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# Evaluation and System Dynamics Modeling of Knowledge Management Flows in Performance of Organizations: A Case Study in PADYAV Consulting Engineering Company

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## ABSTRACT

Sensible property like field, equipment, material, and machines are incisive and important for companies, while knowledge and mental are considered to be the preliminary fountainhead to integrate organizations. Knowledge management is describe as any practice of development, codifying, transfer and using knowledge to develop organizations. Knowledge management is focus on managing affirmative and negative knowledge practices in different types of operations, knowing modern tactics and new products, enhance human resource management, and perform number of purposes. Knowledge management flows includes generation, retrieval, sharing, and application. The great part of research attention has been given to the efforts in developing an evaluation model of knowledge management flows and the variables excluded from knowledge management flows acting and how they affect Companies efficiency by using system dynamics model and in a particular case of PADYAV consulting company.

**Keywords:** Knowledge management, Organization performance, Casual loop analyze

## 1. Introduction

Knowledge growth was very rapid in recent years, as far as in the twentieth century most of the technology and knowledge were produced and every year the volume of knowledge will be increase rapidly. This trend continued in the present century by unbridled growth of knowledge, however, because of the advanced world of science this process has been accompanied by slower growth.

Accordingly in today's sophisticated world that we live in, that development creates new attitude to handle and manage of this growing in the name of knowledge management. Knowledge management is a modern, rational and argumentative term and has various description. The

American Productivity and Quality Center defines knowledge management as the tactics and flows of identifying and capturing and sharing knowledge [1].

Knowledge management flows involve four sets. These sets are creation or generation, storage or retrieval, transfer or sharing, utilization application [2]. On the other hand consulting organizations are generally explained in terms of the knowledge severity of their goods or product. The specifications of a KBO go beyond product to include process and purpose [3]. Process implies the operations within a companies, some of them involved with generating a service and others that are auxiliary but no less significant and purpose implies the assignment and tactics of the companies.
The great part of research attention has been given to the efforts in developing an evaluation model of knowledge management in recent years. Relying on a case study, this research efforts in evaluating and modeling of system dynamics of a knowledge management flow in PADYAV Company as one of the prominent consulting companies in Iran. The basic purpose of our research is to inquire how the activities and acting in knowledge management flows and variables deprived from knowledge management flows act together and how they effect on companies performance and organization efficiency by using system dynamic model.

## 2. Literature Review

There are many definition of knowledge management in several literature. Davenport et al descript knowledge as admixture of framed experiment, avail and data. In organizations knowledge prepare not only in evidence, but also in organizational flow, workout and norms [4]. Most of researchers believe that Knowledge is a means by which people can gain new knowledge. Spek and Hoog face knowledge as a tool that can match with distinct or different characters. This approach is the same as object-oriented approach that use to identify and works with the existence of the organization accordingly in this approach the types of knowledge identified by the use of such properties [5].
Von Krogh believes that for organizational knowledge there are four key features. Uniqueness, Scarcity, being valuable and irreplaceable [6]. Due to this definition knowledge management aims at handling positive and negative exigent knowledge practices in several and different type of operations, produce modern services, enhancing management ability in organizations, and perform objectives and new purpose.
According to different researcher point of view, there are three to eight consecutive levels for knowledge management era. Lawson (2003) model tried to measure the knowledge management flow in the companies [7].
According to Nielsen (2006) knowledge management flow based on eight substantial activities. There are: knowledge creation, knowledge acquisition, knowledge capture, knowledge assembly, knowledge sharing, knowledge integration, knowledge leverage, and knowledge exploitation [8]. On the other hand one year later Zaim et al (2007) define a new definition of knowledge management flow. In that definition knowledge management flow contains four activities. These are: Knowledge creation and development, knowledge codification and storage, knowledge transfer and sharing, and knowledge utilization and application [9]. In the following we will illustrate these studies briefly.

