adaptation	15	0.9917	0.0083	0.009	4	46
Empowerment with Knowledge Base Approach	Teaching Knowledge Management Bases	6	0.9913	0.0087	0.0094	4	42
	Teaching to Use a Knowledge Management System	6	0.9901	0.0099	0.0107	3	32
	Problem Solving and	13	0.9882	0.0118	0.0128	1	23

Concepts	Code	Frequency	Entropy ( $E_j$ )	Uncertainty ( $d_j$ )	Weight factor ( $W_j$ )	Ranking in Concepts	Total Rank
	Creativity Trainings						
	Teaching Knowledge Transfer Methods	7	0.9916	0.0084	0.0091	5	43
	Employee's Participation in Training Inside and Outside the Organization	9	0.99	0.01	0.0108	2	31
	Use of Teacher Training System	7	0.9921	0.0079	0.0085	6	49
Knowledge base motivations	Reward for Self Education	1	0.9949	0.0051	0.0055	5	61
	Group Rewarding	4	0.9849	0.0151	0.0163	1	14
	Reward for Creativity and Innovation	10	0.9912	0.0088	0.0095	3	40
	Reward for Knowledge Creation	1	0.9936	0.0064	0.0069	4	54
	Reward for Transfer of Knowledge	11	0.9906	0.0094	0.0101	2	36
Teamwork	Perception	2	0.9933	0.0067	0.0072	9	51
	Possession	1	0.9933	0.0067	0.0072	10	52
	Creativity and Cooperation	6	0.989	0.011	0.0119	5	28
	Trust	9	0.983	0.017	0.0184	1	5
	Mutual Understanding	2	0.9889	0.0111	0.012	4	27
	Personal Development	2	0.9842	0.0158	0.0171	2	8
	Conflict Resolution	10	0.9882	0.0118	0.0128	3	24
	Collaborative Decision Making	7	0.9902	0.0098	0.0106	6	34
	Clear Leadership	13	0.9906	0.0094	0.0102	7	35
Obligation	9	0.9908	0.0092	0.0099	8	38	
Knowledge Supporting Organizational Communications	Communication Style	1	0.9851	0.0149	0.0161	1	15
	Communication Channel	3	0.9866	0.0134	0.0144	2	20
	Communication Path	2	0.995	0.005	0.0054	4	62
	Communication content	8	0.9908	0.0092	0.0099	3	39
Organizational Structure	Trust Based Relationship	4	0.9945	0.0055	0.0059	3	60
	An External Interaction Relationship	5	0.9852	0.0148	0.016	1	16
	A Pervasive Emotional Relationship	5	0.9936	0.0064	0.0069	2	55
Hardware	Knowledge Management Tools and Systems	5	0.9907	0.0093	0.0101	2	37
	Technical Maturity	3	0.9921	0.0079	0.0086	4	48
	Computers	9	0.9919	0.0081	0.0087	3	47
	Hardware Availability	10	0.9887	0.0113	0.0122	1	25
Software	Quick Information Search	9	0.9888	0.0112	0.0121	5	26
	Employee Communication (Dynamic Interaction Creation)	10	0.9829	0.0171	0.0184	1	6
	Decision Making Tools and Software	1	0.9868	0.0132	0.0142	4	22
	Tailored to the Needs of the Users	10	0.9843	0.0157	0.0169	3	11

Concepts	Code	Frequency	Entropy ( $E_j$ )	Uncertainty ( $d_j$ )	Weight factor ( $W_j$ )	Ranking in Concepts	Total Rank
Network	User Friendly	9	0.9842	0.0158	0.0171	2	9
	Popularity of Technological Tools (Internet and Intranet)	10	0.9892	0.0108	0.0117	2	29
	Access to Network	2	0.9859	0.0141	0.0153	1	18
Security Policy in Knowledge Management	Users	2	0.9865	0.0135	0.0146	3	19
	Information	1	0.9844	0.0156	0.0168	2	12
	Rules and Regulations	2	0.9797	0.0203	0.0219	1	2
	Maintenance	3	0.9916	0.0084	0.0091	4	44
Socialization (tacit to tacit)	Career Rotation	2	0.9937	0.0063	0.0068	4	57
	Conferences	1	0.9938	0.0062	0.0067	5	58
	Brain Storm Sessions	5	0.9841	0.0159	0.0171	1	10
	Meetings	1	0.993	0.007	0.0076	3	50
	Team Issues	7	0.9845	0.0155	0.0167	2	13
Externalization (tacit to explicit)	Modeling and prototyping	1	0.9901	0.0099	0.0107	2	33
	Documenting Experiences	9	0.9825	0.0175	0.0189	1	4
Combination (explicit to explicit)	Telephone Calls	1	0.9855	0.0145	0.0157	3	17
	Documents	1	0.9832	0.0168	0.0182	2	7
	Meetings	7	0.9797	0.0203	0.0219	1	3
	Providing New Articles	9	0.9936	0.0064	0.0069	4	56
Internalization (explicit to tacit)	In-Service Trainings	1	0.9912	0.0088	0.0095	2	41
	Learning Through Observation	7	0.9867	0.0133	0.0144	1	21

