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Studying and Developing Model of Six Sigma Implementation in Companies of Yazd House of Industry and Mine

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Abstract
Despite the increasing interest for Six Sigma implementations, there is also increasing concern about implementation failures. One major reason many implementations of Six Sigma methodology fail is lack of an effective implementation model. Asking CEOs about the most important factors for successful implementation of Six Sigma methodology the purpose of this research is to study and develop model of six sigma implementation in companies of Yazd House of Industry and Mine. The method used in this research is a descriptive-survey one. The research sample includes 276 top managers (CEOs) chosen randomly from among 1000 ones. To gather data a 63-material questionnaire (translated and altered) whose validity and reliability was achieved via existing ways. To analyze data we have used descriptive statistics (charts, frequency, average, Frequency percent, etc) and deductive statistics (Anova, x^2, etc). The outputs show that more than 77 % of the participants suggest that all 11 factors mentioned in this research is significantly important for implementing six sigma in Companies of Yazd House of Industry and Mine. These factors include top management and leadership, six sigma teams, strategic planning, competitive benchmarking, process management, human resource development, education and training, quality tools, information and analysis, customer management and supplier management. A practical model for implementing six sigma in companies of Yazd House of Industry and Mine is also presented in this research out of research findings.

Key words: Implementation model; Six Sigma; Companies of Yazd House of industry and mine

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INTRODUCTION

Six Sigma is a robust statistical measurement of a process, symbolized by the Greek letter δ, which represents a process capability with a normal data distribution having exactly 3.4 defects per million opportunities. It is also defined as an initiative where companies strive for significant financial advantage through continuous improvement using data-driven decisions (Leathers, 2002). Motorola, General Electronics and Toshiba the first time used it in 1980 to improve the performance of the processes (Mccarty et al, 2004).

Quality improvement efforts in the world have been started with primary efforts of people like Deming, Juran, Crosby, Ishikawa and others from mid-twentieth century. Their strategy was a transition from product inspection for detecting defects, to preventing the defects.

To put it simply, Six Sigma is a tool providing information about the product quality and customer satisfaction (Aqadadi and Karbassian, 2006). A prominent feature of Six Sigma quality principles that set it apart from the others is that it can prevent the occurrence of errors. In fact, Six Sigma is the application of statistical methods in industrial engineering and management and it is implemented based on data obtained from the performance measurement process (Sanei, 2007). Six Sigma Academy seekers stated that the goal of Six Sigma is not to reach Six Sigma levels of quality but profitability. Previous to six sigma, quality improvement programs were done by total quality management (TQM) and ISO 9000 but they have not had a significant impact on corporate earnings (Harry and Schroeder) In contrast with other quality initiatives, Six Sigma recognizes that there is a direct correlation between the number of product defects, wasted operating costs, and the level of customer satisfaction. In the short term, Six Sigma is a method to eliminate defects and the opportunity for defects. It utilizes a statistical unit of measurement to measure the capability of the process, then achieve defect free performance, and ultimately increase the bottom-line and customer satisfaction. The Six Sigma strategy aims at improving business processes by eliminating mistakes and improving quality. The pioneers adopted a customer-oriented approach covered in four basic steps to achieve process improvement, and met with remarkable success. The four major steps are:

1. Quantifying what satisfies the customer
2. Identification of the gap between customer needs and the organization's current performance level
3. Analysis of reasons on why such gaps exist
4. Devising methods to remove such gap

Such a customer oriented Six Sigma approach helps organizations:

• eliminate mistakes
• enhance product quality
• innovate products

1. LITERATURE REVIEW

In the midst of 1980s, Motorola (Stamatis, 2004), under the leadership of Robert W. Galvin, was the initial developer of Six Sigma. Six Sigma is a disciplined methodology that uses data and statistical analysis to measure and improve a company's operational performance. It focuses on identifying and eliminating "defects" in processes and has produced hundreds of millions of dollars in new profitability in a wide variety of industries. A large part of the success of Six Sigma lies in its ability to add a communication layer to industrial processes. Visual information systems populate the working environment with clear signals for parts delivery or tool changeover (Antony, 2004). Briefly, Six Sigma provides a suitable strategy with appropriate indicators toward continuous improvement. Six Sigma methodology and statistical methods ensure the throughout improvement in quality and reduction in rejects with the definition of targets and visions. Implementation of Six Sigma will be achieved through a series of successful projects. Project can have different sizes and durations. Depending on the scope of the project, they are categorized as: (Haik, 2005)

