

Factors that Affect the Quality of Inputs in Manufacturing Organisations: A Case Study of Nampak Kenya Limited

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Abstract

Supplier selection, Supply base reduction and supplier development among other factors plays a vital role in ensuring that manufacturing organizations get an acceptable quality of inputs from their suppliers. The purpose of this study is to carry out a research on how the above factors affect the quality of inputs in manufacturing organizations in Kenya. Studies carried out by previous researchers showed that manufacturing organizations lose a lot of money and time patching up issue brought about by poor quality of inputs which leads to scrap, rework and repair, trouble shooting, concessions, and downgrading and even losing future job opportunities.

The research was carried out in Nampak Kenya Limited which is a food packaging company with both local and international suppliers of its raw materials. A questionnaire, interview guide and observation guide were all used to collect the data. A response rate of 92% was obtained. Based on the research findings 89% of the respondents indicated that supplier selection criterion affected the quality of input in manufacturing organizations. 83.9% held it that supply base reduction greatly affects the quality of inputs and 61% said that supplier development greatly affects the quality of inputs in manufacturing organizations. The study concluded that manufacturing organizations in Kenya need to improve on their supplier selection criterion, reduce their supply base and also need to develop their suppliers rather than getting new ones all the time.

Keywords: Supplier selection, Supply base reduction, Supplier development, Quality of inputs

1. Introduction

As competition in the 1990s intensified and markets became global, so did the challenges associated with getting products and services to the right place at the right time at the lowest cost (Rangu-Nathan *et al.*, 2006). A typical manufacturing company spends between half and

three-quarters of its turnover on purchases such as raw materials, components and semi-manufactured goods (Dyer et al., 1998). The complexity of these challenges is closely related to the internationalization of the production processes carried out by many manufacturing companies, which no longer source inputs only from firms based nearby in geographical terms, but obtain a large proportion of their supplies from plants located in other countries (Alberto Bayo-Moriones *et al.*, 2010). To compete on quality in the global market firms must ensure that their suppliers are on the leading edge in quality and regarded as high performers (Chen et al., 2004, Yeung, 2008). The growing attention to this area of quality management reflects an understanding that a firm's quality performance (output) can only be as good as the quality performance of its suppliers (input) (Forker, 1999). Supplier are part of a manufacturing company supply chain and should be selected prudently to remain relevant in the global competition. Due to poor supplier quality many firms have gone down since their products failed to meet their customers' expectations. This result to a non conformance cost which leads to scrap, rework and repair, scrap and rework modifications permits, concessions, trouble shooting, downgrading and even losing future job opportunities.

1.1 Statement of the Problem

When quality-problems occur, the producer invariably receives the blame since, in the customer's mind, the producer has ultimate responsibility for the product. However, the reality is that, in many situations, external suppliers often provide the faulty components and subunits that make their way into final products (Robert J. Trent et al., 1998). This research is backed by (Forker, 1999) Who holds it that a firms quality performance (output) can only be as good as the quality performance of its suppliers (input). In spite of the manufacturing organizations plea to get raw materials that meet or surpass their expectations, poor quality products have always found way in their supply chain. This study therefore sought to carry out an investigation on the factors that affect the quality of inputs in manufacturing organizations in Kenya. (Theodorakioglu et al. 2006) suggested that input quality issues can be improved through partnering with suppliers.

1.2 Objectives of the Study

The general objective of the study is to analyze some of the factors that affect the quality of inputs in manufacturing organizations.

The specific objectives of the study were to:

- a) To determine the role of Supplier Selection on the quality of input in manufacturing organizations.
- b) To determine the role of Suppliers base reduction on the quality of input in manufacturing organizations.
- c) To establish the role of Supplier development on the quality of input in manufacturing organizations.

2. Literature Review

This chapter discussed the literature review of the study. By doing so the researcher was able to explore the available and existing information which has been covered by the various researchers. The literature was reviewed from, journals, reference books, working papers, reports and the internet.

2.1 Theoretical Framework

2.1.1 Analytic Hierarchy Process (AHP)

AHP has been widely used for the purpose of supplier quality evaluation (Liu and Hai, 2005). The AHP method involves breaking down a complex problem into different levels. Once these levels have been identified, pairwise comparison is performed to find the interrelationships among them (Lam *et al.*, 2010).

2.1.2 Analytic Network Process (ANP)

ANP is an advanced form of AHP where interaction between criteria and alternatives are considered. This method is used widely in supplier selection. It is used to detect or find the interaction between equivalent levels of criteria and to reduce the judgmental forecast error (Lam *et al.*, 2010).

2.1.3 Genetic Algorithm (GA)

The GA works as a search algorithm, through which the good chromosomes survive, to be reproduced again, enabling a solution to be found in a short search period. (Ding *et al.*, 2005), used GA as an optimizer in simulation operations to solve the supplier quality evaluation problem.

2.2 Empirical Review of Variables

2.2.1 Supplier Selection

Supplier selection can be said to be an art of identifying from a list of competitive suppliers, a potential one to satisfy the organizations needs. Growth in international competition has forced enterprises to reduce their vertical range of the products they manufacture and to concentrate exclusively on their core competencies. The reduction of the manufacturing depth leads to an increase of the proportion of purchased parts and consequently increases the dependency on suppliers (Maron and Brückner, 1998). Therefore, the success of a company is determined on the higher side by the abilities of its suppliers.

