This study is designed to ascertain the impacts of Six Sigma strategy on the performance of the selected firms in Nigeria. In particular, the study will attempt to satisfy the following objectives:

i. To examine the organizational level of infrastructure that is critical for implementing the Six Sigma in Nigeria.
ii. To ascertain whether the benefits of Six Sigma outweigh the cost of implementing Six Sigma.

Research Hypotheses

The study will be conducted with the help of the following alternate hypotheses:

H_1: The infrastructural level of the organization is critical for implementing the Six Sigma strategy in Nigeria.

H_2: The benefits of Six Sigma strategy outweigh the cost of implementing it.

Research Method

This research therefore covers three selected Manufacturing firms in Nigeria, namely Cadbury Nigeria Plc, Crown Flour Mills and GlaxoSmithKline Consumer Nigeria Plc. Secondary data were obtained through books, journals, and internet. Empirical works of other scholars were consulted. A simple size of 212 was obtained from the population of 450 at 5% error tolerance and 95% degree of freedom using Yamane's statistical formula 212(100%) of the questionnaires distributed 200(94%) were returned and 12(6%) were not returned. The questionnaire was designed in Likert scale format. The researchers conducted a pre-test on the questionnaire to ensure the validity of the instrument. Pearson moment product co-efficient and regression analysis were used to test the hypotheses

Literature Review

I. Concept of Six Sigma

Companies exist to be profitable. Profitable companies provide jobs and pay taxes that value the community, state, and country where they make their products or provide their services. Making a profit is based on having customers who want your product or service. Wanting your product or service is just the beginning. Every customer has requirements conscerning the product or service (Raisinghani 2005).

Linderman et al., (2003) concede that Six Sigma, is ''an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates'', generates intense interest in industry. (Snee and Hoerl, 2003) opined that since its initiation at

Motorola in the 1980s, many companies including GE, Honeywell, Sony, Caterpillar, and Johnson

Controls have adopted Six Sigma and obtained substantial benefits.

According to Kwak (2004) a process is defined as the series of steps and activities that take efforts provided by suppliers add value and provide outputs for their customers. Six Sigma as a management philosophy instructs management to begin identifying the 20 or 30 most important Processes in their business. Next management measures the current sigma performance of each of these processes. Some processes may even be lower than two Sigma. Once management has aknowledged their processes and personally been involved in measurement of their current performance, they then identify the lowest performing processes that have the most straight impact on the company's business objectives.

Harry & Schroeder, (2000) are of the opinion that Six Sigma is viewed today as a disciplined, systematic, measurement-based and data-driven approach to reduce process variation.

This powerful management strategy associations improved metrics to reduce defects or mistakes or errors in processes and thereby strengthening a company's market position and enhancing the financial impact to the bottom-line. Six Sigma is an operational process improvement strategy that focuses on improving process design and reducing process mistake and waste. Organizations can employ the Six Sigma approach as a tool in a change of organizational improvement methodologies or as a "stand alone" quality improvement program. General Electric and Motorola are the best known examples of using Six Sigma as a quality program.

Anthony (2002) argues that, Six Sigma is a strategic business improvement approach that pursues to increase both customer satisfaction and a company's financial health. Six Sigma as management technique attention on bottom-line expense reductions with measurable and documented results. If it has to be put in simple plain words than the answer to a question "what is six sigma?" will be "six sigma is a management strategy which helps you to quickly manage a department or a business by keeping customer interests in forefront and working on the policy of customer satisfaction using facts and data to drive better business resolution.

II. The impact of organizational infrastructures on Six Sigma Application

There is empirical evidence to support the notion that infrastructure is significant for the success of continuous process improvement programs (Flynn and Sakakibara, 1995). The selection of right people is vital for the execution of Six Sigma projects. Once the Six Sigma infrastructure is defined with the help of a Six Sigma consultant with adequate experience, training may begin. The project champions should receive a good overview of Six Sigma important and the skills required for project selection, project prioritization, and project scoping and project execution. The broad impression of the six sigma infrastructure

framework is for organizations to arrange and manage their operations in relation to the environment and gain competitive benefit by using current competences and resources, and building new ones.

Quinn, (1991) opines that, the infrastructure of six sigma programs provides an atmosphere that encourages experimentation, while ensuring a skillful and structured approach, resulting in a type of "controlled chaos" that is essential for Six Sigma. In serving as a forum for experimentation it facilitates the convergence of varied skills and perspectives of project team members.

The study by (Lyles, 1981) also found out that, systematic connections underlying these six sigma elements are designed to not only communicate the strategic necessities but also to generate debate and discussion toward formulation of strategy. A coordination system that encourages employee initiative in setting areas while involving upper management can steer the direction of the program while assuring employee obligation through involvement (Hart, 1992).

III. Benefits of implementing six sigma strategy

Numerous books and articles provide the basic concepts and benefits of the six sigma method (Harry and Schroeder, 2000). The challenges and realities in implementing the Six Sigma method successfully are immense. However, the assistances of applying the six sigma method to technology-driven, project-driven organizations are similarly great.

