

Identification of Critical Success Factors to Implement Six Sigma Projects (Case study: Three Iranian Selected Companies)

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Received: July 24, 2015

Accepted: September 31, 2015

ABSTRACT

In recent years, different organizations and companies in Iran have used strategic, systematic and quality methodology of Six Sigma to achieve, protect and maximize the company's success through ongoing improvement of the process based on rapid exclusion of faults in their products, processes and organizational operations, but considering all the positive characteristics of Six Sigma and the huge time and costs that were allocated to it, they faced a lot of problems at the stage of implementation and execution and they did not achieved the expected success. There are many reasons given and mainly the inattention of the companies to factors of success or failure and or lack of regular assessment of these factors could be referred to. Thus it is necessary to concentrate on the critical factors accompanying the assessment of these factors in the companies together with implementation of six sigma. The goal of this study is to identify the effective factors and to determine their relative importance to implement successfully six sigma in the Iranian selected companies, i.e., Iran Khodro, Polyacryl Isfahan and the group of companies affiliated to the State Defensive Industries. The current study is of applied type as far as its goal is concerned and its research method is of quantitative type and it has an empirical approach. Factor analysis indicates that the six critical factors affect successful implementation of six sigma projects in the Iranian selected companies respectively as follows: 1. Commitment and active participation of management, 2. Connecting six sigma to trade strategies, 3. Understanding of the methodology and techniques of six sigma, 4. Change of culture, 5. Connecting six sigma to the customers, 6. Prioritization and selection of project and other factors, i.e., skills of project management, organizational infra-structures, education, connection of six sigma to suppliers, connection of six sigma to human resources and connections from seventh to twelfth grades.

KEYWORDS: Implementation, Six Sigma, Factor analysis, Critical success factors, Iranian selected companies.

1. INTRODUCTION

Quality management has developed the world of trade during several decades from the mid 20th century until today by presenting the thought to improve on the basis of a movement toward zero fault. It is when six sigma was established as a disciplined method based on the information to improve regularly the process based on prompt elimination of faults in products, processes and organizational operation and it helps us to develop and improve the quality of products and to present the relatively complete services of concentration [1].

The philosophy of six sigma is that if we can measure the degree of existing errors in a process, we can reach elimination of the errors in an orderly fashion and reach the level of zero fault as much as possible [2]. Nowadays six sigma has gained a special position in the advanced world by promising access to superior quality in the final results of trade that has been quite welcomed.

In the recent years, different organizations and companies in the country such as many companies outside Iran used strategic, systematic and quality six sigma methodology to access, protect and maximize the company's success through regular improvement of the process based on prompt exclusion of faults in their products, processes and organizational operations, but they have faced many problems and have not achieved the expected success. But considering all the positive specifications of six sigma, many companies and organizations did not face success to use it. There have been given many reasons and generally speaking, inattention of organizations to factors of success or failure and or lack of regular assessment of these factors can be mentioned. Thus it is necessary to implement six sigma and concentrate on the critical factors together with assessing these factors in organizations.

A review of the cases of failed six sigma projects indicates this reality in the CSFs studies that despite several identifications, the position of these factors has not been understood correctly including Angel and Pritchard, 2008 who expressed that about 60% of the total six sigma programs failed to achieve suitable results [3]. Berg, 2006 reports that the program of six sigma is expensive and the expected results were not achieved [4]. Zimmerman, 2005 [5] and Chandra, 2008 [6] found one of the reasons of the failure of six sigma programs to be incorrect lack of implementation. Weiss, 2005 [5] expressed that less than 50% of the tested companies are happy with their six sigma programs, thus attention to six sigma from the viewpoint of relations governing among CSFs can help understanding the importance of the role and position of each of these factors to implement six sigma projects successfully.