• Transactional Business Process Project: an improvement of a transactional business process that extends across an organization; such as order processing, inventory control and customer service.

• Traditional Quality Improvement Project: aimed at solving chronic problems crossing multiple functions of an organization.

• Design for Six Sigma Project: a project aimed at incorporating the "voice of the customer" (i.e. customer's needs) and Six Sigma level targets into the design of products, services or processes

Six Sigma improvement model typically has five phases: Define, Measure, Analyze, Improve and Control: (Sleeper, 2006)

Phase 1- Define: In the Define phase, the Black Belt forms the team, including members from different departments affected by the problem. The team clearly specifies the problem and quantifies its financial impact on the company. The team identifies metrics to assess the impact of the problem in the past, and to document improvements as the problem is fixed.

Phase 2- Measure: In the Measure phase, the Black Belt team studies the process and measurements associated with the problem. The team produces process maps and assesses the accuracy and precision of measurement systems. If necessary, the team establishes new metrics. The team identifies potential causes for the problem by applying a variety of tools.

Phase 3- Analyze: In the Analyze phase, the Black Belt team determines what actually causes the problem. To do this, they apply a variety of statistical tools to test

hypotheses and experiment on the process. Once the relationship between the causes and effects is understood, the team can determine how best to improve the process, and how much benefit to expect from the improvement.

Phase 4- Improve: In the Improve phase, the Black Belt team implements changes to improve process performance. Using the metrics already deployed, the team monitors the process to verify the expected improvement.

Phase 5- Control: In the Control phase, the Black Belt team selects and implements methods to control future process variation. These methods could include documented procedures or statistical process control methods. This vital step assures that the same problem will not return in the future. With the process completed, the Black Belt team disbands.

How to organize a Six Sigma program: Jim Collins' advice to start with the right people is definitely applicable here. Implementing Six Sigma requires having the "right people in the right seats" to be successful. Six Sigma is no different. Studying some of the companies listed above will prove that having the right people with the right skills and a shared vision is the foundation for success. The key players of the Six Sigma team are the:

(1) Champion: (Usually upper management/ executive officers) The Champion is the person responsible for instilling the vision of Six Sigma and communicating it across the firm. The Champion should receive Six Sigma training in order to be an effective leader. While most likely not as knowledgeable in the use of specific tools in

Six Sigma, a Champion must have an understanding of what the Black and Green Belts are doing in order to relay updates and accomplishments to upper management and throughout the company. The champion also assists the Black Belts by dedicating resources, assists in choosing projects, and is the advocate for the Black and Green Belts. *Some programs distinguish between Champion and Executive leadership, it's up to you.

(2) Master Black Belt: A master Black Belt is a Black Belt that has had extensive experience with the Six Sigma methodology. When a firm first tries to implement a Six Sigma program it may be necessary to hire the services of a master Black Belt to help facilitate correct implementation and initial success. The Master Black Belt can act as a coach to the Black and Green Belts by drawing on extensive experience relating past problems and how they were solved. The Master Black Belt can also evaluate project results and give feedback to Black and Green Belts on performance and implementation.

(3) Black Belts: The rank of Black Belt is achieved through a proper accreditation program that teaches the Six Sigma process and tests understanding of the tools to be used. Black Belts have a strong understanding of statistical methods of data collection and analysis and must have experience in past Six Sigma projects. Their full time responsibility is to Six Sigma projects. Black Belts work as project managers and are responsible for all the traditional roles of that assignment, communicating often with the Champion throughout a process. If there are no Black Belts in an organization it might be necessary to train some and secure the services of a Master Black Belt to mentor and develop new Black Belts. Adams, Gupta, and Wilson suggest that a company develop one black per every million in revenue, or in some cases .5-4.0% of employees should be Black Belts.

