



Prioritization and analysis agility factors affecting the performance of project based organizations with Topsis technique

Elaheh Maghsoudi^{1*}, Hadi Shirouyezhad², Arash Shahin³

¹Department of Industrial Engineering, Najafabad Branch, Islamic Azad University, Isfahan, Iran
(maghsoudi67em@yahoo.com)

²Department of Industrial Engineering, Faculty of Engineering, Najafabad Branch, Islamic Azad University, Isfahan, Iran
(Hadi.Shirouyezhad@Gmail.com)

³Department of Management, Isfahan University, Isfahan, Iran (Shahinmailbox@yahoo.com)

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ABSTRACT

Uncertainly and change in the business environment has been a major topic in conducting research for long time. It seems that to recognize and classify the factors affecting organizational agility, need to specify the amount of their importance, because of knowing agility helps managers for better performance and success of their company. The purpose of this research is assessment and priority of drivers and capabilities agility that influence in performance of project based organization. The research data are collected through questionnaire and the research methodology is based on Topsis technique. Result of the study shows that between agility capabilities competency and between agility drivers change in competition basis have the most influence in performance of the organization.

1. Introduction

Today's organization operate in an environment that rapid changes make them have unpredictable environment is known as the most important challenges of today's organization. Although several mechanisms such as timely production, reengineering, virtual organization and

*Corresponding author name:

E-mail address: Hadi.Shirouyezhad@Gmail.com

virtual network have is one the most popular. In such an environment agility has become an important feature that has significant impact on employees' behavior and firm performance. The agility approach that has been introduced and developed since 2 decades ago is a conscious and comprehensive response to changing needs in competitive environment and obtaining success from the available opportunities (Chamanifard et.al, 2015). With regard to the dynamics of today's environment and the necessity of adapting to the environmental changes and the more important, the speed of this adaptation in gaining competitive advantage, the agility is inevitable. The organization can gain a consistent competitive advantage when is faster and more flexible in decision making, management and process. The employees and intellectual capital assets also make a safe organization for consistent success in a turbulence and uncertain environment on the other hand rapid variable demands and prospects of customers regarding price, quality and time of delivery of the goods or service, the competitive environment and the social and legal factors express the necessity of the organization agility (Jaffarnejad, 2012). There are a few organizations that can change their internal forces and control influential external forces. Although the absolute majority of the organizations have realized the vital role of rapid response to unstable market conditions, they have failed in their efforts to design their own new structure. Each company should be design as an agile organization in order to respond to the internal and external changeable condition (Tseng& Lin, 2011). Evaluation of Business performance is one of the main management agendas, because performance measurement is the element to improve organizational performance. In addition they are criticized for some reason such as encouragement of short-term perspectives, lack of strategic focus, inability to provide quality data, low level of responsiveness and flexibility, optimistic new encouragement, failure to provide information about what customers require and competitors' performance assessment (Yauch, 2011).

There are various definition of "successful organization" or high performance organization in the business literature. Most of them, have pointed out to features and progresses of high performance organization such as: desire financial results, staff and customer satisfaction, much more attempt of all people, profitability and creativity, equality of evaluation performance process with reward order and leadership style. So far this organization, all same aspects would be identified and combined. In accordance with D.Waal's view (2007) a successful organization which through desired competency. With fast reaction and change, foresight management, create of integrated managerial structure, constant improvement for key capabilities, and best behavior with their staff as the most important asset could achieve better financial result in compare with his rivals during a long time: in other words, some feature would be defined for successful organization. * It has a stable improvement which would be much more appropriate and better form his rivals groups financial performance during a time as minimum of 5-years-period.* It has strong ability in order to fast correspondence with environmental changes.* Management process are integrated and continuous so strategy, structure people in all part of the organization is in the same direction. * It has focused on improvement and renewing or continuous revival of all its key capabilities. * It has tried much more on the improvement and his working force progress.

