Business, Management and Economics Research
ISSN(e): 2412-1770, ISSN(p): 2413-855X
Vol. 3, No. 4, pp: 34-39, 2017
URL: http://arpgweb.com/?ic=journal&journal=8&info=aims

Investigating the Use of Value Analysis and Value Engineering as Cost Saving Techniques among Selected Manufacturing Companies in Kano State Nigeria

Musa Gambo Sharifai Department of Purchasing & Supply School of Management Studies, Nigeria

Zakari Uba* PhD, Department of Purchasing & Supply School of Management Studies Kano State Polytechnic, Nigeria

Abstract: The study investigated the concepts value analysis and value engineering, and their relationship with cost savings among selected manufacturing companies that specialize in the manufacture of plastic, steel, metal products, and soft drink manufacturers in Kano state, North west Nigeria. The study employed the use of primary data where one hundred and ten questionnaires were distributed randomly to employees of nine (9) selected companies at Tokarawa, Sharada, Bompai and Zaria Road all within the metropolis in Kano state. Purposive sampling technique was used to select employees in the production, design, maintenance and engineering, marketing, supply and warehouse departments who have worked for their companies for a period of three years. Secondary data from books and journals were employed to review literature. The study found that at 95% level of significance, sig value (0.173) $\leq \infty$=0.05 this reveals an insignificant relationship between value analysis, value engineering and cost savings among the selected companies in Kano state North west Nigeria, leading to the acceptance of the null hypothesis of no significant relationship between the independent and the dependent variable. The study also found very low levels of awareness about the two concepts among manufacturers in Kano state, North West, Nigeria. The paper concluded that the concepts if properly applied would enhance cost savings in manufacturing companies and recommends the adoption of the two concepts by local manufacturers in their efforts to reduce cost(s) and remain competitive in the volatile business environment especially with the challenges of the global economic meltdown.

Keywords: Value analysis; Value engineering; Cost savings; Cost analysis; Insignificant relationship; Business environment; Components.

1. Introduction

Several studies have shown that manufacturers in Nigeria are facing numerous challenges within the environment, for example Asikhia (2006) asserted that a new competitive environment is developing in Nigeria, the business environment has altered rapidly and unpredictably, and new knowledge capabilities are consequently needed to survive in such a turbulent environment. In the same vein, Olarewaju and Folarin (2012) concluded that, the Nigerian business environment is fast changing which deserves the means by which future opportunities and problems can be anticipated by organizations, company executives and administrators needs to pay adequate attention to.It is in the light of the above and in a continued search for avenues for cost savings that the two concepts of value analysis and value engineering emerged, these are avenues of achieving cost savings by reducing cost of production through a review mechanism via a collaborative effort of functional departments such as purchasing, production, research and development, maintenance etc various studies, have all attested to the challenging nature of the Nigerian business environment; companies operate under situations of unstable power supply, unfavourable government laws and legislations, consistent increases in cost of raw materials and inputs, etc.

The concepts of value analysis and engineering are not new, in many advanced economies of the world such approaches are adopted to enhance the competitiveness of business organizations. What is however, not certain is the adoption of such frameworks within the domestic environment. This study is therefore an attempt to explore the practicability or otherwise of these cost saving measures within the domestic environment of Kano state, in North west Nigeria.

*Corresponding Author

2. Review of Related Literature

2.1. Value Analysis

According to Lysons and Farrington (2006), Value Analysis and Value Engineering were developed as a concept by General Electric Company in the United States of America after the end of World War 11. Today nearly three quarters of all American firms have some form of value analysis programme One of the early pioneers of this approach to cost reduction was Lawrence D. Miles who postulated the idea in his book Techniques of Value Analysis and Value Engineering, (Miles, 1972).

Lysons and Farrington (2006), further postulates that; Value Analysis, is a philosophy implemented by the use of specific set of techniques, a body of knowledge, and a group of learned skills. It is a creative approach which has for its purpose the efficient identification of unnecessary cost, cost which provides neither quality nor us nor life, nor appearance no customer features.

