LEVELS OF SUPPLY CHAIN MANAGEMENT IN THE MANUFACTURING SECTOR

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Abstract—Kenya Vision 2030 aims to transform Kenya into a newly industrializing, middle-income country providing a high quality life to all its citizen by the year 2030. However, Kenya manufacturing sector whose share of gross domestic product (GDP) has increased very little over the past two decades: contributes about 13% of the GDP reasons among many include competition from cheap products, inadequate research and development, insufficient management, low capacity utilization and limited technology development. The objective of this study was to survey the extent of implementation of supply chain management (SCM) in the manufacturing sector as they strive to improve their productivity with the view to stay put in this era of global markets competition. The study was conducted in selected manufacturing firms in Nakuru Town. It assessed the levels of SCM in the manufacturing sector. The research hypothesis was on level, accruing from implementation of SCM. Mixed methodology (Qualitative and Quantitative) was adopted because it gives a deeper understanding. Simple stratified random sampling technique was used in selecting the manufacturing firms and data was collected, using purposive sampling from participants using questionnaire and interview schedules to obtain qualitative information from top managers, production, marketing, finance and human resource managers. Data collection was non-parametric quantitative therefore was analyzed using chi square test with a level of significance of α = 0.05. The results indicated that there are specific levels of SCM in the manufacturing sector, operating as required. The study recommended management of manufacturing firms to facilitate identification of Levels of SCM in the manufacturing sector. The Kenya Manufacturers Association should embrace SCM as a modern management concept in the manufacturing sector.

Keywords—Supply Chain Management, levels, Manufacturing Sector.

I. INTRODUCTION

SCM is presented as an integrative philosophy to manage the total flow of a distribution channel from supplies to the ultimate user (Cooper and Ellram, 2001). It focuses on the management of inventory through the entire supply chain. It represents the system approach to viewing the channel as a whole rather than as a set of fragmented parts. This study is based on the systematic approach to management and organization, a management thought under modern theory of management developed after 1950. This system theory looks at an organization as a whole examining all relevant organizational variables simultaneously. The approach identifies the parts of the organization and looks at how these parts operate interdependently. The foundation of the system theory is that a manager cannot emphasize only one aspect of organizational management while ignoring other aspects, whether internal or parts of outside environment.

A supply chain of a manufacturing enterprise is a network of facilities that performs functions of procurement of materials to intermediate and finished products and distribution of finished production to customers (Billington, et al, 1993).
However, globalization of markets has put tremendous pressure on manufacturing enterprises to be competitive. Supply chain runs from suppliers through to customers or stores and requires process technology and people for success; this is true regardless of the industry. SCM uses a tool called just in time (JIT); a manufacturing system which states that supplies are purchased in the time to be used, parts are produced in time to be transported and sold (Kalpakjian, 1991). It is a system in which both the movement of goods during production and deliveries from suppliers are carefully timed so that at each step of the process the next batch arrives for processing just as the preceding batch is completed. This result to a system with no idle items waiting to be processed (Stevenson, 1999).

In the recent past there has been continuous literature review on SCM and the consequences of reviewing has suggested the following supply chain levels: Customer service management, Product Development and Commercialization, Performance Measurement, Physical Distribution, Manufacturing Support and Procurement, and Outsourcing (Stevens, 1989 and SCM global survey, 2006).

i) Level One - Customer Service Management
Comprises customer relationship management, benchmarking and order fulfillment.

ii) Level Two - Product Development and Commercialization
Concerns product data management (PDM), market share, customer satisfaction, profit margins and returns to stakeholders.

iii) Level Three - Performance Measurement
Includes logistics performance measurement, which is correlated with the information flow within the organization, and variation, direction, decision and policy measurements.

iv) Level Four - Physical Distribution, Manufacturing Support and Procurement
Include the enterprise resource planning, (ERP), warehouse management, material management, manufacturing planning, personnel management and order management. Firm shifts focus outwards and begin to form network relationship with carefully selected suppliers, distributors and strategic customers.

v) Level Five - Outsourcing
This includes management methods and the Firm cutting edge strategy and its vital strategic objectives that the firm will identify and adopt for strategic initiatives in the areas of technology information, operations, manufacturing capabilities and logistics.

It is against this scenario that this study sought to establish the extent of implementation of SCM as a modern management concept by assessing the levels.

A strong SCM carefully implemented would enable Kenyan manufacturing firms to compete favorably locally and internationally in today’s difficult business environment; where Firms are constantly searching for improvement in product production, systems management and customer satisfaction.

The specific objective of this study was to: Identify the levels of supply chain management at which manufacturing firms are operating while the tested hypothesis was there are no significant levels of supply chain management in place in the manufacturing sector.

II. METHODOLOGY

This was a survey research study, In which manufacturing industries in Nakuru town were picked using stratified, random sampling technique, which was considered appropriate for obtaining reliable results. The industries are categorized into:- construction and engineering, Electrical Engineering, Food and Agriculture, Textiles, Mechanical Engineering, and Chemicals.

There were 30 manufacturing firms in Nakuru town. The firms were stratified by the category of industry out of which: 2 were construction and engineering, 12 food and agriculture, 8 textiles and 8 chemical. Stratified random sampling was suitable because of the four types of industries represented in
the Nakuru town. Simple random sampling was used to select the industries of each category. There were 15 industries, which was at least 50% of the manufacturing industries in the Nakuru town, and were distributed as, Construction and engineering 2, Food and agriculture 6, Textile 4, Chemical 4.

