International Journal of
Supply Chain Management
(IJSCM)

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IPRJB
INTERNATIONAL PEER REVIEWED JOURNAL AND BOOK PUBLISHING

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.2, Issue 2, No.5, pp 76 - 91, 2017

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EFFECTS OF BULLWHIP ON SUPPLY CHAIN PERFORMANCE IN MANUFACTURING SECTOR IN KENYA, A CASE OF COOPER K BRANDS LIMITED

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Abstract

Purpose: This study focused to analyzing the effect of bullwhip on supply chain performance in manufacturing sector in Kenya. The specific objectives of the study were: to establish the effect of demand forecasting, production strategies, rationing game, and information sharing on supply chain Performance in the manufacturing sector in Kenya

Materials and Methods: The study adopted a descriptive study approach. The total population of the study was all employees working at Coopers Kenya limited. The company had a total of one hundred and eighty (180) employees who are involved in the operations of the company. The target population was individuals which the researcher was interested in describing and making statistical inferences about. Therefore the target population was one hundred and eighty (180) employees working at CKL. Simple Random sampling method was used to select the one hundred and twenty four (124) respondents. This research applied both primary and secondary data. Pilot study was conducted by providing the questionnaires to 10% of the sample size. The collected data was analyzed through descriptive statistics and inferential statistics. Data presentation was through the use of pie charts, bar charts, graphs and frequency tables. Correlation analysis was used to establish the relationship between the independent and dependent variables.

Results: The study found that demand forecasting, production strategies, rationing game, and information sharing were factors affecting supply chain Performance in the manufacturing sector in Kenya.

Recommendations: The study recommended that organization should adopt modern methods and techniques of forecasting demand which will enhance the accuracy of the forecast demand, the use of production smoothing strategies which will results to consistency in the production levels irrespective of the variation of demands, study therefore recommends the elimination of order rationing strategy as a means of managing shortages in the supply chain and the organizations to fully embrace the use of modern information technology in order to enhance information flow.

Key words: *Demand forecasting, production strategies, rationing game, information sharing supply chain performance, bullwhip*

1.0 INTRODUCTION

1.1 Background to the Study

Supply chain management has become a global phenomenon which is playing a great role in enhancing organizational efficiencies (Grabara & Patyk, 2008). Organizations have greatly invested in supply chain so as to ensure customer needs are satisfied at the most efficient and economical manner in the organization. Supply chain management generally involves the extended enterprise that conducts all phases of procurement, manufacturing and distribution of finished goods and therefore requires high level of coordination in order to facilitate achievement of the organizations goal. Customers, suppliers and manufacturers are the three primary elements of any supply chain and informational flow within the chain is of critical importance.

Cannella and Ciancimino (2010) notes that as the firms strive to successfully streamline their operations, there is a great need to concentrate on enhancing the coordination with suppliers and customers in order to receive or get their products to end users within the place, time and form of needed. Budiman (2004) notes that this depends on complex tasks that require several companies working together as a supply chain or network to eliminate all supply chain inefficiencies. In attempting to effectively coordinate the supply activities, firms are faced with intermittent supplies, changing consumer tastes and preferences, advancements in technology and a threatening competition.

In recent years, there has been development of new manufacturing technologies and efficiencies aimed at reducing the total cost of operations in the organizations such as implementation of Just-In-Time (JIT), Total quality management and lean manufacturing. Though the implementation of these strategies has resulted to reduced cost of manufacturing, the dynamism of customers' demands and variations has continued to adversely affect the supply chain management. Whitman et al. (2003) argues that because of variation of customer demand, every supply chain partner is implementing systems that would guarantee customer satisfaction and quality of products without significantly increasing the cost of manufacturing. The objectives of each supply chain partners might conflicts and therefore resulting to distortion of information passing amongst them which results to bullwhip effects. Walker et al (2009) suggest a holistic view of entire supply chain which will result to reduced bullwhip effects which adversely affects organizations profitability in long run.