Most organizations depend on their suppliers, the direct or indirect consequences of a wrong choice of a supplier can be very detrimental. In manufacturing companies, purchasing share in the total turnover typically ranges between 50 - 90% (Telgen, 1994). This makes decisions on supplier selection and purchasing strategies a key element to the profitability of supply chain. (Vonderembse and Tracey, 1999) investigate the extent to which supplier selection criteria and supplier involvement are used by manufacturers, they provide empirical evidence showing that supplier selection criteria has a positive impact on performance. The traditional supplier selection criteria was first based on the unit price then quality and lastly on the delivery speed. "the choice of lowest price, is perhaps one of the most defined characteristics of primitive purchasing". Lamming (1993).

Supplier selection activity is mostly carried out to potential suppliers of core products in a manufacturing organization. In this regard a collaborative relationship is preferred to an arm's length model. Companies select their suppliers based on quality rather than price. Industrial interviews show that, leading companies settle on supplier who are customer-oriented; Since they have a reliable quality assurance system (Saraph *et al.*, 1989); effective control of operations for maintaining expected quality (Hahn *et al.*, 1990); build in quality in day-to-day activities (Curkovic and Handfield, 1996); continuous quality improvement; awareness of quality policy within the company (Landeros *et al.*, 1995); and the international quality certifications (Curkovic and Handfield, 1996), such as the ISO 9000, the BS 7850 and the QS

9000. A better way to select suppliers is by looking not only at current quality but also at their quality record and their potential for further improvement Larson (1994).

The main objective of the procurement process is to ensure there is harmony between the buyer and supplier in order to avoid wastage of resources within the supply chain. The corporate strategy of a manufacturing organization has an effect on the procurement strategy. If an organization pursues cost-leadership, its purchasing strategy could be to buy at cheap prices, thus remuneration criteria such as price and discounts will be regarded highly. Quality is an important dimension of a product. Forker (1997) put's it that the quality of a final product can only be as good as the quality of the inputs they receive from suppliers. When selecting suppliers the quality of raw materials should never be compromised for price. Rather than getting high-quality suppliers at a low price, buyers opting for the lowest prices risk ending up with low-quality supplies (Dyer, 1996). Linear weighted average method (Timmerman, 1986). This method assigns relative importance weight to each criterion. The evaluator then rates the performance of each suppliers with respect to each criterion. The supplier performance ratings are multiplied by criterion importance weights to calculate a weighted score. These weighted scores are then summed over all the criteria to obtain one aggregate weighted score for each supplier. The supplier with the highest weighted score is considered successful. Although this method is based on the subjectivity of the decision maker in assigning weights.

This section presents the steps involved in the supplier selection process, as addressed by (Monczka et al., 2005) also came up with seven steps in supplier selection :-

Step 1: Recognize the Need for Supplier Selection.

Step 2: Identify Key Sourcing Requirements and Criteria.

Step 3: Determine Sourcing Strategy.

Step 4: Identify Potential Supply Sources.

Step 5: Limit Suppliers in Selection Pool.

Step 6: Determine Method for Final Selection.

Step 7: Select Suppliers and Reach Agreement.

The study will help the researcher find out the effects of supplier selection to the quality of inputs in manufacturing organizations and also find out if they follow a certain criteria or specific step like those listed above by (Monczka et al., 2005) or Linear weighted average method (Timmerman, 1986) to select their suppliers.

2.2.2 Supplier Base Reduction

The term supplier base describes the total number of selected suppliers (Monczka et al., 1998). Today the business environment is highly competitive, organizations are committed to SQM in achieving a long term competitive advantage. Some argue that an organization is only as good as its sources of supply (Rajagopal and Bernard, 1993). Hahn et al. (1990) held it that "without a competent supplier network, a firm's ability to compete effectively in the market can be hampered significantly." Fine (1998) emphasized the importance of an organization's supply base by stating that supply chain design is the ultimate core competency. One important decision relating to the design of an organization's supply chain is the number of suppliers that will be utilized for a given product or service (Cooper et al., 1997). Thus a manufacturing supply chain with multiple suppliers will become lengthier, more tedious and costly to manage. (Ogden, 2006) did put it that, the most important elements in designing an

efficient supply chain is the number of suppliers that are utilized for the supply of products or services.

In the past organizations had many suppliers so as to enhance competition between suppliers and also enjoy competitive prices. The buyer supplier relationship was price based or adversarial (Benton, 2010:3). This thinking is supported by economic theories of perfectly competitive markets that claim having more suppliers leads to the lowest price (Rittenberg and Tregarthen, 1999). This pricing took place because of the increased competition between suppliers. As buying organizations purchase from the lower-priced suppliers, the higher priced suppliers are forced to lower their prices and provide additional services in order to retain their market share. However, business practices proved that having many suppliers prevents buyers from establishing good relationships with suppliers and incurs additional costs and causes inefficiencies (Carter et al., 2008).

