

Pathology of Barriers to Sharing Knowledge in Project Management and Ranking Them by AHP Method

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Abstract

Although knowledge management is a necessary part of strategic development of organizations, resources and improvement in competition, since it is always seen just as a temporary solution, most of related experiences have faced failure. Moreover since projects are mostly temporary and after they are done some of the main team members leave the company, this means the knowledge goes with them so this will cost future projects more money and time. In the present study we will try to find the main barriers for knowledge transmission and to rank them by statistical method of Analytic Hierarchy Process (AHP). In the end it comes to conclusion that despite the existence of the Project Management Body of Knowledge (PMBOK), it has been overlooked. The main barriers are the lack of organizational culture of preserving and sharing the knowledge and lack of trust and appreciation for using it throughout the company.

Keywords

Project Management, Knowledge Management, Knowledge Transmission in Project Management

1. Introduction

Through analyzing the importance of the role of knowledge in organizations, it is inevitably concluded that the accessibility to latest information and knowledge is vital to their survival. Particularly in this age of rapid changes and uncertainty, constant validation of the knowledge and information in the process of production and services is necessary and also vital [1].

Knowledge management is to explore the procedure of turning the individual and organizational data into individual and group skills so as to form an environment to share, transfer and counterfeit of knowledge between the members, because if this procedure is done correctly, it can improve company's performance [2].

In most project based organizations [3] [4], their passing effect makes their memory very short so they will soon forget the valuable experiences and lessons. In these types of organizations knowledge assets are not made use of and this will cost more time and money each time. Organizations are made to survive and last for a long time but projects are just temporary and this opposition will be harmful to the company, so here, knowledge management will come to picture to use the knowledge, information and experiences derived from these teams, as efficiently as possible as to avoid future losses.

The rest of this paper is organized as follow: in Section 2 the main knowledge sharing barriers (KSBs) have been introduced and the individual, organizational and technological KSBs have been explained respectively. The proposed research methodology applied in this work and the results have been presented and discussed in Section 3. Finally, Section 4 provides some final conclusions and directions for future work.

2. Knowledge Sharing Barriers

The most important barriers in transferring and sharing the knowledge, include:

- 1) Individual knowledge sharing barriers,
- 2) Organizational knowledge sharing barriers,
- 3) Technological knowledge sharing barriers.

These barriers have been discussed in more detail in [5]. According to the views of researchers, 10 items out of 27 have been used in order to be ranked by Analytic Hierarchy Process (AHP) method.

Due to the high volume of data caused a long processing-time, after consulting with several experts in the field (from both academy and industry), and active pioneer companies in the value engineering, the list was shorted from 36 to 10. This shortened list covered the most recommended factor, used in this study.

The main individual knowledge sharing barriers could be due to the lack of time to share knowledge or to identify colleagues that require a specific knowledge, lack of trust, fear of sharing, experience level differences, poor or inefficient communication, miscommunication, age barriers, differences in culture and social backgrounds, etc.

The main organizational knowledge sharing barriers also could be due to the poor leadership and management, lack of transparency, poor internal and/or external competitiveness, business scale, etc.

The technological knowledge barriers also could be due to the lack or weakness of IT system and process integration, poor communication, IT system and process incompatibility, lack of sufficient training, not being update about the new technologies, etc.

3. Proposed Research Methodology, Results and Discussion

The scope of this research is pathology, identification and ranking of the barriers which prevent knowledge from being transferred in projects with help of Analytic hierarchy process. In evaluating every subject, we are going to need a benchmark. A suitable benchmark can help us in the process of comparing between the alternatives. Although when we have different benchmarks, the process is going to be complicated and take a lot of time. In this process a simple evaluation tool is not going to be enough and there will be need for analytic hierarchy process in which we can compare different alternatives with different background.

The process includes four main steps as follow:

- 1) First step: forming hierarchy tree;
- 2) Second step: allocation of benchmark index and weighing the alternatives;
- 3) Third step: adding up the benchmark's indexes and alternatives weights;
- 4) Fourth step: compatibility test.

In AHP method benchmarks weight will be appointed by comparing two by two based on **Table 1**.

In present study, the following criteria are determined as the most important barriers to the sharing of knowledge.