Obler (2005) asserted that, value Analysis is a systematic procedure, aimed at ensuring that necessary functions are achieved at a minimum cost without detriment to quality, reliability, performance and service delivery. This normally is a post production procedure. In the same vein, Value Analysis is a method of comparing the benefit, function, and cost of materials, components and work processes. A component is a part of the finished product for example, a key pad used on a telephone. Value Analysis can be used to reduce costs or improve design Dwyer and Turner (2009) cited in Leber *et al.* (2013). In the same vein, McGinnis (2005), defined value analysis as a systematic and objective evaluation of the value of a good or service, focusing on an analysis of function relative to the cost of manufacturing or providing the items possibly altering specification and quality requirements that could reduce costs without impairing functional suitability. According to Whittle (2015) of the Chartered Institute of Management Accountants, (CIMA), value analysis is; a systematic inter-disciplinary examination of factors affecting the cost of a product or service, in order to devise means of achieving the specified purpose most economically at the required standard of quality and reliability. The value and quality of a product must be kept the same, or improved, at a reduced cost. it is a planned scientific and approach to cost reduction which reviews the material compositionof a product and production design so that modifications and improvements can be made which do not reduce the value of the product to the consumer or to the user.

Different organisations stress different variations of the fundamental idea, however, two general conceptual tools were put forward by Burnt *et al.* (2003):

- Design Analysis Approach
- Functional Cost Analysis Approach

- Design Analysis Approach: The design analysis procedure entails a methodical step-by-step study of all phases of the design of a given item in relation to the function it performs

The most common approaches include:

- The Value analysis check list: Many companies develop some type of checklist systematize a value analyst activity. The analysts using this method has to ask many questions some of these questions are highly specialized, like the ones suggested by the National Association of Purchasing Management (U.S.A) who suggested that the first thing to do is to determine the item, and then also determine:
  - Can the item be eliminated?
  - If the item is not standard, can a standard item be used?
  - If it is a standard item, does it completely fit the application, or is it a misfit?
  - Does the item have greater capacity than required?
  - Can the weight be reduced? Etc
- The functional cost approach: This method basically deals with the cost element 'What does it cost to perform the function done by this part?' or 'Does the importance of the function to be preformed justify the cost of the performance?'Using this method, benchmark costs are established for performing certain functions that are characteristically encountered in the industry.
- The use of Brainstorming: This technique, which is often used in conjunction with either of the preceding approaches, is the classical brainstorming approach. Brainstorming is a process designed to stimulate creative thinking. A group of individuals with different backgrounds meets for the purpose of generating ideas useful in solving a particular problem. Emphasis is placed on the unhindered generation of ideas; which are recorded as soon as they are made.

The objective of this point is to develop spontaneous and positive ideas. The major focal point of this idea to problem solving is that it recognizes that many of the ideas spontaneously generated are completely infeasible. The potential use of this technique for approaching value analysis problem should be apparent. Once the feasible problems are thoroughly defined and understood, some companies call on several representatives from the appropriate departments for example Production, Procurement, Marketing, Account/Finance etc to participate in a brainstorming session. After the session, the resulting ideas are subsequently turned over to analysts for further development.

- The Use of Suppliers: This is a value analysis technique which encourages a supplier to submit to the buying organization a proposal on how best to reduce the costs of one or more of its products, part or components which its supplies to the buying organization.

The point here is that after all, a supplier knows more about its products more than any other person, as such the task is pushed on to the supplier to identify areas through value analysis, that costs can be reduced. In the United State of America for example, Chrysler Corporation initiated a voluntary value analysis/cost reduction programme for its suppliers. The objective was to make each supplier to value-analyze one or more of its key products sold to the company, and to submit the resulting value analysis suggestions for considerations. During the first two years of the programme, Chrysler received more than 3,400 suggestions, which materialized into projects that saved approximately 136 million US Dollars Lysons and Farrington (2006). It should be emphasized that seeking for supplier's assistance in value analysis programmes is based on the premise that creative suppliers will be compensated for their efforts by receiving additional business or by sharing in the cost saving they help to generate.

2.2. Value Engineering

Value Engineering is the application of value analysis techniques to new products, services, processes, or systems, commencing with the conceptual or design stage. Value Engineering applies value analysis processes to cost reduction or value enhancement at the design stage (Lysons and Farrington, 2006).

Value Engineering has also been defined more simply as the application of value analysis techniques in the engineering sphere of responsibility (Farrell and Aljian, 1982). The results of any value analysis system can only be said to be successful if and only when the value engineering is successfully carried out on the product. It emphasises the importance of value analysis as early as possible in the design process and obtaining competitive advantage by means of designs that enhance customer satisfaction. In the same vein, CIMA (2005) defined value engineering as; the application of value analysis to new products. It further explained the concept as redesign of an activity, product or service so that the value to the customer is enhanced while costs are reduced (or atleast increased by less than the the resulting price increase). Value engineering relates closely to target costing as it is cost avoidance or cost reduction before production. Value analysis on the other hand, is cost avoidance or cost reduction of a product already in production, both adopt the same approach, ie a complete audit of the product.