During the 1980s, intense global competition forced many organizations to adopt a more cooperative purchasing paradigm in an attempt to reduce costs, improve quality, and increase efficiency. The application of this new paradigm resulted in a reduced number suppliers being utilized and an evolution from adversarial to more cooperative relationships with these suppliers (Hartley and Choi, 1996). Companies realized that better coordination with suppliers and distributors across corporate boundaries offered the greatest opportunities for cost savings and efficiency improvements (Fisher, 1997).

A large supply base of an organization leads to the purchasing budget being divided among many suppliers. Some of the suppliers might be willing to develop in order to meet the buying organizations requirement while others may be less collaborative and difficult to deal with since their purchasing budget is considerably low. Thus both the buying organization and the suppliers becomes less motivated to nurture a buyer supplier relationship idea. As a result the manufacturing organization will be forced to deal with poor service levels and have little or no bargaining power on its suppliers who supply critical or non stock items. Any kind of delay or lack of cooperation coming from the suppliers will affect the buying organization profitability and the overall quality of inputs in the long run. As a result many companies have found that it is advantageous to have a smaller supplier base (Christopher and Jüttner, 1998). This will enable manufactures to enjoy volume discounts, improved quality, lower administrative costs and enjoy supplier involvement in product and process development. (Asmus and Griffin, 1993) report that world-class manufacturers in the automotive sector have reduced their supplier base typically by 50% and move to single-sourcing (one supplier per part). Narrowing the supplier base and single-sourcing are claimed to be key sources of competitive advantage. This leads to quality sensitive suppliers who understand the buying organization processes, and also the effects of poor quality of inputs to the respective manufacturing organizations. Single sourcing is a process for reducing the numbers of supplier for a particular item to one (Lee and Ansari, 1985). The study will help the researcher find out if supply base reduction is one of the factors that affects the quality of inputs in manufacturing organizations.

Manufacturing organizations may use different approaches to reduce their supply base, in this literature review i will concentrate on systematic elimination approach and standardization approach which are generally accepted leaving the rest for example using percentages approach for future research.

In a Systematic elimination approach supply base reduction is accomplished by systematically reducing the number of suppliers who are invited to competitively bid for a given contract or purchase order (Womack et al., 1991). This approach at times calls for the deleting of

suppliers names from an organization's database that the firm has not used during a given period of time.

In a Standardization supply base reduction approach (Womack et al. 1991) held it that organizations can cut the number of suppliers by reducing the parts count in their components. This can be done by either simplifying the product or service design or by standardizing component parts or services across product lines. An example of simplification would be the use of one machined piece of aluminum to replace three pieces that need to be bolted together.

The research will sought to find out the effects of supply base reduction on the quality of inputs and also get to know if Nampak Kenya have made an attempt to reduce its supply base and if so which approach do they employ. Since according to (Portal, 1997) many companies have not yet reached their supply base reduction goals. Supplier base reduction paves way for supplier development. A usual starting point in supplier development activities is to reduce the size of the supply base (Burt et al, 2002).

2.2.3 Supplier Development

Supplier development refers to a program developed by a buyer firm to upgrade its supplier's capabilities and foster ongoing improvements (Krause and Handfield, 2007). It involves long-term cooperative efforts between the primary firm and its suppliers to upgrade the supplier's technical, quality, delivery and cost capabilities and foster on-going improvements (Hahn, et al., 1990). The ultimate goal of these programs is for a mutually beneficial relationships that will help both firms to compete more effectively in the marketplace (Watts and Hahn, 1992).

Such programs are created by buyer firms to help their suppliers, particularly their deficient ones, improve their capabilities and business processes (Wagner, 2006). Toyota have developed supplier development programs aimed at helping their suppliers improve their capabilities and business processes (Modi and Mabert, 2007).

The growing demands of the global market, the ever shortening life cycles of products and the intense market competition have made many organizations to concentrate more on their core competencies which they have a competitive advantage over their competitors and outsource all the other products or activities. The increased acquisition of products and services from external suppliers has augmented the dependence of buying firms on the capabilities and performance of their supplier base (Mollahosseini and Barkhordar, 2010). In this regard organizations have more than before begun to recognize the strategic value of actively managing their supplier base (Herna'ndez-Espallardo et al., 2010).

Supplier audits help to identify non conformance in manufacturing process, engineering change process and quality process at the supplier. The manufacture and the supplier jointly come up with corrective actions that are to be implemented by the supplier within an agreed time frame. Successive audits ensure that previous actions have been implemented. But the buyer may opt to come in and develop the supplier as a best practice.

Poor quality of inputs is very expensive. Semich states: "firms are spending a quarter of their income patching up mistakes Semich (1987)." Similarly, Shetty suggests: "Twenty-five percent of most manufacturing and administrative time is devoted to repair of defects and errors" Shetty (1986). She also cites a case of product recall costing a firm \$135 million, a sum greater than its annual net income!. Thus the need to develop our suppliers more towards our organization processes and our customer requirements rather than changing suppliers when they have quality issues is regarded to be a noble practice.

