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MODERATING EFFECT OF MANUFACTURING RESOURCE PLANNING IMPLEMENTATION (MRP II) ON SUPPLY CHAIN PERFORMANCE IN MANUFACTURING SECTOR IN KENYA: A CASE OF HACO INDUSTRIES LIMITED

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ABSTRACT

Manufacturing Resource Planning (MRP II) is not plainly a software, but can be perceived as a marriage of people**'s** skills, database accuracy, dedication and computer resources. It is therefore more of the company**'s** management concept for using human resources more effectively and productively. MRP II has in the past few years provided a platform where various business functions are linked-up including capacity management, production planning, , business planning, marketing, purchasing, accounting, finance and even human resource management. The main objective of this study was to assess the role of MRP II implementation on supply chain performance in the manufacturing sector in Kenya with Haco Industries Limited as the case study. The management and employees of Haco Industries Limited were the target population. The study targeted 450 employees at Haco Industries Limited but only 45 employees (10 percent of 450) were included in the sample population. A descriptive survey design was adopted as the major research design. Both qualitative and quantitative data were collected in this study. Questionnaires were the major instrument for data collection. The quantitative data collected in this case was analyzed further for inferential and descriptive statistics by use of the SPSS Version 20 software. the qualitative data from the open ended questions was organized into subtopics. The responses were further coded, processed and tabulated as per the data analysis procedure. Pie charts and frequency tables were in this case used to present the study result.

Keywords: *Manufacturing, Resource Planning, capacity management, supply chain performance, production planning and purchasing*.

Background of the study

In the recent past, globalization and technological advancements have led to evolution of the manufacturing sector of the world. According to Monk et.al (2006) with advancement on the level of technology and disappearance of the borders, emergence of complexities in the global supply chain management and revival of the inter-company rivalry has ensued. This has pushed the manufacturing companies of the world to not only seek new ways of improving on production operations but also managing the production materials in order to effectively meet the demands of the evolving markets of the world (Vorster, 2007).

In the recent past, manufacturing companies in most parts of the world have been faced by a new challenge-providing the consumers with quality products within the least time possible and effectively getting the ready products to the market in good time (Vorster, 2007).This challenge has threatened the prosperity of both the SMEs and the multinational corporations of the world. However, this has been observed to be a problem of the small and medium-sized manufacturers since most world-class manufacturers have already found the solution to this menace-integration of the manufacturing Resource Planning system (Johansson, 2007). First introduced by Oliver Wight in the early 1970s, manufacturing Resource planning has today grown beyond manufacturing and operations to providing a link-up of the various business functions including production planning, capacity management, business planning, finance, purchasing, accounting, marketing and even human resource management (Kumar et al., 2014).

Haco Industries Limited

Haco Industries Ltd was incorporated in 1974 as a subsidiary of HAGEMEYER NV, a leading international trading house based in the Netherlands. Haco Industries Ltd is today jointly owned by Tiger Brands International of South Africa (51%) and Mr. Chris Kirubi 49%) and its strong product portfolio consist of both international and local brands. Haco Tiger Brands (EA) Limited is a reputable and well-established manufacturing and trading company in the FMCG sector in Kenya and currently employs in excess of 650 employees (Haco Tiger Industries, 2010).

Haco Tiger Brands (EA) Ltd technical competence and emphasis on exacting quality standards has enabled it to forge lasting partnerships with prominent international companies such as SocieteBic, (Ballpoint pens, shaving instruments, high profile pens, lighters), Alberto-Culver/Pro-Line International, USA (TCB, Motions), E.T Browne Drug Co. Inc., USA and Jeyes, UK. The company is the sole manufacturer and distributor of Bic, TCB, Palmers, Jeyes products and imports Tiger Brands products. As one of the pioneers in the sale and promotion of its merchandise in the region, Haco Tiger Brands (EA) Ltd has become a major force in the consumer goods market (Haco Tiger Industries, 2010).

