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Exploring Six Sigma Practices, Critical Success Factors and Business Performance in the IndianBanking Sector

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Abstract

The present research presents application of Six Sigma applications practices and their effects on business performance of the selected Indian banks. It additionally finds the critical success factor of Six Sigma and its effect on the success in Implementing Sigma and tests its relationship with the business performance of surveyed Indian banks. For the ascertainment of the objectives, the study used the information gathered by a survey questionnaire from 120 respondents from selected Indian banking organizations by using a convenient sampling technique. Arithmetic average and measure of dispersion examination was employed to report the extent of Six Sigma application and its critical success factor as well as business performance. Regression statistics and correlation analysis were applied to test the proposed assumption and conceptual model. The study findings reports surveyed Indian banks as concentrated to apply Six Sigma practices and its application revealed a potential improvement in business performance. The critical success factors of Six Sigma were also positively influenced on implementing Six Sigma successfulness and altogether these factors were indicated a positive relationship with the business performance of surveyed banks in India. The study from the empirical findings effectively tested and shielded the proposed model. The study provides implications for banking organizations to adopt Six Sigma practices cautiously and improve in its critical factor to remain competitive in the contemporary industrial setting.

Keyword: Six Sigma, critical success factor, business performance, banks, competitive.

INTRODUCTION

The competitive business environment resulted in increased demands and expectations from the customer for quality products and services. Developing a product or service in the 21st century requires a supporting process for long-term success (Kaplan & Norton, 2001, Conger, 2015). This calls for a sound management system within the organization to promote the improvement in performance and quality (Gryna, 2001). To cope with the novel requirements of businesses, firms have to mount management tools such as Six Sigma to remain competitive and growing (Dey, 2013; Muhareb & Graham-Jones, 2014).

Six Sigma is widely implemented as a managerial process for continuous improvement in products/services, reduction in cost and error, shorten delivery cycle that leads to increased performance and customers' satisfaction (Thawanı, 2004; Gijo & Rao, 2005; Kaushik & Khanduja, 2009; Johannsen, Leist & Zellner 2015).

The tendering this initiative of 'Six Sigma' in the banking industry is described as a systematic procedure to gather information, evaluate the current process, analyzing process for ascertaining the weaknesses that are causing deviation from the mean, improving in the current process through the deception of weakness and control in near future (Sunder, Ganesh & Marathe, 2020).

This practice of business management provides an innovative arrangement for controlling existing processes and seeking betterment in terms of the banking sector (Stoiljkovic et al., 2006; Pande 2000). Accordingly, the researchers (such as Thomas, 2009) described that "Six Sigma" as the methodology for making a new procedure for upgrading profitability and no error is DMADV model ("Define-Measure-Analyse-Develop-Verify") and DMAIC model ("Define-Measure-Analyse-Improve-Control"). Fundamentally, these two methodologies are applied with intention of seeking betterment and redesigning of business procedures. From the broader perspective, Hill and Brierley (2017) can be described as a management model to enhance the performance of the service sector organization including financial and banking institutions where customers perceived worth equals or are greater than the cognitive worth, there is no customer satisfaction.

Application of 'Six Sigma' in banks has resulted in condensed process time, efficiency in managing cash, a decline in grievances caused by error, and overall customer satisfaction from enriched performance; therefore, finance managing

establishments like Citibank, Bank of America in Wichita, and many more have accomplished prodigious outcomes from Six Sigma creativities (Singh, 2017). Alder and Ambrose (2005) also revealed a rise in banks' profitability, customer satisfaction, and loyalty as an outcome of the Six Sigma application. As a result, successful implementation of this technique in banking institutions is highly demanding in the contemporary period. But on another side, the successful application of this initiative i.e. 'Six Sigma" for managing a business is largely affected by different critical success factors (CSFs) within a business firm (Coronado & Antony, 2002). According to Antony, and Ghosh (2002), bearing in mind these elements as a cause for the achievement of any suite applied, specifiedthat its achievement is determined by key elements i.e. 'CSF' in current study, otherwise the applied business practice cannot succeed in the organization. The literature (Pande, Neuman, & Cavanagh,2000; Snee & Junior,2002) identified some of the key factors in applying Six Sigma such as top management support, leadership, participation, infrastructure, and working environment of an organization are responsible for building the success of 'Six Sigma' practice. Therefore, implementation of Six Sigma practices supported by the availability CSF as described above will positively affect the business performance of the organization (Coronado & Antony,2002; Snee & Junior,2002). The researcher assumes this base for the current study, and thus evaluates this phenomena case of the banking sector of India.

The banking sector in India is rising dramatically over the last few decades and thus, several government and private banks are operational in the country. According to a report of the Reserve Bank of India (RBI, 2021), there are more than thirty nationalized scheduled commercial banks in the country with large clientele representing both public and private sectors. But, with the rising number of customers, banks in the country are facing certain challenges related to handling error-free services and delivering quality services. For instance,researchers (Vijaya & Anton, 2015; Sunder, 2016) noticed some of the common challenges faced by the banking sector in the country are long waiting times, rising business operation costs, and delayed cycle process. Thus, the implementation of effective methods of managing a business such as 'Six Sigma' in banks and other financial institutions is of vital prominence to improve business performance and customer satisfaction, and loyalty. Few researchers (such as Chakrabarty & Chuan,2009; Johannsen *et al.*,2015) also supported that the successful application of Six Sigma with the availability of necessary key elements of CSF within the banking sector could have been successful from considering different facets of a business firm. But, when it comes to implementation of Six Sigma practices in financial institutions including banks, literature reported limited coverage (Antony, 2011; Raisinghani, 2005) and that too from developed nations of the world without any due consideration to the Indian banking sector and hence, this emphasized to be justification for the present research.

Therefore, the current researcher seems it worthwhile to extend Six Sigma practices and their CSFs with organizations' business performance in the banking sector. Hence, keeping this in mind, the current study has the following research objectives in focus:

1. To explore the extent of Six Sigma practice application in Indian banks.
2. To study the effect of Six Sigma practices on business performance of Indian banks.
3. To explore the critical success factors (CSF) for Six Sigma practice application in Indianbanks.
4. To analyse the effect of 'critical success factors (CSF) on the success of Six Sigmapractice in Indian banks.
5. To explore the association between the critical success factor (CSF) for Six Sigma andthe business performances of Indian banks.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Six Sigma Practices

The concept of Six Sigma has been considered differently by scholars, such as Divoky (2008) defined this term as an innovative exertion to a reduction in failings equal to merely a little part per million and thus gaining recognition in different businesses across the globe. Similar to this, Goh (2011) stated Six Sigma as a methodology to collaborate different service elements and enhance business performances in a dynamic business environment. Some Indian researchers (Jaglan, et. al., 2011; Kaushik, 2012; Vijay, 2012; Pradhan & Vijay, 2021) also describe this as the approach applied to eradicate wastage, upsurge productivity, decreaseoverheads associated with unassuming excellence, and increase the effectiveness of business activities. Pokharkar et. al. (2010) in a study elaborated that Six Sigma has

few different features i.e. 'enhancement, 'redesigning' and managing business procedures. Few researchers (such as Thomas, 2009; Aleem, et. al., 2014) in respect of this method ('Six Sigma') comprehensively described this in two processes i.e. (1) "DMAIC practice (Define, Measure, Analyse, Improve and Control)" and "DMADV process (Define, Measure, Analyse, Develop and Verify)". Thus, from a broader perspective, this can be supposed by different researchers as a procedure to develop the qualitative aspect, bring satisfied customers, size of the business market, workers' commitment, organization environment, business expansion, and minimization of cost and errorless business procedures.