In this study the influence of agility capabilities and drives factor that identified by Sharifi and Zhang priority then factor rank. For this purpose the information of questionnaire that distributed in 6 projects based organization in Isfahan with Entropy method weight then with using Topsis technique rank. The result of the study show that among agility capabilities,

competency and in agility drivers, change in competition basis have more result in the performance of the project based organization.

2. Background

Several researchers have studied about agility and effect its factor on the performance of the organization, etc. Table 1 expressed some related literature about this subject.

Table 1: background of research

Researcher/ Researchers	Year	Research	Conclusion
Banihashemi et.al	2010	Evaluation and ranking of agility capabilities in the Ghaen cement company	Result of research indicate that capabilities and abilities of company for achieving organizational agility is in the medium level and some more effort should be done in this field
Yauch	2011	The agility performance metric was developed by creating a theoretical model and then operationalizing the model through literature review	The agility performance metric is demonstrated using data from four manufacturing plants, which represent the four possible combinations of success and turbulence
Shirouyehzad & Dabestani	2011	Using Topsis for evaluating project with considering 16 CSF and priorities this factor in 5 different project	clear and realistic goals and program evaluation are the most important factor in project
De Oliveira et al.	2012	Using Bayesian Network model to analyze the influence of leadership style and factors associated with organization agility on project performance	It can use combination of leadership style, agility and organization factor to achieve high project performance
Ebrahimpour et al.	2012	Relationship between Agility Capabilities and Organizational Performance: a case study among Home Appliance Factories in Iran	The data analysis reveals that there is a significant positive relationship between agility capabilities and performance of the company in confidence level of 0.99
Jaffarngad et.al	2013	Apply Topsis &AHP technique to prioritize agility drivers	At first use questionnaire in Ghaem Reza integrated industries to identify agility factor then through MCDM approach rank the indicator at last they conclude that some indicator can safe organization against environmental turbulence

3. Definition of Concepts

3.1. Agility

Agility is defined as the ability to prosper in competitive environment characterized by constant and unpredictable change. This definition can be stated more succinctly as a firm's ability to succeed in a turbulence environment while the concept of agility has become wildly know, it is a very difficult construct to measure. A wide array of measurement approaches have been proposed in the past 2 years. Many, however, solely on operational/ structured characteristics of organizations; ignore some/all of the business environments, or examine agility of particular processes (Yauch, 2011). The view of agility as context specific emphasizes

agility in terms of outcomes. The highest priority of agility is to satisfy the customer through rapid and continuous delivery of value (Macheridis, 2009).

Some definition of agility is described in Table2.

Table2: Definition of agility

Authors	Definition
Goldman(1995)	Agility is a comprehensive, strategic response to fundamental and irreversible structural changes that are undermining the economic foundations of mass production – based competition
Yusuf et al. (1999)	Successful exploration of competitive base such as speed, flexibility, innovation, quality, and profitability through the integration of reconfigurable resources and best practices in knowledge-rich environment to provide customer-driven product and services in fast changing market environment.
Sharifi & Zhang (2000)	Agility is ability to sense respond to, and exploit anticipated or unexpected changes in the business environment. Such organization must be able to identify the environmental changes and regarding them as the growth factor.

3.2. Agility Drivers

Agility drivers are the changes/pressure from the business environment that necessitates a company to search for new ways of running it business in order to maintain its competitive advantageous (Sharifi&Zhang, 2000). Agility drive denotes those variables that exist out of organizational context and the organization doesn't have enough power to control or influence them. These factors affect the business enterprise of the firm, and through influencing the organizational inputs cause the transfer of disorder and change in the organization (Sharifi & Zhang, 2000).

Change in market: including items such as growth of niche market, national and international political changes, increasing rate of change in product models, product life time shrinkage.

Change in competition criteria: including items such as rapidly changing market, increasing pressure on cost, increasing rate of innovation, increasing pressure of global market competition, decrease new products time to market, responsiveness of competitors to change.