(4) Green Belts: Green Belts are essentially assistants to the Black Belts in their job. Effective Green Belts have an understanding of statistics but don't have the expertise and experience with the Six Sigma tools and projects like Black Belts. Green Belts typically do the leg work under Black Belt direction such as data collection and so on. However, it is important for Green Belts to be involved with the whole process of choosing projects, analyzing processes, using Six Sigma tools, and improving processes so that they can achieve the level of Black Belt and advance into a leadership role. Generally Green Belts work on Six Sigma projects part time while still taking care of their normal responsibilities. (AGW) There should be approximately 10 Green Belts for every Black Belt in a company as a general rule.

2. SIX SIGMA DEPLOYMENT

Papers addressing Six Sigma deployment focus on people issues, with particular emphasis on the professional role of Belts and training issues. For example, some authors describe the role of BBs and the required qualifications including the suggestion of a BB training curriculum. Hoerl et al. (2004) suggest that it is a positive career move for a statistician to take up a leadership role in Six Sigma, implying that it is important for BB to have statistical skills. However, care is needed in selecting the right qualities for Belts, as it is important for Six Sigma to retain an inclusive stance rather than becoming too closely aligned with specialist skills. Caulcutt (2004) suggests the use of Myers-Briggs Type Indicator (MBTI) tool to assist BBs to work effectively with others. It is claimed that this tool helps BBs to understand the personality types of team members and communicate more effectively, gain cooperation and overcome resistance. However, these papers are descriptive using authors' experience. Therefore further research is needed to investigate the qualities required by the Belt candidates. Further rigorous research is needed to investigate evidence for the effectiveness of the proposed training methods.

Another issue regarding deployment is the successful use of teams, given that Six Sigma projects are accomplished through team efforts. It is important to focus on team success, rather than individual success, if Six Sigma projects are to be successful overall. No paper has been identified that address an individual's reaction or resistance to Six Sigma. Management involvement and support are essential to Six Sigma deployment, as is the case for many other initiatives. Haikonen et al. (2004) present a preliminary case study on the role of management in the improvement of the deployment process in Six Sigma and highlights its key finding that the level of management support is positively related to how well they understand the Six Sigma methodology.

3. SIX SIGMA IMPLEMENTATION

Six Sigma implementation can be divided into types of business: manufacturing and non-manufacturing, described as follows.

3.1 Manufacturing Business

Cases of successful companies that have adopted Six Sigma are presented in many papers. The authors describe how the respective companies' implement Six Sigma, giving insights into issues of perceived best practices. Motorola was the first organization to use the term Six Sigma in the 1980s as part of its quality performance measurement and improvement program. Six Sigma has been successfully applied in other manufacturing organizations such as Boeing, DuPont, Ford Motor, Seagate, Texas Instruments, GE, etc. All of these papers are categorized as descriptive papers, giving details of business cases, but without a rigorous case study approach.

As a result of Six Sigma being initiated in the USA, all the above success stones describe US companies.

Very few papers have been found regarding successful implementation strategies for whole businesses in other parts of the world. Therefore, academic research outside USA could be a good area of future study to determine any comparative differences in implementation issues, such as those caused by cultural issues.

3.2 Non-Manufacturing Business

1) Healthcare sector
Healthcare services are one of the major active nonmanufacturing contexts in which Six Sigma has been adopted, with the majority of papers studying implementation issues in USA. Six Sigma principles and the healthcare sector are very well matched because of the healthcare nature of zero tolerance for mistakes and potential for reducing medical errors. Some papers explain how Six Sigma improves healthcare service quality by reducing medical errors and increasing patient safety.