Six Sigma Practices in Banking Sector

The management of banking services has been considered important for several years; initiatives to deal with managing quality business operations (such as Six Sigma) were taken by banking institutions for the business development and loyal customer (Stoiljkovic, Milosavljevic & Randjelovic, 2010). To start with the Indian banking sector, some researchers have given consideration, for instance, Chaudhary (2012) reported Six Sigma technique is a dynamic business initiative to transform the operations and process of banking. The implementation of Six Sigma in banks resulted in enhanced yield, abridged expenditures, and enriched revenue generation. Thus, it is high time to implement this growing phenomenon for getting a competitive advantage in the banks and other financial establishments.

The implementation of 'Six Sigma' in banking institutions is carried out by researchers (Doran, 2003; Wang & Hussain, 2011) that considered as a tool to maintain quality, accuracies in cash dispensation to ease service charges, generation of daily reports, minimization of defects in the process such as loan, check & cash collection, reducing customer complaints, minimizing transaction time, computing, analyzing, and overall improvement in performance. Sunder (2016) in this respect, observed the significant impact of the Six Sigma advantage in the banking industry in India towards improving the real-time bank process and providing the bank with customer knowledge to customer-oriented metrics in processing performance indicators that require Six Sigma practices. Thus, it can be asserted that Six Sigma was successfully adopted and integrated by banking organizations for enhancement in its operational and business activities.

Business Performance

Measurement of business performance is the fundamental practice for seeking improvement in organization products and services (Snee, 2004; Sadrabadi *et al.*, 2015). This is the best technique for identification and eradicates the origins of errors in operational procedures of organizations through emphasizing procedure outcomes that are precarious to clienteles. Therefore, different organizations applied a different set of managing strategies and precarious measures to deal with common or specific intentions known as the performance of businesses.

A business's performance is a combination of different elements and is well acknowledged in the literature, such as Jaakkola (2006) identified the determination of organizational performance through measurement of its 'economic progression', 'enhancement of business size', 'employee productivity, and inclusive development. Darabi (2007) defined that, "monetary or market-based methods alike marketplace, success, qualitative services, consumer contentment, retaining, and workers' commitment" as crucial aspects of business organization performance. Sharabati (2008) on the other hand gives weightage to the delivery process, cycle time, sales, and valuation of defects/errors in the procedure as components to assess the businesses' performance. Particularly, in the case of the application of Six Sigma in the business organization, August (2013) stressed the importance of monetary paybacks, firm progress, market share, consumer contentment, and efficiency as elements of business performance. Thus, from this deliberation, the current study focused on Six Sigma practices will consider the assessment of performance (operative as well as financial) in the case of Indianbanks surveyed in the study.

Critical Success Factors (CSFs) and Six Sigma Implementation

The application of 'Six Sigma' practices has resulted in certain benefits including financial and non-financial to some business organizations. However, the literature (Henderson & Evans, 2000; Eckes, 2000; Sandhold & Sorqvist, 2002) brought up that not every business firm attaining similar paybacks, and thus variation in benefits of implementing Six Sigma can be reported due to certain organizational factors. Researchers (Antony & Banuelas, 2001)reported 'CSFs' as

responsible towards the success of 'Six Sigma' implementation, and thus considered essential. Henderson and Evans (2000) furthermore discovered as, 'organization participation', 'organizational substructure', communication, culture change, and training implements as the key mechanisms in the efficacious application of 'Six Sigma' in an organization. On the other hand, Goldstein (2001) noticed the organizational change, employee commitment, incentives, rewards, and recognition system as determining elementsin the success or failure of Six Sigma practices. According to Dale (2000), a sound systematic process of delivery also improves and governs management control techniques (such as Six Sigma in the current study). Education and training are also noticed as key components because it is critical to be operative for refining business performance through the 'Six Sigma' methodology (Linderman et al., 2002).

Hence, the abundance of literature (Pande et al., 2000; Halliday, 2001; Henderson & Evans, 2000; Antony & Banuelas, 2002) is available that reported that 'CSFs are crucial and responsible for application success of 'Six Sigma' in an organization. From considering the above-discussed studies the key factors identified as essential for Six Sigma practices by the researcher as top management support, leadership, cultural change, communication, organizational systematic process, education, and training for assessment of relationship with business performance.

Six Sigma Effect on Business Performance

The application of management practices such as 'Six Sigma' reported an upside changein the performance of business organizations. The relationship is acknowledged and considered by available literature (Olsen, 2004; Parast, 2011; Habidin, et. al., 2012) in respect of different industries and business sectors.

Khaidir, et. al. (2013) in their study on the Malaysian healthcare sector discovered a positive relationship between 'Six Sigma practices' and organization performances. Edaily (2014) in a study based on the Jordan manufacturing sector discovered the application of the business innovation i.e. 'Six Sigma' along with consequential benefits such as a decrease in cost, waste production, along improved business performance in the market. The studies from an Indian perspective are also illustrated from the literature, such as Singh, et. al. (2010) in research focused towards application of 'Six Sigma' strategies showed a reduction in cycle and service processing time, reduction in manpower requirement, and rise in productivity per operator. Similar to this, Kumaravadivel and Natarajan (2011) in an empirical study discovered the association between the Six Sigma aspect and customer satisfaction in the case of the Indian foundry sector.

In respect of the banking sector, Stoiljkovic, Milosavljevic, and Randjelovic (2010) determined that by using the Six Sigma viewpoint and DMAIC model, the banking organization is improving its quality, service delivery process and reducing in cycle period. Kumar (2014) concerning banking institutions reported that the use of Six Sigma practices has demonstrated as an advantage to numerous banking organizations for delivering better service-quality to its consumers in an effective and enriched method over other banks. Athawar and Lunge (2016) in a recent study noticed competitive advantage and reduced process time in different fields to match customers' expectancy as a benefit of applying Six Sigma practices in the banking organizations. Hence, from the above discussion, the literature confirmed the association between 'Six Sigma practices' and 'business performances' in the organizations.

Relationship of Critical Success Factors (CSF) to Business Performance

The role played by 'CSF' in the efficacious application of the 'Six Sigma' approach in business organizations for improvement in business performance has been considered by literature. For instance, the study of Obaidullah (2005) conducted in the United Kingdom provides insight that application of 'Six Sigma' and availability of its 'CSF' associated withthe business performance of both productions as well as a service industry.