Critical success factors are the factors that are of high importance in the success of every organizations and help the organization to facilitate and accelerate implementation of programs in question by concentration of powers on the main

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topics and prevent wasting resources [6]. In this direction, it is necessary to identify, classify and prioritize the factors of success of failure of six sigma projects and the programmers of the organizations can decide considering the conditions and amounts of resources and existing facilities in preparation and implementation of the mentioned programs.

In this direction, the current study identified the critical success factors of six sigma projects upon review of the literature of the topic and then classified the factors and prioritized them and determined their amount of importance toward each other by assessing their positions in the Iranian companies.

2. Study of Research Literature

Coronado and Antony, 2002 conducted a study regarding the critical success factors of six sigma in production sectors of the UK in which they identified 12 cases of critical success factors [18]. These CSFs consist of commitment and engagement of senior directors, understanding of six sigma methodology, connection of six sigma to trade strategy, connection of six sigma to customer, selection of project, organizational infrastructures, cultural change, skills of project management, connection of six sigma to suppliers, education, connection of six sigma to human resources and communication.

In another study that was conducted about the critical success factors of six sigma in service organizations of the UK by Antony, 13 main factors of success using review of literature and proportionate to the service environment were extracted [8]. that consist of connection of six sigma to trade strategy, attention to customer's needs, project management skills, commitment of senior and executive management, organizational infrastructure, prioritization and selection of project, management of cultural change, consolidation of six sigma with financial revenues, understanding DMAIC methodology, apprenticeship and education, review of the project, motivating and reward program and commitment in the entire company.

Another research activity which was the result of experience by Becky Midows in General Electric Company studied the communication and counter effects of factors of success of six sigma projects in General Electric company using the number of flashes toward outside that showed their key results over the other factors and considering the number of input and output flashes of each factor, the key factors were introduced according to their degree of importance respectively: Leadership of managers, concentration on customer, strategic goals, project selection, education, human and organizational resources, tools, indexes, culture, communication and planning [9].

Sandholm and Sorquist, 2008 in their study expressed the 12 factors effective on successful implementation of six sigma that consisted of: Commitment and support of the senior management, having holistic view toward six sigma, investment of sufficient resources, concentration on results, being customer-centered, education and apprenticeship, proportion between needs and conditions of the organization, prioritization and selection of projects, existence of similar language and understanding, strategic preparation to introduce six sigma, pursue and exchange successes and responding to external effects [10].

Schroeder et al, 2008 defining six sigma and its infrastructural theory expressed the special six sigma elements including commitment of leadership, selection of strategic projects, improvement experts, method to make DMAIC finding, assess the performance (financial and customer-centered) [11]. Zu et al, 2008 believed that six sigma has a supplementary factor in addition to supporting the key TQM element which is vital for successful implementation of six sigma projects and this consists of a belt system (championship, senior black belt, black belt, green belt, improved process of DMAIC, concentration on standards together with seven traditional factors of quality management on quality performance and effective trade [12]. Chakaravorty, 2009 also expressed the increased concerns about absence of executive success of six sigma programs including six steps for effective implementation of six sigma projects [13].

Alizadeh in a study identified the effective factors on success of six sigma and expressed factors such as organizing work environment, making standards for works, inclusive repairs and maintenance, connection to individuals and staff, commitment of senior management and team educational system [14].

There are many factors that should be taken into account when implementing six sigma projects. According to review and expansion of the relevant projects with regard to successful implementation of six sigma. Factors were identified according to Table 1.

Table 1: Effective factors on successful implementation of six sigma

Critical Success Factors		[12]	[11]	[9]	[8]	[18]	[15]	[7]	[13]	[10]	[16]	[17]
1	Understudying Six Sigma Methodology (DMAICU)	*	*		*	*						
2	Prioritization and selection of project		*	*	*	*		*		*	*	*
3	Cultural change			*	*	*						
4	Degree of commitment and involvement of senior management		*	*	*	*	*	*	*		*	*
5	Organizational infrastructure				*	*		*				*
6	Apprenticeship and education			*	*	*	*	*	*	*	*	*
7	System of belts	*										
8	Sufficient financial resources									*		
9	Trade goals and strategies			*	*	*	*	*		*		
10	Motivation and reward system				*		*					
11	Access to data						*					