### 2.1. Knowledge Development

Organizational knowledge development includes developing modern context within the organization. Knowledge development relates to the expansion of modern organizational knowledge in the companies. Actually Knowledge creation should be the center and heart of the organizational tactics and strategies [9].

### 2.2. Knowledge Codification

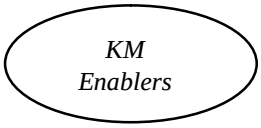
Alavi (2000) illustrated that knowledge developing is not sufficient and cycles in companies are needed to store accumulate knowledge and then recapture it when needed. The expression and meaning of organizational memory is the best solution of this opinion. In fact knowledge codification is connected to the organizational retention. It involves many factors like database in companies as electronic or papers, structured information, human knowledge, and methods that based in organization [10].
According to Probast et al (2000) there are several major activities for protecting knowledge: limited availability to some of the knowledge fountainhead by using ID and passwords, recognizing exclusive knowledge quickly, tacit and explicit knowledge protection and most importantly communicating the value of knowledge protection on massive firms [11].

### 2.3. Knowledge Transfer

Knowledge transfer implies total acting which are legislate, sharing, and catching the knowledge. Knowledge transferring gives an occasion to the companies to product competitive advantages from its finances in knowledge development. However, Szulanki (1996) claimed that Knowledge transfer is confide by lack of absorptive capacity of the recipient and relationship between the sender and receiver [12].

### 2.4. Knowledge application

Basic point in knowledge management is to make sure that current knowledge in an organization is allowed productively to profit the organization. The effective application of knowledge helps companies increase their efficiency and reduce costs [13]. Knowledge application involves utilization operation and problem solving which can eventually lead to knowledge development. Knowledge application may be the most important part in this flow. Since all the profits at the earlier stages such as acquisition and dissemination should gather within the framework of utilization flow and enable benefits for the firm [14]. In the following we illustrate these process by figure1.



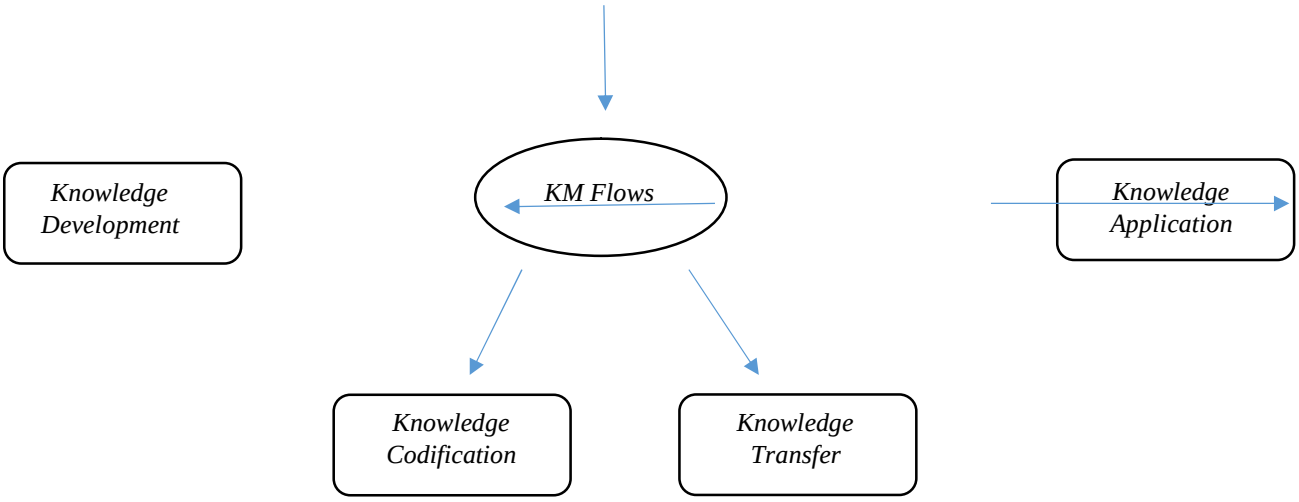



**Fig1.** Theoretical framework

## 3. Case Study

PADYAV Consulting Engineering Company is one of the authoritative construction consulting engineering company in Iran which start their activity since 2002 and they has been a member of Iran Consulting Society since May 2009. The scope of that company involves managing and leading architectural and civil projects in order to enhance quality and design. They have bright record in national, educational, sports, and medical projects. PADYAV is working on review initial design and provide consultation on their completion procedure as well as supervising the work at implementation phase.