Reddy and Reddy (2010) in their study also revealed that the CSF of 'Six Sigma' practice in the micro-business organizations of Hyderabad are largely affected by improvement in operational efficiency of business firms with a reduction in error variation. Similar to this, Moosaa and Sajid (2010) in a study based on these factors (i.e. 'CSF') of implementing 'Six Sigma' in organizations through an analytical approach reported a sudden rise in business productivity and product quality after implementing Six Sigma. The study Jawadeh (2011) specifically discovered that elements like administrative cooperation and direction were responsible for the improvement of quality services and overall business performance in thecase of the healthcare industry. Chakraborty and Tan (2012) in respect of 'CSFs' of 'Six Sigma' application in the service sector in Singapore noticed internal organizational elements i.e. workforce assurance and working environment as primarily associated with rising in business performance. Furthermore, Khaidir,

et. al. (2013) study discovered some other elements such as, 'leadership', 'customer focus', 'structured improvement procedure' and 'focus in metric' as the main CSF that related to the business performance of the organization.
In the case of the banking sector, the cultural change as crucial in the prosperous application of this methodology ('Six Sigma') in monetarist establishments is considered important by research (Kwak & Anbarib, 2006) based on Six Sigma in financial institutions. In respect of financial organization including bans, Sharma and Singh (2013) discovered CSFs such as training and learning programs for its employees are positively linked to business performance by achieving a level of error-free service delivery, rise in profits, and loyal customers. Thus, it can be ascertained from the literature that the 'CSFs' of 'Six Sigma' is related to business performances of different business sectors.

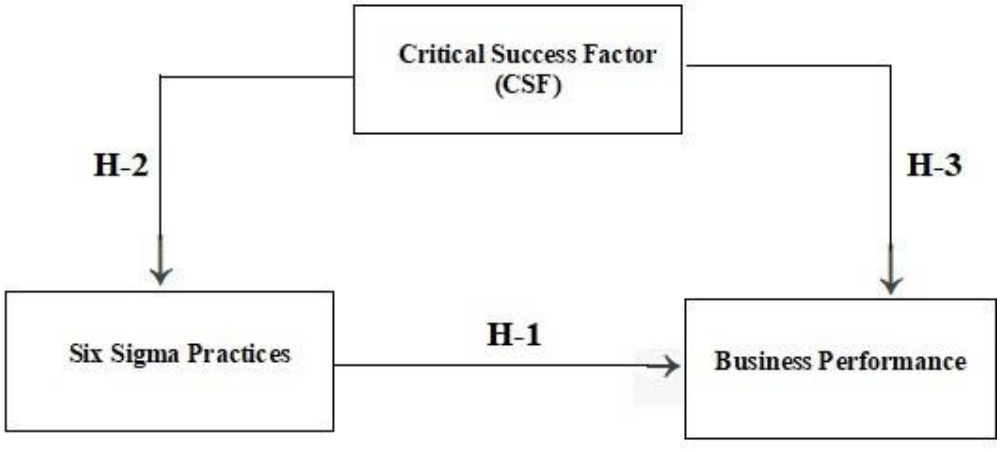
Development of Model and Study Hypotheses

The researcher from the existing literature found models in the field of Six Sigma were unclear and not unified. However, some authors used different models to measure the application of the Six Sigma approach and businesses' performance. For instance, Darabi (2007) assessed the direct influence of 'Six Sigma' practices on business performances tested eight hypotheses model by using regression analysis technique. Olsen (2004) used a model to test the connection between Six Sigma methodology and improved finance and revenue generation in the manufacturing sector. The model did not have any weightage to non-financial performance and thus left a research gap in the research area. Though literature (Reijns, 2010; Habidin, et. al., 2012) also reported assessment of both operational and financial performance and its association with the Six Sigma approach. But, the model did not consider the relationship of the 'CSFs' of 'Six Sigma' methodology to businesses' performance and hence reported a research gap. Besides, the importance of these key elements i.e. 'CSFs' for the success of 'Six Sigma' practices and relationship with business organizations' progression, few researchers (such as Zamri, et. al., 2013) tested the relationship in the business sector other than banking. Thus, the banking sector remains unexplored from this perspective.
Therefore, to fill this research gap and for the accomplishment of study objective, current research targeted to extend the sights of three-folded relationship model; (i) 'effect of 'Six Sigma' practices on 'business performance'; and (ii) influence of 'CSFs' on the implementation of 'Six Sigma' in banking organization and (iii) association of 'CSFs factors of Six Sigma' practices to the 'business performance' of organizations. Hence, by taking the following conceptual model for empirical testing through investigations by proposing the following research questions (RQs) and hypothesis (Hs):

RQ1. Do Six Sigma practices affect the Indian banks' business performance?

RQ2. What is the effect of 'critical success factors (CSF) on the success of Six Sigma practicein banks of India?
RQ3. Is there any association between the critical success factor (CSF) for Six Sigma and thebusiness performances of Indian banks?

Figure 1: Proposed Model for Study



Source: Developed by author

H1: Six Sigma practice application in Indian banks have a significant effect on its business performance.
H2: The application of Six Sigma practices in Indian banks is significantly influenced by critical success factors.
H3: Critical success factors of Six Sigma practices are significantly related to the business performances of Indian banks.

RESEARCH METHODOLOGY

The current study is exploratory and analytical. The study explores the Six Sigma practices and their 'CSF' towards its application in banks surveyed from India in the study. From an analytical perspective, it studies the influence of 'Six Sigma' practice on 'business performance' and association amid 'CSFs' to 'business performance' in terms of Indian banks surveyed in the study. The study used an extensive review of literature for identification of study variables and understanding theoretical and methodological perspectives. The list ofscheduled commercial nationalized banks is taken from the report of the central bank of the county i.e. 'Reserve Bank of India' (RBI, 2021) as it is the supreme regulating and monitoring body for the banking sector in India. The sampling participants for the study were composed of personnel from different hierarchical positions (top-level, middle-level, and low-level) from surveyed Indian banks in the study. The data for the study has been collected from July- December 2019. The number of scheduled commercial nationalized banks is thirty-four (34) in India and thus, to maintain the statistical equality, the researcher distributed the questionnaireto 340 managers through a convenient sampling technique by selecting at least 10 to ensure the equal representation of each scheduled commercial nationalized banks. Out of distributed questionnaire, only 120 filled and returned the questionnaire.

For designing the questionnaire, existing literature was reviewed for the selection of study variables. The questionnaire was finalized and validated with the help of academicians and professionals in the field of banking. The developed questionnaire was designed in four parts. Part 1 contains the demographic and background information of employees of Indian banks surveyed in the study such as gender, age, family status, academic qualification, position, department, and experience. In part 2 the 12 items indicating the implementation of Six Sigma practices were given to record the responses of the managers. Part 3 contains the 09 question item indicating the business performance of the organization from implementing Six Sigma practices. Part 4 gave coverage to 05 items expressing crucial factors accountable for the effective implementation of 'Six Sigma' practices in banks from India selected for survey in the present study. Last three part of the questionnaire (2-4) was designed by using a 5-point 'Likert-Scale' ranged between 1-5 ratings (1=strong disagreement, 2=disagreement, 3=neutral, 4=agreement, and 5=strong agreement). The internal consistency of the questionnaire wasverified through the value of 'Cronbach alpha coefficients' of internal consistency. Reliability analysis for variables is more than considerable value i.e. 60% as supported from existing literature (such as Sekran, 2003). The reliability test statistics for three constructs are ranging between 0.710 (Six Sigma practices), 0.812(business performance), and CSFs (0.862). The gathered information from respondents was investigated using 'statistical package for social science' knows as SPSS applying suitable statistical tools i.e. descriptive (percent, average, and Std. dev. analysis) and inferential tests (multiple regression and bivariate correlation) for investigation of the study hypothesis. From the application of regression analysis, the study assesses the influence of; (i) independent variables (Six Sigma practices) on the dependent variable (business performance) and (ii) effect of CSFs as Independent variables on successful implementation of Six Sigma practices (Dependent variable) in terms of Indian banks surveyed in the study. In another word it is apprehended that six sigma practices are mediating the relationship between CSF and business performance of surveyed Indian banks. For the prediction of goodness-of-fit of the regression model, the study examines the 'multiple correlation coefficients (R)', 'coefficient of determination (R^2)', and 'F ratio' in the study. Bivariate correlation was applied to measure the 'power of a direct association among two different variables' i.e. in the current study between 'CSFs' and 'business performance' of Indian banks surveyed in the study.