2) Financial services sector
In recent years, finance and credit department are pressured to reduce cash collection cycle time and variation in collection performance to remain competitive. Typical Six Sigma projects in financial institutions include improving accuracy of allocation of cash to reduce bank charges, automatic payments, improving accuracy of reporting, reducing documentary credits defects, reducing check collection defects, and reducing variation in collector performance. Bank of America is one of the pioneers in adopting and implementing Six Sigma concepts to streamline operations, attract and retain customers, and create competitiveness over credit unions. It has hundreds of Six Sigma projects in areas of cross-selling, deposits, and problem resolution. Bank of America reported a 10.4% increase in customer satisfaction and 24% decrease in customer problems after implementing Six Sigma (Roberts, 2004)

3) Other Sectors
Still, there are other sectors in Six Sigma implementation, including Civil Engineering and Construction, Research and Development, Supply Chain Management, Human Resource Management and Train and safety.

3.3 Success Factors in Six Sigma Implementation Some Papers Present the Key Ingredients for the Effective

Introduction and Six Sigma implementation in manufacturing and services organizations as the following.

1) Management commitment and involvement.
2) Understanding of Six Sigma methodology, tools, and techniques.
3) Linking Six Sigma to business strategy.
4) Linking Six Sigma to customers.
5) Project selection, reviews and tracking.
6) Organizational infrastructure.
7) Cultural change.
8) Project management skills.
9) Liking Six Sigma to suppliers.
10) Training.

4. RESEARCH METHODOLOGY

The best method to achieve reality in the present study is "Mixed Method". Mixed method is a type of non-experimental research which involves both quantitative and qualitative methods. In qualitative part, "Focus Group" method and in quantitative part, descriptive method has been used.

4.1 Population and Sample

The method used in this research is a descriptive-survey one. The research sample includes 276 top managers (CEOs) chosen randomly from among 1000 ones. To gather data a 63-material questionnaire (translated and altered) whose validity and reliability was achieved via existing ways. To analyze data we have used descriptive statistic (chart, frequency, average, Frequency percent, etc) and deductive statistics (Anova, x^2, etc). The outputs show that more than 77 % of the participants suggest that all 11 factors mentioned in this research is significantly important for implementing six sigma in Companies of Yazd House of Industry and Mine. These factors include top management and leadership, six sigma teams, strategic planning, competitive benchmarking, process management, human resource development, education and training, quality tools, information and analysis, customer management and supplier management.

4.2 Data Gathering Instruments

According to the study objectives, a translated and altered questionnaire was used for gathering data in this study. After reviewing the researches and studies conducted in this field, the research hypothesis and prototype have been prepared first. The main obstacles and parameters of them were then modified using "Focus Group" technique and in the meetings with managers, top experts and strategic management consultants of the desired companies. Some obstacles were eliminated, some others were corrected and 9 new items were added based on companies' conditions. Finally, the final list of obstacles and parameters was prepared. The research model was completed following extracting each of the main obstacles and then the researcher-made questionnaire was provided according to the identified parameters and factors.

In order to determine the content validity of the questionnaire we asked 10 professors of Executive Management, who had required expertise in the fields of research, statistics and research methodology, for help and their comments were very useful in improvement and modification of the questionnaire. To test the reliability (creditability) of it, a pilot study was conducted on 32 subjects. The reliability coefficient for the whole questionnaire and each of its components was determined through Cronbach's Alpha test using SPSS software.

4.3 Data Analysis Method

In the current study descriptive and inferential statistics have been used for analyzing data in two separate phases. In the first phase the descriptive analysis of data has been done in the form of frequency distribution tables and charts. In the second phase of inferential statistics methods: Kolmogorov-Smirnov Test (in order to specify the normality of data distribution), Cronbach's Alpha Test (for determining the reliability of study instruments), Friedman Test (for rating each factor and component), Exploratory and Confirmatory Factor Analysis (to design a model for barriers to implementing business strategies) have been used. All above mentioned statistical operations have been done using SPSS and AMOS software.