Haco Tiger Brands (EA) Ltd's operations go beyond Kenya and apart from the E. African countries of Tanzania and Uganda, Haco also services the broader COMESA markets and these include Rwanda, Burundi, Ethiopia, Sudan, Zambia, and Malawi. It is a key player in the fields **of stationery, personal care, homecare, and foods. The mission of the company is 'Adding Value to everyday life' (Haco Tiger Industries, 2010). Its values are 'consumers are** our business Integrity in everything we do A passion for excellence Value people and treat them with dignity **Continue to reinvest in our society' and the company's mission is 'To be the Most Valued & Admired Branded Consumer Goods Company' (Haco Tiger Ind**ustries, 2010). The company has highly invested in MRP II and ERP systems to enhance its performance and to remain competitive not only in Kenya but also in East Africa and South Africa. This study, therefore, focuses on how Haco Industries Limited has used the MRP II system to enhance its performance.

Statement of the Problem

According to Salonen (2010) excellent supply chain performance can yield 25-50% reduction in total supply chain costs; 25-60% reduction in inventory holding; 25-80% increase in forecast accuracy and 30-50% improvement in order-fulfillment cycle time. Bourne et.al, (2005) further stated that the costs associated with production material; raw materials, Work In Progress (WIP), **and finished goods account for 50% to 60 % of the company's** total production cost. The **manufacturing sector's contributions to Gross Domestic Product (GDP) is about 10 percent** (Economic Survey Report, 2015). In the year 2014, the manufacturing sector recorded a growth of 3.4 per cent as compared to a growth of 5.6 percent in 2013 (Economic Survey Report, 2015). Research studies both local and international have been conducted and majorly in the manufacturing sector. Studies by Monk (2006), Vorster (2007), Henry et.al (2012), Ambrose et.al (2010) and Macharia (2015) have observed varied effects resulting from implementation of

various integrated manufacturing systems on supply chain performance in the manufacturing sector. Some of the key findings include, and not limited to, customer satisfaction, supply chain relationships, improved customer service, cost reduction, improved collaboration, improved communication, organizational policies and buyer-supplier integration. However, the supply chain performance in the manufacturing sector has not been well covered.

Today, the manufacturing supply chain is more complex as a result of increased number of suppliers, sellers, buyers and even middlemen within the supply chain structure. The complexity of the manufacturing supply chain has been observed to call for highly integrated systems or models to coordinate the flow of goods, services, information and finances within the sector, to enhance supply chain performance. In Kenya, very few studies have been directed towards analyzing the role of the integrated manufacturing systems on supply chain performance, and especially in the manufacturing sector. This study, therefore, sets to bridge this gap by analyzing the role of MRP II implementation on supply chain performance in the Kenyan manufacturing sector.

LITERATURE REVIEW

Quality level

Quality in manufacturing can be termed as production of superior goods. In order to produce value and optimize profitability, it is fundamental to establish successful partnerships with the supply chain organizations that can be achieved by new models of cooperation, improved communication and integration among all the supply chain partners (Bozarth, 2009; Agus, 2011). In this context, the use of integrated approaches to quality management, logistics and SCM has become fundamental (Lin et.al, 2005). It is therefore of great importance to take advantage of **TQM and SCM synergies in order to improve customer satisfaction, increase employee's** motivation and to promote performance of the supply chain (Lin and Gibson, 2011).

Improving the quality of all supply chain processes leads to cost reductions, improved resource utilization, and improved process efficiency (Lin and Gibson, 2011).

Many studies have been undertaken to investigate how the quality management can be used to improve the performance of the entire supply chain and inclusive solve some problems within the supply network (Lin and Gibson, 2011). The study by Lin et.al (2005), concluded that key QM practices could be integrated in the supplier participation programs to provide needed collaboration, which in turn would result in improved organizational performance and also that organizational performance can be optimized when the organization considers its suppliers as important trading partners and members of the value chain (Lin and Gibson, 2011).