The main goal of this study is to describe how the activities of knowledge management flows and the variables excluded from it acting with each other and how they affect organization performance by using system dynamics model that is illustrates in figure 1.

## 4- Methodology and Background Information

Our research study's focus is on generating theoretical vision by evaluating and modeling knowledge management flows and simulating its effects in a consulting organization by MATLAB and illustrate its by casual loop diagram and analyze.

### 4.1. System Dynamics

Jay Forrester the founder of system dynamics expanded system dynamics area by renaming system approach. Nowadays system dynamics is universal for extending and developing of intricate world. According to analyze a diversification strategy based on core and non-core commerce and perceive the management resources system, Morecroft (1999) has promoted systems dynamics model [15]. Also Winch (1999) focus on an inventory model to wield the skill management during the period of essential transformation [16]. In the long run, Warren (1999) illustrate tangible and intangible properties and wealth for system dynamic model [17].
System dynamics model is a means of analyzing the behavior of intricate socioeconomic systems to indicate how organization and policy affect behavior over time (Wankhade & Dabade, 2006) and it can be used as a tool [18].

### 4.2. Main steps in System Dynamics Modeling

This modeling has significant steps:

- Boundary selection
- Formulating of dynamic hypothesis.
- Formulating of model
- Testing the model by sensitivity analyze
- Evaluation

### 4.3. Causal Loop Analyses

Better Performance of system dynamics as a learning tool is understand the results and effect of reaction loops on dynamics system. Causal diagram is an incisive tool for organizing the feedback loops. Due to extend cause and effect relationship between variables of system, causal loop diagrams should be predicted as a tool [19].
These variables are linked by pointer to the causal impacts among variables. In this research we show positive and negative to illustrate affiliate variable change. The important issue is describing the loop identifier that indicates which loop is positive or negative. While the positive loop implies bolstering and the negative loop implies adjustment feedback. In the following we will describe Causal Loop Analyses by using figure2.

#### *4.3.1. The Activities of Knowledge Management Process and Other Variables*

In our research the variables we determined related to knowledge development that was taken from PADYAV consulting company as follows:

- Knowledge development as an outcome of fault when retention is done.
- Knowledge development as an outcome of sanitations.
- Knowledge development when in comparison with other companies.

- Knowledge development as an outcomes of reproduced regulations.
- Knowledge development after implementation of projects.
- Knowledge development through the conformity of innovations.

Knowledge codification is connected to the organizational retention. It involves many factors like database in companies as electronic or papers, structured information, human knowledge, and methods that based in organization. In our research the variables we determined related to knowledge generation that was taken from PADYAV consulting company as follows:

- Knowledge codification as hard document.
- Knowledge codification as electronically.

Knowledge transferring and knowledge sharing implies total acting which are legislate, sharing, and catching the knowledge. In our research the variables we determined related to knowledge generation that was taken from PADYAV consulting company as follows:

- Knowledge sharing as electronically
- Knowledge sharing as meetings
- Knowledge sharing as education

Knowledge application could be used as an effective term to enhance organization performance.

*4.3.2. Other Variables*

- Credits and Reliability
- Organization performance
- Defective rate of return after retention
- Organization business performance
- Acquiescence of Customers
- Profitability
- Productivity
- Retention cycle
- The cost of fragile an friable quality

### 4.4. Content of Supporting Loop in Casual Loop Analyze

S1: Supporting Loop

S1 loop is the supporting loop because of the positive result. That loop consist knowledge management flows by including knowledge development, knowledge codification, knowledge transferring, and knowledge application and organization services and efficiency. As knowledge development and knowledge generation becomes higher, knowledge storage, and sharing, and knowledge application increase depending on organizational structure. As it is seen in that loop firm efficiency e is affected positively by the acting of the knowledge management flows. Furthermore, this loop illustrates the relationship between the acting of knowledge management flows.