5. RESEARCH FINDINGS

Formulating Six-Sigma Model in Yazd House of Industry and Mine Member Companies

In order to evaluate the proposed model, Anderson & Gerbing two-step approach (1988). The measurement model and model structure were estimated in the first and second step respectively according to first step's results and by the use of Structural Equation Modeling (SEM). All analyses were done through SPSS 17 and AMOS 18. For testing the mediated effects in the proposed model and their significance, Baron and Kenny (1986) method and Sobel test (1982) were used. The adequacy of the model's fitness was determined using several fitness indices including X^2, Normed X^2 index, Goodness-of-fit X^2 index (GFI), Adjusted goodness-of-fit index (AGFI), Normed fit index (NFI), Comprative fit index (CFI), Incremental fit index (IFI), Tucker-Lewis index (TLI), and Root-mean-square error of approximation (RMSEA).

To evaluate the proposed model Structural Equation Model (SEM) was used. Prior to exploring structural coefficients, fitness of the models was reviewed. The fitness of the primary model is reported in table 1 according to the fitness indices used in this study. Since the fitness indices values of the primary model suggested that the proposed model needs some slight modification and improvements, so in the next step considering the modification indices (MI) presented by Amos 18, a regression line between quality service teams and competitive modeling and also a line between strategic planning and customer management were added to the model. After making these changes another analysis was done and the results of its fitness indices are presented in second model row of table 1. As it was expected, these indices showed improvement in fitness of the second model; but considering fitness index values the model still needed to be modified, so according to presented modification indices (MI), in the next step the regression line between evaluation and estimation and six-sigma teams and the line between top management and leadership and development of leadership were added to the model, and then the data was analyzed again and the results of its fitness indices are presented in third model row of table 1. As it was expected, these indices showed the second model fitness improvement and the acceptability of the model. The modified model is the final version (Figure 1) whose fitness with data based on fitness indices is presented in table 1. Looking at this table it is obvious that the first model does not have a perfect fitness. By adding lines of proposed MIs in the next steps it becomes better and the fitness indices are accepted.

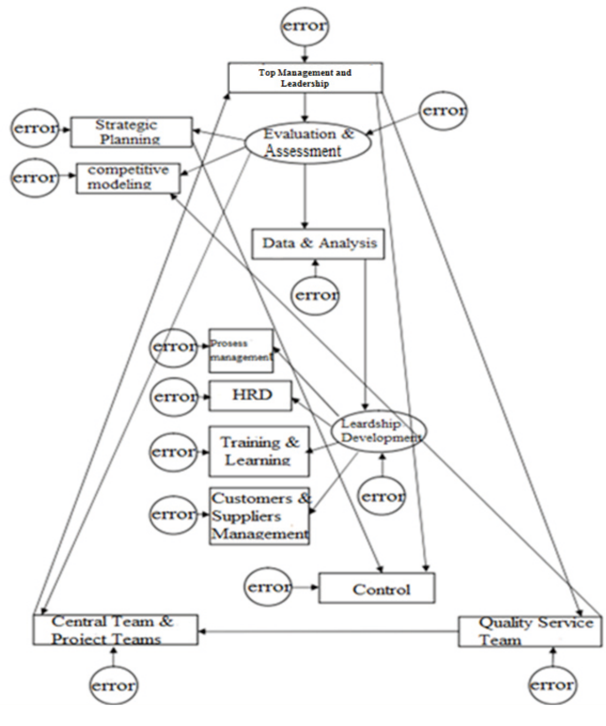

Figure 1
Final Model for the Consequences of Successful Implementation of Six-Sigma

Table 1
Fitness Indices for Models 1, 2 and 3

Fitness	Index Model	X^2	Df	X^2/Df	GFI	AGFI	IFI	TLI	CFI	NFI	RMSEA
1	Formulated Model	745.9	42	17.97	0.73	0.58	0.58	0.47	0.58	0.57	0.25
	Dependence Model	1766.24	55	32.11							0.345
2	Formulated Model	183.3	40	4.6	0.89	0.82	0.92	0.88	0.91	0.89	0.11
	Dependence Model	1766.24	55	32.11							0.345
3	Formulated Model	146.3	38	3.85	0.92	0.88	0.94	0.91	0.94	0.92	0.06
	Dependence Model	1766.24	55	32.11							0.345