Customer satisfaction

To a world class organization, a happy and satisfied customer is of the utmost importance Gunasekaran et al. (2004) argued that customer satisfaction is the customer's reaction to the value received from the purchase or utilization of the offering. Customer satisfaction represents the customer's reaction to his or her perception of the value received as a result of using a particular product or service (Cengiz, 2010). That reaction will be influenced by the desired value (ideal standard) as well as by the perceived value of competitive offerings (industry norms, expectations based on use of competitor products). Thus customer satisfaction is influenced by the perception of the value delivered as well as by the perception of the value offered by competition (Mosahab et al., 2010).

Today, customers are from every corners of the world; the supply chain strategies in this case are forced to plainly focus towards satisfying the customers. Without satisfied customer, the whole exercise of applying the supply chain strategy could be costly and futile (Cengiz, 2010). For improving performance, supply chain metrics must be linked to customer satisfaction.

Meeting the customer's needs and demand has always been a key factor to the success of any company. Unfortunately, the concept of customer service and satisfaction are frequently misunderstood and poorly defined by the companies of the world. Emergence of the service hungry customers who possess tremendous channels power places tremendous pressure on the different firms throughout the supply chain to develop the needed capabilities to deliver value and real-time customer services (Bastos and Gallego, 2008).

Cost reduction

To excel, different firms today are realigning their activities in way that will maximize revenue and minimize cost (Gachora et al., 2014). Different business firms are moving towards (1) lowering operating costs, (2) decreasing procurement costs, (3) reducing marketing costs, and (4) lower distribution costs (Gachora et al., 2014). According to Shukla et al. (2011) supply chain involves the cost to convey the information, produce components, store them, transport them, and transfer funds.

According to Gachora et al. (2014) costs along the supply chain emanate from poor coordination among the supply chain members what results in dysfunctional operational performance. Further inventory costs, warehousing costs, transportation costs and distribution costs are the most common types of costs along the supply chain (Pasula et al., 2013). Ideally, improvement of the supply chain translates to benefits for all supply chain members. Costs decrease as a result of reduced redundancies, lower inventory levels, shorter lead time and lessened demand uncertainties. Improved supply chain performance result in enhanced product quality, customer service, market responsiveness, and target market access. Supply chain performance is thus improved through better use of internal and external capabilities creating a seamlessly coordinated supply chain, elevating inter-company competition to inter-supply chain competition (Salonen, 2012).

Lead Time reduction

According to Rajaniemi (2012), by reducing lead times, productivity can increase or more value can be added for the end-users. This could lead to a preferable market position. Risks can be reduced and trust can be increased (Fawcett et al., 2013). Short lead times in the order fulfillment process make it easier for the salesman to make reliable promises to the customer. Reduction of lead times will eventually contribute to the reliability of product delivery (Rajaniemi, 2012).

Proper management of lead time can be a competitive advantage to a manufacturing firm. Managing time may be the mirror image of managing quality, cost, innovation, and productivity (Fawcett et al., 2013). For reducing lead time it is essential to adopt Just in Time philosophy and need for continuous improvement focus on issues. In this case, integration of manufacturing resource planning (MRPII) tools, flexible manufacturing cells (FMC) or flexible manufacturing systems (FMS), automation tools and efficient information technology tools is vital (Ding, 2014).

Supply chain performance

Manufacturing operations has its roots back to the late 19th and early 20th centuries with ideas espoused by Frederick W. Taylor, the father of applying scientific methods to running business. His ideas for time and motion studies of operations were successfully used to scientifically manage production lines and warehouse operations (Ketchen and Hult, 2007). These ideas, **however, led to exaggerated business processes that transitioned into "running a business by the stopwatch" with employers treating human employees as if they were highly reliable, predictable** machines to be monitored and controlled.

Throughout the last decade, companies have expended significant amounts of time and effort to re-engineer their supply chains through business process change and technology focused on implementing integrated Supply Chain Management (SCM) principles (Gibson et.al 2005). While substantial financial and human resources have been spent on doing this, there has been little sign of realized benefits. While consultants are recommending supply chain measurement, they generally lack formal approaches to it.