2.3. Cost Analysis

The general idea of cost covers a number of different meanings; a great deal of controversy exists as to whether certain items are properly costs at all. Most of this controversy will disappear if we carry our study far enough to recognize that there are different kinds of problems for which we need information about costs, and the particular information we need differs from one problem to another, (Clark, 1923). In the same vein, Belkaoui (1983) postulated that, a firm's production activities centres on the relationships between two decision variable, inputs and outputs. The transformation of inputs, or scarce resources, into outputs or goods and services, creates a cost to the firm. The concept of cost is complex, with differing scopes and classification schemes in response to the different needs of economics, accounting, finance, engineering and law. The firm may classify costs as either manufacturing, selling or administrative costs:

- The manufacturing costs are related to the production function or input mix. They are generally cover the direct material, direct labour and manufacturing overhead.
- The non manufacturing costs, fall into two broad categories:

i. Selling overhead which are costs incurred after manufacturing process. It includes all expenses necessary for the transition of the product from the manufacturer to the immediate buyer.

ii. Administrative overhead includes all expenses necessary for the maintenance of an efficient management administration.

Belkaoui further asserted that costs are classified on the basis of traceability relative to an object of costing, such as a product line. A direct cost is easily identified and traceable to an object of costing. The prime cost and some overhead are usually directly traceable to a product, department, or segment of the firm. A cost that cannot be identified and traced to one segment of a firm is an indirect cost and is usually associated with several segments of the firm. Therefore, a salary for example, is given to a worker may be a direct charge to a department but an indirect charge to a product.

Many industrial buyers as a result of diverse reasons realize that a lot of the prices they pay do not accurately reflect the cost of the product, parts or components. The major problem however, is that unless the buying firm has a substantial knowledge of production costs in some cases it may not know whether its buyers are in fact paying fair prices or not. Cost analysis involves the investigation of a supplier's costs of producing a given product. The analyst constructs estimated elemental costs for materials, labour, and manufacturing overheads. When all these are added up together they represent the theoretical total cost incurred by an efficient producer. A good cost analyst when presented with wage data, material price lists and various industry known standards can determine the theoretical cost, which reasonably approximates the actual cost. To this figure, a profit margin is added.

2.4. Target costing

According to Blocher *et al.* (1999) target costing is an approach in which the firm determines the desired cost for the product or service given a competitive market price, so the firm can earn a desired profit:

Target cost= Competitive price – Desired profit

The firm has two options for reducing costs to a target cost level:

- By integrating new manufacturing technology, using advanced cost management techniques such as activity based costing, and seeking higher productivity through improved organization and labour relations, firms can reduce costs.
- By redesigning the product or service, accompany can reduce cost to a target cost level. This method is the more common of the two, because it recognizes that design decisions account for much of the cost elements in a product.

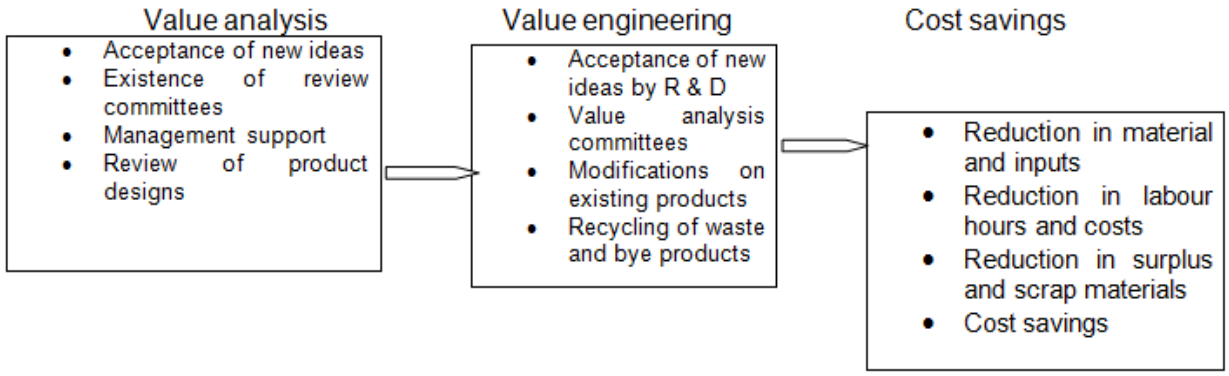
Cost analysis plays two important roles in a value analysis programme namely:

- Cost analysis is conducted for purchased items which costs appear excessive. In such cases the information developed from cost analysis is used as a basis for further price negotiation with the supplier.
- Cost analysis also serves as a means of locating high-cost parts, which should be subjected to design analysis. During the course of a cost analysis, some high cost elements are frequently isolated for the first time. Subsequent design analysis often leads to specification and production modification and ultimately to reduce cost.