S2: Supporting Loop

This loop includes all activities of knowledge management flows. Credits and Reliability, organization Performance, defective rate of return after retention, organization business performance, acquiescence of Customers, profitability, productivity, retention cycle, and the cost of fragile an friable quality. It goes without saying that by increasing in productivity, organization efficiency also increases.

S3: Supporting Loop

S3 loop involves these variables that mentioned above as other variables:
Credits and Reliability, organization performance, defective rate of return after retention, organization business performance, acquiescence of customers, profitability, productivity, retention cycle, the cost of fragile an friable quality. Due to this loop, defective rate of return after retention will grow progressively less. It is obvious organization performance will grow high according to decrease defective rate of return after retention.

S4: Supporting Loop

Finally this loop consist these variables: knowledge development, knowledge codification, knowledge transferring, knowledge application, defective rate of return after retention, acquiescence of customers, and organization performance. This loop illustrates that an increase in acquiescence of customers causes the organization performance to makes better.

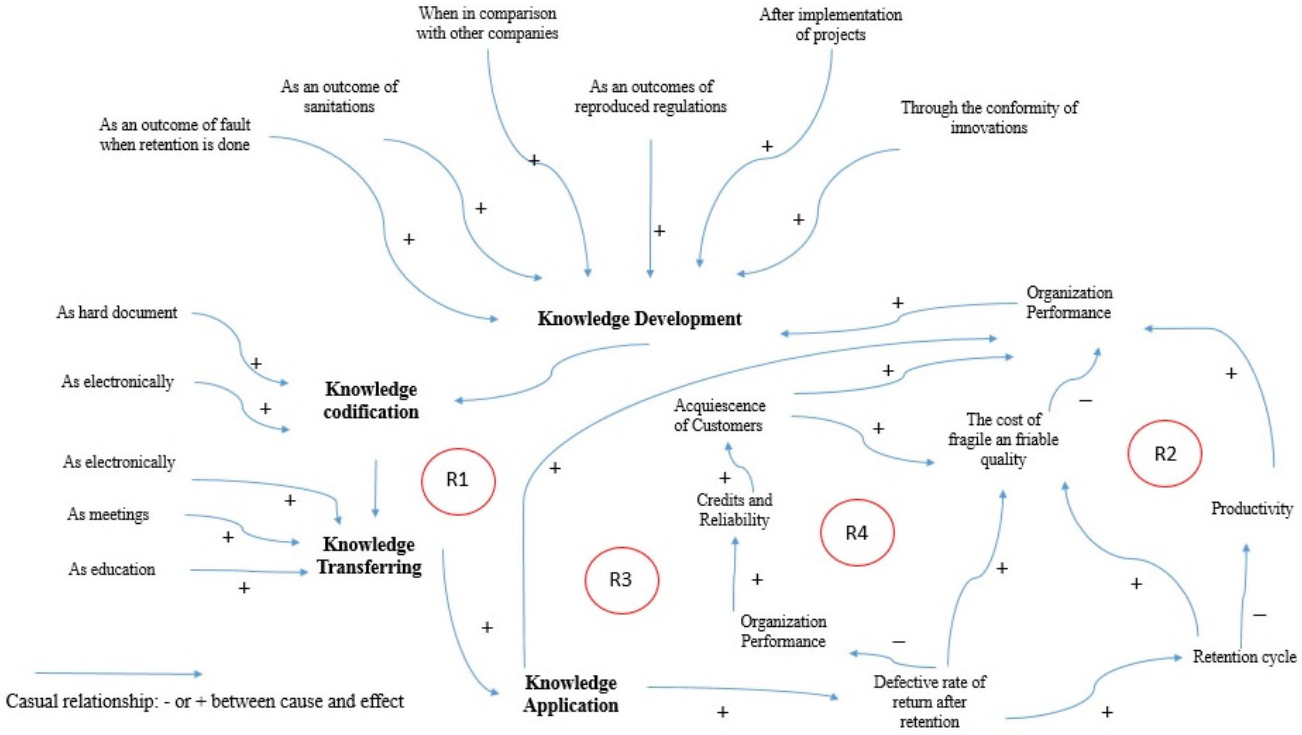