In addition, while SCM software providers are selling solutions that enable companies to drastically improve their supply chain performance, these same vendors do not adequately provide tools needed to measure these improvements (Stefanovic et.al, 2007). Key performance indicators are measurements that directly relate to key business requirements. KPI come in various forms from simple reporting measurements to very complex, cross correlated analytic results (Kumar et al., 2014). Information from supply chain management (SCM) processes must be collected, measured, analyzed and continuously monitored to cross-check the performance of the supply chain management (Bozarth et al., 2009). Over the centuries, a number of scholars

have focused their attention plainly on the issue of MRP II implementation. However, there are few studies that have ideally focused on the role of MRP II implementation within the manufacturing sector.

RESEARCH METHODOLOGY

This study adopted a descriptive survey design. In this case, the target population consisted of the different employees in Haco Tiger Company Limited. The unit of observation comprised of the senior managers, middle-level managers and the support staff. The target population (N) was 450 employees who were randomly picked. Random sampling technique was adopted by the researcher following the homogeneity of the target population. In this regard, the researcher determined his sample population (n) using the formula; n= 0.1(N). Hence, the sample population in the study was set at 45 employees. This sample population was in agreement with Neuman (2002) who argued that a sample of 10 percent of the population is sufficient for use in a study. The primary data was collected by use of questionnaires that were administered by the researcher himself. Data was analyzed by use of the SPSS software which has descriptive statistics features that assist in variable response comparison and gives a clear indication of response frequencies.

DATA ANALYSIS AND RESULTS

Reliability analysis

Reliability of an instrument is the ability to produce consistent and stable results. One of the **most common reliability coefficient is the Cronbach‟s alpha which estimates internal** consistency by determining how all items on a test relate to all other items and to the total test - internal coherence of data. The reliability is expressed as a coefficient between 0 and 1. The higher the coefficient, the more reliable is the test. According to Malhotra (2004), a standard minimum value of alpha of 0.7 is recommended. In this study, all the alpha values were more than 0.7 as indicated in Table 2.

Table 2: Reliability test

Variable	Cronbach's Alpha	No. of items
Quality level	.760	5
Customer satisfaction	.949	4
Cost reduction	.732	5
Lead-time reduction	.915	5

(Source: Author's own calculations, 2015).

Regression Analysis

The study employed a multiple linear regression analysis to determine the relationship between the depend variable (Supply chain performance) and independent variables (quality level, customer satisfaction, cost reduction and lead-time reduction). In this regard, the four independent variables were observed to explain 70.25 percent of the supply chain performance as represented by R2 in **Table 10**. This is an indication that other factors not studied in this research study contribute to 29.75 of supply chain performance. Therefore, further research should be undertaken to investigate the other factors (29.25%) that affect supply chain performance in the Kenyan manufacturing sector. The significance value was 0.033 lesser than 0.05 an indication that the model was statistically significant in predicting how independent variables (quality level, customer satisfaction, cost reduction and leadtime reduction) affect dependent variable (supply chain performance).

Table 10: Model summary

Model	R	R Square	Adjusted R Square	Change Statistics	
				F Change	Sig. F Change
1	.745[a]	.705	.7025	7.724	.033

(Source: Author's own calculations, 2015).

According to the ANOVA and F statistics in Table 11, the F calculated (7.724) was higher than the F critical (2.448) at 5 percent level of significance an indication that the investigated independent variables (quality level, customer satisfaction, cost reduction and lead-time reduction) affect supply chain performance in the Kenyan manufacturing sector with reference to Haco Industries Limited.

Table 11: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84.152	4	21.038	7.724	.033[b]
	Residual	41.727	28	12.205		
	Total	125.879	32			

a. Dependent Variable: Supply chain performance

b. Predictors: (Constant), Leadtime reduction, Quality level, Customer satisafaction, Cost reduction

(Source: Author's own calculations, 2015).