Purposive sample was used to select at least one respondent that took part in this study in each of the 15 industries. This was done purposively to obtain respondent with specific or insight and comprehensive knowledge on the subject of the study. There were 28 respondents that made up the sample size were; Construction 2, Food and agriculture 11, Textile 7, and Chemical 8.

Questionnaire was used to collect data from top managers who in this study were considered well versed with the subject under study. The questionnaire had both close-ended items and open-ended items. Each respondent had to respond to the items by himself/herself simple language was used in the questionnaire items touching on levels of SCM.

Structured Interview Schedule was administered to obtain data for qualitative analyze. Face to face interview was conducted that involved some of the managers: general managers, finance, marketing, and human resource managers. The interview facilitated researcher to collect supplementary information about the SCM in the manufacturing sector both in terms of the professional training and the environment that was of great importance in interpreting the data.

Data collected were in two categories. The first set consisted of data generated by use of questionnaires and the second set consisted of data generated by the interview schedules. Statistics and Presentation System Software (SPSS) package, was used to analyze data. While data collected from the interview schedule was analyzed qualitatively. Frequencies, means and percentages were determined and subsequently used to describe the extent of implementation of supply chain management in the manufacturing sector focusing on the levels.

Chi-square($x^2$)-test was used to determine any significance difference in implementation of SCM in terms of levels. The level of significance was set at alpha level of 0.05

III. RESULTS AND DISCUSSION

There were 28 respondents on the item on the levels of SCM in the manufacturing sector.
Level 1-2 2/28(7.15%), Level 1-3 2/28(7.15%), Level 1-4 8/28(28.6%), and Level 1-5 16/28 (57.1%); Level 1 – Customer service management, Level 2 – Product development and commercialization, Level 3 – Physical distribution manufacturing support and procurement, Level 4 – performance measurement, Level 5 – Outsourcing.

From the results there is clear evidence that the majority of the manufacturing sectors are operating on the full scale levels of a supply chain management. The chi- square test statistics for this item on levels were:

| Levels     | Frequency | Percentage |
|------------|-----------|------------|
| Level 1    | 2         | 7.15       |
| Level 1-3  | 2         | 7.15       |
| Level 1-4  | 8         | 28.6       |
| Level 1-5  | 16        | 57.1       |
| Total      | 28        | 100%       |

Source: SPSS Result
Histogram representation using percentage proportion

![Histogram](image)

**Figure 1: Levels of SCM Histogram**

**Source:** Field survey

From the Table 1 and the figure 1, it is evident that there is clear evidence that the majority of the manufacturing sectors are operating on the full scale levels of a supply chain management. The Chi-square frequencies were tabulated as shown for the levels of SCM in the manufacturing sector. Table 2 shows the chi-square frequencies for the levels of SCM in the manufacturing sector.

**Table 2: Chi-square Frequencies on levels.**

| Levels     | Observed (O) | Expected (E) | Residual |
|------------|--------------|--------------|----------|
| Level 1    | 2            | 7.0          | -5.0     |
| Level 1-3  | 2            | 7.0          | -5.0     |
| Level 1-4  | 8            | 7.0          | 1.0      |
| Level - 5  | 16           | 7.0          | 9.0      |
| Total      | 28           |              |          |

Source: SPSS results

The chi-square test statistics for this item on levels were:

**Table 2: Statistics Test for the Levels of SCM in Manufacturing Industries**

| Item          | Chi-Square $X^2$ | df | p-value | $\alpha$ |
|---------------|------------------|----|---------|----------|
| Levels of SCM | 18.857 (7.815*)  | 3  | 0.0000  | 0.05     |

$X^2_{\text{Calculated}} = 18.857$, $X^2_{\text{Critical}} = (7.815) * df = 3$, $p = 0.000 = 0.05$

The chi-square results shows the p-value obtain from this test is 0.000 and it is less than the set level of significance value of 0.05. Since the p-value obtained is less than the set significant value, it is
not true that there are no significant levels of SCM in the manufacturing sector. Therefore the hypothesis two that states there are no significant levels of SCM in place in the manufacturing sector is rejected. To support this again is the calculated chi-square value (18.857), which is greater than the critical value of 7.815. The test results show that the manufacturing industries in Nakuru town are operating on the full scale SCM levels. The result supports the results of (SCM global survey 2006) that a fully operational SCM should have a full range of five levels i.e. level 1 – Customer service management, level 2, product development and commercialization, level 3, physical distribution manufacturing support and procurement level 4- performance measurement and level 5- outsourcing.

IV. CONCLUSION

Conclusion of the study were drawn based on the hypotheses of the study There are components i.e. plan, source, make, deliver, and return of SCM in placed in the manufacturing sector, as indicated by the result 22 (78.6%) respondents. The levels of SCM in place in manufacturing sector result 16 (57.1%) respondents. These levels are :a) Level 1 – customer service management; b) Level 2- Product development and commercialization; c) Level 3 – Physical distribution and manufacturing support and procurement; d) Level 4 – Performance measurement; e) Level 5 – Outsourcing; Putting the levels of SCM in place, result in increased in productivity, enabling the firms satisfy its customers, and increase their profit margin.

V. RECOMMENDATION

From the findings of this study, the researcher makes the following recommendations: a)The management in the manufacturing sector should bring to the attention of every employee the awareness of supply chain management; b)The management should facilitate the identification of the levels of SCM in their respective firms; c)The Kenya manufactures association should embrace SCM as a modern management concept in the manufacturing sector

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