12	Holistic approach toward six sigma								*	
13	Communication	*		*	*	*	*	*	*	*
14	Suppliers			*						
15	Human resources	*	*	*						
16	Attention to customers' needs	*	*	*		*	*	*	*	*
17	Skills of project management		*	*						
18	Concentration on results							*		
19	Commitment in entire company		*							
20	Existence of similar language and expressions							*		
21	Consolidation of six sigma and financial revenues		*							
22	Review of the project			*						
23	Tools and indexes	*	*	*						
24	Planning		*							
25	Responsiveness to external effects							*		

3. RESEARCH METHOD

3.1. Main goal of research:

Identification and prioritization is the most important critical success factors (CSFs) to implement six sigma projects in Iranian selected companies.

3.2. Main question of research:

What are the most important critical success factors (CSFs) to implement six sigma projects in Iranian selected companies and how are they prioritized?

3.3. Geographical and temporal scope of research:

The geographical scope of Irankhodro (ISACO, SAPCO and some car parts manufacturers), Polyacryl Isfahan, dependent organizations and companies on defensive industries (SaIran, Sasad, Batrisazi, Air industries, Aerospace, Etko, etc.). This study is a single-period study from temporal aspect because the single-period studies collect information only in a certain period of time.

3.4. Type and method of research

During this study the critical success factors of six sigma projects were identified using survey (literature of the topic) and then the statistical data of the research were collected through questionnaires and eventually the critical success factors (CSFs) of implementing six sigma projects in the Iranian companies were assessed and as a result the current study is of applied type as far as how the goal is known. The results will apply to the Iranian selected companies and the research strategy is expressible within the framework of correlative and quantitative projects. This strategy is aimed at exploring the existing realities and describing a research society with regard to distribution of a certain phenomenon. Due to the survey nature of the study, in this research the questionnaire made by the researcher was used to collect data.

3.5. Statistical society of research:

The statistical society of the study are the senior directors, champions, project managers, senior black belt, black belt, green belt, team member, six sigma consultants in the big Iranian companies with more than 1000 employees such as Iran Khodro companies (ISACO, SAPCO and a number of car parts manufacturers), Polyacryl Iran Co. and affiliated organizations and companies dependent on the Ministry of Defense (Sa Iran, Sasad, Battery Sazi, Air industries, Aerospace, Etko, etc.) Since all respondents of the statistical society participate and have roles directly in six sigma projects, they have more experience and sufficient knowledge to comment about critical success factors of six sigma projects.

3.6. Research tools:

In order to collect the research data, the tool of questionnaire was used. This questionnaire was made of two parts. The first part is related to the details of the executive organization of project and also the role of respondent's presence to conduct six sigma projects. The second part of the questionnaire is allocated to the items relevant to the critical success factors of projects that were collected according to the literature of the topic and according to the ideas and experiences of six sigma experts. According to the guideline of questionnaire, the respondents were asked to make comments regarding each item according to five-spot scale of Likert, i.e., 1. The least degree of importance, 2. less important, 3. important, 4. very important and 5, maximum degree of importance. It is worth mentioning that before vast distribution of the questionnaire, the conceptual validity and validity of its adaptability was studied.

3.7. Validity and reliability of research tools:

In this study to make sure of the face validity, the questionnaire was made available to the experts regarding six sigma and they were asked to study the questionnaire and comment regarding it and in this way the questionnaire was finalized according to the corrective and complementary views of them. In this study, in order to determine the validity of the components adaptability, the questions were distributed in form of a pre-test and then Cronbach's Alpha was calculated. The quantity of it was equal to 0.887 that showed the internal integrity of the questionnaire.