Hypothesis: H0; There is no significant relationship between value analysis and engineering and cost savings among manufacturing companies in Kano state, Nigeria.

2.5. Conceptual Framework

Figure-1



Adapted from Fearon *et al.* (1993), Burnt *et al.* (2003) and modified by the researchers, (2015).

3. Methodology

Descriptive correlation and survey design was adopted for this study; one hundred and ten (110) researcher designed questionnaires were administered on respondents (engineers, plant managers, warehousing and stores personnel) who were purposively selected from among the manufacturers of plastic products, metal and steel fabricating companies in Kano state, Nigeria. Ninety eight (98) were retrieved representing 89% response rate. Face validity of the instrument was done through expert analysis where specialists in supply management, and business management were consulted. Content validity was through the Cronbach Alpha, which yielded a score of (0.542), which shows an acceptable range of the stability of the questionnaire items. Data was analysed using the statistical package for social scientists (SPSS).

4. Results and Findings

Table-1. Item analysis of the independent variable, value analysis/value engineering among selected manufacturing companies in Kano state, Nigeria

Questionnaire Items	Mean scores	Interpretation
Value analysis awareness within the company	2.04	Low
Existence of value analysis committee in the company	2.00	Low
Management support for value analysis programs	2.01	Low
Rate of review of product designs	2.67	High
Rate of Implementation of new product designs	2.43	Low
Rate of new product development in the company	2.45	Low
Ability of company to recycle materials, components and parts	2.65	High
Rate of modifications on existing products	2.56	High
Rate of wastages arising from production	2.54	High
Efficiency in disposal of scrap and surplus materials	2.72	High
Management acceptance of new ideas	2.54	High
Awareness of any benefit(s) derived from value analysis by the company	2.45	Low
Rate of surplus and waste components arising from production	2.34	Low

Efficiency in maintenance of production machinery	2.65	High
Awareness of value engineering among company employees	2.32	Low
Efficiency in introducing new products to the market by the company	2.74	High
Efficiency in recycling waste products to new products	2.34	Low
Efficiency of company suppliers	2.63	High
Average mean	**2.45**	**Low**

Source primary data, 2015

Table one above reveals a varying amount of findings from respondents in the study, respondents rated the existence of value analysis in their companies very low with a mean score of (2.020), awareness of value analysis within their companies was also rated low with a mean score of (2.045), management support for value analysis programmes also rated low with mean score of (2.014) in the same vein, awareness of value engineering programmes among employees within the organizations under study was also rated low (2.321), Awareness of any benefit(s) derived from value analysis by the company rated low with a mean score of (2.453) from these scores we can infer that the companies involved in the study do not have a vibrant value analysis programmes in their organizations. The situation is not any different in the area of value engineering, where the respondents rated the awareness of value engineering among the employees as low with a mean score of (2.321).

Table-2. Item analysis of the (dependent variable) cost savings among the selected companies in Kano state, Nigeria.

Questionnaire items	Mean scores	Interpretation
Rate of increase in prices of raw materials and components	2.34	Low
Rate of cost savings resulting from design modification	2.42	Low
Reduction in production time as a result of process modifications	2.43	Low
Rate of positive responses from customers	2.64	High
Savings in terms of inputs (raw materials and components)	2.36	Low
Volume of sales in the last three years	2.63	High
Increase in the company's distributors in the last three years	2.54	High
Ability of the company to source raw materials locally	2.43	Low
Efficiency in implementation of new product ideas	2.32	Low
Availability of qualified design engineers within the company	2.63	High
Savings in labour as a result of design modifications	2.43	Low
Availability of qualified cost analysts in the company	2.44	Low
Average mean	**2.46**	**Low**

Source: primary data, 2015

Table two above, reveals that respondents rated lowly increase in prices of raw materials and components with a mean score of (2.34), other areas of concern among the findings is the savings interms of inputs (2.36), efficiency in implementation of new product ideas (2.32). However, the findings reveal that there is availability of qualified engineers in those companies, mean scores (2.63). There is also evidence of increase in the company's distributors (2.54).

