IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 23, Issue 1. Ser. III (January 2021), PP 19-24
www.iosrjournals.org

A Study of Barriers and Critical Success Factors for Implementing In It System and Processes

Dr. ANAND K
Associate Professor
Department of Business Administration
Maharaja's College
University of Mysore
Mysore

Abstract:*"Six Sigma is a statistical measure of the performance of a process or product. It is used as a quality control mechanism, which seeks to reduce defects or variations in a process to 3.4 defects per million opportunities thereby optimizing output and increasing customer satisfaction.Thus, the aim of this article is to identify the barriers in the implementation of Six Sigma and examine critical success factors constructs for Six Sigma implementation IT system and processes.Critical Success Factors are crucial for the success of any business, 22 critical success factors were considered. Six Sigma initiatives is no different from other quality initiatives, it encounters barriers for successful implementation19 factors were analysed. In conclusion, it can be stated that Communication and Executive engagementhas shown to be the most important factor that can be considered as an important Critical Success Factor. On the other hand, the study indicated that the factors that act as barriers lack of Six Sigma awareness and lack of employee engagement has been shown to be the most important factor that acts as the barrier for Six Sigma implementation.*

Key words: *Barriers , Critical Success Factors , Customer Satisfaction , Employee Engagement , Six Sigma Implementation ,Quality Control.*

Date of Submission: 26-12-2020 Date of Acceptance: 08-01-2021

I. Introduction

Businesses inclined towards customers' delectation greatly focus on the quality of the products or services they deliver and having a control over the quality promises greater abilities to conquer potential competitors. Therefore enriching the quality has become an essential part of business strategy beneficial to various industrial sectors including manufacturers, service providers, distributors, health care providers, educators and even many governmental organizations. Hence developing strategies aimed towards refining the quality defines the success of any business in the distant future. Accordingly, various quality measurement techniques have been framed of which Six Sigma is widely practiced.

Six Sigma being a project-oriented and statistically based approach towards quality measurement and improvement refers to accomplishing a sigma level of 3.4 Defects per Million Opportunities (DPMO) or 99.9997 per cent precision for any product or service delivered by an organization. Defects may vary from any damaged tool to a faulty customer invoice. It is obligatory for any customer service organization to cater to the needs of the customer and ensure that their satisfaction is gained. Information Technology (IT) companies providing technological services to the customers have the privilege of getting closer to the customers, receiving their feedback and incorporating their voice in quality improvement programs. Of late, many companies compel their service providers to adopt the well-established Six Sigma practices to continue their business in the future. Because of the increasing high-quality product expectations of the customer, it is essential for companies to concentrate on their quality of products which constitutes the core of quality and serves as an adept technique to confront the challenges and outlive in the competition. Any kind of negligence or poor focus on these factors may pose high risk to the industries and may thwart the existence of the industry. Alternatively, companies tend to lose their customer base owing to poor quality of products or services.

The primary focus of Six Sigma is on developing and implementing quantifiable strategies that emphasis on perfecting the process by reducing the defects. Statistical interpretation of Six Sigma strategies is focussed far ahead of qualitative elimination of defects as perceived by the customers. Sigma quality level is determined by the frequency of defects in the final output or the yield of the process.

II. Review of Literature

Antony (2006) describes Six Sigma tool as having 'specific role and narrow in focus' while he delineates that 'Six Sigma technique has a wider application and requires specific skills, creativity and training'.

Chakraborty and Tan (2012) analysed the qualitative and quantitative benefits of Six Sigma in service organizations. The review of literature done by them on various critical success factors of Six Sigma reveal that only 30% of the articles mention understanding of Six Sigma methodology, tools and techniques and the rank consigned to this factor was 11 out of the 19 Critical Success Factors reviewed.

The question whether Six Sigma provides new techniques for quality improvement or is it the 'repackaging' of conventional quality management practices is still debatable and has led to some perplexity about Six Sigma methodologies (Goffnett, 2004). This question has put the managers in ambiguous situation unable to decide whether or not to adopt Six Sigma. If the managers, on one hand, do not adopt Six Sigma then they may not obtain considerable benefits like the GE, because of the simple reason that they considered Six Sigma practices to be identical to those conventional quality improvement methods. On the flip side, no precise answer is available that clearly differentiates between traditional quality management practices and Six Sigma methodologies (Schroeder et al., 2008). Conversely, Yusur, Othman and Mokhtar (2011) clearly state that Six Sigma can be distinguished from other quality management practices in three different dimensions namely, "Six Sigma role structure, Six Sigma structured improvement procedure and focusing on metrics".