3.8. Method to distribute, collect and classify findings

In the first step to collect the required data, firstly the necessary coordination by Tarbiat Modarres University was made through letter and introduction of the researcher to the quality units of the relevant organizations, then the questionnaires were distributed and the necessary details about them were given. Then the manager of the quality unit

completing them returned them and they were collected and returned to the researcher. It is worth mentioning that 310 questionnaires were distributed out of which 241 questionnaire were collected. In the second step, the data were classified through factor analysis and using SPSS 13 software and eventually they were analyzed.

4. RESULTS

In this study to identify the critical factors in successful implementation of six sigma, factor analysis was used. In this study, factor analysis is the common method to explore the infrastructural structure of the relatively big set of variables and the main goal of using it was to reduce the number of variables to fewer factors with regard to the increased capacity of being interpretable and to explore the hidden structures of the data. Factor analyses tries to use the technique to reduce or briefly identify the factors or principal variables considering the correlation and internal relation among the observed data. By analysis of the factors, the number of main factors and variables of each factor is extracted and the factors having higher importance from the first to the last one could be obtained.

To do factor analysis, firstly it should be made sure if the condition to use the factor analysis is in place. For this purpose, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett test was used. As it is shown in table 2, the amount of KMO (0.782) is higher than 0.7 which shows the sufficiency of the sample. Meanwhile the observed level of significance in Bartlett test is lower than 0.50, thus H_0 (same as matrix) was rejected. In other words, there is the required correlation among variables for reckoning of factors.

Table 2: Results of Kroit Bartlett test and KMO

Sufficiency of KMO sample		0/782
Chi-square approximate quantity	Kroit Bartlett test	5483/679
Degree of freedom		946
Level of significance		0/000

The results of factor analysis showed that the effective factors on successful implementation of six sigma projects in Iranian selected companies could be classified in seven groups according to table 3 and the total of 56,468 changes were explained to change the successful implementation of six sigma projects. As it is shown in the table, "commitment and active participation of management" with the variance of 7401 has the highest effect on successful implementation of organizational strategy, while the factor of 'communication' with variance of 2969 stands at the last grade.

Table 3: Matrix of factors after rotation

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
VAR00008	.734											
VAR00001	.587											
VAR00004	.580											
VAR00038	.518											
VAR00006	.506											
VAR00022	.503											
VAR00035	.476											
VAR00032		.873										
VAR00009		.719										
VAR00003		.633										
VAR00033		.561								-.455		
VAR00011		.456										
VAR00007		.328										
VAR00040			.778									
VAR00041			.737									
VAR00039			.551				.415					
VAR00002			.521									.421
VAR00036			-.450									
VAR00019				.630								
VAR00021				.608								
VAR00005				.554								
VAR00020				.530								
VAR00025				.488								

VAR00013				.431				.402				
VAR00029						.738						
VAR00015					.681							
VAR00030					.423							
VAR00017							.756					
VAR00037						.626						
VAR00028			.416			.471						
VAR00031							.730					
VAR00016							.589					
VAR00012							.448					
VAR00010								.550				
VAR00014									-.540		.428	
VAR00027				.413						.517		
VAR00018										.484		
VAR00026										.352		
VAR00042											.620	
VAR00024											.589	
VAR00034											.730	
VAR00023											.446	
VAR00043												.553
VAR00044												.435
Special value	3.25	3.11	2.86	2.59	2.19	2.10	1.98	1.43	1.38	1.36	1.30	1.23
Variance	7.40	7.07	6.51	5.90	4.99	4.79	4.52	3.26	3.14	3.09	2.96	2.79
Collective variance	7.40	14.4	20.99	26.89	31.89	36.68	41.2	44.4	47.6	50.7	53.6	56.468
		7					0	6	0	0	7	

Considering the common characteristics of the variables affecting the 12 factors, the reckoned factors were named as follows: first factor: commitment and active participation of management, second factor: connection of six sigma to trade strategies, third factor: understanding of the methodology and techniques of six sigma, fourth factor: cultural change, fifth factor: connection of six sigma to customers, sixth factor: prioritization and selection of project and the other factors such as skills of project management, organizational infrastructure, education, connection of six sigma to suppliers, connection of six sigma to human resources and telecommunication were the seventh to twelfth factors respectively.