- Apprehension of fear that sharing may reduce or jeopardize people's job security;
- External competitiveness within business units or functional areas and between subsidiaries can be high (e.g. not invented here syndrome);
- Lack of leadership and managerial direction in terms of clearly communicating the benefits and values of knowledge sharing practices;
- Existing corporate culture does not provide sufficient support for sharing practices;
- Insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes that would enhance individual and organizational learning effects;
- Differences in education levels;
- Not keeping skillful and experienced employee;
- Lack of transparent rewards and recognition systems that would motivate people to share more of their knowledge;
- Gender differences;
- Not welcoming new ideas, shortage of formal and informal spaces to share, reflect and generate (new) knowledge.

For pairwise comparison of above criterion, a questionnaire of 50 questions, includes five general questions and 45 questions based on the binary comparative barriers. The questionnaire was formed and distributed among nine well-experienced project managers. These people were selected among academic members from the faculties of Industrial Engineering and management with PhD degree in project management or knowledge management.

It should be noted that, naturally, there would be an uncertainty about the

Table 1. Pairwise comparison (Saaty's AHP).

| Definition | Weight Index |
|--|--------------|
| Equally important | 1 |
| Equally or slightly more important | 2 |
| Slightly more important | 3 |
| Slightly to much more important | 4 |
| Much more important | 5 |
| Much to far more important | 6 |
| Far more important | 7 |
| Far more important to extremely more important | 8 |
| Extremely more important | 9 |

preference weights, even though from specialists. This could be due to this fact that different specialists may have different preferences. So a sensitivity analysis was performed on the preference weights to provide measures for assessing the sensitivity due to changes in these weights. The performed sensitivity analysis was based on the work presented in [6] [7] [8].

After collection of the questionnaires, each question's weighted mean is gathered and the following matrix is formed.

The questionnaire has been prepared based on AHP [9] [10] and it is in Persian due to the comfort of the participants who all spoken Persian as their first language.

The five general questions covered:

- 1) Level of the education,
- 2) Field of study,
- 3) Field of activity,
- 4) Duration of experience on civil affairs operation,
- 5) Address and the name of the organization (optional).

The forty-five 45 binary comparative barrier questions covered the following issues:

- 1) The barriers to implement and use of the value engineering,
- 2) The importance of culture and enthusiasm/intention,
- 3) The importance of teamwork and optimization,
- 4) The team expertise/qualification impact,
- 5) The importance of level of risk ability and creativity,
- 6) The intention of creativity,
- 7) The employer's adaptability and the government role,
- 8) Time allocation,
- 9) The impact of knowledge on value engineering,
- 10) The lack of expertise,
- 11) Etc.

The next step is to calculate the relative weight of each criterion with help of geometric mean. In geometric mean, first the values of each column in **Table 2** are added and then the value of each pairwise comparison matrix is divided by

total of its column in order to calculate the normalized matrix of pairwise comparison, in the end geometric mean of each line in the normalized pairwise comparison matrix is calculated (Table 3).

As seen in Table 4, absence of culture of supporting sharing the knowledge is the most important barrier.

Calculating consistency ratio:

Now raises the question of how trusted this hierarchy is. To answer this question, consistency ratio is used. When ratio is $1 \geq C \cdot R$, the ranking can be trusted.

Consistency ratio is calculated by the following formula:

$$\lambda_{\max} = \frac{1}{n} \left[\sum_i^n (Aw_i) / w_i \right] \tag{1}$$

$$\lambda_{\max} = \frac{1}{N} \tag{2}$$

$$C.I = (\lambda_{\max} - n) \cdot (n - 1) \tag{3}$$

Table 2. Criterion weightmatrix (similar to [11]).

| critrion | m1 | m2 | m3 | m4 | m5 | m6 | m7 | m8 | m9 | m10 |
|----------|------|------|------|------|------|------|------|------|------|------|
| m1 | 1.00 | 5.00 | 3.00 | 1.00 | 2.00 | 4.00 | 5.00 | 5.00 | 3.00 | 4.00 |
| m2 | 0.20 | 1.00 | 0.50 | 0.25 | 0.25 | 0.50 | 1.00 | 1.00 | 0.50 | 1.00 |
| m3 | 0.33 | 2.00 | 1.00 | 0.50 | 0.50 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 |
| m4 | 1.00 | 4.00 | 2.00 | 1.00 | 1.00 | 3.00 | 5.00 | 4.00 | 2.00 | 3.00 |
| m5 | 0.50 | 4.00 | 2.00 | 1.00 | 1.00 | 3.00 | 4.00 | 4.00 | 2.00 | 3.00 |
| m6 | 0.25 | 2.00 | 1.00 | 0.33 | 0.33 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| m7 | 0.20 | 1.00 | 0.50 | 0.20 | 0.25 | 0.50 | 1.00 | 1.00 | 0.33 | 1.00 |
| m8 | 0.20 | 1.00 | 0.50 | 0.25 | 0.25 | 1.00 | 1.00 | 1.00 | 0.50 | 1.00 |
| m9 | 0.33 | 2.00 | 1.00 | 0.50 | 0.50 | 1.00 | 3.00 | 2.00 | 1.00 | 1.00 |
| m10 | 0.25 | 1.00 | 1.00 | 0.33 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Table 3. The normalized matrix (similar to [11]).

