

# **The influence of Inventory Management Techniques and supply chain management: A study on how effective inventory management systems and supply chain management can help establish high performance in Johannesburg manufacturing Industries.**

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## **Abstract**

This study is conducted to show the relationship between the techniques used in Inventory Management and the Supply Chain Management. Inventory management is a train fundamentally about indicating arrangement of supplied merchandise (Mwangi, 2013). There is a need to examine the implementation of effective inventory management system, its impact on the supply chain management of a manufacturing company and how it plays a role on the performance levels of the organization. The study was conducted at a manufacturing company, which will be referred as Company X. This research paper followed a casual design approach, and mixed methodology technique further explored the findings from the literature review and the extent of application in practice. A non-random sampling technique was used, containing 34 employees in total. Questionnaire was developed and distributed amongst all 34 employees from supply chain, inventory control and manufacturing line. The study conducted has evidently shown that Inventory Management and Supply Chain have an impact on the performance of the organization. It is then recommended that management ensures that the two department have and maintain a good working relationship.

## **Keywords**

Inventory management, Supply Chain, Performance, Customer Satisfaction,

## **Introduction**

A vast majority of manufacturing companies have organized themselves as networks of production and distribution sites in order to remain competitive in today's dynamic market. The most uncomplicated network consists of a single company that performs both manufacturing and distribution. The complicated networks consist of multiple companies scattered around the world these companies would be responsible for distributing inventory to consumers. These networks are referred to as supply chains.

Inventory likewise alluded to the merchandise and materials that a business holds for the accomplishing its generation objectives. Inventory management is a train basically about indicating situation of (Mwangi, 2013). The target of inventory management is to "strike a balance between inventory investment and customer service" (Heizer & Render, 2014) Stock management includes diverse capacities inside an organization specifically; giving merchandise to meet the client requests and separate from vacillations in that request, to decouple different parts of the creation procedure, to exploit amount rebates, and to support against swellings and value changes (Heizer and Render, 2014). It is a costly resource in the organization, in this way it is basic that it is overseen accurately for the organization to be viable, to build its efficiency levels, and to kill exercise in futility and materials and have low generation costs. Inventory management is critical on the grounds that associations will guarantee resources and stock are very much overseen and request anticipating is extraordinarily improved to maintain a strategic distance from impromptu acquisition.

Supply chain is a course of action of affiliations, people, activities, information, and resources connected with moving a thing or organization from supplier to customer. Heizer and Render (2014) defined Supply Chain Management (SCM) as overseeing the sequence of processes involved in the production and distribution of a commodity; from the external supplier to internal functions then to external distribution of the finished goods. It is related with the stream and change of products from crude materials (inventory) to a completed merchandise or administrations (finished inventory). The implementation of SCM allows management within an organization to keep track of the movement of any goods within the organization, they can account for any inventory; raw material, Work-in-Process and finished products. By doing so, they can increase customer satisfaction (both internal and external customers), as they will be able to answer any questions about the movement of the products.

Stock accept a fundamental part in supply chains since it is a wonderful point of convergence of supply chains. The most focal part that stock plays in supply chains is that of empowering the modifying of intrigue and supply. To effectively direct forward and switch streams in the store organize, the affiliation needs to oversee upstream supplier exchanges and downstream customer demands. This helps strike an amicability between fulfilling the solicitations of customers, which is as often as possible difficult to gauge with precision or accuracy, and keeping up agreeable supply of materials and stock. Poor inventory management leads to a company not satisfying their customers, not reaching their targets and objectives, and affects the quality of the production. Customers are the most important factors of the organization, both the internal customers and external customers. Poor supply chain management systems can affect the three most important factors on the performance of an organization; product flow, information flow, and financial flow, (Dempsey, 2017). SCM limits delays and permits full traceability and perceivability into the developments of products from the supplier to customer.

Therefore, supply chain systems help the organization to satisfy both customers, meet the daily targets and achieve the company's strategic goals. One way a company to have a competitive advantage is to ensure that they offer products at a relatively low price compared to their competitors. Inventory management and supply chain affects this competitive dimension.