It should be noted that the final collective variance of 56468 shows that the reckoned six factors show about 57% of the variability in successful implementation of six sigma projects. In other words, the other effective factors are in process that were not identified in this study.

4.1. Interpretation and naming of factors

To name the determined factors and to avoid different interpretations through holding joint meeting and exchanging views among three university lecturers of quality management and six sigma, they agreed how to name the factors. On this basis, commitment and active participation of management, connection of six sigma to trade strategies, understanding of methodology and six sigma techniques, cultural change, connection of six sigma to customers, prioritization and selection of project, skills of project management, organizational infrastructure, education, connection of six sigma to suppliers, connection of six sigma to human resources and communication were determined as the names of the extracted factors. The final results are shown in table 3. Further on, the factors are interpreted:

Considering table 3, it is noticed that factor analysis method was identified for the first critical success factor of 7 variables and taking the allocated variables into consideration, the first factor was named commitment and active participation of management. In table 4, all the existing variables are given in the first invoice together with the variable code.

Table 4: Existing variables in the first factor

First critical success factor: Commitment and active participation of management	Variable code
Role of senior management to establish balance and to estimate commercial needs, customers' needs and staff's needs.	VAR00008
To allocate resources by senior management for education of six sigma methodology and implementation of the selected ways.	VAR00001
Serious and determined commitment of senior management to access results of the project.	VAR00004
Regular follow up of projects by team champion.	VAR00038
Degree of awareness of senior directors and champions of advantages and benefits of six sigma.	VAR00006
To take innovation in implementation of six sigma projects into consideration	VAR00022
Relation between results from six sigma projects and degree of paid reward to champions and team members.	VAR00035

Considering table 3, it is noticed that factors analysis has identified six variables for the second critical success factor and according to the allocated variables, the name of the second factor is connection of six sigma to trade strategies. In table 5, all existing variables in the second factor are given together with the variable code number.

Table 5: Existing variables in the second factor

Second critical success factor: Connection of six sigma to trade strategies	Variable code
Unity of six sigma projects with strategic goals of key products and main processes of organization.	VAR00032
Outlook of long-term programs and operational strategies and transferring them to the staff.	VAR00009
Determination of strategic goals by senior management for selecting projects	VAR00003
Contribution of six sigma to organizational development	VAR00033
Existence of self-assessing systems like EFQM	VAR00011
Receiving and studying sent monthly reports by six sigma teams	VAR00007

Considering table 3, it is noticed that factors analysis has identified five variables for the third critical success factor and according to the allocated variables, the name of the third factor is understanding of the methodology and six sigma techniques. In table 6, all existing variables in the third factor are given together with the variable code number.

Table 6: Existing variables in the third factor

Third critical success factor: Understanding of methodology and six sigma techniques	Variable code
Understanding of DMAIC methodology	VAR00040
Effective use of six sigma tools	VAR00041
Use of black belt holders on full time basis	VAR00039
Presence of champions in meetings of six sigma teams	VAR00002
Presence of operators and owners of process in improved team	VAR00036

Considering table 3, it is noticed that factors analysis has identified six variables for the fourth critical success factor and according to the allocated variables, the name of the fourth factor is cultural change. In table 7, all existing variables in the fourth factor are given together with the variable code number.

Table 7: Existing variables in the fourth factor

Fourth factor: Cultural change	Variable code
Change of approach of managers, supervisors and staff toward necessity to create changes and improve	VAR00019
Existence of team work and its effectiveness	VAR00021
Creating motivating policies in the process and after implementing projects by management	VAR00005
Distribution of results of successful and unsuccessful six sigma projects to encourage the staff and managers	VAR00020
Champions' presence in educational courses	VAR00025
Existence of system and information network to promote six sigma in organization	VAR00013

Considering table 3, it is noticed that factors analysis has identified three variables for the fifth critical success factor and according to the allocated variables, the name of the fifth factor is connection to six sigma by customer. In table 8, all existing variables in the fifth factor are given together with the variable code number.