During supplier development, the buying organization usually sends out a cross-functional development team to train the supplier and give him knowledge on how he can improve his quality and reduce his production costs. The buyer also introduces to the supplier innovations processes for example just-in-time, total quality management, value stream mapping, six sigma and kanban. The buyer also involves the supplier in the designing of new products, the definition of product specifications, improvement of production processes and the selection of manufacturing technologies. Supplier development is increasing in popularity and a number of studies have been conducted to examine the concept (e.g. Krause and Handfield, 2007; Modi and Mabert, 2007; Wagner, 2006). According to past research, supplier development concepts like knowledge transfer and buyer involvement intensity they had a positive impact on the buyer's supply chain performance.

The transfer of knowledge between buyers and their suppliers is extremely important (Hughes and Perrons, 2011) and a growing body of research argues that organizations that are able to effectively manage their knowledge related assets perform better than organizations which are unable to do so (Luo et al., 2006). Knowledge transfer has been found to have an impact on a firm's ability to innovate and improve its business processes and a number of researchers (e.g. Luo et al., 2006, Inkpen and Tsang, 2005) assert that the transfer of knowledge across boundaries is critical for the success of new products and processes. Schiele (2006) argues that suppliers are increasingly becoming a major source of new ideas for firms and a buyer firm's ability to improve its processes is increasingly reliant on the quality of its supplier base. In this regard a collaborative relationship between the buyer and the supplier is key to the profitability of any supply chain.

The level of involvement by a purchasing firm is defined as the extent to which the buyer invests time, effort and other resources into the development of their suppliers (Krause, 1999). They also exhibit a high level of involvement if they utilize activities that involve direct interaction between them and their suppliers like: on-site assistance; site visits; and training of supplier's personnel (Modi and Mabert, 2007).

In this regard we can say that supply chains that invest their time and resources into developing their suppliers will record high profitability and better quality of inputs compared to those who don't. Wagner (2006) found that some supplier development activities can lead to process improvements and (Chapman and Corso, 2005) assert that collaboration between a customer and its suppliers is the most common source of continuous innovation and improvement.

Quality is one of the most important and inevitable aspects of supplier development and improvement of supplier's quality process and products is a critical need for all companies. (Arumugam *et al.*, 2011). Without ensuring the quality level of a supplier's delivery of goods or services, supplier development efforts will not be successful and activities like involving suppliers in product development will be problematic (Gitlow *et al.*, 1983).

The study will help the researcher find out if Nampak Kenya makes an attempt to develop its suppliers. The study will also seek to find out the effects of supplier development to the quality of inputs in manufacturing organizations.

Below are ten steps towards supplier development practices according to (Cristo'bal Sa'nchez-Rodríguez *et al.*, 2005) which this research sought to find out if manufacturing organizations follow while developing their suppliers.

- 1) Buying from a limited number of suppliers per purchased item. (Forker *et al.*, 1999) (Krause *et al.*, 2000).

- 2) Supplier performance evaluation and feedback.(Forker and Hershauer,2000),(Forker et al., 1999),(Krause, 1997).
- 3) Parts standardization (Handfield et al., 2000).
- 4) Supplier certification. Forker and Hershauer (2000), (Forker et al., 1999).
- 5) Supplier reward and recognition. (Krause et al., 2000).
- 6) Plant visits to suppliers. (Krause,1997).
- 7) Training to suppliers. (Forker and Hershauer, 2000), (Krause, 1997).
- 8) Intensive information exchange with suppliers (e.g. sharing of accounting and financial data by the supplier and sharing of internal information such as cost, quality levels, by the supplier).(Krause, 1999).
- 9) Collaborating with suppliers in materials improvement and development of new materials.(Forker and Hershauer, 2000).
- 10)Involvement of suppliers in the buyer's new product development process. (Trent and Monczka, 1999).

2.2.4 Quality of Inputs

The concept of "quality" has been a topic of intense interest in the past and even to today. Quality has been variously defined as value (Abbott, 1955), conformance to specifications (Gilmore, 1974) , conformance to requirements (Crosby, 1979), fitness for use (Juran, 1988), loss avoidance (Taguchi, cited in Ross, 1989), and meeting and/or exceeding customers' expectations (Gronroos, 1983).

Since quality at the source is central to the core value of total quality, it must be realized that supply quality is the source for an imbalance proportion of the inputs into their organization's products, processes and services (Trent *et al.*,1999).(Forker, 1999) holds it that a firms quality performance (output) can only be as good as the quality performance of its suppliers (input). If organizations get poor quality of inputs from their suppliers the end products quality will also be wanting. According to the QM literature, manufacturers cannot consistently produce quality products without effective collaboration among suppliers (Anderson et al., 1994). (Flynn and Flynn, 2005) propose that organizations which pursue goals related to supply chain will also pursue goals related to quality, and argued that supply chain performance are built on the foundation of quality. Hence, supplier quality management is a key to achieve good quality, so as to achieve world-class success (Lemke *et al.*, 2003). However, due to the raising importance of supplier management, manufacturing companies have taken proper actions against this change, where sourcing suppliers, evaluating and selecting suppliers, providing training to suppliers, supplier performance rating and supplier certification are the common practices in managing their suppliers (Besterfield *et al.*, 1995; Dobler, 1990) .Since the supply chain main objective is to satisfy the customer's needs, the supplier is directly involved. Long-term relationship with reduced-base supplier is one of Deming's 14 QM methods (Anderson et al., 1994).The just-in-time (JIT) production practice cannot be implemented without the collaboration of suppliers. In coming raw materials have to be inspected to ensure that they conform to the order specification. A number of tests are to be carried out on the incoming sheet metals, including accelerated rust test, hardness test, toughness test, formability test, dimensions checks among others. Due to time constraints i was able to handle Rockwell hardness test,formability test and accelerated rust test.