The regression equation becomes:

$$Y= 0.484+0.219X_1+0.207X_2+0.338\ X_3 + 0.403X_4$$

In this regard, taking all independent variables constant at zero, the supply chain performance remained constant at 0.484. also, taking other independent variables to be zero, a unit increase in quality level will result to 0.219 increase in supply chain performance and this was statistically significant at 0.013, a unit increase in customer satisfaction will result to a 0.207 increase in supply chain performance and it was statisticaly significant at 0.023, a unit increase in cosr reduction will results to a 0.338 increase in supply chain performance and was statistically significant at 0.009 while a unit increase in lead-time reduction will result to a 0.403 increase in supply chain performance and was statically significant at 0.003 as in Table 12.

Table 12: Multiple regressions

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	.484	.296		.033
Quality level	.219	.183	.119	.013
Customer satisafaction	.207	.140	.107	.023
Cost reduction	.338	.179	.040	.009
Leadtime reduction	.403	.119	.005	.003

(Source: Author's own calculations, 2015).

Discussion of the findings

Lead-time reduction

In this day and age, proper management of the lead-time has become a competitive advantage for the different manufacturing companies of the world. According to Rajaniemi (2012), short leadtimes in the order fulfillment process make it easier for the salesmen to make reliable promises to the customer. Reduction of the leadtime eventually contribute to the reliability of product delivery (Rajaniemi, 2012). One of the basic objectives of this study was to investigate if lead-time reduction on MRP II implementation had an effect on supply chain performance. From the study finding, 72 percent of the respondents agreed that lead-time reduction did affect supply chain performance while 23 percent disagreed. An indication that leadtime reduction did affect supply chain performance at Haco Industries Limited. This is in line with the study finidings made by Meticevic et al. (2008) who observed that implementation of MRP II systems, JIT and OPT (Optimized Production Technology) adequately reduced leadtime resulting to enhanced supply chain efficiency. Also, the study established that at 5 percent level of significance, lead-

time reduction was the most significant variable affecting supply chain performance. In this regard, the study findings concurred to Fawcett et al. (2013) who argued that the aspect of time directly impacted quality, cost, innovation, and productivity of the manufacturing firm.

Cost reduction

Business enterprises today are competing interms of cost reduction strategies. According to Gachora et al. (2014) costs along the supply chain emanate from poor coordination among the supply chain members what results in dysfunctional operational performance. A key objective in this study was to investigate if cost reduction as a result of MRP II implementation affect supply chain performance. From the findings made in the study, 69 percent of the respondents agreed that cost reduction had an effect on supply chain performance. 20 percent of the respondents disagreed while 11percent were not sure. A clear indication that cost reduction actually did affect the supply chain performance in Haco Industries Limited. This is in line with the study findings and argument made by Quesada et al. (2012) who established that MRP II system was vital in enhancing supply chain relationships among the different supply chain players as well as for cost management. In this regard, he argued that the MRPII system was the backbone of the logistics system for almost all the manufacturing firms of the world (Quesada et al., 2012).

The respondents further agreed to the facts that cost reduction was core in material management, enhanced sales volume, affected the overall performance of the company and improved on production accuracy. Further, the study established that cost reduction was the second most significant variable (0.009) that affected the supply chain performance in the Kenyan manufacturing sector. In this regard, these findings collaborates to the literature review by Gachora et al., (2014) who made a remark that cost factor is a key determinant of the performance of a firm. In this regard, to excel, the manufacturing firms today are realigning their activities in way that maximizes revenue and minimizes cost (Gachora et al., 2014).