1.2 Statement of the Problem

According Hendriks (2015) the purpose to existence of any supply chain is to satisfy customer needs, in the process generating profits for itself. Supply chain activities start with a customer order and end when a satisfied customer has paid for his purchase. According to Oyatoye (2011) supply chain management is solely dependent on the information flowing within the system since it determines the production and the products path to reaching the ultimate customer. Inadequate information or distorted information is very detrimental in achieving organizational

goals since it can result to cause variances in demand and supply and this phenomenon is known as bullwhip effect. Hendriks (2015) study on role of information distortion on supply chain identifies that there is a gap on how bullwhip effects specific industries and recommends for further study on its impact on different supply chain configuration.

1.3 General Objective

The overall objective of this study was to examine the effect of bullwhip on supply chain performance in a manufacturing sector in Kenya.

2.0 LITERATURE REVIEW

2.1 Demand Forecasting

The Barlas (2011) study has provided a connection between the bullwhip effect and forecasting. He points out that bullwhip effect exists as a result of forecasting inaccuracy that is attributed by uncertainties surrounding the actual demand at a given time. Sengupta et al. (2009) measure the magnitude of the bullwhip effect under different forecasting techniques such as exponential smoothing and moving average. The study demonstrate that the variance of orders placed by the downstream echelons would be higher than the variance of demand if a downstream echelon periodically updates the mean and the variance of demand that based on observed customer demand data.

2.2 Production Strategies

A firm can smoothen its production relative to its sales (i.e., its production is less than sales) by using inventory as a buffer. Such behavior is desirable for a firm if maintaining production at a constant level is less costly than varying the level of production, possibly because the production cost function is convex in the amount produced or because it is costly to change the rate of production (Aviv, 2010). Production smoothing is then an appropriate strategy: Produce at a reasonably constant rate throughout the year, building inventory during the low season and drawing down inventory during the high season. Production smoothing is also desirable with the combination of seasonality and stochastic shocks (Mollick, 2004)

Inventory management policies can have a destabilizing effect by increasing the volatility of demand as it passes up to the supply chain. The principal reason used to justify investment in inventories is its role as a buffer to absorb demand variability in the market. Inventory should have a stabilizing effect on material flow patterns which eventually smoothens the flow of materials along the supply chain. The replenishment policies play a great role in managing the market variability and failure to adequately monitor the management of the inventory would result to inventory amplification (Warburton (2009).

2.3 Order Rationing

Rationing can be seen as rational because when customers over react because they anticipating shortages, the supplier then has to ration the products to avoid complete shortages in the market. Proportional rationing schemes are countered by allocating units based on past sales. Ignorance of supply chain conditions can be addressed by sharing capacity and supply information.

Unrestricted ordering capability can be addressed by reducing the order size flexibility and implementing capacity reservations. For example, one can reserve a fixed quantity for a given year and specify the quantity of each order shortly before it is needed, as long as the sum of the order quantities equals to the reserved quantity (Rong et al, 2008).

2.4 Information Sharing

Giloni et al. (2014) indicates that the value of information sharing is statistically significant improvements since it has the possibility of resulting to 7% to 81% increase in organization performance. According to Chen and Lee (2009) the value of information sharing is strictly positive for any forecast lead time (regardless of the demand structure and the ordering policy). At first glance, the decision uncertainty seems to diminish the attractiveness of analyzing a retailer's replenishment process due to the unpredictability of the order decision. Such uncertainty, however, opens the door to information loss as signals propagate upstream. As demand signals and decision deviations propagate upstream to produce the order process, they follow distinct evolution patterns: the evolution of inventory governs the translation of decision deviations into replenishment decisions while the evolution of inventory and current demand together govern the translation of demand. This difference prevents orders from carrying both full information of demand and results to decision deviations. Information sharing then becomes valuable to recover the order's elaborate information structure and to improve forecast accuracy.

2.5 Supply Chain Performance

Chen (2010) studies the importance of centralized demand information in a serial inventory system. He compares the echelon stock and installation stock policies and shows that the value of information is related to the system parameters namely lead times, batch sizes, number of stages, demand variability, and customer service level. McCullen and Towill (2001) study on the efficiency of a supply chain and they used information transparency system as one of the methods that reduce the bullwhip effect which consists of high information integrity between supply chain members. Information sharing between supply chain members and investigate its benefits to the each member of the chain. In their model, a retailer and a manufacturer can both gain benefit by information sharing.

