

CRITICAL SUCCESS FACTORS OF SIX SIGMA: A LITERATURE REVIEW

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Abstract

Six sigma methodology is primarily used for cultivating the operational efficiency through the purging of defects. The implementation of six-sigma has become a great concern for the manufacturing organizations due to the existence of certain barriers. There are certain factors which play a valuable role in the implementation of six-sigma. These factors are known as critical success factors. Critical success factors behave as an enabling element in the successful implementation of six sigma. The main objective of this research work is to highlight the literature on the critical success factors of six sigma.

Keywords: critical success factors, six-sigma implementation.

1. Introduction

The manufacturing industries play a very important role in the development of country. Due to increase in the competition in market, it is very important to made defect free product to satisfy the customer. After satisfaction of customer more profit are be earned. So, six sigma is used for process improvement. Basically six sigma is widely used tool and technique for defect free product. It was firstly introduce by engineer Bill Smith while working at Motorola in 1980. A six sigma process is one in which 99.99966% of all opportunities to produce some features of a part are statistically expected to be free of defects. Apart from reduction of defects in manufacturing, Six Sigma also makes support processes to get rid of errors and inefficiency thus it help to the organisation at great extent. Six Sigma is widely implemented by the manufacturing organizations irrespective of their size.

Six sigma has been used from many past years. It is very flexible and adaptive method for business and process improvement. First well-publicized implementation of Six Sigma was at General

Electric (Henderson and Evans, 2000). Originally six sigma was used in manufacturing but now it is used in construction industries also due to increase in demand. As a project-driven management approach, the range of Six Sigma applications is also growing from reduction of defects in an organization's processes, products and services, to become a business strategy that focuses on improving understanding of customer requirements, business productivity and financial performance (Kwak and Anbari, 2006).

Six sigma have two key method:- DMAIC and DMADV. DMAIC stand for Define, Measure, Analyse, Improve, Control while DMADV stands for Define, Measure, Analyse, Design, Verify. DMADV is the advance version of DMAIC.

The attainment of good or acceptable quality of product has been a problem over many years. As a result, significant amount of resources both in terms of human resources and material are wasted every year. This greater wastage is mainly the result of insufficient, inefficient or non-existent quality management procedures (Stewart and Spencer, 2006). In literature, there are well documented cases of success and failure of six-sigma initiatives. The six-sigma implementation is always walled by certain barriers. These barriers make its implementation more complex. Besides this, there is another category known as critical success factors which play a valuable role in the successful implementation of six-sigma. Adequate consideration of these critical success factors in the six-sigma implementation process results into fruitful outcomes. So the study of critical success factors of six sigma for process improvement become necessary. Rockart (1979) was the first one who introduces the critical success factors for determine the need and decision making. In view of this, the main objective of this research work is to highlight the literature review on the critical success factors of six-sigma implementation.

2. Literature Review

The reduction in waste or to reduce the defect are the universal goal of six-sigma methodology. Six sigma helps to reduce the variation in process such the defect in product. And the critical success factors of six sigma are the factors whose study are important to gain higher return, decision making and also for achievement of objectives. The critical success factors can be change with the change in industries or country to country. The literature review on critical success factors of six-sigma is documented below:

Siddiqui et. al. (2016) found 22 critical success factors affecting the implementation of six-sigma. From these 22 critical success factors, authors found that around 32 percent were most critical, 50 percent were critical and 18 percent was least critical. Most critical success factors are:- Quality information, Project management skills, Project tracking and reviews, Continuous improvement, Financial benefits, Vision and planning, Team work, Customer satisfaction, Information technology and innovation, Risk management, Top management involvement, bench marking.

Pathiratne et al., (2018) identified 48 critical success factors of six-sigma in service and manufacturing industries. Afterwards, authors classified these factors into eight groups. Moreover, authors found that 35 factors are related to strategy, project and human resource.

Alhuraish et. al. (2017) examined the combined results of the estimated level of success for implementing lean manufacturing and six sigma. Based on the study, authors found that top management commitment is the most important critical success factor for the successful implementation of both lean manufacturing and six sigma.

Stankalla et al., (2018) recognized different CSFs of six sigma in manufacturing SMEs. Moreover, authors analyzed and compared the importance of various factors. Authors stated top management commitment and linkage of Six Sigma to business strategy as the significant factor of six sigma implementation.

Abliwi et al. (2015) highlighted top 6 critical factors for six sigma implementation as well as for the implementation of lean six sigma. These critical success factors are- time-management, Requirement of training and coaching, management of resources, awareness about six sigma, managed expectations, employee reaction and support toward a new business strategy.

Shah and Din (2016) identified various critical factors of six sigma implementation in Pakistan organizations and then performed survey for determine their significance in implementation.

Gutierrez-Gutierrez et al. (2016) found Continuous improvement structure, Strategic analysis, Cross functional teams, Organizational commitment as the critical success factors in the implementation of six-sigma.