Quality level

Quality is not a bonus for the customer; it is expected. Quality is also important for the acceptance of a product. It is the aspect of meeting or exceeding the expectations

of your customer (Agus, 2011). Improving the quality of all supply chain processes leads to cost reductions, improved resource utilization, and improved process efficiency (Lin and Gibson, 2011). This study to to investigate the role of MRP II implementation on supply chain performance in the Kenyan manufacturing sector with a specific objective to investigate if quality level has an effect on supply chain performance. From the study findings, 65.6 percent of the respondents agreed that Quality level had an effect on the supply chain performance with 20.4 disagreeing and 14 percent being not sure. This implied that indeed quality level did affect the supply chain performance in Haco Industires Limited. This collaborates to the findings of Vorster (2007) who established that one of the major need for MRP II tool implementation in the

manufacturing firms was to improve on effective use of material resources so as to impact on quality of products. The respondents strongly agreed that quality level affected production capacity, material planning and the relationship between the manufacturing company and its stakeholders. Further, the study established that at 5 percent level of significance quality level was the third most significant (0.013) factor affecting supply chain performance in the Kenyan manufacturing sector. This is in agreement to the literarature review by Lin and Gibson (2011) who argued that quality level has a significant influence on the performance of the supply chain.

Customer satisfaction

The customer's perception is not always the same as the product manufacturer's perception.

Customers may give more value to low cost, on time delivery, delivery date certainty, or receiving a customized product (Gunasekaram et al., 2004). Customer satisfaction represents the customer's reaction to his or her perception of the value received as a result of using a particular product or service (Cengiz, 2010). From the study findings, 58 percent of the respondents agreed that customer satisfaction had an effect on supply chain performance. However, 28 percent of the respondents disagreed while 14 percent were not sure. This is in line with the findings made by Gill et al. (2010) who established that MRP II implementation was vital for the small-scale manufacturing firms and one of the major motives to MRP II implementation was customer satisfaction. According to them, MRP II implementation played a significant role in enhancing customer satisfaction. The respondents also strongly agreed that customer satisfaction affected the relationship of the company and its suppliers as well as the fact that customer satisfaction **influenced the company's level of competitiveness. The study further established that** customer satisfaction was the fourth most significanct variable (0.023) affecting supply chain performance in the Kenyan masnufacturing sector. This collaborates to the literature review by Cengiz (2010) who argues that without satisfied customer, the whole exercise of applying the supply chain strategy could be costly and futile.

Conclusion

The study concluded that quality level, customer satisfaction, cost reduction and lead-time reduction influences supply chain performance in the Kenyan manufacturing sector. Lead-time reduction was in this case declared the most significant followed by cost reduction in the manufacturing sector in Kenya. the study concluded that 70.25 percent of the supply chain performance in the manufacturing sector in Kenya was explained by quality level, customer satisfaction, cost reduction and lead-time reduction.

Recommendations

The study recommended the following:

1. Use of MRP II tool at customer service level to enhance efficiency and effectiveness of the services offered to the customers. MRP II tool does not only perfect the production planning and schedule but also ensures that all players along the supply chain have acess

to similar and accurate information at all times. This reduces on cost related with information sharing and paperwork what adequately enhances the productivity of the employees. This has a positive impact on the performance of the individual manufacturing firms.

2. The Kenyan manufacturing companies to heavily invest in ICT tools and integrated systems such as the MRP II systems within the supply chain so as to shift from a traditional supply chain networks to a modern supply chain network. Kenya as a developing nation has made huge investments in improving the state of technology in the country. This is because, technology is everything today and for the manufacturing firms, they have to change with the changing manufacturing environment of the world which is highly influenced by technology.
3. MRP II system to be fully implemented in manufacturing firms to help reduce the production costs. MRP II adotion results into improvement in production scheduling and enhance control of the inventories. This would eventually result in improved performance of the individual firms resulting in efficiency the entire manufacturing sector. This would have a significant impact not only to the individual manufacturing firms but also to the GDP of Kenya as a country.
4. Integration of the MPR II designed in-house for the small scale manufacturers in the Kenyan manufacturing sector. The in-house MRP II designs are cheaper and requires a lower implementation cost. Small scale manufacturers are not in a position to buy and implement the advanced and the most recent MRP II systems. However, this cannot be used as a justification as to why the small scale manufacturers would keep off from integrating MRP II system in their day to day operations.

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