Table 8: Existing variables in the fifth factor

Fifth factor: Connection of six sigma to customers	Variable code
Connection of six sigma projects to customers' needs and expectations	VAR00029
Existence of quality control rings in organizations	VAR00015
Receiving regular feedback from customers	VAR00030

Considering table 3, it is noticed that factors analysis has identified three variables for the sixth critical success factor and according to the allocated variables, the name of the sixth factor is connection to prioritization and project selection. In table 9, all existing variables in the sixth factor are given together with the variable code number.

Table 9: Existing variables in the sixth factor

Sixth factor: Prioritization and selection of project	Variable code
Use of prioritization and selection of projects methods	VAR00017
Connecting expertise of team members to subject of selected projects	VAR00037
Level of education and work experience of green and black belts	VAR00028

Considering table 3, it is noticed that factors analysis has identified three variables for the seventh critical success factor and according to the allocated variables, the name of the seventh factor is skills of project management. In table 10, all existing variables in the seventh factor are given together with the variable code number.

Table 10: Existing variables in the seventh factor

Seventh factor: Sills of project management	Variable code
Awareness of directors and champions of project using project management techniques	VAR00031
Compliance with required conditions for projects	VAR00016
Existence of orderly and written job description regarding projects members	VAR00012

Considering table 3, it is noticed that factors analysis has identified two variables for the eighth critical success factor and according to the allocated variables, the name of the eighth factor is organizational infrastructure. In table 11, all existing variables in the eighth factor are given together with the variable code number.

Table 11: Existing variables in the eighth factor

Eighth factor: Organizational infrastructure	Variable code
Existence of indicators to measure and assess performance at different organizational levels	VAR00010
Existence of data banks of processes under improvement	VAR00014

Considering table 3, it is noticed that factors analysis has identified three variables for the ninth critical success factor and according to the allocated variables, the name of the ninth factor is education. In table 12, all existing variables in the ninth factor are given together with the variable code number.

Table 12: Existing variables in the ninth factor

Ninth factor: Education	Variable code
Qualification and ability of educational teachers of six sigma	VAR00027
Active presence of Champions in selection of projects	VAR00018
Presence of senior black belt holder and consultant	VAR00026

Considering table 3, it is noticed that factors analysis has identified two variables for the tenth critical success factor and according to the allocated variables, the name of the tenth factor is connection of six sigma to suppliers. In table 13, all existing variables in the tenth factor are given together with the variable code number.

Table 13: Existing variables in the tenth factor

Tenth factor: Connection of six sigma to suppliers	Variable code
Contribution of suppliers to implement six sigma projects	VAR00042
Presence of senior directors (leadership) in educational courses	VAR00024

Considering table 3, it is noticed that factors analysis has identified three variables for the eleventh critical success factor and according to the allocated variables, the name of the eleventh factor is connection of six sigma to human resources. In table 14, all existing variables in the eleventh factor are given together with the variable code number.

Table 14: Existing variables in the eleventh factor

Eleventh factor: Connection of six sigma to human resources	Variable code
Existence of system of organizational promotion and motivation for green and black belt holders	VAR00034
Accompanying and understanding programs to improve six sigma in organization	VAR00023

Considering table 3, it is noticed that factors analysis has identified three variables for the twelfth critical success factor and according to the allocated variables, the name of the twelfth factor is communication. In table 15, all existing variables in the twelfth factor are given together with the variable code number.