Change in customer requirements: including items such as demand for individualized product and services, quicker delivery time and time to market, quality expectation increasing, sudden changes in order quantity and specification.

Change in technology: including items such as introduction of more efficient, faster and economic production facilities, introduction of new soft technologies (software and methods) inclusion of information technology in new hand technology.

Change in social factors: including items such as environmental pressure, workforce/workplace expectations, legal/ political pressure, cultural problems, social contact changes.

3.3. Agility Capabilities

Agility capabilities which are the essential that the company needs in order to positively respond to and take advantage of the changing (Sharifi&Zhang, 2000). Agility capabilities are considered as inescapable features of today's forward looking organizations those organizations which possess such characteristic would be able to achieve competitive advantage and gain one edge over competitors. Some agility capabilities such as responsiveness, flexibility, speed and competency mentioned in agility literature (Ebrahimpour et.al, 2012).

Responsiveness is considered as the ability to identify change and respond quickly to then (Sherehiy et.al, 2007).

Competency is defined as an extensive set of abilities that provide a basis for productivity, efficiency and effectiveness of a company's activities (Sherehiy et.al, 2007).

Flexibility is an ability to process different products and achieve different objectives with the some facilities (Sherehiy et.al, 2007). However recent research finding showed that manufacturing flexibility requires developing and maintaining highly skilled, technologically competent and adaptable workforce that can deal with non-routine and exceptional circumstances (Sherehiy et.al, 2007).

Quickness is the ability to carry out tasks and operations in shortest possible time (Sherehiy et.al, 2007).

3.4. Project Based organization

Project based organization refers to several of organization which is engaged in manufacturing temporary systems to implementation of project activities (Jafery et.al, 2014). Today, more than ever, organizations are managing their business by projects which led to the creation of a new kind of project based organizations. In these organizations, decisions are taken on a project, other projects can be as unpredictable or even harmful effect In these organizations, decisions are taken on a project, other projects can be as unpredictable or even harmful effect, because these organizations are located in an environment that increases the complexity and the increasing demand for faster, cheaper and better to do a project that features (Nori, 2010).

3.5. Shannon Entropy

Shannon and Weaver proposed the entropy concept, which is measure of uncertainly in information formulated in terms of probability theory. Since the entropy is well suited for measuring the relative contrast intensities of criteria to represent the average intrinsic information transmitted to the decision maker, conveniently it would be a proper option for our purpose. Shannon developed measure H that satisfied the following properties for all pi within the estimated joint probability distribution (Shiroyehzad& Dabestani, 2011).

Using below formula help to obtain the weight of indexes.

W_j is the weight of the a_j index

$$P_{ij} = \frac{a_{ij}}{\sum_{i=1}^m a_{ij}} \quad ; \forall_j$$

$$E_j = -\left(\frac{1}{\ln m}\right) \sum_{i=1}^m p_{ij} \ln p_{ij} \quad ; \forall_j$$

$$d_j = 1 - E_j \quad ; \forall_j$$

$$w_j = \frac{d_j}{\sum_{j=1}^n d_j} \quad ; \forall_j$$

3.6. Topsis Technique

The TOPSIS² method was first developed by Hwang and Yoon, 1981 and ranks the alternatives according to their distances from the ideal and negative ideal solution, i.e. the best alternative has simultaneously the shorter distance from the ideal solution and the farthest distance from the negative ideal solution (Zadeh Sarraf et.al, 2013).