Thus, there is a need to examine the implementation of effective inventory management system, its impact on the supply chain management of a manufacturing company and how it plays a role on the performance levels of the organization.

The point of this examination is to demonstrate the connection between the systems utilized as a part of Inventory Management and the Supply Chain Management. As indicated by the advancement of stock administration, creation supervisor can without much of a stretch arrange other division to enhance store network to upgrade the opposition of the organizations. The study will explore the different techniques that can be used to manage inventory and the benefits of each technique. These techniques include; techniques that will be focused on are Just-In-Time, Re-order point, Economic Order Quantity. The study will further establish the challenges of inventory management implementation techniques within manufacturing industries and establish how industries deals with the inventory management challenges from cost-effective view.

## **Literature Review**

This section deals with the theoretical literature of the study related to Inventory management and Supply chain. The thought is to pick up learning of how stock administration (Inventory management) and supply chain can influence the execution of the association. The understanding of concepts and techniques related to the topic of this research is presented in this section.

### **Inventory management and Supply Chain Relationship**

Producer, provider, and distributors assume a basic part in the production network and are critical connections in viably giving abnormal amounts of client benefit while keeping up least levels of stock (Williams and 2008). Chopra and Meindl [2001] considered stock the real driver of a store network attributable to its solid impact over the supply. It is essential for organization to supply its customers at the right time, right place and right number of required units. Supply chain and inventory management set up together, are one conceivable method for lessening expenses and inventories to build effectiveness and to streamline forms, which may emerge organizations over the long haul. The primary objective is to satisfy customers while minimizing costs (Hollósi, Lakner, Oláh& Popp J. 2017). An implementation of a good supply chain system allows the company to get right goods at the right place, at the right

time and in the desired condition [Slack, Chambers, Johnston, 2010]. Whereas effective Inventory Management allows an organization to reduce its operational costs.

Sustainable supply chain is characterized as the arranging, coordination, and control of an organization's store network that makes an incentive to its clients with least cost, while really securing nature (Linton et al. 2007). Regarding sustainability measures in a supply chain, leaders need to consider stock arrangements that limit cost and negative effect to the earth. Since the conveying costs related with owning and moving stock are exceptionally noteworthy in conventional production network administration, chiefs have been executing different strategies (Linton et al. 2007).

### **Inventory management techniques**

Inventory management techniques are basic for the elite abilities of an industry on the grounds that their thriving and cost decreasing of the organization's utilization require upgraded generation arrange execution and data to the delegates (Lambert, 2008). Proper implantation of these systems can benefit the association.

Different techniques are discussed below;

#### **➤ Just-in-Time (JIT)**

Hazier and Render (2014) described Just-in-Time as having the exact amount of inventory goods arriving at the exact time when it is needed. It is essential to have the minimum inventory necessary to keep the system running. This technique or strategy increases the efficiency of the company and decreases waste, which leads to a reduction in inventory costs, as goods will only arrive when needed in the production process. According to a study undertaken between 1981 and 2000 in the US, it was found that manufacturing companies with less stock in the warehouse are more efficient than those with more stock in the warehouse. Thus, it is discovered that keeping moderate stock in the distribution center enables an association to work unimportant expenses of holding costs and furthermore keep setup cost at supreme least, takes out bothersome lead time and convey items as per customers mastermind. This enables an organization to accomplish total quality control (TQC) as proficient and powerful store network administration.

The implementation JIT inventory system requires a long-term and good relationship with suppliers, as they play a crucial role in supplying inventory as they reach a minimum level. This system is viewed as the most critical component in reducing costs within an organization, as it has benefits such as lower inventory levels, which decreases the inventory holding cost (Phung 2011).

#### **➤ Re-order point (ROP)**

This system enables an organization to know when to order and when to not order. This can be accomplished utilizing quantitative techniques which require appropriate stock administration (Apte, 2010). Re-ordering level is critical for ideal effectiveness and being successful prompting high store network execution and consumer loyalty. Hazier and Render (2014) clarifies that ROP the organization will just request when the stock achieves a specific level and that the request will be gotten instantly. ROP brings down the stocks by and large, more receptive to changes sought after, is suitable for generally varying kinds of stock inside a similar firm and Automatic age of a recharging request at the proper time. Re-Order level is basic for associations to accomplish ideal productivity and be viable prompting high store network execution and consumer loyalty, at that point they need two reorder levels one that is ordinary while the other is a crisis one in the event of catastrophe (Beamon and Kotleba, 2006).