Rockwell C Scale Material Hardness Test

Hardness measurements represent the most convenient methods for quality assurance in the area of mechanical characterization of materials. This is as a result of its acceptability,simplicity and quickness of execution. The advances have been made possible

by the development of instruments that continuously measure force and displacement as an indentation is made.(D.Stone et al,1988)

Rockwell C scale measurement is an indentation test .A protocol for performing this test consists of prescriptions for choosing a properly shaped indenter, for driving the indenter into the material, and for calculating the hardness value from the indentation depths. The American Society for Testing and Materials (ASTM 1998) and the International Organization for Standardization (ISO 6508,1986) have outlined the requirements and procedure of carrying out the test. According to (Walter .S et al 2000) Hardness is calculated from the difference between the second depth and the first. This difference is expressed in multiples of 0.002 mm and subtracted from 100. For steels, Rockwell C scale hardness values are typically between 25 HRC and 65 HRC.

Formability Test

The formability test should be carried out before acceptance from the supplier to ensure that it meets the set standards. The Forming Limit Curve (FLC) is a very tool used as a failure criterion in sheet metal forming. Good sheet metal formability is essential in the production of quality stamped products (Haberfield 1975). Process planners and tool designers must determine the level of formability required for each workpiece to be stamped (Kumar 2002). The identification of regions of stretching, deep drawing and plane strain during forming can contribute to improve the forming process technology and tool geometry optimization (Buchar 1996) or control of process parameters (Lim, Ulsoy 2008, 2009, 2010). FLCs are used as an indication of the formability of a certain material.

The FLC is usually determined experimentally by using Nakazima out-of-plane test which uses a hemispherical punch where a sheet metal sample is strained by a flat-bottomed cylindrical punch.

The test specimens, with a circular grid applied upon them,are deformed up to the point of fracture or necking. By conducting a series of experiments, you realize there is an ideal state of the sheet metal where maximum strain and minimum strain neither necks nor the specimens.

3.0 Research Methodology

This study applied a case study research design. The ultimate aim was to gather data from the respondents on the factors which affect the quality of inputs in manufacturing organizations. The population for this study was on all the food package manufacturing organizations in Kenya. The target population was comprised of 50 employees working at Nampak Kenya Ltd supply chain. Stratified sampling was used to group the employees into categories from various departments such as procurement, human resource, finance, production, distribution who are directly or indirectly involved in the supply chain activities. Purposive sampling was then applied to select the subject from every strata. This is because purposive sampling enables the researcher to focus only on the subjects that have similar characteristics which are of interest to the researcher (Lund Research Ltd, 2012s). This resulted to a sample size of 25 employees. This study used a questionnaire as the primary data collection method. The questionnaire contained both open ended and closed ended questions. Questionnaires are effective instruments since they allow the respondents to give much of their opinion as far as the research problem is concerned (Dempsey, 2008). The questionnaires were self administered to the 25 employees who were picked for the purpose of analysis. Empirical and theoretical literature from journals and the internet provided the secondary data. Descriptive statistics in the form of frequencies, percentages and inferential statistics were used for analysis in this study (Mugenda and Mugenda (1999). Statistical Package for Social sciences

(SPSS) computer software was used to present the data in the form of percentages, frequency and tables.

4.0 Results of the Study

4.1 Supplier Selection.

Basis of Selection Suppliers

The study also sought to establish various aspects used to select suppliers on the basis of quality, price and delivery time. The results indicated that all respondents (100%) said that their selection is based on quality. 92% of the respondents said their selection is based on price while 7% indicated that price was not a selection criterion. Finally, 72% of the respondents said their selection of suppliers was based on delivery time; only 28% did not use delivery time as a ground for selection. These results indicated that quality was the most preferred criterion for selection of supplier followed by price and lastly delivery time.

Supplier Selection Procedure

The study aimed at establishing whether the respondents use a supplier selection procedure like the the Monzeka seven steps or the Linear weighted average method when selecting suppliers. 70% respondents said that they follow a linear weighted average method while 30% said they do not follow a specific route while selecting suppliers.

Selection requirements

The study also sought to find out whether the certain critical requirements are looked at while carrying out supplier selection. Table 4.2 indicates the responses of the various requirements. All respondents (100%) said it is mandatory to have a reliable quality assurance system. The results indicated that 75% of the respondents had internal certification. The findings also indicated that 94% of the respondents said that it is mandatory that supplies work towards continuous quality improvement. 88% of the respondents agreed that it is necessary to have a quality policy.

These results indicate that the main or major requirement is a reliable quality assurance system, then working towards continuous quality improvement. This is followed by having a quality policy and finally having an internal certification.