For X^2/DF the values less than 5 are suitable and it shows good fitness of the model as much as it's closer to zero. For GFI, AGFI, IFI, CFI, TLI and NFI the value near 0.90 and more is considered as acceptable fitness of goodness which indicates the good model. Regarding RMSEA, the values near 0.05 or less show good fitness of the model and a value of 0.08 or less suggests reasonable error of approximation; values above 0.10 shows the necessity of rejecting the model (Qasemi, 2010). Therefore considering the values of fitness indices for the final model (model 3) and the limits of acceptable values mentioned above, it can be said that the final model proposed in this study is accepted.

The coefficients of the lines between final model variables are reported in table 3. The results of regression analysis of the variables show that evaluation and assessment are influenced by two components of strategic planning and competitive modeling; in other words, these two apparent external variables form latent external variable of evaluation and assessment. Development (leadership) is influenced by Process Management, Human Resource Development (HRD), Training and Learning and Customers and Suppliers Management i.e. these five apparent internal variables create the latent internal variable of Development (leadership). These results also shows that the Top Management and Leadership interacts with Quality Service Teams; Quality Service Teams with Central and Project Teams; Central and Project Teams with Top Management and Leadership. The model's regression lines also suggest that there is significant relation between Evaluation and Assessment and Data and its analysis; Data and analyses and Leadership Development. But Leadership Development is not significantly related to Control. The modified lines of the model also show significant relations between Quality Service Teams and Competitive Modeling; Evaluation & Assessment and Central and Project Teams; Strategic Planning and Control; and Top Management and Leadership and Control (Table 2).

Table 2
Structural Model of Lines and Their Standard Coefficients in the Final Model

Line	Factor Loads	Significance
Evaluation and Assessment →Strategic Planning	0.096	0.011
Evaluation and Assessment →Competitive Modeling	0.84	0.016
Leadership Development →Process Management	0.09	0.009
Leadership Development → Human Resource Development	0.77	0.000
Leadership Development → Training and Learning	0.62	0.000
Leadership Development → Customer and Supplier Management	0.68	0.000
Top Management and Leadership → Quality Service Teams	0.10	0.013
Quality Service Teams → Central Teams and Project Teams	0.36	0.002
Central Teams and Project Teams → Top Management and Leadership	0.29	0.000
Top Management and Leadership →Evaluation and Assessment	0.16	0.000
Evaluation and Assessment → Data and Analysis	0.66	0.000
Data and Analysis → Leadership Development	0.30	0.000
Leadership Development → Control	0.022	0.445
Quality Service Teams → Competitive modeling	0.40	0.000
Evaluation and Assessment → Central Teams and Project Teams	0.38	0.000
Strategic Planning → Control	0.83	0.000
Top Management and Leadership → Control	0.80	0.000

Note: The last four rows are the new lines added to the proposed model with their coefficients.

CONCLUSION

When an organization decides to implement Six-Sigma, it should be ready to face some challenges. It is very difficult to create a culture for timely improving and changing the paradigms in the organization especially when prosperity and success are replaced by despair, failure and team and managers' lack of commitment due to complexities of some steps and tools, prolonged duration and high cost of those changes. To solve this dilemma projects with smaller size, but with more quantity, should be used. Surely, the whole plentitude of interests gained by the organization through these projects will be satisfactory. The organizations also should note that Six-Sigma is not a certificate or degree which needs short periods of effort to be achieved. It is an endless way of quality improvement and increase that leads to a lot of economic and commercial benefits for an organization. Today, Managers should notice that regarding dramatic changes occur in today's world they will not have a future unless they think of permanently remaining successful. The organizations with conventional thought do not have any place in today's world in which the competitive environment does not give any chance to making mistakes. The leading progressive organizations are the ones with high flexibility toward internal and external changes. Creating a sense of change among staffs, timely execution of changes throughout the organization and generally change management is the major art of managers and leaders today.