Therefore, the following equation can be used;

$ROP = \text{Demand per day} * \text{lead time for a new order}$

#### **➤ Economic Order Quantity (EOQ)**

Bachetti, Plebani, Saccani and Syntetos (2010) battles that stock organization ought to be made brilliantly so the affiliation can have the ability to know when to ask for and the sum to orchestrate. This can be accomplished through Economic Order Quantity, (EOQ). Monetary request amount engages association to outline their stock reviving or reordering on a perfect introduce, for instance, month to month, quarterly, half yearly or yearly preface. This framework empowers an organization to have irrelevant limit costs or zero holding costs inside their conveyance focuses since stock is coming in and going out immediately. EOQ is the request amount that limits add up to holding expenses and requesting costs for the year. EOQ and ROP are basic instruments that organization can use to ensure that stock supply does not hit a stock out as cleared up by Gonzalez and Gonzalez (2010). Determining the economic order quantity will ensure that the supply chain of these organizations is replenished on a timely basis and delivered to the final consumer.

➤ **Vendor Managed Inventory**

Administration of stock chooses the way an affiliation will drive itself to prevalent adequacy. Two or three affiliations have happened as expected to Vendor Managed Inventory (VMI) structures which assist the provider with screening client's stock utilize. Through this VMI framework, clients will stay away from stock outs in light of the way that the providers will have as of late reestablished their stock. The key perspective here is correspondence which ought to be composed well from the most reliable starting phase of business relations between the provider and the client (Frahm, 2003). Dealer supervised stock extras an affiliation tremendous back and time since the supplier will have the ability to screen its customer's stock levels and have a go at reviving them As the client and provider take an interest, the correspondence channel should be clear and lively with the target that they may keep away from cases of stock outs. Where the client envisions having a sporadic request levels, they ought to exhort the provider with the target that they can change their age to cook for the request.

**Inventory Management Challenges**

Integrating demand planning and inventory planning has been listed as one of the inventory management challenges. Stock counts on a daily basis, weekly, monthly, quarterly, half yearly and yearly basis are highly encouraged because this stock is money for the organization (Management Study Guide, 2013). To keep the Inventory Management system up to date Enterprise Resource Planning (ERP) or Material Resource Planning (MRP) are recommended.

As indicated by Sandeep K. (2007) inventory management can bring outlandish misfortunes the business dependably has stock outs, absence of legitimate warehousing designs, conveying the wrong merchandise to the clients and in addition absence of appropriate documentation for products obtained. Thusly, it is fundamental that workers comprehend the stock administration strategies to guarantee the organization gets an incentive for its cash. The unplanned positioning of inventory inside your warehouses which leads to time being wasted as employees will have to spend time locating stock.

As indicated in the article titled “*Overcome the 5 Key Challenges of Inventory Management*( n.d.)” there are five main challenges faced within the inventory management system (QBES Inventory, n.d) ;

1. *Not knowing specific statuses is costly*

- This can build stock expenses since poor stock following causes superfluous uses because of waste, surge shipping charges and extra minutes charges.
- Increased lead times and stock-outs; Running out of stock means frustrated clients and decreased client faithfulness.
- Delayed sending and conveyance; Customers and end clients need things at a specific time.
- Lack of bits of knowledge and data; It's hard to examine patterns and tallies over all stockrooms and areas, and to settle on educated operational choices.
- No consistent change; There's no real way to drive efficiencies, distinguish bottlenecks or streamline forms.

2. *Depending on manual procedures*

There's no real way to track long haul patterns, store network bottlenecks or wasteful aspects. Manual stock procedures likewise hamper coordinated effort and data sharing.

3. *Guaranteeing everybody approaches the stock data they require.*

Without controlled access, indispensable data can be stolen, erased or generally rendered unusable. data should be exact and a la mode, which isn't generally simple when different locales are each utilizing their own particular manners of getting things done.