The TOPSIS procedure consists of the following steps (Tzeng & Opricoric, 2004):

Step 1: Compute the normalized decision matrix. The normalized value r_{ij} is calculated as:

$$R_{ij} = \frac{a_{ij}}{\sqrt{\sum_{j=1}^J a_{ij}^2}}$$

Step 2: Calculate the weighted normalized decision matrix. The weighted normalized value is calculated as: $V_{ij} = W_i r_{ij}$

Where w_i is the weight of the i th attribute or criterion, and $\sum_{i=1}^n w_i = 1$

Step 3: Determine the ideal and negative ideal solution

$$A^+ = \{V^+_1, \dots, V^+_n\} = \{(\text{Max } V_{ij} | i \in I^+), \{(\text{Min } V_{ij} | i \in I^-)\}$$

$$A^- = \{V^-_1, \dots, V^-_n\} = \{(\text{Min } V_{ij} | i \in I^+), \{(\text{Max } V_{ij} | i \in I^-)\}$$

Where I^+ is associated with advantage criteria, and I^- is associated with cost criteria.

Step 4: Determine the ideal and negative-ideal solution calculate the separation measure, using the n -dimensional Euclidean distance. The separation of each alternative from the ideal solution is given as:

$$d_i^+ = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^+)^2} \quad , i=1,2,\dots,m$$

So, the separation from the negative ideal solution is given as:

$$d_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2} \quad , i=1,2,\dots,m$$

Step 5: Calculate the relative closeness to ideal solution. The relative closeness of the alternative a_j with respect to A^* is defined as:

$$CL_i^* = \frac{d_i^-}{d_i^- + d_i^+}$$

Then ranked the preference order

4. Priorities of agility factors with Topsis technique

² Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

In this study a questionnaire including 37 questions in two sections for survey on agility capabilities and agility drivers was designed and then distributed in 6 project based organization with construction background in Isfahan city. Managers and experts in these organizations ranked the effective of capabilities and drivers agility indexes in their performance, then with Shannon Entropy indexes weighted after that using Topsis technique to rank them.

Table 4 show the weight of the capabilities agility with Shannon Entropy

Table 4: Capabilities Weight

Capabilities index	Responsiveness	Competency	Flexibility	Speed
weight	0.6	0.1	0.24	0.06

Table5 show the weight of the drivers agility with Shannon Entropy

Table 5: Drivers Weight

Drivers index	Change in marketplace	Change in competition Basis	Change in customer	Change in technology	Change in social factor
Weight	0.18	0.2	0.21	0.17	0.25

Table 6: Priority of agile capabilities with Topsis

Organization \ Indexes	Organization						CI	Rank
	1	2	3	4	5	6		
Responsiveness	3.2	3.67	3.82	3.17	4.22	3.83	0.2	4
Competency	3.48	3.63	3.88	3.78	3.93	3.8	0.8	1
Flexibility	3.4	4	3.97	3.5	3.89	3.92	0.57	3
Speed	3.53	3.83	3.91	3.67	3.78	3.67	0.7	2

As Table6 shows, among 4 indexes of agile capabilities, competency has the high rank and it's shown that organization can had better efficiency with notice this factor.

Table7: priority of agile drivers with Topsis

Organization \ Indexes	Organization						CI	Rank
	1	2	3	4	5	6		
Change in Marketplace	2.6	2.79	3.93	2.54	3	3.125	0.37	4
Change in Competition Basis	2.63	2.8	3.7	2.44	2.28	2.83	0.65	1
Change in Customer Request	2.95	2.83	4.18	2.83	2.58	3.125	0.37	3

Change in Technology	2.67	3.23	4.15	3.06	2.89	3	0.34	5
Change in Social Factor	2.72	2.67	3.87	2.2	2.6	2.9	0.56	2

As Table 7 shows, changing in competition basis has the high noticeable index in agile drivers and company can reach the best efficiency with consider to this factor.

5. Conclusion

Turbulent times and uncertainty in the business environment have been recognized as the cause of most failure in company. This research presented a methodology for identifying the important factor with considering agility's aspects in project based organization. These factor have direct influence on performance of the organization and the manager can achieve their goals with notice them. At first the influence of the agility capabilities and agility drivers that identified with Sharifi & Zhang model on the performance of the organization gathers with questionnaire in 6 organizations that finish their project 2011-2014 then with Topsis technique factor ranked. At last the results show that among agility capabilities competency, and among agility drivers change in competition basis have the more influence. For future research it is recommended that some no sensible factor and other methods use for analysis, and so use more company with different background to survey.