ANALYSIS AND DISCUSSION OF RESULT

Socio-Demographic Background

The study, first of all, highlights the background information of respondents and indicated in terms of gender, most of the respondents are males (59.2%) while females less frequently participated in the survey (40.8%). This reveals that the majority of managers in Indian banks surveyed in the study were males. The highest percentage of the respondents' ageswere above 35-45 (52.5%), then above 25-35 (29.2%), then ages above 45-55 (15.8%), and ages above (2.5%).

Hence, it is predicted that most managers who participated in the survey were above 35 – 45.
Education-wise classification of respondents revealed the maximum number of respondents with graduation qualification (71.7%), followed by post-graduation (24.2%), diploma education, and remaining to have higher education above postgraduate (1.7%). The hierarchical position of respondents in their respective banks reported high participation from mid-level hierarchy managers (62.5%), followed by top-level managers (17.5%) and low-level managers (20%). The study in case of information of respondents indicated that the majority of the respondents were from departments such as quality, finance, and operation under administration division (52.5%), followed by customer service (23.3%), research and development (12.5%) and finally sales & marketing department (11.7%). From the experienceof respondents, the highest number of respondents was reported with 5 to 10 years of working knowledge (58.3%) trailed by respondents having more than 10–15 years of experience (21.7%), below or up to 5 years (10%) and remaining were indicating 15 or higher number of years in working experience (10%).

Descriptive statistics

Six Sigma practices

Table number 1 highlighted the man score of respondents' perception regarding the level of Six Sigma application in their respective banking organizations. The analysis reported the mean of Six Sigma variables were 4.01 to 4.64 along with 0.31-0.54 as a range of standard deviation. This reveals a great level of Six Sigma applications in selected banks of India. The weighted sum of all variables (Six Sigma Practices) reveals as more than 4 and standard deviation as 0.25 indicating high agreement among respondents of Indian banks surveyed in the study. This indicates that the directors and managers working at Indian banks surveyed in the study comprehend the significance of applying Six Sigma practices.

Table 1: Descriptive Score of 'Six Sigma Practices'

Six Sigma Practices	**Mean**	**Std. Dev.**
Responsibility and involvement of top managers(X_1)	4.64	0.37
Proposing business strategies based on customers' demands(X_2)	4.49	0.37
Systematic execution of Six Sigma practices(X_3)	4.40	0.43
Investing on fundamental sources(X_4)	4.43	0.35
Investing in and training and consultants(X_5)	4.52	0.31
Award and recognition system(X_6)	4.29	0.54
Analysing data using the available data(X_7)	4.04	0.41
Considering short-term and long-term goals(X_8)	4.18	0.49
Accordance with knowledge management system(X_9)	4.08	0.35
Accordance with company's business strategy(X_{10})	4.13	0.47
Cooperation and relations(X_{11})	4.10	0.49
Effectiveness of capacity building programmes(X_{12})	4.01	0.46
Weighted score	**4.34**	**0.25**

Business performance

Table number 2 reported that means a score of perception of respondents towards the role of Six Sigma practices into the improvement of business performance dimension of selected banking organizations. The statistics reported a mean score of 3.92-4.32, with a standard deviation of 0.52-0.70. This descriptive analysis indicated a high-end agreement

among respondents towards the application of Six Sigma practices and achievement of business performance dimension. The weighted average score of business performance is 4.12 and the standard deviation is 0.34 that reveals a rise in the business performance of surveyed Indian banks due to higher-level application of Six Sigma practices. This indicates that the directors and managers work in surveyed Indian banks surveyed in the study; they know the importance of the implantation of the business performance dimension.

Table 2: Descriptive Score of 'Business Performance'

Business Performance Indicators	**Mean**	**Std. Dev.**
Employee efficiency(BP_1)	4.01	0.57
Minimum waste/errors(BP_2)	3.92	0.57
Competitive products/services(BP3)	4.25	0.58
Business Growth(BP4)	4.30	0.61
Profitability(BP5)	4.16	0.61
Sales and marketing promotion(BP6)	4.13	0.68
Employee satisfaction and commitment(BP7)	4.05	0.70
Reduced cost(BP8)	4.03	0.67
Customer satisfaction and loyalty (BP9)	4.32	0.52
Weighted score	4.12	0.34

Critical success factors

By application of descriptive statistics, the study discovered five 'CSFs' of 'Six Sigma practices' in Indian banks surveyed in the study. The success factor in the current study was in descendent structure as 'management support & leadership', 'education and training', 'communication', 'cultural change' and 'systematic process'.

Table 3: Descriptive Score of 'Critical Success Factors'

Critical Success Factors	**Mean**	**Std. Dev.**
Management Support & Leadership(CSF_1)	4.07	0.58
Education and Training(CSF_2)	3.93	0.62
Communication(CSF_3)	3.60	0.66
Cultural Change(CSF_4)	3.89	0.71
Systematic Process(CSF_5)	3.86	0.80
Weighted score	3.78	0.67

The mean value of CSFs was ranged between 3.60 to 4.07 with a standard deviation range of 0.58-0.80. From the descriptive table, the order revolved out to be 'management support & leadership' at the most followed by, education and training, then cultural change, then systematic process, and communication in last. The examination demonstrates that 'management support & leadership' is the utmost essential factor for the prosperous application of Six Sigma. The weighted score for the critical Six Sigma factor was alsoindicating a good rating (3.78).

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Inferential Statistics for Hypothesis Testing

Influence of Six Sigma practices on business performances

The dependent variable (business performance) was coded as Y and independentvariables (Six Sigma practices) were coded (X1-X14) to formulate the regression equation.
Thus,

X1: Responsibility and involvement of top managers

X2: Proposing business strategies based on customers' demands X3: Systematic execution of Six Sigma practices
X4: Investing in fundamental sources

X5: Investing in and training and consultants X6: Award and recognition system
X7: Analysing data using the available data

X8: Considering short-term and long-term goals

X9: Accordance with the knowledge management system X10: Accordance with the organization's business plan
X11: Collaboration and relations
X12: Effectiveness of capacity building programs Y: Business performance
Table 4 reveals the results of variance analysis. If the significance level is less than 0.05, then the independent variables will determine the change in the 'dependent variable'. Asobserved from the below analysis, the significance level of the test is 0.000 which indicates the existence of direct association among both variables.