4. *Manual stock control isn't versatile*

Following with a spreadsheet works fine for 15 things, however it won't fill in also if that number increments to 100. In like manner, forms appropriate for a solitary stockroom, circulation channel or retail store may not cut it when more are included.

5. *Software is too complex*

Numerous product frameworks are exceedingly intricate with UIs that aren't instinctive and forms that are hard to ace. That can influence preparing unpleasant, to tedious and expensive, nullifying a considerable lot of the advantages created through stock process computerization. Costs include much more if extra preparing is required — like with representative turnover or when another contract joins the organization. On the off chance that new highlights or

different updates are discharged for a mind-boggling framework, it's protected to wager that all the more preparing will be vital

### **Inventory Supplies**

Supply Chain Management supplies the given production unit with all the necessary stock required for its operation. It includes activities ranging from procurement to the transfer of materials into the production system. Its basic functions are procurement stockpiling and other related logistical functions. (Hollósi, Lakner, Oláh& Popp J. 2017) Its primary objectives are the following:

- To guarantee abnormal state ability to exchange.
- To give abnormal state adaptability even with request and supply changes,
- To complete acquisitions at the most minimal conceivable costs under ideal conditions,
- To meet abnormal state quality prerequisites,
- To limit the level of lockup by store lessening.

### **Procurement / Acquisition**

Acquisition is the procedure that a creator, a distributor, or retailer, buys materials organizations and supplies from outside suppliers to encourage its errand. Contrasting and obtaining from production network administration point of view, acquirement underlines on connections amongst purchasers and dealers and is in a higher, vital level action (Bowersox et al., 2002). For a few associations, the purchase of materials from suppliers' records for half of amassing costs and once in a while this figure can be over 70% (Lambert, 2008).

Bowersox (2002) described the activities of procurement as follows;

- Minimize stock venture; Modern acquirement is to keep up supply progression with the base stock speculation conceivable. This requires changing the expenses for passing on completed the best material against the likelihood of an age stoppage. The objective is to have required materials arrives just before orchestrated age
- Quality change; Procurement can expect an essential part in the idea of an organization's things or organizations. Precisely when utilized materials and parts are of low quality, the completed things quality won't fulfill client necessities. Quality change through securing in like way impacts on costs in the firm by scrap and adjust in the creation.
- Supplier advancement; Successful obtainment relies upon finding or creating providers, examining their abilities, and choosing and working with those providers to accomplish ceaseless change.
- Pricing and purchasing discount; Price is a conspicuous worry in obtainment. Nobody needs to pay a higher cost than would normally be appropriate. When utilizing markdown some different components ought to be considered. For instance, a markdown for provoke installment of a receipt offered by one provider must be contrasted and other providers' offers, which may have diverse percent's or eras included

### **Methodology**

This paper will apply a mixed methodology to further explore the findings from the literature review and the extent of application in practice. As Yin (2017) explained that this approach provides the researcher with the opportunity to look in all areas of the subject to achieve thorough results and to make a good analysis and conclusion of the study.

The quantitative research methodology will be used to inquire about if and how the type of inventory management system and supply chain affects the performance of the organization and measure the overall performance the manufacturing company. This will require the use of structured questionnaires, as data will be analyzed using a descriptive method approach. Qualitative research methodology will provide a depth of understanding on issues that are not possible using quantitative research, by using case studies. The questionnaire is structured in such a way that employees will have to choose the answer they feel is most applicable and other questions will be given scales, which employees can use rate their answers.

A non-random sampling technique will be used; questionnaire will be developed and distributed amongst management, employees in the supply chain department and inventory control department, therefor answers will be tabulated and analyzed. In total sample size will be 34 employees of Company X. Questionnaires will be distributed

electronically, making it easy to analyses and also easier of the participants to answer the question quicker. The remaining number of employees will be excluded from the study.