| critrion | m1 | m2 | m3 | m4 | m5 | m6 | m7 | m8 | m9 | m10 |
|----------|------|------|------|------|------|------|------|------|------|------|
| m1 | 0.23 | 0.22 | 0.24 | 0.19 | 0.31 | 0.25 | 0.20 | 0.23 | 0.24 | 0.24 |
| m2 | 0.05 | 0.04 | 0.04 | 0.05 | 0.04 | 0.03 | 0.04 | 0.05 | 0.04 | 0.06 |
| m3 | 0.08 | 0.09 | 0.08 | 0.09 | 0.08 | 0.06 | 0.08 | 0.09 | 0.08 | 0.06 |
| m4 | 0.23 | 0.17 | 0.16 | 0.19 | 0.16 | 0.19 | 0.20 | 0.18 | 0.16 | 0.18 |
| m5 | 0.12 | 0.17 | 0.16 | 0.19 | 0.16 | 0.19 | 0.16 | 0.18 | 0.16 | 0.18 |
| m6 | 0.06 | 0.09 | 0.08 | 0.06 | 0.05 | 0.06 | 0.08 | 0.05 | 0.08 | 0.06 |
| m7 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.04 | 0.05 | 0.03 | 0.06 |
| m8 | 0.05 | 0.04 | 0.04 | 0.05 | 0.04 | 0.06 | 0.04 | 0.05 | 0.04 | 0.06 |
| m9 | 0.08 | 0.09 | 0.08 | 0.09 | 0.08 | 0.06 | 0.12 | 0.09 | 0.08 | 0.06 |
| m10 | 0.06 | 0.04 | 0.08 | 0.06 | 0.05 | 0.06 | 0.04 | 0.05 | 0.08 | 0.06 |

Table 4. Final ranking of criterion.

| Criteria | Relative weight |
|---|-----------------|
| Existing corporate culture does not provide sufficient support for sharing practices | 0.23 |
| Insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes that would enhance individual and organizational learning effects | 0.18 |
| Lack of leadership and managerial direction in terms of clearly communicating the benefits and values of knowledge sharing practices | 0.16 |
| Differences in education levels | 0.08 |
| External competitiveness within business units or functional areas and between subsidiaries can be high (e.g. not invented here syndrome) | 0.08 |
| Not keeping skillful and experienced employee | 0.07 |
| Apprehension of fear that sharing may reduce or jeopardize people's job security | 0.06 |
| Not welcoming new ideas, shortage of formal and informal spaces to share, reflect and generate (new) knowledge | 0.05 |
| Lack of transparent rewards and recognition systems that would motivate people to share more of their knowledge | 0.04 |
| Gender differences | 0.04 |

Table 5. Random consistency index.

| | | | | | | | | | | | | | | | |
|-----|---|-----|----|-----|------|------|-----|-----|------|-----|------|------|-----|------|-----|
| n | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| R.I | 0 | 0.2 | .6 | 1.1 | 1.11 | 1.26 | 1.3 | 1.4 | 1.45 | 1.5 | 1.55 | 1.58 | 1.6 | 1.67 | 1.7 |

Random index: if the values in a matrix are acquired by random, then (n) is chosen from the **Table 5** of random index.

Based on the results, it has been observed that:

$$1 \geq CR \quad (4)$$

So the results are reliable and can be trusted.

4. Conclusion

Absence of culture of supporting sharing the knowledge is the most important barrier to sharing knowledge in accomplishing projects. Considering **Table 5**, elimination of these barriers can be done with regard to their priority. With elimination of these barriers organizations can save both time and money. Other benefits derived, are as follows: application of past experiences, preventing from future possible errors, motivating innovation and creativity in present projects and mental preparation of employees and engineers of future projects.

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