Table 4: Analysis of ANOVA Variance

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	10.129	3	0.723	20.35	0.000
Residual	1.280	116	0.036		
Total	11.408	119			

As it is observed in the above table, responsibility and involvement of top managers(X1) were reported positively and significantly related to business performance (Y) of surveyed banking organizations at revealed from its significance level (0.028) at 95% confidence level. Almost similar results were noticed in the case of the effect of variable X2 (proposing business strategies based on customers' demands) on the business performance of surveyed banking organizations (Y). The regression table reported significance and positive association (p=0.29 at 95% confidence level) among these two variables. At 95% confidence level is a significance level for variable X3=0.020. Since it is less than 0.05, it reveals a direct (positive beta) and significant relation between Systematic executions of Six Sigma practices with businessperformance.

Table 5: The results of regression between the dependent and independent variable

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constants)	2.622	0.299		8.770	0.000

X_1	0.244	0.108	0.542	2.323	0.028
X_2	0.347	0.138	0.582	2.126	0.029
X_3	0.251	0.103	0.533	2.431	0.020
X_4	0.201	0.089	0.464	2.245	0.031
X_5	0.017	0.097	0.032	0.171	0.865
X_6	0.099	0.140	-0.197	-0.707	0.484
X_7	0.488	0.164	0.960	2.978	0.005
X_8	0.480	0.142	0.741	3.380	0.003
X_9	0.399	0.119	0.663	3.359	0.002
X_{10}	0.321	0.152	0.437	2.112	0.042
X_{11}	0.509	0.220	0.832	2.309	0.027
X_{12}	0.259	0.150	0.372	1.72	0.041

According to the regression table, the variable X_4 based on investing in fundamental sources was reported significantly related to the business performance of surveyed banking organizations. This result is supported by empirical evidence (p=0.031 at 95% confidence level)produced by regression analysis in the study. The table reported that variable X_5 (investing in and training & consultants) and variable X_6(award & recognition) do not have impacts on business performance, at the confidence level of 95%.

According to the regression table, the significance level of the variable X_7 is =0.005. It displays the direct and significant relation between using available data and business performance. Since data is of great importance in Six Sigma practices, availability of data and completeness of databases accelerate analyzing the data and improvement in the enactment of 'Six Sigma'. This influence denotes the positive impact of analyzing the data on business performance in organizations that implement Six Sigma.

Variable X_8(considering the 'short-term' and 'long-term' goals) and X_{10}(accordance with the organization's business plan) have inverse and significant relation to business performance, at the confidence level of 95%. The significant influence of 'Six Sigma' application on determining the 'short-term' and 'long-term' goals indicated an improvement. Similar to this, the regression analysis reports the significant and constructive influence of 'Six Sigma' procedures to growth following the company's business strategy, thus, the banking organizations' performance will grow due to this.

X_9 has a significance level of 0.002, at the confidence level of 95%. This displays the direct and significant relation between this variable and business performance. Knowledge management has an important role in gaining competitive management and its survival in the organization. This variable is concerned with non-profit training and research organization which has defined knowledge management as "strategies and processes of recognizing, obtaining and using knowledge to add to the competitive ability". In the modern global economic world, gaining a competitive advantage depends on the increase in quality andcustomers satisfaction.

These happen through using knowledge management in Six Sigma projects. The significance level for X_{11} equals 0.027, at the confidence level of 95%. This indicates a direct and significant relation between using Six Sigma and business performance.

The variable X_{12} (effectiveness of capacity building programs) also indicated a positive impact on business performance (Y) of surveyed organizations in the current study. The regression statistics applied in the study supported this by revealing a significant value of regression (p=0.041) on the confidence level of 95%.

From the above analysis, it came to notice that most of the variables (except, X_5 and X_6) are significantly related to business performance (Y) of surveyed Indian banks, and hence,

The Six Sigma approach is used to solve the issues related to management and the result revealed that the improvement process is completed through using these standard stages and results in recognition of main problems and improvement

of the range discussed in Six Sigma practices. From the empirical evidence provided by regression statistics in table number 5, the corresponding hypothesis **(H1)** can be supported as the significance value ($p<0.05$) is below its acceptance level at 95% confidence, thus, it is postulating positive and significant influence of 'Six Sigma' application on 'business performances' of surveyed Indian banks.

Influence of 'critical success factors' on the 'success' of Six-Sigma practices

Table number 6 highlighted the influence of five CSFs as an independent variable on the success of Six Sigma (dependent variable). R square value reveals the suitability of the model for multiple regressions and explicates the variance of the independent variable on the dependent variable. Since R square is 79% then the independent variable can explain 79% of the variance on the 'dependent variable', since (R square=0.79, F=51.35, significance level=0.000).

Table 6: Analysis of ANOVA Variance

Model	**r**	**R^2**	**Adjusted R^2**	**F**	**Sig.**
1	0.87[a]	0.79	0.79	51.35	0.00[b]

Table number 7 indicates the dependent variable (success of Six Sigma) issignificantly affected by each independent variable (CSFs) in the current study.

Table 7: The results of regression between dependent and independent variables

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.21	0.22		-0.94	0.34
CSF1	0.17	0.04	0.23	4.27	0.00
CSF2	0.10	0.04	0.13	2.34	0.02
CSF3	0.12	0.03	0.18	3.40	0.01
CSF4	0.14	0.03	0.18	3.72	0.00
CSF5	0.16	0.03	0.22	4.21	0.00

Table number 7 highlighted that there exists a positive and direct impact of CSF1defect on successful implementation of Six Sigma since (Beta=0. 23, t=4.27, level of significance i.e. $p\leq0.05$). In the case of CSF2, the table reported a positive and straight influence on the success of 'Six Sigma' practices, since (Beta=0.13, t=2.34, level of significance i.e. $p\leq0.05$). Theregression statistics indicated positivity and significance in the effect of CSF3 to the successful implementation of Six Sigma in surveyed Indian banks as reported by table values (Beta=0.18, t=3.40, level of significance i.e. $p\leq0.05$). The application of regression analysis revealed the existence of significant and positive impact of CSF4 on Six Sigma's successful application in targeted Indian banks that is supported by regression result (Beta=0.18, t=3.72, level of significance i.e. $p\leq0.05$). For measurement of the effect of CSF5 on successful implementation of Six Sigma practices surveyed Indian banks, the study from regression analysis reported a positive direct and significant effect (Beta=0. 22, t=4.21, level of significance i.e. $p\leq0.05$). Conclusively, all the independent variables ('CSFs') affect the dependent variable ('Six Sigma' application) in surveyed Indian banks. The CSF1 was occupying the highest effect (Beta=0. 23, t=4.273, level of significance i.e. $p\leq0.05$), followed by CSF5 (Beta=0. 22, t=4.21, level of significance i.e. $p\leq0.05$), then CSF4 (Beta=0.18, t=3.72, level of significance i.e. $p\leq0.05$), CSF3 (Beta=0.18, t=3.40, sig. 0.00) and CSF2 (Beta=0.13, t=2.34, level of significance i.e. $p\leq0.05$).

Therefore, from empirical evidence reported by regression statistics, the corresponding hypothesis **(H2)** is supported by postulating a direct and significant effect of 'CSFs' on the 'success of 'Six Sigma' application in surveyed Indian

banks as the value of regression statistics is significant (sig. 0. 00, p<0.05) in case of all independent variables. Hence, the study disclosedthat all the surveyed CSFs are reported a 'positive' and 'significant effect to the success of Six Sigma implementation in surveyed Indian banks.