The responses of the distributed questionnaires data will be analyzed using a descriptive method approach, by separating responses in terms of the different groups (management members, inventory control department employees, employees from the manufacturing line and employees from supply chain). Line Graphs and two-dimensional tables will be used to demonstrate and analyze the data collected, as they are easy to read and understand. The graph will demonstrate the relationship between the type of inventory management system and performance of the organization. The variables of the graphs will include the types of inventory management tool verses its effectiveness rating; supplier location verse arrival time of inventory in the inventory; production beginning time verse arrival time of inventory in the company.

## Results

Questionnaires was distributed to 4 management members, 10 inventory control department employees and 10 employees from the manufacturing line and 10 employees from supply chain.

Table 1 represent the results obtained from the distributed questionnaires amongst management members. The questionnaires followed a Likert Likelihood Scale, where 3 = To a Great Extent, 2 = Somewhat and 1 = Not at All. The response rate from management was 100%. The results are as follows, representing the average rating scale and its percentage;

Table 1. Results from management members

Questions	Mean ( $\bar{x}$ )
1. How effective is your inventory management system?	3.25
2. Does the SCM have an impact on inventory management system?	4
3. Does the SCM department work with the inventory control department?	3.25
4. Does the relation between SCM and Inventory Control affect the manufacturing line?	4
	$\bar{\bar{x}} = 3.63$

Scale; 4=To a Great Extent, 3= Somewhat, 2= Very Little, 1=Not at All

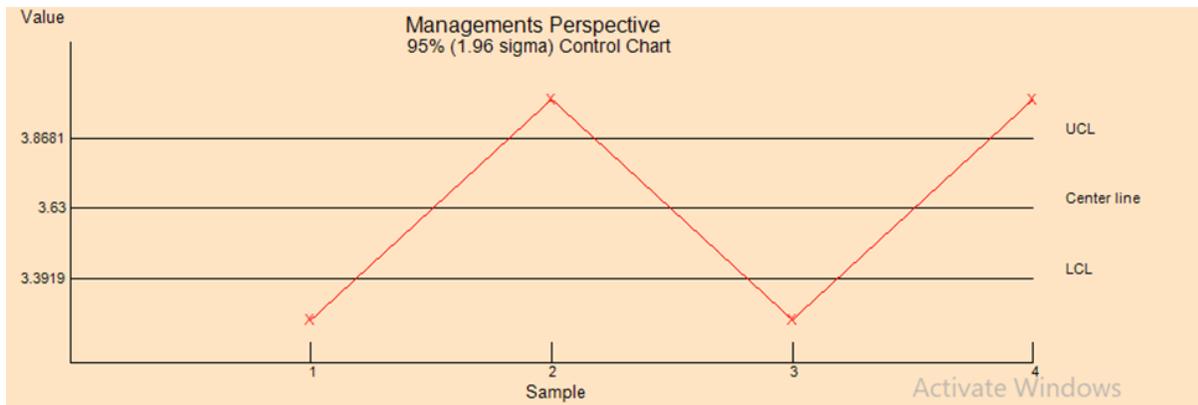


Figure 1: Management Perspective

In accordance with Figure 1, an analysis of managements perspective on the impact of inventory management and supply chain management on organizational performance.it is therefore evident that management has either minimal knowledge on the subject or are uninformed due to a lack of information flow within the relevant department. The Analysis depicts that the process is out of control as none of the plots are within the established control limits.

Questionnaires distributed to the Inventory Control department and Supply Chain were similar. This was done to establish the importance of the linkage between the two departments and establish the impact one has on the other. Questions focused on the communication flow and the level of performance of each department. Results are as follows;

Table 2. Results from inventory control department

Questions	1	2	3
1. Does the information flow from SCM affect the performance of this department?	0%	0%	100%
2. How effective is the current inventory management techniques?	0%	90%	10%
3. Is the communication process between SCM, Inventory Control and manufacturing line effective?	0%	90%	10%
4. Does the relationship between the supplier and the company affect the effectiveness of the department?	0%	0%	100%
<b>Average %</b>	<b>0%</b>	<b>45%</b>	<b>55%</b>

Scale; 3: To a Great Extent= 3, Somewhat =2, Not at All= 1



Figure 2.1: Inventory Control Perspective

The findings (Figure 2.2) show that, none (0%) of the respondents in the inventory control department believe that inventory management and supply chain do not have an impact on the performance of the organisation. An average of 45% showed a neutral perception, meaning that they were not really sure whether these principles impact on performance or not. 55% showed a strong perspective, meaning that they were confident that these two principles impact heavily on the performance of the organisation.