Many companies such as GE, start wood hotels, Motorola have benefited from Six Sigma management tools; the only thing is Six Sigma as management system works to its best and optimal results can only be attained by implementing it organization wide with all stages working in sync with one another. While the benefits of Six Sigma are persuasive, the difficulty and complexity of a far-reaching change program are daunting. Pyzdek (2001) recommends that the average time to achieve benefits from a Six Sigma program can be more than three years — a period that many enterprises simply don't have the organizational patience to undergo. Still, companies that do take the drop are rewarded.

Companies who implement Six Sigma strategies notice a dramatic reduction in employee and executive turnover to other establishments, because results driven improvement projects make these individuals feel productive and worthwhile in their work environment.

[1] The Levels of Six Sigma benefit

Executive management at companies in manufacturing industries, governmental agencies and even service-related organizations have applied the Six Sigma methodology to decrease waste, advance quality and establish statistical methods for analyzing business processes. Six Sigma has become a way for corporate managers to monitor, improve quality and strategically differentiate their company as leaders in a global marketplace.

[2] Increased Quality

The fundamental push for Six Sigma is high quality. Management can decrease variations in production by rooting out poor raw materials, correcting inefficient processes and measuring all parts of their operations. Six Sigma pushes quality from inputs to post production in every area of the business. This push on quality helps improve the final product, but also reduces rework, waste and errors in all business functions. The increased quality can help increase customer satisfaction.

[3] Competitive Advantage

Crowded markets require businesses to stand out to gain sales, loyal customers and to beat competing firms. Managers can use Six Sigma to give their firm a competitive advantage in relation to other companies in their industry or market. The focus on quality can be used as a selling point for gaining contracts, selling products or in marketing efforts. Six Sigma may also be used in a company to uphold its position if other competing firms start using the management philosophy.

[4] Reduced Cost

Six Sigma is used as a way to help improve products and reduce above caused by waste. Since all production and operations are rationalized, constantly reviewed and measured, cost reductions are often a byproduct of Six Sigma operations. Initially, Six Sigma can increase costs through the need for higher quality raw materials, employee training and process reengineering. Long-term, the management process is designed to reduce long-term costs associated with poor production systems and product returns.

[5] Recognition

Management uses Six Sigma as a way to recognize, promote and educate employees. Using "belt" classifications such as "green belt" and "black belt," employees are rated based on their mastery and education in the Six Sigma method. These belt attainments help label and distinguish employee levels. They can also be used as a basis for job advancement and appreciation.

IV. The prospects of six sigma strategy on organizational transformation

Six Sigma is a business method of improving quality by removing defects and their causes. It essences on outputs, which are important to customers. A defect can be any type of product or service that does not conform to a standard review unit or satisfy the customers. The method uses various statistical tools to measure processes.

The main goal of Six Sigma is unremitting process improvement through DMAIC (Define Measure, Analyze, Improve and Control) method. First, the project and the process to be improved are defined. Then, the performance of the process is measured according to (Pyzdek, 2003). The data is then examined and the bottlenecks and problems are identified. After analysis,

improvement programmes are defined and defects are removed. Six Sigma srtuggle to improve customer satisfaction and in turn increase profitability by reducing and abolition defects

Breyfogle, et al (2001) believes that senior managers' support for Six Sigma controls the degree to which other quality practices are implemented. During the process of accepting Six Sigma program, new rules need to be set up, new procedures need to be followed, and new tools need to be knowledgeabl . Companies often encounter uncertainly, confusion, and resistance in this process. This was collaborated by (Bhote, 2003) that managers' consistent involvement in Six Sigma activities enables the restructuring of business processes and facilitates changing employees' attitudes toward continuous process improvement through the unstable transformation period (Bhote, 2003). Some companies connection managers' compensation to their efforts and performance in Six Sigma implementation, which helps to reduce the danger of managers' having a temporary but quickly fading zeal for quality improvement and to ensure a consistent and high level of top management provision for Six Sigma (Antony and Banuelas, 2002).

Test of Hypotheses

Hypothesis one

H_1: The infrastructural level of the organization is critical for implementing the Six Sigma strategy in Nigeria.

Table 1: Table of correlation between infrastructural level of the organisation and Six Sigma

Correlations

		infrastructural level of the organization	Six Sigma
infrastructural level of the organization	Pearson Correlation	1	.473**
	Sig. (2-tailed)	200	.000
	N		200
Six Sigma	Pearson Correlation	.473 **	1
	Sig. (2-tailed)	.000	200
	N	200	

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

According to above calculations is noticed that amount of correlation coefficient between infrastructural level of the organization and Six Sigma is equal to 47.3 per cent and seeing that a significant level is less than 5%. That is there is progressive relationship between infrastructural level of the organization and Six Sigma.