Jaffal et al., (2017) determined critical factors which supports the successful implementation of six-sigma in carpet organizations of Turkey. Afterwards, authors analyzed the factors through questionnaire survey.

Krishnan (2016) mentioned that involvement of organizations plays a very important role in the implementation of six-sigma for better quality. This will help for improving the standard of products and service to survive in the competitive market condition.

Sreedharan et al., (2018) determined critical success factors of six sigma, lean sigma and TQM on the basis of literature analysis. Moreover, authors analyzed 22 factors of six-sigma through Pareto analysis.

Babbar and Koufteros (2008) discussed that the product should be according to the requirement of customer and the product should made in such a way that it can satisfy the customer. Authors found that employee training and development and role-of front line employees in improving service operations performance are the significant factors in the implementation of six-sigma.

Silva et al., (2018) performed survey in the 45 manufacturing and service organizations of brazil. The survey was based on 45 organizations which have successfully implemented the six-sigma in brazil. The authors identified various critical success factors affecting the six-sigma implementation. Authors found five major critical success factors such as goals and gain, data availability, implementation of the present solution and resistance to change, and priority of infrastructure and training. These factors will help the organizations for the fruitful implementation of six sigma.

Talankar et al., (2015) identified various critical success factors of successful implementation of six-sigma. These factors are knowledge sharing, giving reward and incentives to empower the employees, Human resources management,

Awareness programme, Project selection, Data base management.

Carvalho et al. (2014) presented a case study in three companies. On the basis of case study authors, identified and categorized various critical success factors of six sigma implementation. These factors are Top management commitment, having quality control, project management and project prioritization, project selection, Linking Six Sigma to business strategy, Training, Adopting of tools and techniques.

Ismyrlis and Moschidis, (2013) categorized the critical success factors of six-sigma in two groups i.e. hard, soft factor and enablers. Soft factors include human behaviour, proper use of human resources, management at every stage, education, communication, spirit of innovation, reward, linking of six sigma with supplier, attaching the success with financial benefit, leadership and others. Hard factors include tools and techniques. Enablers includes strategy, people-staff, partnership and resources, leadership, processes-products-services.

Alsmadi et al. (2012) mentioned five most critical success factors in the investigation carried out in 100 organizations of Saudi-Arabia. These factors are project management skill, senior management support, linking six sigma to business strategy and customers, leadership quality. These factors are most critical followed by any organization for better implementation.

Agarwal et al., (2017) presented a case study of an Indian auto component company for analysing the role of various critical factors in the implementation of six-sigma. Authors found that linking of six sigma with supplier and linking of six sigma with employee is least critical factors. Brainstorming technique was used to analyse the condition with the help of experts. From the analysis, authors found various critical success factors such as project prioritization, project management, project selection, training, linking of six sigma with customer, linking of six sigma with business strategy, cultural change, understanding six sigma methodology, infrastructure of organisation, management involvement.

Laureani and Antony (2016) identified four main critical success factors of six-sigma implementation. Authors used questionnaire method for identifying the impact of critical success factors in six-sigma implementation. Authors found that leadership is the most important critical factor. The other factors of successful implementation of six-sigma are project

management, financial accountability, most talented staff selection.

Clegg et al. (2010) used questionnaire methodology for the identification of various critical success factors in the implementation of six-sigma. Authors found that critical success factors such as training, leadership, quality improvement, use of advanced statistical tools, customer satisfaction and clear defined roles and responsibilities of employees and improvement initiative in the six-sigma implementation.

Coronado and Antony, (2002) recognized various critical success factors in the six-sigma implementation. These success factors are organisation infrastructure, top management involvement, management commitment, Cultural change, communication, linking six sigma to business strategy, training, linking six sigma to customer, linking six sigma to supplier and human resources also, project management, projection selection.

Raghunath and Jayathirtha, (2013) identified various critical success factors for small and medium scale auto component manufacturing industries. These factors are cultural change, linking six sigma to customer, financial gains and business strategy, suppliers, employees leadership in six sigma, management commitment and participation, organizational infrastructure, training, cultural change, project management, understanding six sigma methodology, project prioritization and selection.

Tyagi et. al. (2017) found five critical success factors such as linking six sigma to suppliers, customer satisfaction, leadership, fact based decision making and linking six sigma to business strategy in the implementation of six-sigma. These factors are most crucial and help in implementation of six sigma.

3. Conclusion

Six-sigma methodology are increasingly implemented by various types of organizations such as manufacturing and service organization irrespective of their structure or size for elimination of defects. In view of this, the main focus of this paper is to present a significant literature review on the critical success factors of six-sigma implementation. These factors play a valuable or significant role in the implementation of six-sigma. The top management of manufacturing as well as service organizations may effectively deploy these

critical success factors in the implementation of six-sigma.

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