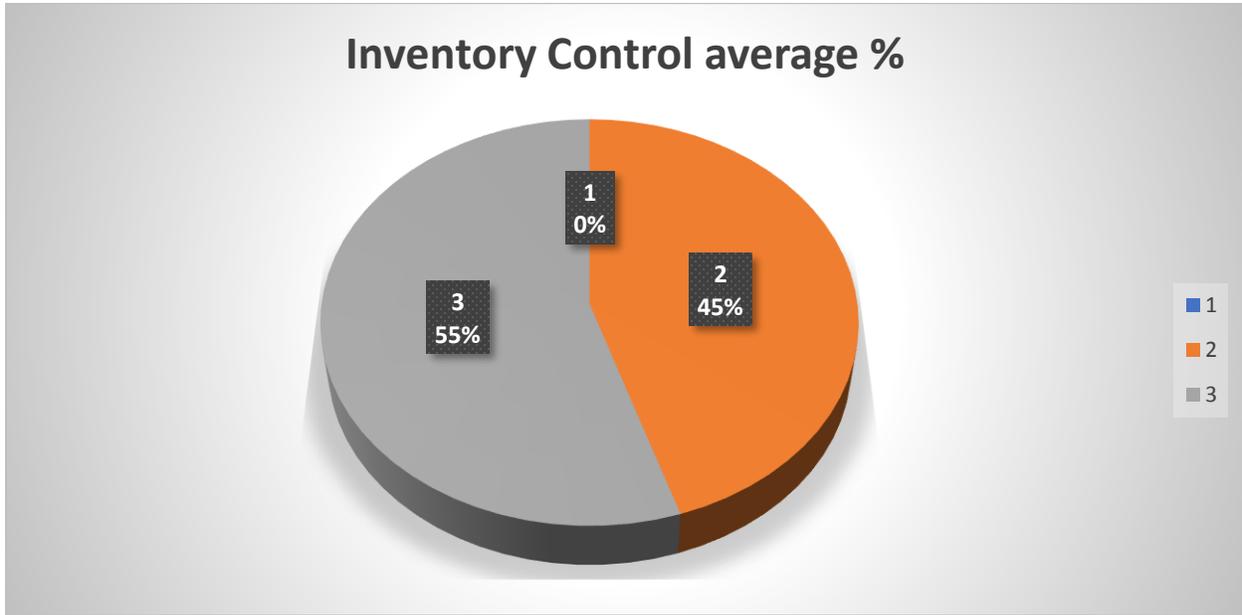


Figure 2.2: Average % of Inventory Control employees perspectives

Table 3. Results from Supply Chain Department employees.

Questions	1	2	3
1. Does the inventory control department affect your work efficiency?	0%	90%	10%
2. How effective is the current supply chain management procedures?	0%	100%	0%
3. Is the communication process between SCM, Inventory Control and manufacturing line effective?	0%	10%	90%
4. Does the relationship between the supplier and the company affect the effectiveness of the department?	0%	0%	100%
<b>Average %</b>	<b>0%</b>	<b>50%</b>	<b>50%</b>