The study adopted a descriptive study approach. The total population of the study was all employees working at Coopers Kenya limited. The company had a total of one hundred and eighty (180) employees who are involved in the operations of the company. The target population was individuals which the researcher was interested in describing and making statistical inferences about. Therefore the target population was one hundred and eighty (180) employees working at CKL. Simple Random sampling method was used to select the one hundred and twenty four (124) respondents. This research applied both primary and secondary data. Pilot study was conducted by providing the questionnaires to 10% of the sample size. The collected data was analyzed through descriptive statistics and inferential statistics. Data presentation was through the use of pie charts, bar charts, graphs and frequency tables. Correlation analysis was used to establish the relationship between the independent and dependent variables.

4.0 DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Demographic Information

4.1.1 Gender

The study considered Gender as important aspects since there is need to ensure that the research is not limited by the gender bias. There is need to ensure balanced response from the both Male and female employees working in the organization. From the findings the male were majority representing 67% of the respondent while the female represented 33% of the respondents. The study indicates there was no equal distribution of the gender but both genders were substantially represented. This makes the research free from one gender bias and hence the results can be relied on irrespective of consideration of the gender.

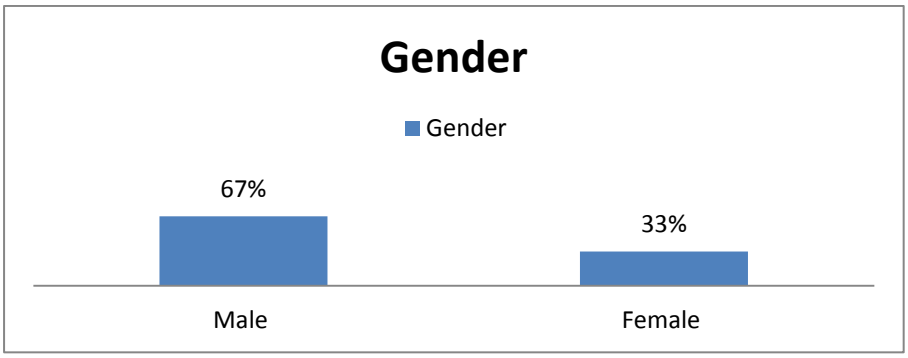

Figure 1 : Response by Gender

4.1.2 Work Experience

The study sought to find out the years of experience of the respondents have worked for Coopers Kenya limited and the analysis has been presented in figure.2. It was established that a majority of respondents, 43.8% have worked in the study area for between 11 and 15 years. This was followed by those having worked for between 6 and 10 years, as indicated by 39.8% of respondents. Only 11.3% and 5.1% of respondents were found to have worked at the study area for above 15 years and less than 5 years respectively. The results reveal a rather fair distribution across the years representing the length of service in the service, which is also reflective of the respective experiences. With a majority having worked for over 6 years, responses can be deemed to be informed by adequate experience on their areas of specialization. This implies that majority of the respondents understands the operations of the organization and therefore they will give more accurate information.