Pulakanam and Voges (2010) have compiled the Critical Success Factors (CSF) and the barriers in implementing Six Sigma as identified in numerous articles. The review article reports that 'management of cultural change' was graded 4.4 out of 5, 5 being critical to success by (Chakraborty and Chuan, 2009). On the contrary the same factor was allotted second rank under barriers to implement Six Sigma by (Antony and Desai, 2009; Yang, 2005). Similar result was obtained by Adeyemi (2005) who analysed the benefits of Six Sigma in small and large manufacturing companies. The data identified three major barriers namely, management support, cost of implementation and fear of cultural change in that order.

III. Objectives

1. To examine the critical success factors for Six Sigma implementation of IT industrial system and processes.
2. To identify the barriers in the implementation of Six Sigma methodology in the IT system and processes.

IV. Hypotheses

H_1:There is a significant relationship between Six Sigma implementation and critical success factors in IT industrial system and processes

H_2:There is a significant relationship between Six Sigma methodology and Barriers in implementation in IT system and processes

V. Methodology

The study was conducted in selected Indian Information Technology companies across Karnataka.The study used exploratory research design. A total of 336 respondents of the firms were selected as a part of sample.The respondent samples were from different levels in the organisation, Master Black Belts, Black Belts, Project owners, Team members, and other stakeholders (Sponsors, Champions) of the organizations. The data collected has been analysed with the help of SPSS software, the statistical technique used for the analysis is Extraction Method: Principal Component Analysis., KMO and Bartlett's Test, factor analysis and Chi-square.

VI. Data Analysis and Interpretation

Table:1
Total variance explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.783	28.915	28.915	5.783	28.915	28.915
2	3.862	19.310	48.224	3.862	19.310	48.224
3	2.139	10.695	58.920	2.139	10.695	58.920
4	1.091	5.455	64.375	1.091	5.455	64.375
5	.979	4.894	69.269			
6	.801	4.006	73.275			
7	.730	3.652	76.927			
8	.712	3.561	80.488			
9	.643	3.215	83.703			

10	.587	2.937	86.640			
11	.483	2.414	89.053			
12	.442	2.211	91.264			
13	.431	2.153	93.417			
14	.299	1.495	94.912			
15	.285	1.426	96.338			
16	.225	1.123	97.461			
17	.182	.910	98.371			
18	.130	.649	99.020			
19	.106	.530	99.550			
20	.090	.450	100.000			

Extraction Method: Principal Component Analysis.

Table :2
Loading factors for Critical Success Factors for Six Sigma Implementation

Construct	Factor loadings	% variation	% Cumulative variation
Communications		*28.915*	*28.915*
Advocating and creating a 'common language' based on Six Sigma	.928		
Communicating pertinent facts about Six Sigma in every company	.913		
Development and dissemination of communication aids to management	.911		
Creation and communication of a human resources plan to support Six Sigma roles	.896		
Regular written communication on Six Sigma news and successes	.870		
Executive Engagement		*19.310*	*48.224*
Quality improvement	.776		
Competitive advantage	.758		
Need to satisfy customers	.737		
Requiring the use of facts and data to support actions at all level of decision making.	.673		
Coordination among the various departments	.670		
Clear prioritization (relative to other initiatives, programs and priorities)	.649		
Creating accountability, expectations, role and responsibilities for the organization.	.594		
Projects		*10.695*	*58.920*
Assign a Champion and Black Belt to each project (and hold them accountable).	.827		
Establish projects of appropriate scope and size (significant savings and achievables)	.826		
Assure linkage of Six Sigma projects to critical business and customer needs.	.800		
Establish a documented 1-year Six sigma project inventory (and refresh regularly)	.776		
Implement a project tracking system to facilitate replication and reuse.	.775		
Management involvement		*5.455*	*64.375*
Assuring linkage of Six Sigma to corporate strategies.	.785		
Visible, consistent support and an active role in communication and reward	.319		

Extraction Method: Principal Component Analysis

As evident from the table1 and table 2illustrates the factor loadings obtained for the identified critical success factor constructs for Six Sigma implementation. Factors that loaded below 0.4 were suppressed for better reading of the results. The results show that four factors were extracted with Eigen value more than 1 that explained 64% of the variability of the data. Among the four factors that were extracted, Communication (28.91%) has been shown to be the most important factor that can be considered as an important Critical Success Factor. Executive engagement contributed to 19.31% of the variance suggesting that top management commitment is also a critical success factor for Six Sigma implementation. This was followed by Projects (10.695%) and Management involvement (5.455%).