Relationships between the critical success factor and business performance

Table number 8 shows that the relationships among 'CSFs' and 'business performance' are moderate to strong relationships, where the value of r was noticed as 0.203-0.670, excluding the relationship among communication CSF and performance improvement through a rise in profitability of surveyed bank organization, that was noticed pathetic and insignificant where (r=0.151, sig.=0.099).

Table 8: Correlation (r) Between Independent Variables and Dependent variables

		CSF1	CSF2	CSF3	CSF4	CSF5
BP1	Correlation	.292**	.459**	.318**	.356**	.405**
	Sig.	0.001	0	0	0	0
BP2	Correlation	.259**	.337**	.267**	.266**	.418**
	Sig.	0.004	0.009	0.002	0.003	0.002
BP3	Correlation	.351**	.315*	.278**	0.387**	.424**
	Sig.	0	0.018	0.002	0.000	0.002
BP4	Correlation	.307**	.350**	.285**	.286**	.433**
	Sig.	0.001	0	0.002	0.002	0.005
BP5	Correlation	.203*	.301*	0.151	.371**	.451**
	Sig.	0.034	0.045	0.099	0	0
BP6	Correlation	.322**	.328*	.205*	.266**	.461**
	Sig.	0	0.012	0.006	0.003	0.001
BP7	Correlation	.384**	.356**	.320**	.441**	.431**
	Sig.	0	0	0	0	0
BP8	Correlation	.663**	.670**	.309**	.664**	.655**
	Sig.	0	0	0	0	0
BP9	Correlation	.656**	.633**	.303**	.617**	.621**
	Sig.	0	0	0	0	0

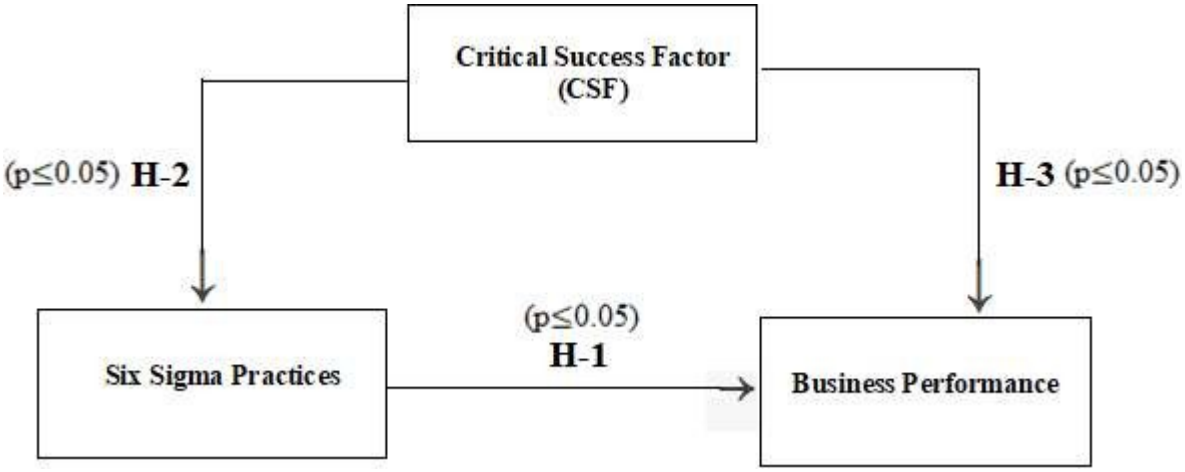
**. "Correlation is significant at the 0.01 level (2-tailed)". *. "Correlation is significant at the 0.05 level (2-tailed)".

Table number 8 indicated that the relationships between management support & leadership CSF1 and all the variables of business performance (BP1-BP9) are strong since r ranging between 0.203 and 0.663 with significant value. The relationships among communication CSF3 and different variables of business performances (BP1-BP9) are media since r ranging from 0.205 to 0.320 with significant value (except BP5). Also, the correlation between education and training CSF2 with business performance is strong, as the value of r was 0.301 to 0.670. A similar result was noticed in the case of correlation between cultural changes CSF4 and 'business performance' of the surveyed bank is stout as reported by correlation statistics i.e. as 0.266-0.664. Lastly, the correlation of systematic process CSF5 and all the variables of 'business performance' is also very much considerable, as the value of 'r' is observed as 0.405-0.655 with significant values. Thus, it is evident from the

correlation table that the "CSFs of six sigma practices and business performance of surveyed bank organizations" is positively and significantly related to each other.

From the above statistics, a positive and significant correlation of 'CSF' of six-sigma application with 'business performance' of surveyed has existed, and hence, based on bivariate correlation result in table number 8, the corresponding hypothesis **(H3)** is supported by postulating a positive and significant relationship between study variables.

Figure 2: Testing of Model with Empirical Statistics in the Study



The study is based on findings reported from the analysis of regression statistics for identification of; (i) effect of 'Six Sigma' practice application on 'business performance' in organization, (ii) influence of 'CSFs' of extending of 'Six Sigma' application, and from the result of correlation analysis (iii) relationship of 'CSFs' on 'business performance' of surveyed Indian banks, revealed that all the proposed assumptions ('H1', 'H2', and 'H3') were supported as the result revealed the existence of a positive and significant relationship in terms of all the three folds stated above. Hence, based on empirical evidence given by regression analysis and correlation analysis, the proposed conceptual model was successfully tested and defended inthe study.

CONCLUSION, IMPLICATIONS, AND LIMITATION

Conclusion

The competitive business environment stimulates the banking sector that resulted in rising customer demands for better products and services. Thus, the banking sector is facing challenges to bring the best possible service to its customs without any error, and hence, the various banking organizations prioritizing strong management techniques like, 'Six SigmaPractices' for surviving in a dynamic corporate atmosphere. The study in an explorative mannerdescribes that Six Sigma practices were seamlessly functioning in surveyed banking organizations in India and it is an effective approach for business performance as well as comprehensive business development. The study analyses that adoption of 'Six Sigma' methodology has a thorough and significant impact on the business performance of surveyed banks except for x6 and x7(investing in and training teachers and consultants and companies' award and encouraging system) where the degree of execution of the 'Six Sigma' tools is high. Current findings reveal an agreement on the higher side tendering of 'Six Sigma Practices' anda rise in the 'business performance' of surveyed banks. Secondly, the amount of 'Six Sigma' operation in surveyed Indian banks reported a positive and significant effect of its 'CSF'. Thirdly, the study also investigated the association of 'CSF' with 'business performance' of surveyed banking organizations. This examination revealed medium to strong relationships between them, except communication CSF and rise in profitability of surveyed bank organization, which was weak and not significant. Finally, based on applied inferential statistics, the study reported that (i) "application of Six Sigma have positive and significant influence of business performance, (ii) "a positive and significant influence of CSF on extent of 'Six Sigma application", and (iii) "positive and significant relationship between CSF and business performance" in case of surveyed Indian banking organizations. Thus, the

proposed conceptual model was empirically tested and defended well in the study.

Implications

The study from its findings provides implications for industry practitioners to provide management support, effective leadership, communication, capacity building programs, and infrastructure to facilitate the 'Six Sigma' approach in their company. The manager of a banking organization should also go for frequent statistical analysis techniques to devise a balanced combination of Six Sigma practices to maximize customer satisfaction and probability. From a theoretical perspective, the study also provides the implication that the policymakers in the field of banking should formulate suitable planning that focuses to overcome the shortcomings in the application of innovative practices of 'Six Sigma' and alike such as employee resistance, organization culture, and infrastructure to achieve overall and sustainable development in banking and other sectors.