Table 4.2 selection requirements

Selection requirements	Yes (%)	No (%)
Reliable quality assurance system	100	0
Internal Certification	75	25
Quality improvement	94	6
Quality policy	88	12

Quality History of the Suppliers

The study also sought to find out if the organization used quality history of the suppliers as a factor to consider when rating its suppliers. 100% of the respondents said that the quality history of the suppliers should be investigated. This results show that a supplier quality history is a major factor when selecting suppliers.

Effects of Supplier Selection Criterion on the Quality of Inputs

The research also sought to find out the effects of supplier selection criterion in relation to quality of inputs. Figure 4.4 illustrates that most of the respondents 89 % indicated that selection criterion greatly affected the quality of inputs while 11 % of the respondents indicated that the selection criterion affected the quality of input mildly. These results indicated that the supplier selection criterion has a long term effects on the quality of inputs.

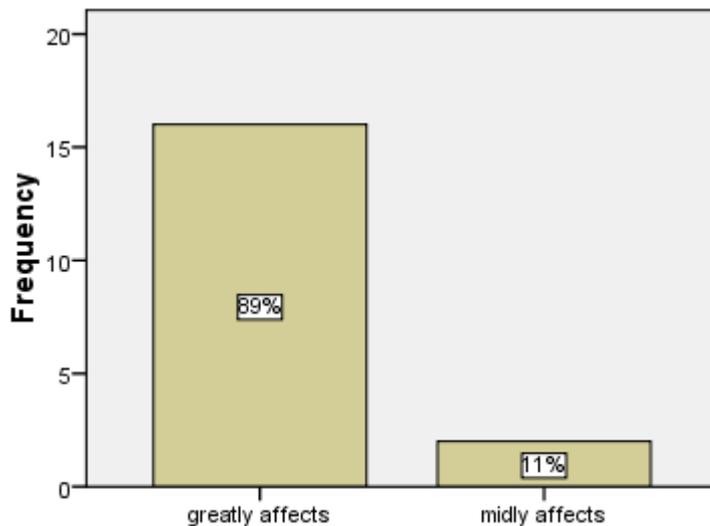


Figure 4.4 Effects of supplier selection criterion on the quality of inputs.

Quality Checks

The research sought to find out if quality checks of incoming raw materials are done. The respondents held that only visual quality check are done since they do not have a lab and equipments to do any tests. 100% of the respondents said they do not carry out Rockwell hardness test or formability tests on sheet incoming sheet metals.

4.2 Supplier Base Reduction

Supply Base Management

The research sought to find out whether respondents manage their supply base. The figure 4.7 illustrates that majority 94% of the respondents do not manage their supply base while the rest 6% do. The respondents when asked which supply base reduction approach they use 90% said they use non while 10% said they use Systematic elimination approach.

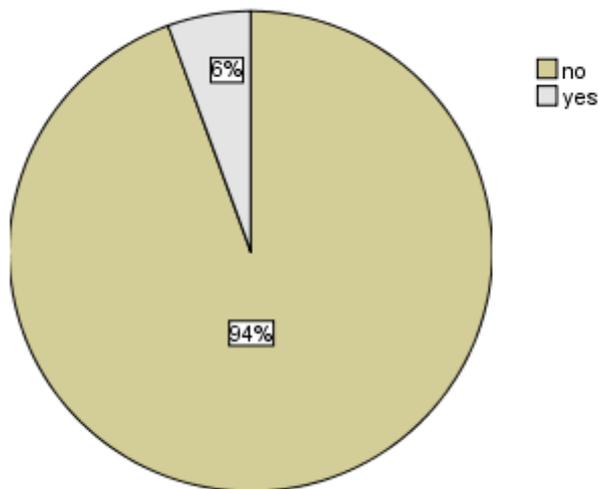


Figure 4.7 supply base management

Impact of Supplier Base Reduction on Quality of Outputs

The research sought to find out the impact of supplier base reduction on the quality of inputs. The results are presented in cross tabulation below. All respondents agreed that supply base reduction have an impact on the quality of inputs. Respondents were then asked to rate the extent in which quality of inputs is affected. Table 4.5 shows that most of the respondents (93.8%) said that effect was great, while 6.2 % of the respondents rated the effect as mild. Since, it is easy to make a follow up in terms of input quality while dealing with a small number of suppliers.

Table 4.5 supply base reduction impact on the quality of inputs.

		what extent does it affect the quality of inputs				
			greatly affects		mildly affects	Total
supply base reduction impact on the quality	Yes	Count	15		1	16
		% within	93.8%		6.2%	100.0%

Supplier Base Management Frequency

The question sought to find out the frequency at which respondents manage their supplier base in the organization. Figure 4.8 indicates 61% of the respondents manage annually, 33% manage quarterly and lastly 6% manage semi- annually.