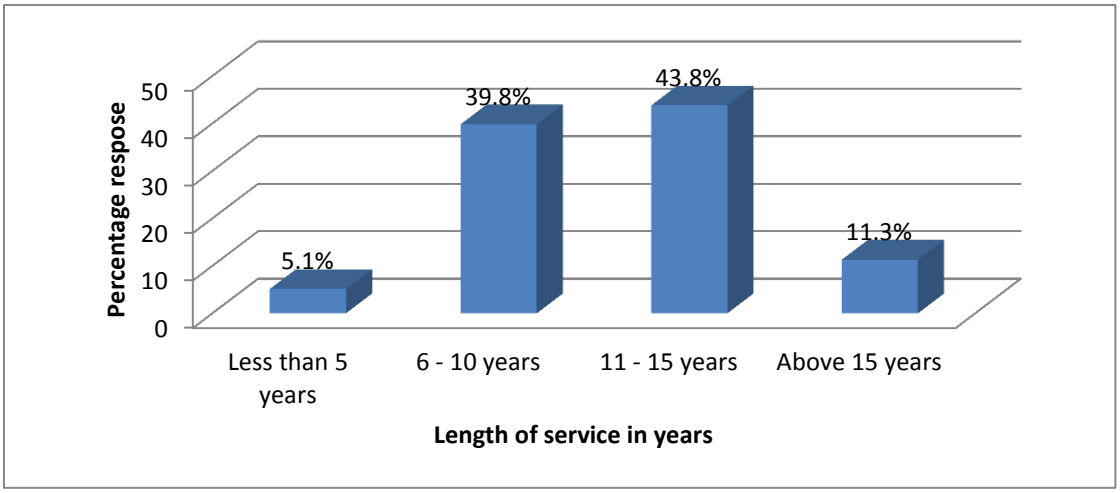

Figure 2: Length of service

4.1.3 Respondents' level of education

Respondents were further asked to indicate their highest levels of education. This would serve to show the academic backgrounds among respondents in their respective positions in their study area. This would also show the respective levels of conversance with various supply chain issues in addition to the practice in their current stations. As figure 3 above illustrates, a majority of respondents, 44.2%, indicated having attained a Degree level, closely followed by 39.4% having attained either a Diploma or a Higher National Diploma level. A further 16.4% further indicated having attained a Postgraduate Degree. From the findings, overall, respondents can be said to have attained high education levels, hence able to comprehend the survey objectives and give reliable responses.

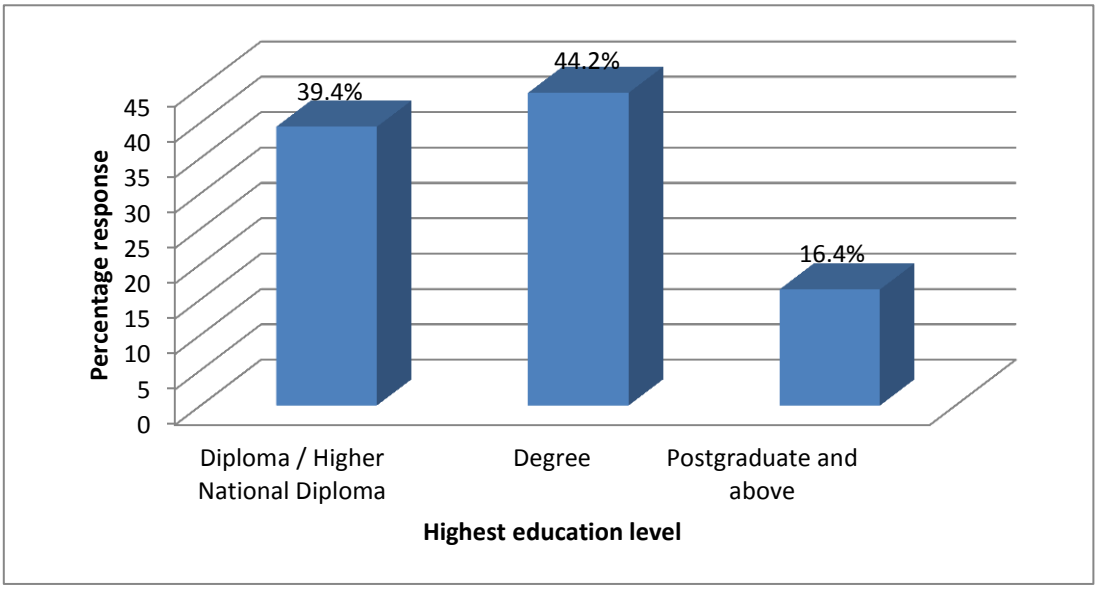

Figure 3: Response by level of education

4.2 Demand Forecasting

The study sought to determine effects of demand forecasting on the supply chain performance in the manufacturing sector in Kenya with specific reference to reference to CKL.This section presents findings to survey questions asked with a view to establish the extent to which demand forecasting affects the supply chain performance. Responses were given on a five-point Likert scale (where 5 = very great extent; 4 = Great extent; 3 =moderate extent; 2 = little extent; 1= very little extent). The scores of 'little extent and 'very little extent' have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of 'moderate extent' has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of 'great extent' and 'very great extent' have been taken to represent a statement highly agreed upon equivalent to a mean score of 3.5 to 5.0.