Limitation and Future Research Direction

The study also came across some sort of limitation such as it focuses on Indian banking organizations and thus, generalization of its findings to other regions of the world is somewhere questionable. Hence, carrying out a similar study in the future on different parts of the world can be more comprehensively cover this limitation. One major limitation the study encounteredin sampling technique as it was difficult to identify the appropriate respondent for the questionnaire. As the knowledge about Six Sigma practice is expected from respondents, the study used a convenient sampling method. This indicates the absence of unbiased representation of different samples from the banking sector. Thus, there is a scope for future studies to use randomly collected data to evaluate the effect of 'Six Sigma' techniques on banks or other allied sectors. Moreover, the study test the relationship of Six Sigma practice and its CSFs to business performance, but, the study did not consider the impact of organizational characteristics on Six Sigma implementation, thus, more work is needed in future studies.

REFERENCES

1. Alder, G.S., & Ambrose, M.L. (2005. An examination of the effect of computerized performance monitoring feedback on monitoring fairness, performance, and satisfaction. *Organizational Behaviour Human Decision Process*, 97(2), 161–177.
2. Aleem, H., Anwar, S., Shariff, I., & Abdul Aziz, S. (2014). Six Sigma Applications: An Order Management System. *IOSR Journal of Humanities and Social Science*, 19(1), 95-100.
3. Antony, J. (2009). Reflective practice, Six Sigma vs TQM: some perspectives of leading practitioners and academics. *International Journal of Productivity and Performance Management*. 58(3), 274-279.
4. Antony, J. (2011). Reflective Practice Six Sigma vs. Lean some perspectives from leading academics and practitioners. *International Journal of Productivity and Performance Management*, 60(2), 185-190.
5. Antony, J., & Banuelas, R. (2001). Six Sigma: A Business Strategy for Manufacturing Organizations. *Manufacturing Engineering*, 8(3), 119-121.
6. Antony, J., & Banuelas, R. (2002). Key Ingredients for the Effective Implementation of Six Sigma Program. *Measuring Business Excellence*, 6(4), 20-27.
7. Antony, R., & Ghosh, A. (2002). Critical success factors for SPC implementation. *TQMMagazine, 14* (4), 217 - 224.
8. Athawar, V.S., & Lunge, H.S. (2016). Impact of Application of Six Sigma in Banking Industry.
9. Indian Journal of Applied Research, 6(6), 177-192.
10. August, A. (2013). Lean Production and Business Performance: The Moderating Effect of the Length of Lean Adoption. *Journal of Economics, Business, and Management*, 1(4), 324- 328.
11. Chakrabarty, A. & Chuan, T.K. (2009). An exploratory qualitative and quantitative analysis of Six Sigma in service organizations in Singapore, *Management Research News*, 32(7), 614-632.
12. Chakraborty, A., & Tan, K. (2012). Case study analysis of Six Sigma implementation in service organizations. *Business Process Management Journal*, 18(6), 992-1019.
13. Chaudhari, P. (2012). Key For Implementation of Six Sigma in Indian Industries. *Journal of Information and Operation Management*, *3*(1), 203–205.
14. Conger, S. (2015). *Six Sigma and business process management. Handbook on Business Process Management.* Springer Berlin Heidelberg.
15. Coronado, R. B., & Antony, J. (2002).Critical success factors for the successful implementation of Six Sigma

projects in organizations. *The TQM Magazine, 14* (2), 92-102.
16. Dale, B.G. (2000). *Managing quality (*4th edition). Blackwell Publishers, Oxford.
17. Darabi, Y. (2007). *The impact of market orientation on business performance and website adoption: a study among Iranian SMEs*. Unpublished Master thesis, Lulea University of Technology.
18. Dey, S. (2013). Transforming Washington DC's Parking Meter Program Using Lean Six Sigma Based Asset Management, *TRB 2014 Annual Meeting*, 1-21.
19. Divoky, J. (2008). Factors Affecting Six Sigma Project Selections in the Information Systems/Information Technology Arena. *Review of Business Information Systems*, 12(4), 13-20.
20. Doran, C. (2003). Using Six Sigma in the credit department. *Credit Management*, 1(1), 32–34. Eckes, G., (2000), *the Six Sigma Revolution.* John Wiley and Sons, New York, NY.
21. Edaily, F. (2014). *The Possibility of Applying Six Sigma and its Role in Cost Reduction and Increasing Competition – Applied Study of Advanced Technology Companies of Recycling Used Materials An Empirical Study*. Unpublished Master Thesis, Zarqa University.
22. Gijo, E.V., & Rao, S. (2005). Application of Six Sigma methodology to reduce defects of a grinding process. *Quality and Reliability Engineering International*, 5(3), 156-167.
23. Goh, T.N. (2011). Six Sigma as a Change Agent in Quality Management. *The* 55^{th} *EOQ Congress and World Quality Congress*, Budapest (June 20-23), 1-10.
24. Goldstein, M. (2001). Six Sigma program success factors. Six Sigma Forum Magazines. *British Standards Institute*.
25. Gryna, F. M., (2001). *Quality Planning & Analysis: From Product Development through Use - Fourth Edition,* McGraw-Hill, New York, NY.
26. Habidin, N.F., Yusof, S.M., Che Omar, C.Z., Mohamad, S.I.S., Janudin, S. E., & Omar, B. (2012). Lean Six Sigma Initiatives: Business Engineering Practices and Performance in Malaysian Automotive Industry. *IOSR Journal of Engineering*, 2(7), 13-18.
27. Halliday, S. (2001). So What Exactly is Six Sigma? *Works Management,* 54(l), 4-15. Henderson, K.M., & Evans, J.R. (2000). Successful implementation of Six Sigma:benchmarking General Electric Company. *Benchmarking: An International Journal*, 7(4), 260–81.
28. Hill, N., & Brierley, J. (2017). *How to measure customer satisfaction*. Routledge, London Jaakkola, M. (2006). *Strategic marketing and its effect on business performance: moderatingeffect of country-specific factors*. Unpublished Master thesis, Helsinki University of Technology.
29. Jaglan, P., Kaushik, P., & Khanduja, D. (2011). Six Sigma: A Road Map for SMEs.
30. *International Journal of Advanced Engineering Technology*, 2(4), 461-464.
31. Johannsen, F., Leist, S., & Zellner, G. (2015). Implementing Six Sigma for improving business processes at an automotive bank. In handbook on business process management. *International Handbooks on Information Systems (*393-416), Springer Berlin Heidelberg.
32. Kaplan, R. S., & Norton, D. P. (2001). Transforming the balanced scorecard from performance measurement to strategic management: Part I. *Accounting Horizons*, 15(1), 87-104.
33. Kaushik, P. (2012). Six Sigma looks at in education: managing perception. *International Journal of Research in IT & Management*, 2 (6), 49-59.
34. Kaushik, P., & Khanduja, D. (2009). Application of Six Sigma DMAIC methodology in thermalpower plants: A case study. *Total Quality Management*, 20(2), 197-207.
35. Khaidir, N.A., Habidin, N.F., Ali, N., Shazali, N. A., & Noor Jamaludin, N. H. (2013). Six Sigma Practices and Organizational Performance in Malaysian Healthcare Industry. *IOSR Journal of Business and Management*, 6(5), 29-37.
36. Kumar R. D. (2014). Six Sigma Methodologies in Banking Industry for Quality Improvement.
37. *Journal of Innovative Research and Solution (JIRAS)-A unit of UIIRS*, 1(1), 147-157.
38. Kumaravadivel, A., & Natarajan, U. (2011). An empirical study on employee job satisfaction upon implementing Six Sigma DMAIC methodologies in Indian foundry – A case study. *International Journal of Engineering, Science and Technology*, 3(4), 164-184.
39. Kwak, Y.H. & Anbari, F.T. (2006). Benefits, obstacles, and future of Six Sigma approach',
40. *Technovation*, 26(5-6), 708–715.
41. Linderman, K., Schroeder, R. G., Zaheer, S., & Choo, A. S. (2002). Six Sigma: a goal-theoretic perspective.