**Fig2.** Causal Loop diagram of knowledge management model

### 4.5. Simulating by MATLAB

The model simulated during twelve months by MATLAB and the result of simulation is to illustrate how knowledge management flows affects efficiency of business and organizational performance and it is obvious in Fig 3 that increasing organization performance during one year.

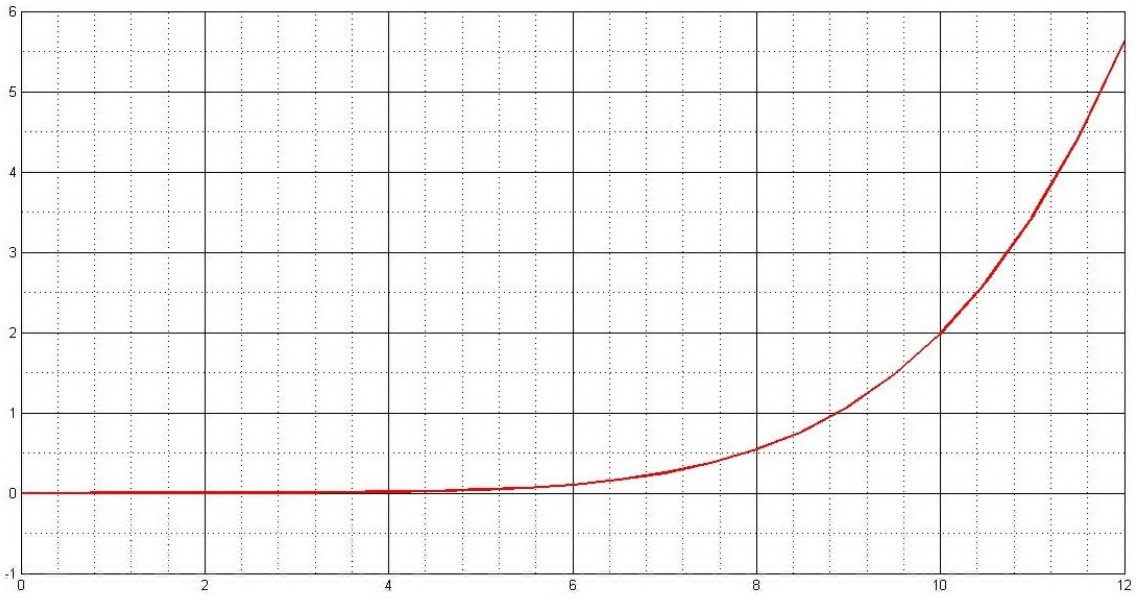



**Fig3.** Simulation Result

## 5. Conclusion

Knowledge management is focus on managing affirmative and negative knowledge practices in different types of operations, knowing modern tactics and new products, enhance human resource management, and perform number of purposes. Knowledge management flows includes generation, retrieval, sharing, and application. The great part of research attention has been given to the efforts in developing an evaluation model of knowledge management flows and the variables excluded from knowledge management flows acting and how they affect Companies efficiency by using system dynamics model. By using casual loop analyze we illustrate relationship between knowledge flows and its efficiency on PDYAV consulting company and we simulate it by MATLAB during one year. This research demonstrates that the activities of knowledge management flows have a positive relationship with each other and this flows helps organizations to develop and it results in better performance.

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