Table 1 presents the findings. Majority of respondents affirm that the demand variability limits the accuracy of demand forecast (4.013); changes in prices has significant impact on the demand (3.71); use of collaboration to enhance accuracy of demand forecasting (3.357); application of old forecast to use future demand (3.701): inflation of demand as a result of marketing – manufacturing conflict (3.452) and wrong forecasting results to high cost of stock (4.80).

From the findings in table 1, demand forecasting has been identified as critical components that may result to amplification of the upstream demand and hence resulting to increased buffer stock. Demand variation over a given period of times makes it difficult to accurately forecast the actual demand resulting to over productions or under production which has a significant effect on the supply chain performance. The fluctuation of prices is a major component resulting to fluctuations of demands which make it difficult to accurately forecast the demand levels and this affects the stock flow along the supply chain. The Organization has adopted collaborative strategy to enhance the accuracy of forecast demand which would eventually result to production of products based on the forecasted demand. The findings indicate that marketing and manufacturing conflicts has played a role in aggravating the bullwhip effects since the marketers are aiming to gain high commissions from high sales and therefore are likely to order more products while manufacturing company is focused on producing quantities that the customers are willing to purchase. The study indicates that the major impact of wrong or inaccurate forecasting is increase in the cost of handling stock in an organization.

The findings are in agreement with the Chen et al. (2010) study which provided a connection between the bullwhip effect and forecasting. He points out that bullwhip effect exists as a result of forecasting inaccuracy that is attributed by uncertainties surrounding the actual demand at a given time. Warburton (2009) study indicates that the elimination of bull whip effects is likely to result to over 10 % of the supply chain costs. This finding further agrees with Moll (2013) who contributes inefficiencies as a result of bullwhip to the marketers- manufacturer's conflicts where it results to a win –lose relationship. This conflict results to amplification of demand on the side of marketers and high production levels on the side of the manufacturers. The findings are in agreement with Lee et al. (2007) who suggest that making demand data available at the

downstream site to an upstream site is a remedy to mitigate demand signal processing. This can be achieved by establishing a collaborative relationship along the supply chain network.

Table 1: Demand forecasting and supply chain performance

Statement	Mean	Standard Deviation
Demand variability in the market limits the demand forecast accuracy	4.013	0.5423
The changes in price have significant effects on the actual demand levels.	3.713	1.0617
The organization has established close collaborations with other supply chain partners	3.357	0.6834
Old forecasts are used to determine the future demand	3.701	0.9431
'Marketing-manufacturing conflict' has resulted to inflated demand forecast by supply chain partners	3.452	1.2317
Wrong forecast results to increased cost of managing stock	4.8	0.6874

4.2.1 Influence production strategies on supply chain performance

The study sought to determine effects of production strategies on the supply chain performance in the manufacturing sector in Kenya with specific reference to reference to CKL. This section presents findings to survey questions asked with a view to establish the extent to which production strategies affects the supply chain performance. Responses were given on a five-point Likert scale (where 5 = very great extent; 4 = Great extent; 3 =moderate extent; 2 = little extent; 1= very little extent). The scores of 'little extent and 'very little extent' have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of 'moderate extent' has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of 'great extent' and 'very great extent' have been taken to represent a statement highly agreed upon equivalent to a mean score of 3.5 to 5.0.

From table 2 , the findings indicate that majority of the respondent indicate that organization has established reorder levels for every material (3.92); order batching has been applied to reduce transaction costs(4.109) and mass production has been applied in the organization(4.052). Respondents moderately agreed that policies on buffer stocks have been strictly adhered to in the organization with a mean of 2.87. Respondents have agreed to little extent that organization has implemented production smoothing in the organization with the mean of 1.6.

The findings indicate that the organization has implemented stock management strategies such as reorder levels and mass production in order to reduce the cost of holding stock in the organization. The establishment of re-order levels helps to ensure inventory costs are reduced while holding optimum inventories enough to ensure operations of the organization remains uninterrupted. Reorder levels also assist to ensure there are buffer stocks which help to balance the demand variations in the market. The amplifications of upstream demands results to organization holding much inventory as buffer stock. This explains the reasons why

organizations are unable to effectively adhere to the buffer stock regulations. The organization has not adapted production smoothing strategy that enables organization to have predetermined constant production levels. This level helps organizations to smoothen the production quantities such that in season of lower consumptions, the excess products are stored as buffer while at the time of excess demand the buffer stocks are used to satisfy the customers demand. Order batching has been highly utilized by customers in the organization which may results to huge buffer stocks on the downstream supply chain. Batching is applied to reduce the transaction costs and reduce the inventory runs on the side of the customers.