4.1. Interpretation of the Mean Scores

Mean range	Description	Interpretation
3.26-4.00	Very high	very good
2.51-3.25	High	good
1.76-2.50	Low	Fair
1.00-1.75	Very low	very poor

Table-3. Relationship between value analysis, value engineering and cost savings

Variables correlated	R	Sig	Interpretation	Decision on H
Value analysis and engineering And Cost savings	0.243	0.173	Positive but not significant relationship	Not rejected

Source primary data, 2015

The linear correlation analysis conducted reveals that; value analysis and value engineering have a positive but insignificant impact on cost savings among the companies investigated. Sig. value= (0.173) the results further reveal that; value analysis and engineering have a positive but insignificant correlation with cost saving, R= (0.243). The findings are in line with those of Clarke, (2004) and Barker, (2009) who found a non significant relationship between value analysis and engineering and cost savings among South African, and Indonesian manufacturing companies. The findings however differ with those of McDonald, (2002) who establish a significant relationship among manufacturing pharmaceutical companies in Boston (U.S.A).

5. Test of Hypothesis

From the Linear correlation results (R=0.243, Sig. =0.173), the sig. value is greater than 0.05. It is therefore sufficient enough not to reject the null hypothesis, and conclude that there is no significant relationship between value analysis and cost savings, among the companies investigated in Kano state, North West Nigeria.

6. Conclusion

The conventional approach used by many business organizations in Nigeria to increase the price of their product(s) in order to cushion the effect of increases in cost of inputs that are necessary for production, this has however been proven to be counter productive in many instances. Consumers often switch to substitute goods whenever the price(s) of a particular product(s) is beyond their reach. It is therefore pertinent that manufacturing companies must look for less conventional approaches to saving costs and improving bottom line profits. Value analysis and engineering are one of those less conventional approaches which are open to manufacturers. Based on the findings of the research, it is safe to conclude that value analysis and engineering does not significantly relate to cost savings among the companies investigated. By implication, value analysis, and engineering has no significant bearing on cost savings. Therefore, manufacturing companies in Kano state have a lot to learn in this respect.

Recommendations

The study makes the following recommendations which stems from the findings:

- Manufacturing companies should explore the concepts of value analysis and value engineering as cost saving mechanisms this is due to the potentials inherent in them if properly applied.
- Awareness about the two concepts should be improved by the management of companies; through enlightenment campains.Where possible relevant employees should be trained in order to understand the relevant aspects of the cost saving initiative.
- The companies should strive to source more of their raw materials locally.
- More cost analysts should be engaged to help in financial and cost analysis.

References

Asikhia, O. U. (2006). Market Focused Strategic Flexibility and Sales Growth: Emphirical Evidence from Nigeria PhD Dissertation, University of South Africa.

Belkaoui, A. (1983). *Cost accounting: A multidimensional emphasis* The Dryden Press: Chicago, USA.

Blocher, E. J., Chen, K. H. and Lin, T. W. (1999). *Cost management a strategic emphasis.* Irwin McGraw-Hill Boston: U.S.A

Burnt, D. N., Dobler, D. W. and Starling, S. L. (2003). *The key to Supply Chain Management Tata* McGraw Hill Publishing Company Ltd: New Delhi India.

CIMA (2005). Chartered Institute of Management Accounting. Available at: www.cimaglobal.com.

Clark, M. J. (1923). *Studies in economics of overhead costs.* University of Chicago Press: USA.

Farrell, P. V. and Aljian, G. W. (1982). *Purchasing handbook* McGraw Hill Book Company: New York United States of America.

Fearon, H. E., Dobler, D. W. and Killen, K. H. (1993). *The purchasing handbook.* 5th edn: McGraw-Hill, Inc: New York U.S.A.

Leber, M., Bastic, M., Mavric, M. and Ivanisevic, A. (2013). Value analysis as an integral part of new product development. *Science Direct Procidia Engineering*, 69(2014): 90-98.

Lysons, K. and Farrington, B. (2006). *Purchasing and supply chain management.* Prentice-Hall Pearson Education Ltd: England.

McGinnis, M. A. (2005).'Value analysis and value engineering basics for purchasing professionals'. *90th Annual International Supply Management Conference.* Penn State New Kensington.

Miles, L. D. (1972). *Techniques of value analysis and value engineering.* McGraw –Hill: USA.

Obler, M. S. (2005). *Practice of shipping.* Almet Publishers: Lagos Nigeria.

Olarewaju, A. A. and Folarin, E. A. (2012). Impact of business environment on organisational performance in the food and beverage industry in Nigeria. *British Journal of Arts and Social Sciences*, 6(2): 194.

Whittle, N. (2015). Value Analysis, Functional Analysis, Value Engineering and Target costing (P2) University of Northamton Chartered Institute of Management Accountants. Available: www.cimagloba.com