Journal of Operations Management, *21*(2), 193-203.

42. Moosaa, K., & Sajid, A. (July 2010). Critical analysis of Six Sigma implementation. *Total Quality Management & Business Excellence*, 21(7), 745-759.
43. Muhareb, T.M., & Graham-Jones J. (2014). Using Lean Six-Sigma in the Improvement of Service Quality in Aviation Industry: Case Study at the Departure Area in KKIA. *International Journal of Social, Human Science, and Engineering*, 8(1), 1-7.
44. Obaidullah, H. K.K. (2005). A Study of Six Sigma Implementation and Critical Success Factors. *Pakistan's 9th International Convention on Quality Improvement*, 1-12.
45. Olsen, E.O. (2004). *Lean Manufacturing Management: the relationship between practice and firm-level financial performance*. Unpublished doctoral dissertation, The Ohio State University.
46. Pande, P., Neuman, R., & Cavanagg, R. (2000). *The Six Sigma Way: How GE, Motorola, and other top companies are honing their performance*. McGraw-Hill, New York.
47. Pande, P.S. (2000). *The Six Sigma Way*. McGraw-Hill.
48. Parast, M.M. (2011). The effect of Six Sigma projects on innovation and firm performance.
49. *International Journal of Project Management*, 29 (1), 45-55.
50. Pokharkar, D., Jadhav, V., Gholve, S., & Vilasrao Kadam. (2010). Six Sigma: Golden Opportunity for Pharmaceutical Industry. *International Journal of PharmTech Research*, 2(2), 1160-1164.
51. Pradhan, A., & Vijay, S. (2021). Feasibility Study for Implementation of Six Sigma in Sinhgad Institute (Stes) Libraries for Enhancing Quality of Library Processes and Services. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(7), 2374-2385.
52. Raisinghani, M.S. (2005). Six Sigma: concepts, tools, and applications. *Industrial Management and Data Systems*, 105(4), 491-505.
53. Reddy, G.P.P., & Reddy, V.V. (2010). Process improvement using Six Sigma – a case study in the small-scale industry. *Int. J. Six Sigma and Competitive Advantage*, 6(1-2), 1-11.
54. Reijns, T.J.F. (2010). *The advantages and limitations of Lean Six Sigma in process (re)design: Combining continuous improvement methods to align the product characteristics with the customer's requirements*. Unpublished Bachelor Thesis, Tilburg University.
55. Reserve Bank of India, RBI (2021 *List of Scheduled Commercial Banks (SCBs) in India.*
56. Retrieved from: https://m.rbi.org.in/scripts/bs_viewcontent.aspx?Id=3657.
57. Sadrabadi, A., Ebrahimzade,C., Pezeshki, R., Abolghasemi, M., & Ahmadi, S. (2015). SixSigma approach to assessing the quality of services. *Quarterly Journal of Business Administration exploration*, 5(10), 71-96.
58. Sandhold, L., & Sorqvist, L. (2002). 12 Requirements for Six Sigma Success. *Six Sigma Forum Magazines*, 12(1), 17-22.
59. Sekaran, U. (2003). *Research Methods for Business: A Skill Building Approach* (4th Edition).
60. John Wiley and Sons (ASIA) Pte Ltd. Singapore.
61. Sharabati, A.A. (2008). *The Effect of Intellectual Capital on the Performance of Pharmaceutical Manufacturing Organizations in Jordan*. Unpublished Doctorate thesis. Amman Arab University.
62. Sharma, S., & Singh, V. (2013). Six Sigma Approach: Application, Benefits, and Scope. *International Journal of Medical Engineering and Robotics Researches*, 2(3), 365-370.
63. Singh, B., Garg, S.K., Sharma, S.K., & Grewal, C. (2010). Lean implementation and its benefits to the production industry. *International Journal of Lean Six Sigma*, 1(2), 157-168.
64. Singh, J.P. (2017). Implementing Six Sigma in a Co-operative Bank. *International Journal of Engineering Technology, Management, and Applied Sciences*, 5(6), 279-286.
65. Snee, R. D. (2004). Six Sigma: the evolution of 100 years of business improvement methodology. *International Journal of Six Sigma & Competitive Advantage*, 1(1), 4-20.
66. Snee, R. D., & Junior, W. F. (2002). The Project Selection Process. *Quality Progress*, 35(9), 78-80.
67. Stoiljkovi, V, Milosavljevic, P., & Randjelovic , S. (2010). Six Sigma concept within thebanking system. *African Journal of Business Management*, 4(8), 480-493.
68. Stoiljkovic, V., Jesic, S., Stojiljkovic, L., & Petrovic, Z. (2006). Integrated Management Systems. *CIM College and Faculty of Mechanical Engineering in Nis Magazine, Nis, Serbia*, 511-525.
69. Sunder M., V., Ganesh, L.S., & Marathe, R.R. (2019). Lean Six Sigma in consumer banking –an empirical inquiry. *International Journal of Quality & Reliability Management*, 36(8), 1345-1369.

70. Sunder, M.V. (2016) Rejects reduction in a retail bank using Lean Six Sigma. *Production Planning and Control*, 27(14), 1131–1142.
71. Thawanı, S. (2004). Six Sigma—Strategy for Organizational Excellence. *Total Quality Management*, 15(5/6), 94-104.
72. Thomas, A. (2009). Applying Lean Six Sigma in a small engineering company—a change model. *Journal of Manufacturing Technology Management*, 20(1), 113–129.
73. Vijay, S.M. (2012). Integration of Six Sigma with project management. *International Journal of Advanced Engineering Technology*, 3(1), 29-32.
74. Vijaya, S.M., & Antony, J. (2015). Six-sigma for improving Top-Box Customer Satisfaction score for a banking call center. *Production Planning & Control: The Management of Operations*, *26*(16), 1291-1305.
75. Wang, L & Hussain, I. (2011). Banking Sector Growth in China: Can Six-Sigma Be a Solution?
76. *International Journal of Business and Management*, 6(2), 169-176.
77. Zamri, F., Hibadullah, S. N., Fuzi, N. M., & Desa, A. F. (2013). Green Lean Six Sigma and Financial Performance in Malaysian Automotive Industry. *Business Management and Strategy*, 4(1), 97-106.