The finding supports Mollick (2004) study which indicated that reduction smoothing is a desirable with the combination of seasonality and stochastic shocks and its helps to reduce bullwhip effects. Production is carried out at reasonably constant rate throughout the year, building inventory during the low season and drawing down inventory during the high season. The findings are in agreements with Jung et al. (2009)who urges that order batching regarding and infrequent ordering in large lot sizes are preferred by firms because they enhances the flexibility of suppliers to purchase according to their requirements. Cachon et al. (2006) argues that though order batching reduces the transaction costs, the process results to adverse effects of bullwhip effects where large buffer are created within the supply chain.

Table 2 : Production strategies on supply chain performance

Statement	Mean	Std. Dev
The organization has established the reorder level of every material in the organization.	3.92	0.5682
The policies on the quantities of buffer stock to hold at a given time are strictly applied	2.87	0.6134
Order batching by the supply chain partners is applied to reduce transaction costs.	4.109	1.0067
Mass production strategy is applied in the organization	4.052	0.5225
Production smoothing strategies have been implemented in the organization	1.6	.5360

4.2.2 Influence of Order rationing on supply chain Performance

The study sought to determine effects of Order rationing on the supply chain performance in the manufacturing sector in Kenya with specific reference to reference to CKL. This section presents findings to survey questions asked with a view to establish the extent to which Order rationing affects the supply chain performance. Responses were given on a five-point Likert scale (where 5 = very great extent; 4 = Great extent; 3 =moderate extent; 2 = little extent; 1= very little extent). The scores of 'little extent and 'very little extent' have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of 'moderate extent' has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of 'great extent' and 'very great extent' have been taken to represent a statement highly agreed upon equivalent to a mean score of 3.5 to 5.0.

From the findings tabulated at table 3, majority of the respondents indicated that the supply chain partners are flexible on orders they make to the organization (3.985); organization has no limits on orders made (3.719); rationing results to increased production runs (3.629); and organization has strict return policy. The respondents agreed to small extent that organization applies capacity reservation policy to limits the number of orders with a mean of 1.603.

The findings imply that the organization has no limitations on the orders the customers can make at a given time. The failure to limit orders gives the supply chain partner the leeway to order whatever quantity they require without considering the actual demand by the customers. This will result to oversupply in the market which can be well be explained as bull whip effects. The production levels are high compared to what is actually required for consumption in the market. Due to failure to limits what the customer's order; the organization production capacity may be overwhelmed resulting to organization applying the rationing principle to satisfy the customers' orders. The Order rationing in other hand will result to increased inventory runs in the supply chain. The frequency of the customers' orders will increase with rationing, therefore resulting to too many inventory run in the organization. The existence of strict return policies exists to prevent the customers from ordering more than they require since incase of low sales they will not have an opportunity to return the buffer to the suppliers. The non-existence of capacity reservation policy enables the customers to strictly purchase the item required at a given time. It can however result to over-ordering where the supply chain partners forecast high demand in future, shortages or instances of rationing.

The finding supports the argument by Rong et al (2008) that rationing can be seen as rational because when customers over react because they anticipating shortages, the supplier then has to ration the products to avoid complete shortages in the market. The Order rationing results to the limitation of supply chain partner's flexibility to order the products required. This is likely to result to supply chain partners using unethical ways to increase their allocations and eventually may result to oversupply of products in the market after the stoppage of the rationing. Lee et al (2004 indicate that when buyers know that a shortage is imminent and rationing will occur, they will often increase the size of their orders to insure they get the amounts they really need.