Regression analysis test of Infrastructural Level of the Organization and Six Sigma

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773 [a]	.624	.722	3.96426

a. Predictors: (Constant), infrastructural level of the organization

Regression coefficient of R = .773 or 77.3% indicate that relationship exist between independent variables and dependent variable. The coefficient of determination R^2 = 0.624 which show that 62.4% of variation in Six Sigma is explained by infrastructural level of the organization. The adjusted R-square in the table shows that the dependent variable, (Six Sigma) is affected by 72.2% by independent variable (infrastructural level of the organization). It shows that there are positive effects of infrastructural level of the organization on Six Sigma.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	15.036	.806		18.644	.000
infrastructural level of the organization	1.319	.125	.473	10.520	

a. Dependent Variable: Six Sigma

The coefficient of determination for Six Sigma is positive (1.319) and is highly significant (0.000) in infrastructural level of the organization. The p-value of 0.000 is less than the t-statistic value of 10.520 and the standard error value of 0.125. This suggest that a unit increase in Six Sigma will lead to 1.319 increases in infrastructural level of the organization. Therefore, the Null hypothesis is rejected and alternate hypothesis is accordingly recognized, meaning that the infrastructural level of the organization is critical for implementing the Six Sigma strategy in Nigeria.

Hypothesis two

H_2: The benefits of Six Sigma strategy outweigh the cost of implementing it.

Table 2: Table of correlation between Benefits of Six Sigma and Cost of Implementing

Correlations

		Benefits Of Six Sigma	Cost Of Implanting
Benefits Of Six Sigma	Pearson Correlation	1	.499**
	Sig. (2-tailed)	200	.002
	N		319
Cost Of Implementing	Pearson Correlation	.499 **	1
	Sig. (2-tailed)	.002	200
	N	200	

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

According to above calculations is observed that amount of correlation coefficient benefits of Six Sigma is equal to 49.9% and considering that a significant level is less than 5%. Then can say that there is a positive relationship between Cost of implanting Six Sigma and benefits of Six Sigma. This implies that one percent decrease in benefits of Six Sigma will lead to 49.9% increase cost of implementing.

Regression analysis test of benefits of Six Sigma and cost of implementing

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.899[a]	.849	.747	3.90132

a. Predictors: (Constant), benefits of Six Sigma

Regression coefficient of R = .899 or 89.9% indicate that relationship exist between independent variables and dependent variable. The coefficient of determination R^2 = 0.849 which show that 84.9% of variation in Cost of implementing is explained by benefits of Six Sigma. The adjusted R-square in the table shows that the dependent variable, (cost of implementing) is affected by 74.7% by independent variable (benefits of Six Sigma). It shows that benefits of Six Sigma are responsible for cost of implementing Six Sigma in the companies.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	16.960	.593		28.596	.000
benefits of Six Sigma	1.733	.154	.499	11..257	

a. Dependent Variable: cost of implementing

The coefficient of determination for benefits of Six Sigma is positive (1.733) and is highly significant (0.002). The p-value of 0.000 is less than the t-statistic value of 11.257 and the standard error value of 0.154. This implies that a unit increase in benefits of Six

Sigma will lead to 1.733 increases in cost of implementing it. Therefore, the Null hypothesis is rejected and alternate hypothesis is accepted, meaning that the benefits of Six Sigma strategy outweigh the cost of implementing it.

Conclusion

This paper examined the impacts of six sigma strategy on the performance of selected manufacturing firms in Nigeria. Based on the findings of the study, it is concluded that six sigma adds significant value to the organizations that adopt the strategy. That the successful application of Six Sigma largely depends on the infrastructural level of the organizations. The presentation of six sigma strategy has tremendous benefit involved to it. The application of six sigma strategy has positive relationship with quality improvement initiative. Consequently, the impacts of the process on quality of products and services have been touched.

This has shown why the companies in Nigeria that adopt the six sigma strategy have been able to contest with their counterparts elsewhere in the global market.

Recommendations

Based on the findings, conclusions and implication of the study, the following recommendations have been made to facilitate the impact of six sigma strategy in Nigeria.

i. The business community in association with core professionals, in the nation manufacturing, banking, oil and gas sector and all major stake holders should organize a seminars, workshops and conferences on six sigma processes and its application. This will help both the owners of the business and their customers to understand and value the process.

ii. Government should create a favourable environment in relations to infrastructure development and guided monetary and fiscal policy, for the industry in order to have competitive improvement.

iii. Constant review or scanning of the environment should be encouraged to avoid the unpredictable troubles.

iv. The importance of having strong leadership responsibility and support cannot be overdone. Leadership needs to empower staff, be actively involved, and continuously drive quality improvement. Without the commitment and support of senior-level leadership, even the best deliberate projects are at great risk of not being successful.

v. A culture of safety and improvement that rewards improvement and is driven to improve quality is important. The culture is needed to support a quality infrastructure that has the resources and human capital required for successfully enlightening quality.

vi. Quality improvement teams need to have the right stakeholders involved.

vii. Quality improvement teams and stakeholders need to understand the problem and root causes. There must be a consensus on the definition of the problem. This arrangement is as crucial to the success of any improvement effort as the validity of the data itself. Implementation plans need to be supple to adapt to needed changes as they come up.

viii. Change takes time, so it is important to stay focused and proceed.

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