Table: 3
KMO and Bartlett's test used for sampling adequacy for Critical Success Factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.846
Bartlett's Test of Sphericity	Approx. Chi-Square	4119.776
	Df	190
	Sig.	.000

Table 3 shows the adequacy of the samples was tested through the Kaiser-Meyer-Olkin (KMO) measure, which is to confirm that the sample size used for the study was adequate to apply factor analysis on the data. A KMO value of 0.846 suggests that the high sampling adequacy for factorial analysis.

The statistic test for sphericity was calculated based on Chi-squared transformation of the correlation matrix determinant (Bartlett, 1954). In this study, the Bartlett's Test of Sphericity was 190 and it was also significant (p=0.000), confirming the factorability of the correlation matrix. Thus, the Bartlett’s test of sphericity shows that the variables within factors are correlated with each other.

Table: 4
Total variance explained for barriers of Six Sigma Implementation

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumula-tive %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.140	63.372	63.372	10.140	63.372	63.372	6.332	39.572	39.572
2	1.310	8.190	71.563	1.310	8.190	71.563	5.118	31.991	71.563
3	.758	4.736	76.298						
4	.593	3.704	80.003						
5	.532	3.328	83.331						
6	.506	3.165	86.495						
7	.371	2.320	88.815						
8	.326	2.036	90.851						
9	.280	1.748	92.599						
10	.240	1.501	94.100						
11	.218	1.362	95.461						
12	.180	1.122	96.584						
13	.167	1.044	97.628						
14	.150	.940	98.568						
15	.121	.757	99.325						
16	.108	.675	100.000						

Extraction Method: Principal Component Analysis.

Table: 5
Factor loadings for barriers to Six Sigma implementation

Construct	Factor loadings	% variation	% Cumulative variation
Lack of Six Sigma awareness		*63.372*	*63.372*
False notion that Six sigma is too complex to use	.805		
Poor training and coaching	.794		
Poor Six Sigma project selection	.777		
Wrong identification of the process parameters	.772		
Cultural barriers	.748		
Insufficient organizational alignment	.724		
Lacunae in data collection	.720		
Inability to change	.707		
Lack of knowledge about Six Sigma	.669		
Internal resistance	.623		
Lack of employee engagement		*8.190*	*71.563*
Lack of cooperation among the employees	.892		
Lack of top management support	.865		
Improper planning	.798		
Lack of resources	.771		
Lack of awareness among the employees	.737		
Lack of time	.596		

Extraction Method: Principal Component Analysis

As evident from the table4 and table 5 illustrates the factor loadings obtained for the identified barriers for Six Sigma implementation. Factors that loaded below 0.4 were suppressed for better reading of the results. The results show that two factors were extracted with Eigen value more than 1 that explained 71.56% of the variability of the data. Between the two factors that were extracted, Lack of Six Sigma awareness (63.372%) has been shown to be the most important factor that acts as the barrier for Six Sigma implementation, whereas lack of employee engagement contributed to only 8.190%.

Table:6
KMO and Bartlett's test used for sampling adequacy for barriers

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.938
Bartlett's Test of Sphericity	Approx. Chi-Square	5129.605
	Df	120
	Sig.	.000

Table 6 shows the adequacy of the samples was tested through the Kaiser-Meyer-Olkin (KMO) measure, which is to confirm that the sample size used for the study was adequate to apply factor analysis on the data. A KMO value of .938 suggests that the high sampling adequacy for factorial analysis.

The statistic test for sphericity was calculated based on Chi-squared transformation of the correlation matrix determinant (Bartlett, 1954). In this study, the Bartlett's Test of Sphericity was 120 and it was also significant (p=0.000), confirming the factorability of the correlation matrix. Thus, the Bartlett’s test of sphericity shows that the variables within factors are correlated with each other.