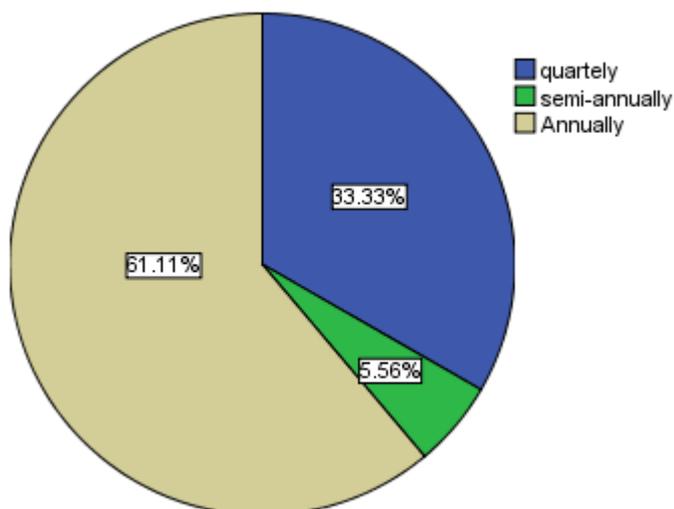


Figure 4.8 frequency of supplier base management

Effects of Reduced Supply Base to the Supply Service Level

The research sought to find out the impact of reduced supply base on supply service level, consistency of input quality and quality discounts. Table 4.6 presents the findings. All the respondents agreed that reduced supply base improved supplier's service level 75% of the respondents indicated that reduction resulted to better and consistent quality of inputs. 94% of the respondents enjoyed quality discounts.

Table 4.6 Effects of Reduced supply base to the supply service level

	Yes (%)	No (%)
Improve supply service level	100	0
Better and consistent input quality	75	25
Quality discounts	94	6

4.3 Suppliers Development

Development of suppliers

The research sought to find out whether a program to develop supplier's technical, quality systems, delivery and cost capabilities would fosters on-going improvements in the quality of inputs. The results are indicated in table 4.8. below.

Table 4.8 supplier development

	Yes (%)	No (%)
Buying from a limited number of suppliers per purchased item. So as to develop a small group.	89	11
Supplier performance evaluation and feedback	93	7

Parts standardization	47	53
Supplier certification	78	22
Supplier reward and recognition	89	11
Plant visits to suppliers	88	12
Training to suppliers	100	0
Intensive information exchange with suppliers	90	10
Collaborating with suppliers in materials improvement and development of new materials	92	8
Involvement of suppliers in the buyer's new product development process.	100	0

Supplier Development Frequency

Respondents were then asked to rate the frequency at which they develop their suppliers. Majority of the respondents 65% rated annually, 24% rated quarterly and finally 12% rated semi-annually.

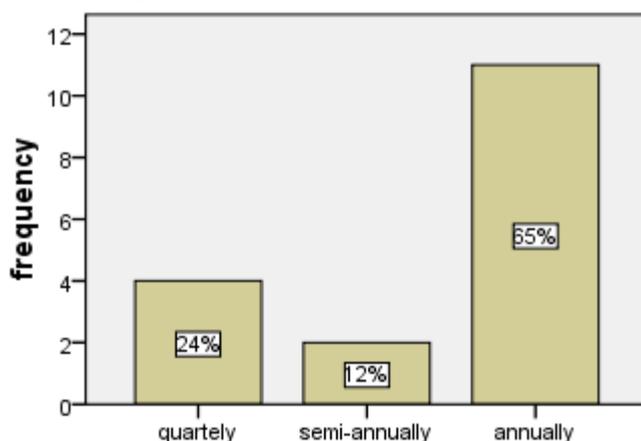


Figure 4.11 frequency of Supplier development

Impact of supplier development on the quality of inputs

Respondents were asked to describe the extent at which supplier's development affects the quality of inputs. Figure 4.12 indicates that majority of the respondents 61% felt that suppliers development affects quality of inputs greatly and the remaining 39% said that the effect was mild.