Table 15: Existing variables in the twelfth factor

Twelfth factor: Communication	Variable code
Effective relation among members of projects with other members of the organization	VAR00043
Reporting structure of belts to project supporters	VAR00044

4.2. Grading importance of factors:

To determine the grade importance of the reckoned factors, Friedman I test was used. As it is shown in table 16, the grade of factor of "commitment and active participation of management" is higher than all and this factor is considered as a critical and effective factor to implement six sigma projects. The factor of "linking six sigma to trade strategies" stood at the second grade and the factor of "understanding of methodology and six sigma techniques" stood at the third grade, the factor of "cultural change" stood at the fourth grade and the factor of "connection of six sigma to customers" stood at the fifth grade and the factor of "prioritization and selection of project" stood at the sixth grade and completely matched the

research literature. The factors of skills of project management, organizational infrastructures, education, six sigma connection to suppliers, connection of six sigma to human resources and communication stood from the seventh to the twelfth grades. It is highly important to mention the point that although these factors were located at a low grade, due to the degree of acquired credit that these factors had, they are of high importance respectively and can be considered as the important advancing factors in six sigma projects.

Table 16: Grading from Friedman test

Factor	Average grade
Commitment and active participation of management	5.7005
Connection of six sigma to trade strategies	5.5365
Understanding of technology and six sigma techniques	5.2585
Cultural change	4.952
Connection of six sigma to customer	4.498
Prioritization and project selection	4.3955
Skills of project management	4.26
Organizational infrastructure	3.63
Education	3.5735
Connection of six sigma to suppliers	3.5485
Connection of six sigma to human resources	3.4845
Communication	3.397
Number	72
Chi-Square	186/246
Degree of freedom	6
Level of significance	0/ 000

5. DISCUSSION AND CONCLUSION

In this study factor analysis showed that the effective variables on successful implementation of six sigma projects can be classified within the framework of six main factors and these factors are: 1. Commitment and active participation of management, 2. Connection of six sigma to trade strategies, 3. Understanding of methodology and six sigma techniques, 4. Cultural change, 5. Connection of six sigma to customers, 6. Prioritization and selection of project and other factors, i.e., skills of project management, organizational infrastructure, education, connection of six sigma to suppliers, connection of six sigma to human resources and communication in further grades.

It should be noted that the findings of this study completely corresponds with the former studies. For example, the identified 12 factors in this study correspond with the mentioned factors in the other studies indicated in table 1. The difference of this study from old studies was shown in the grade importance of factors and this issue is justifiable taking the required local conditions of the country into consideration.

Considering the applied nature of this study, the findings of the executive suggestions of the study could be presented as follows:

1. Managers should be engaged with establishment and management of the management system of the process and have active participation in the projects. Six sigma should be part of the tasks of every individual including the senior and high ranking directors (high ranking officials, trade unit or even directors of the office).
2. Connection of trade strategies of the company considering the quality six sigma projects through being in line with these projects with strategic goals, key products and main processes of the organization.
3. Comprehension, acceptance and development of methodology and techniques of six sigma and its importance by the directors, individuals having belt in improvement projects.
4. Change in the method of understanding and using six sigma and reduced resistance against change and adaptability with it and dominance of the culture to regularly improve the companies.
5. Concentration on customers' needs, necessary data for success of the improvement team of six sigma processes.
6. Selection of projects helps improve the competition situation, trade profitability, process cycle time, progress in products.
7. Reinforcement of management skills of project to assess and control the timetable, allocate resources and guide and use six sigma project results.
8. Having united organizational structure by prepared strategies regarding six sigma implementation.
9. Training and empowerment of staff by establishing the suitable system of education and apprenticeship of six sigma belts.
10. Allocation of budget and sufficient financial resources for successful implementation of six sigma projects.

It should be noted that the collective variance of the reckoned factors is about 57%. Hence, the other factors are effective which are not known by this study. That is why it is recommended that other researchers, considering the other effective variables complete the gained model. Meanwhile the reckoned factors by this study only supervise the Iranian selected companies. That is why due care should be taken to generalize their findings to other different companies.

Acknowledgement

At the end I would like to extend my appreciation to the managers and personnel of Iran khodro Company, Ployacryl Isfahan Company, Group of companies affiliated to the State Defensive Industries who helped me in this study.

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