VII. Conclusion

Quality is the main criteria for the survival of IT/ITES companies in a fiercely competitive business environment. The IT/ITES companies are expected to provide high quality service to its globally present customers, who are always on the lookout for cost efficient services. Poor service quality will hike the costs of rework, time spent on service recovery, complaints, and so on. On the other hand, software quality is frequently viewed as a mysterious and an elusive subject, and it perceived to be the most neglected topic among software development. Further, communication strategy is the key to the successful implementation of Six Sigma. Lack of awareness and lack of employee engagement should be removed by adequately training the staff and motivating them to perceive the global picture of quality of service provided by the company to the customers. Aligning the focus of employees to the business strategy can enable the employees to feel more engaged and take the initiative to ensure the achievement of business goals.

References

[1]. Adeyemi, Y. (2005). An analysis of six sigma at small vs. large manufacturing companies.
[2]. Antony, J. (2006). Six sigma for service processes. Business Process Management Journal, 12(2), 234-248.
[3]. Chakraborty, A., & Chuan, T. K. (2009). An exploratory qualitative and quantitative analysis of six sigma in service organizations in Singapore. Management Research News, 32(7), 614.
[4]. Chakraborty, A., & Tan, K. C. (2012). Additional qualitative and quantitative analysis of six sigma in service organizations.
[5]. Desai, D. A., & Patel, M. B. (2009). Impact of six sigma in a developing economy: Analysis on benefits drawn by Indian industries. Journal of Industrial Engineering and Management, 2(3), 517-538
[6]. Goffnett, S. P. (2004). Six sigma methodologies. Understanding six sigma implications for industry and education. Journal of Industrial Technology, 20(4).
[7]. Linderman, K., Schroeder, R. G., Liedtke, C., & Choo, A. S. (2008). Six sigma: Definition and underlying theory. Journal of Operations Management, 26(4), 536-554.
[8]. Pulakanam, V., & Voges, K. E. (2010). Adoption of six sigma: Review of empirical research. International Review of Business Research Papers, 6(5), 149-63.
[9]. Yang, Ching-Chow. (2005). Six sigma and total quality management. 1995.
[10]. Yusur, M. M., Othman, A. R., & Mokhtar, S. S. M. (2011). Six sigma and innovation performance: A conceptual framework based on the absorptive capacity theory perspective. International Journal of Emerging Science, 13, 307-323 .
[11]. Chakraborty, A., & Tan, K. C. (2012). Additional qualitative and quantitative analysis of six sigma in service organizations.
[12]. Dannenmaier, S., & Dannenmaier R. (2008). Impact of six sigma on 12 categories of success; factors of strategy implementation, personal interviews held on the 29th of February 2008 and 18th of August 2008.
[13]. Desai, D. A., & Patel, M. B. (2009). Impact of six sigma in a developing economy: Analysis on benefits drawn by Indian industries. Journal of Industrial Engineering and Management, 2(3), 517-538
[14]. Flynn, B.B., Sakakibara, S. & Schroeder, R.G., (1995). Relationship between JIT and Total Quality Management: practices and performance. Academy of Management Journal, 8(5), 1325-1360.
[15]. Henderson, K. M., & Evans, J. R. (2000). Successful implementation of six sigma: Benchmarking General Electric company. Benchmarking: An International Journal, 7(4), 280-81.
[16]. Jones, R. R., Thomas, P. T., & Page-Thomas, K. (n.d.). Quality management. Tools & Techniques: Profiling SME Use & Customer Expectations, 1-17.
[17]. Murugappan, M., & Keeni, G. (2000). Quality improvement – the six sigma way. A defect is anything that results in customer dissatisfaction.
[18]. Pyzdek, Thomas (2003). The Six Sigma Handbook. McGraw-Hill Publishing, 16.
[19]. Zakuan, N., & Saman, M. Z. M. (2010). The impact of six sigma and TQM on quality performance in manufacturing industries. December, 7-10

Dr. ANAND K. “A Study of Barriers and Critical Success Factors for Implementing In It System and Processes.” *IOSR Journal of Business and Management (IOSR-JBM)*, 23(01), 2021, pp. 19-24.