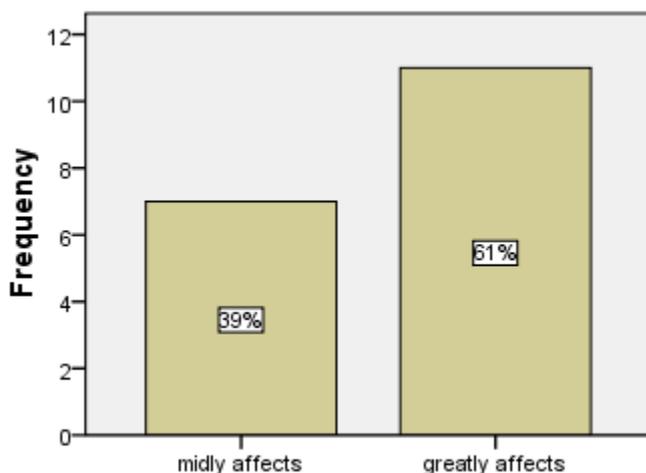


Figure 4.12 Impact of Supplier Development on the Quality of Inputs

Quality on Inputs

The study sought to find out if the quality of inputs from their suppliers was meeting respondent's needs. None of the respondents strongly disagreed that they were satisfied 88% of the respondents agreed that they were satisfied with the supplier's input quality, 12% strongly agreed, 72% indicated that they were unhappy with the supplier's input quality, 28% strongly disagreed that they were not happy with supplier input quality. In terms of repeat purchases, 22% strongly agreed that they would go for more quality conscious supplier, 39% agreed, 6% were not sure, 27% disagreed while 6% strongly disagreed. 17% of the respondent strongly agreed that they were pleased with quality supplier improvement, 77% agreed, while 6% strongly disagreed. Majority 61% of the respondents disagreed that they had a bad experience with the supplier, 27% strongly disagreed, 6% agreed and another 6% strongly agreed. 72% of the respondents agreed they were pleased with the services level and input quality of their supplier's, 17% strongly agreed, 6% disagreed and another 6% strongly disagreed. 78% agreed they were pleased with the services level of the supplier, 11% strongly agreed and another 11% disagreed that they were happy with the services of the supplier. 11% of the respondents strongly agreed that they were pleased with the supplier delivery time 78% agreed, 11% were not sure while 8% disagreed that they were pleased with the supplier delivery time. 33% of the respondents strongly agreed that both parties had obtained a competitive advantage over their competitors that would not have been realized individually, 67% agreed. majority of the respondents 78% agreed that both firms have reduced scraps and reworks due to product recalls allowing them to compete more efficiently in the market place, 17% strongly agreed and 6% were not sure. Majority of the respondents 82% were sure that they do not perform Rockwell hardness test on incoming steel sheets while 18% were not sure, 90% of the respondents were sure that formability test is not carried out on incoming steel sheets while 10% of the respondents were not sure as shown in table 4.9 below.

Table 4.9 Input Quality

Input Quality.	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Overall satisfaction with the supplier's input quality.	2(12%)	16 (88%)	0	0	0
Not completely happy with the supplier input quality.	0	0	0	17 (72%)	6(28%)
Go for more quality conscious supplier	5(22%)	9 (39%)	1 (6%)	7(27%)	1 (6%)
Pleased with supplier input quality improvements.	4(17%)	18 (77%)	0	0	1(6%)
Bad experience with supplier's input quality	1(6%)	1(6%)	0	14(61%)	7 (27%)
Happy with the supplier level quality from our suppliers.	4(17%)	17 (72%)	0	1(6%)	1(6%)
Satisfied with supplier's service level	2(11%)	18 (78%)	0	2(11%)	0
Pleased with the supplier's delivery time	2(11%)	18 (78%)	2(11%)	1(8%)	0
Competitive advantage over competitors in terms of quality.	8(33%)	15 (67%)	0	0	0
Good input quality has eliminated product recall issues.	4(17%)	18 (78%)	1(6%)	0	0
Rockwell hardness testing on incoming steel sheets			5 (18)		19 (82)
formability tests on incoming steel sheets			2 (10)	21 (90)	

Key: SA (strongly agree), A (agree), D (disagree), DS (Strongly disagree)

Conclusions

Supplier selection, supplier base reduction and supplier development initiative are major factors that determine the quality of inputs in manufacturing firms. Poor quality is very expensive since firms spend a quarter of their income patching up their own mistakes (Semich, 1987). According to (Forker, 1999) Who holds it that a firms quality performance (output) can only be as good as the quality performance of its suppliers (input). Today's businesses must ensure that the products they bring to the market are of high quality, safe for users and competitively priced if the business wishes to sustain growth in the global market Kanchan Das (2010). The quality of inputs from our supplier is key to meeting this objective and supplier selection, supplier base reduction and supplier development are some of the factors that need to be put into consideration. With this regard managing our suppliers is inevitable in the current competitive business environment a fact supported by (Besterfield *et al.*, 1995; Dobler, 1990). Who says due to the raising importance of supplier management, manufacturing companies have taken proper actions against this change, where sourcing suppliers, evaluating and selecting suppliers, providing training to suppliers, supplier performance rating and supplier certification are the common practices in managing their suppliers (Besterfield *et al.*, 1995; Dobler, 1990).

Nampak Kenya Ltd had a product recall due to rust on tins, busting paper bags, easy open tins tabs pulling off among others, all this were due to poor supplier quality. This could have been caused by its large supplier base magnitude which make the suppliers to lack ownership and commitment .This has greatly affected the quality of inputs from the suppliers.

The company though has good supplier selection process based on quality and later price as the second factor on supplier selection. This explains why most respondents were satisfied with the suppliers. The company has also embraced a buyer- supplier relationship management system which involves the suppliers in process and product development and gives onsite assistance to the suppliers. Such programs are created by buyer firms to help their suppliers, particularly their deficient ones, improve their capabilities and business processes. Nampak Kenya failure is also attributed to its lack of a quality Lab a reason why 82% of the respondents said that Rockwell hardness test is not done and 90% of the respondents said that formability test on incoming steel sheets is not done.

Recommendation

The study recommends the company to reduce its supply base and embrace a single sourcing strategy thus create a good buyer supplier relationship hence enjoy volume discounts, improve quality, lower administrative costs and enjoy supplier involvement in product development.

The study also recommends that the company improve on its supplier selection approach which should not be subjective but objective. Also the company should invest on a quality lab to avoid adding value on defective products.

The company should also embrace more Supplier audits which will help to identify nonconformance in manufacturing process and quality process at the supplier thus be able to know in which area to develop their suppliers.

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