Table 3: Influence of Order rationing on supply chain Performance

Statement	Mean	Std. Dev
The supply chain partners are flexible on the size of orders they make.	3.985	0.9442
The organization does not limit the orders made by the customers	3.719	0.0429
Rationing has resulted to increased production runs in the organization.	3.629	0.8592
Customer's capacity reservation policies are applied to limits customers from ordering more than they require.	1.603	0.3056
The organization has strict materials return policy	3.601	1.3078

4.2.3 Influence of information sharing on supply chain Performance

The study sought to determine effects of information sharing on the supply chain performance in the manufacturing sector in Kenya with specific reference to reference to CKL. This section

presents findings to survey questions asked with a view to establish the extent to which information sharing affects the supply chain performance. Responses were given on a five-point Likert scale (where 5 = very great extent; 4 = Great extent; 3 =moderate extent; 2 = little extent; 1= very little extent). The scores of 'little extent and 'very little extent' have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of 'moderate extent' has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of 'great extent' and 'very great extent' have been taken to represent a statement highly agreed upon equivalent to a mean score of 3.5 to 5.0.

The findings indicate that majority of the respondents agree to great extent that the organization has clear communication channels in the supply chain (3.619); VMI has significantly reduced distortion of information in the supply chain; and there is distortion of information in the supply chain (3.603). Respondents agree to moderate extent that organization has embraced the use of information technology in facilitating information sharing in the supply chain with a mean of 2.483.

From the finding it is quite evident that the issue of information flow is critical in managing supply chain management. Distortion of information in the supply chain evident and this may have a direct impact on the amplification of demand upstream. Bullwhip effect can be experienced in organization where the information flow is prone to distortion. The organization has clear channels of communication which acts as a control measure to reduce information distortion. The organization has embraced the use of VMI which provides a platform of passing information from the supplier chain partner to the manufacturing company thereby reducing instances of distortion amongst the intermediaries in the supply chain. Information technology has not been fully embraced in the supply chain and this may offer opportunities of passing inaccurate information resulting to bullwhip effects. Bullwhip effects will lead to increase in cost of holding stocks and will increase the buffer stock in the supply chain.

The findings agrees with the findings of Giloni et al. (2014)study which indicates that the value of information sharing is statistically significant to improvements since it has the possibility of resulting to 7% to 81% increase in organization performance. The findings recognize the value of sharing information in the supply chain. This would facilitate accurate forecasting which would eventually result to reduction in bullwhip effects on the supply chain. Hayya et al. (2004) find out that information sharing decreases total and stage to stage variance amplification of demands and therefore the application of VMI has facilitated where such information is shard directly from the customer to the organization.

Table 4. Information sharing and supply chain performance

Statement	Mean	Std. Dev
The organization has fully embraced technology in enhancing information sharing with other supply chain partners.	2.483	0.9442
There is a clear channels of communication which limits distortion of information	3.619	0.0429
Vendor managed inventory(VMI) has reduced distortion of information in the supply chain	4.629	0.8592
The organization is distorted as it flows from downstream to upstream in the supply chain	3.603	0.3056

4.3.1 Pearson Correlation Analysis

Table 5 below presents the Pearson correlations for the relationships between the bull whip Effects variables and supply chain performance. From the findings, a positive correlation is seen between the each bull whip effects variable and supply chain performance. The analysis of correlation results in Table 5 illustrates that between demand forecasting and supply chain performance of manufacturing sector there is a positive coefficient 0.447, with p-value of 0.000. It indicates that the result is significant at α =5% and that if the demand forecasting increases it will have a positive impact on supply chain performance of manufacturing sector. The correlation results between production strategy and supply chain performance of manufacturing sector also indicates the same type of result where the correlation coefficient is 0.219 and a p-value of 0.082 which significant at α = 5%. The results also show that there is a positive association between Order rationing and supply chain performance of manufacturing sector where the correlation coefficient is 0.251, with a p-value of 0.046.