6. References

- Azar, A., Rajabzadeh, A., (2010). Applicable of decision making through MADM approach. Fourth Edition.
- Banihashemi, S.A. Sarani, A.H., (2012), "Assessment of organizational agility in cement industry", *African Journal of Business Management*, Vol. 2, No. 27, pp. 8055-8064.
- Chamanifard, R. Nikpour, A., Chamainifard, Sh., Nobarieidish, S.,(2015), "Impact of organizational agility dimensions on employee's organizational commitment in foreign exchange offices of Tejarat Branch, Iran", *European online Journal of Natural and Social Sciences*, Vol.4, No.1 Special Issue on new Dimensions in Economics, Accounting and Management.
- De Oliveira, A. M., Dalla.V., Oliveira, L.V, Osmar, P, (2012), "Forecasting project performance considering the influence of leadership style on organizational agility". *International Journal of Productivity and Performance Management*, Vol. 161, No.6, pp. 653-671.
- De waal, A.A (2007), The characteristics of high performance organization, *Business Strategy Series*, Vol. 8, No. 3
- Ebrahimpour, H. Salarifar,M. Asiaei,A., (2012), " The relationship between Agility Capabilities and Organizational Performance: a case study among Home Appliance Factories in Iran", *European Journal of Business and Management*. Vol. 14, No.17, pp 186-195.
- Jaffarnejad.A,Davoodi. S.M.R, Sherafat.A, (2013), "Applying Multi-Criteria Decision – Making Techniques to Prioritize Agility Drivers", *International Journal of Academic Research in Business and Social Science*, Vol. 3, No.7, pp. 296-305.

- Jaferi, F., Sajadi, S. M., Alinaghian, M., Beyranvand, M. (2014), "Investigation of project risk management in project-based organization using the PMBOK guideline, case study: National Gas Company of Lorestan Province", *International Journal of Applied Research on Industrial Engineering*, Vol. 1, No. 2, pp. 50-58.
- Macherdis, Nikon, (2009), "Agility in entrepreneurial Projects". Lund Institute of Economic Research Working Paper Series.
- Nori, Sh., (2010), searching the impress of PMO in project-based organization's success and represent suggestion for its administration, M.S thesis, Tehran University
- Opicoric, S., Tzeng, G-H, (2004), "Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS", *European journal of operational research*, Vol. 156, No. 1, pp. 445-455.
- Sherehiy, B., Karwowski, W., Layer, J., (2007), "A review of enterprise agility, concepts, frameworks and attributes", *International Journal of Industrial Ergonomics*, Vol. 37, No. 1, pp. 445-460
- Shirouyezadeh, H., Dabestani, R. (2011), "Evaluating Project Based On Safety Criteria; Using TOPSIS", *2nd International Conference on Construction and Project Management*, Vol. 15, pp. 69-73
- Tseng, Y. and Lin, C.T. (2011), "Enhancing enterprise agility by deploying agile drivers, capabilities and providers", *Information Sciences*, Vol. 181, pp. 3693-3708
- Zadeh Sarraf, A., Mohaghar, A., Bazargani, H. (2013), "Developing Topsis method using statistical normalization for selecting knowledge management strategies", *Journal of Industrial Engineering and Management*, Vol. 6, No. 4, pp. 860-875
- Zhang, Z. and Sharifi, H., (2000), "A methodology for achieving agility in manufacturing organizations", *International Journal of Operations and Production Management*, Vol. 20, No. 4, pp. 496-512.
- Yauch, Charlene A. (2011), "Measuring agility as performance outcome". *Journal of Manufacturing Technology Management*. Vol. 22, No. 3, pp. 384-404