Based on the coefficients obtained in Table 4, it was found that crisis management codes in the uptake, rules and regulations, holding meetings to integrate knowledge, trust in teamwork, documentation of experiences in order to externalization knowledge, trust in teamwork, existence of a software for employee communication (dynamic engagement), use of documents to incorporate knowledge and care for individual development in team work have the highest importance coefficients and the highest rank among the codes. In this sense that in feasibility study and effective deployment of knowledge management in construction projects, these topics are more studied and have more reproducibility than other codes. Therefore, it can be said that paying attention to these dimensions in feasibility and effective deployment of knowledge management in construction projects is very important.

### 5. RESULTS AND DISCUSSIONS

Based on the findings of this study, for the feasibility and establishment of knowledge management in construction projects, the dimensions of man power resources, structure, infrastructure and strategy should be considered. According to past experience and studies, the final pattern of this study is a suitable way of feasibility and effective deployment of knowledge management. Among the 62 codes studied in this study, it was found that crisis management codes in the uptake, rules and regulations, holding meetings to integrate knowledge, trust in teamwork, documentation of experiences in order to externalization knowledge, trust in teamwork,

existence of a software for employee communication (dynamic engagement), use of documents to incorporate knowledge and care for individual development in team work have the highest importance coefficients. Therefore, the organizations must first consider the policy of security in knowledge management, integration strategy (explicit knowledge conversion into explicit knowledge), the knowledge-based knowledge approach in recruitment and employing, knowledge management strategy, knowledge management software, and team work. According to the final model of knowledge management in project based organizations, attention to some important points is suggested:

- 1- Special attention to existing laws and regulations as well as the legal requirements required in feasibility studies to deployment of knowledge management.
- 2- In developing knowledge strategies, we focus on documenting the experiences in combination strategies and also holding meetings and using knowledge documents in outsourcing strategy.
- 3- In the required infrastructure to implement knowledge management, the existence of appropriate software for employee communication (dynamic engagement) is required.
- 4- The existence of a knowledge plan and engagement in it to effectively implement knowledge management.

- 5- The assessment of knowledge activities of employees and to consider the rewards of knowledge tailored to these efforts.
- 6- Creation and retention of trust and personal growth for the success of teamwork.
- 7- The knowledge based approach to the recruitment and application of man power resource with special attention to the capability of team work and crisis management of the applicants.

However, the present study tries to explain the concept of knowledge management in development projects in a comprehensive manner, but it can be developed from different aspects.

Some of the suggestions for future studies in this area are:

- ✓ Scrutiny, completion and development of the proposed framework by using other qualitative methods of research.
- ✓ Focusing on studying and presenting effective implementation guidelines with centrality of structure and strategies in order to facilitate the movement of project oriented organizations on the path of implementation of knowledge management.

Moreover, some practical proposals in this area are as follows:

- ✓ The use of knowledge management solutions with emphasis on how micro and macro elements interact as a supplement of knowledge management initiatives in project oriented organizations.
- ✓ Identify the current approach of the organization in the field of knowledge management and design and explanation of the prospects for development.
- ✓ Selecting an effective structural framework to guide decision making in the field of knowledge processes.
- ✓ Examine the knowledge ecosystem of projects and attention to the key role of relational mechanisms of knowledge management.
- ✓ The erection of a continuous improvement cycle in the field of knowledge management.

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