Further, the result shows that there is a positive association between information sharing and supply chain performance of manufacturing sector where the correlation coefficient is 0.487, with a p-value of 0.000. This therefore infers that the strongest correlation was established between information flow and supply chain performance (r = .487), and the weaker relationship found between demand forecasting and supply chain management (r = .447). Production strategy and rationing game are also strongly and positively correlated with performance at correlation coefficient of .219 and .251respectively. All the independent variables were found to have a statistically significant association with the dependent variable at 0.05 level of confidence. The correlation matrix implies that the independent variables were major determinants of supply chain performance of the manufacturing sector as shown by their strong positive relationship with the dependent variable; supply chain performance of the manufacturing sector

Table 5 Pearson Correlation Matrix

	Supply chain Performance	Demand forecasting	Production strategies	Order rationing	Information sharing
Supply chain Performance	1				
Demand forecasting	.447**	1			
	0.000				
Production strategies	0.219	.484**	1		
	0.082	0.000			
Order rationing	.251*	.634**	.0610	1	
	0.046	0.000	.0063		
Information sharing	.487**	0.184	.0690	.338**	1
	0.000	.000	.0585	0.006	

***Correlation is significant at the 0.05 level (2-tailed)**

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

5.1.1 Effects of demand forecasting on supply chain performance in manufacturing sector in Kenya.

The study sought to establish the effect of demand forecasting on supply chain performance in manufacturing sector in Kenya. Demand forecasting plays an integral part in enhancing supply chain performance in the manufacturing sector in Kenya. Demand forecast failure to adequately and accurately forecast the demand results to upstream amplification of demand in the supply chain. This results to increase in the buffer stock in the supply chain and therefore increasing the

cost of managing stock. Therefore the study concludes that demand forecasting has a direct effect on the supply chain performance of manufacturing sector in Kenya

5.1.2 Effects of production strategies on supply chain performance in manufacturing sector in Kenya

The study sought to establish the effect of production strategies on supply chain performance in manufacturing sector in Kenya. Different production strategies affect the supply chain in different forms. Order batching results to upstream amplification of demand supply and eventually results to increased buffer in the supply chain. The increase in buffer stock will result to increased cost of managing stock and therefore supply chain will not achieve the goal of efficiency. Therefore the study concludes that production strategies adopted has a direct effect on the supply chain performance of manufacturing sector.

5.1.3 Effects of Order rationing on supply chain performance in manufacturing sector in Kenya

The study sought to establish the effect of order rationing on supply chain performance in manufacturing sector in Kenya. Order rationing principle has been applied by the organization to manage stock where the customer demand is higher than anticipated by the organization. Order rationing has been used as a means of managing order amplifications since organizations are unable to meet the required demand from the supply chain partners. Order rationing therefore has a great impact on the supply chain performance. It can result to customer dissatisfactions due to the limitation of issues of product as per the supply chain partner order. The cost of operations also significantly increases in the supply chain due to the increase in the number of inventory runs in the chain. The study therefore concludes that order rationing therefore affects the supply chain performance of manufacturing sector in Kenya.

5.1.4 Effects of information sharing on supply chain performance in manufacturing sector in Kenya

The study sought to establish the effect of information sharing on supply chain performance in manufacturing sector in Kenya. Information flow has been identified as a critical element of enhancing supply chain performance and incase of distortion of information in the supply chain network there would be bullwhip effects which adversely affects the supply chain performance. Organizations are applying modern technology in enhancing information flow within the supply chain. Information flow in the organization has a tendency of enhancing customer satisfaction and reduction of costs in the supply chain performance. The study therefore concludes that information sharing affects the supply chain performance of manufacturing sector in Kenya.

5.2 Recommendations

The study established that there is a direct effect of demand forecasting on the supply chain performance in the manufacturing sector in Kenya. Therefore the study recommends that organization should adopt modern methods and techniques of forecasting demand which will enhance the accuracy of the forecast demand. This will result to reduction of bullwhip effects since the production will be purely based on forecast demand.

The study also established that there is a direct effect of production strategies on the supply chain performance the study therefore recommends the use of production smoothing strategies which will results to consistency in the production levels irrespective of the variation of demands. Order batching should also be discouraged so as to reduce the level of buffer stock in the supply chain.

The study established that order rationing affects the supply chain performance in manufacturing sector. The study therefore recommends the elimination of order rationing strategy as a means of managing shortages in the supply chain. This will result to organization increasing its production capacity as a means of ensuring customers demand s are met in high seasons.

The study finally established that information sharing has a direct effect on the supply chain performance. Therefore the study recommends for the organizations to fully embrace the use of modern information technology in order to enhance information flow. This will result to instant exchange of information and therefore eliminating instances of distortion as information flows in the supply chain.

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