Another important point in implementation of Six-Sigma is the comprehensive support of top management, providing necessary sources and proper facilities, careful planning (in performing different phases of DMAIC methodology step-by-step), required trainings at all levels, creating the culture needed for change and doing tasks in multidisciplinary groups and also using leaders and staffs who have enough efficiency and capability to have a role in the team. If any of these items mentioned is weak in the Six-Sigma, the results will be far away from what has been expected by the top management.

Regarding the main effective factor in implementation of Six-Sigma in member companies of Yazd House of Industry and Mine from the view points of their top managers, data analyses show that more than 77 percent of the respondents list 11 factors mentioned in this study including: Top Management and Leadership, existence of Six-Sigma Teams, Strategic Planning, Competitive Modeling, Process Management, HRD, Training and Learning Management, using Quality Tools, Data and its Analyses, and Customers and Suppliers Management. These results are consistent with Mojibi and Aghapour Study (2009) on "Challenges Facing Implementation of Six-Sigma Methodology in the Public Sector (a case study in pipeline and telecommunication companies)", which suggest challenges facing implementation of Six-Sigma in the Public Sector are weak dynamics of Six-Sigma teams, lack of expert staffs in using statistical methods, incorrect identification of losses, lack of an efficient system for measuring data, lack of enhancement idea, intangible outputs of processes, lack of process-oriented view and high portion of human resources, and with the results of Deruntz and Meier (2010) which concluded that implementing Six-Sigma without extensive strategies and management responsibility cannot be done easily and also it is possible to be implemented by supports of upper and lower management, suitable sources, sensitive staffs, necessary trainings, alignment of projects and connection with effective procedures. Moreover, these results are in accordance with the findings of Jing et. al. (2008) suggests that 13 factors are effective in the success of Six-Sigma Green Belts.

Therefore considering the results of this study and other past researches 11 factors mentioned are important for implementing Six-Sigma methodology and if one or some of these factors is incomplete or does not exist, the implementation of this method will encounter fundamental problems.

Regarding the main focus of the current study and proposing a model for implementing Six-Sigma in member companies of Yazd House of Industry and Mine; in order to examine the model presented by Tsung (2002) in member companies of Yazd House of Industry and Mine and do necessary modifications Structural Equation Modeling method (SEM) was used and the results of regression analysis of variables indicate that evaluation and assessment are influenced by two components of strategic planning and competitive modeling; Development (leadership) is influenced by Process Management, Human Resource Development (HRD), Training and Learning and Customers and Suppliers Management. These results also show that the Top Management and Leadership interacts with Quality Service Teams; Quality Service Teams with Central and Project Teams; Central and Project Teams with Top Management and Leadership. The model's regression lines also suggest that there Evaluation and Assessment and Data and its analysis; Data and analyses and Leadership Development are significantly related, but Leadership Development is not significantly related to Control. The modified lines of the model also show significant relations between Quality Service Teams and Competitive Modeling; Evaluation & Assessment and Central and Project Teams; Strategic Planning and Control; and Top Management and Leadership and Control. These findings are also consistent with the model proposed by Tsung (2002) and the results of the study done by Nasiripour et.al (2008). On this basis, it can be said that in implementation of Six-Sigma, there is an interaction between Top Management and Leadership, Project Teams (Black Belts and Green Belts) and Six-Sigma Central Teams as four major factors. Also 'Top Management' and 'Evaluation and Assessment'; 'Evaluation and Assessment' and 'Data and its analysis'; 'Data and analyses' and 'Leadership Development'; and 'Leadership Development' and 'Control' are directly or indirectly related. Thus according to these results all factors interact directly or indirectly with each other and cannot be separated, so the responsible implementers of this method should know that the rational interaction of the mentioned factors is of the most importance, otherwise the implementation of Six-Sigma will face problems in any companies or organizations.

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