Scale; 3=To a Great Extent, 2= Somewhat, 1=Not at All

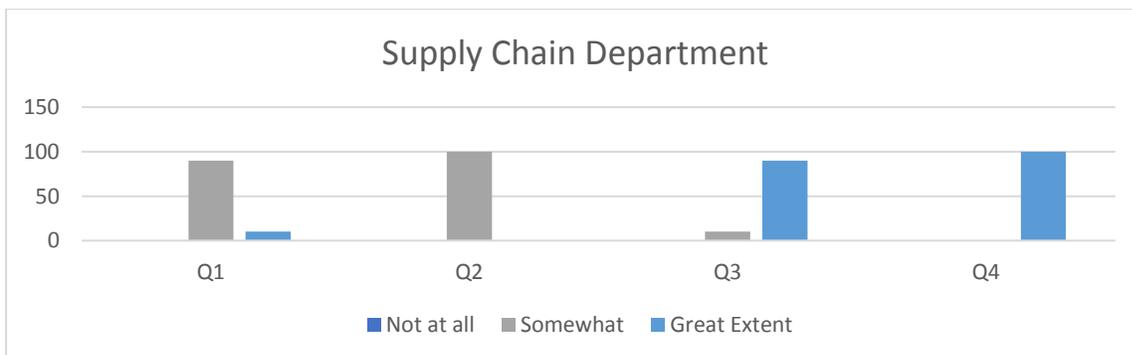


Figure 3.1: Supply Chain Department Perspective

The perceptions of the impact of inventory management and supply chain were captured from the employees in the supply chain department, who had been involved in the department for a remarkable amount of time to provide valid information relative to the subject at hand. In most cases, in almost every organisation, these principles are adopted to improve the process or operation of the business. Therefore, the results shown in Figure 3.2 indicate that 50% of the respondents believe that inventory management and supply chain have an impact on the performance of an organisation. Same as the ones with the neutral perspective on the subject.

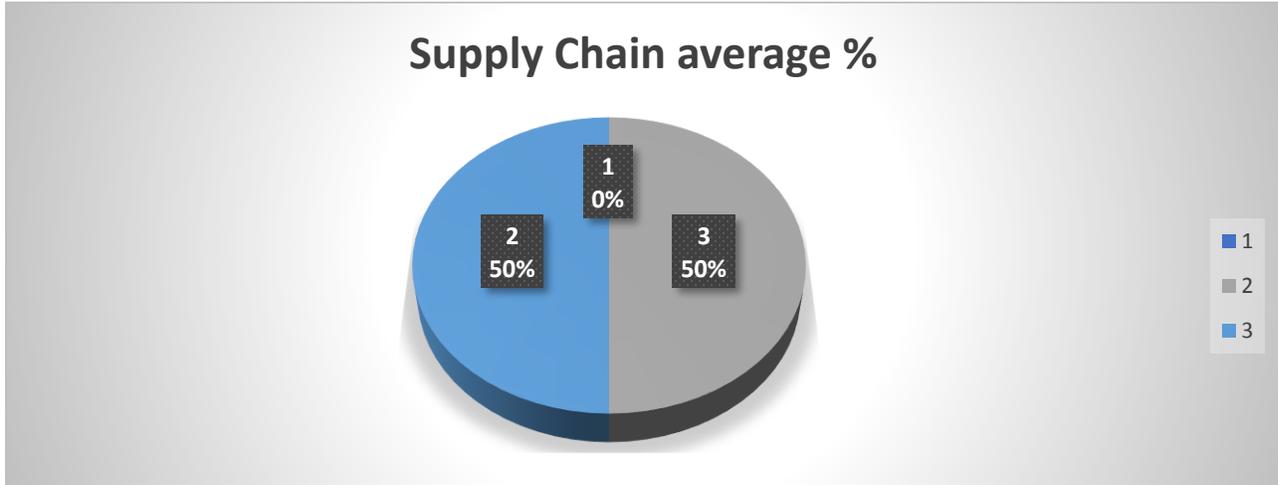


Figure 3.2: Average % of Supply Chain Department Perspectives

Employees from the manufacturing line were questioned to establish the impact the SCM and Inventory Control Department (ICM) has on the performance of the manufacturing line.

Table 4: Results from Manufacturing Line employees

Questions	1	2	3
1. Is the current inventory management technique effective?	0	90	10
2. Does the SCM and ICM effectively communicate with the manufacturing line?	0	100	0
3. Does the implemented inventory management technique impact the quality and quantity of the final product?	0	10	90
4. Does the relationship between inventory control department and supply chain affect the performance of the organization?	0	0	100
<b>Average %</b>	<b>0</b>	<b>50%</b>	<b>50%</b>

Scale; 3=To a Great Extent, 2= Somewhat, 1=Not at All

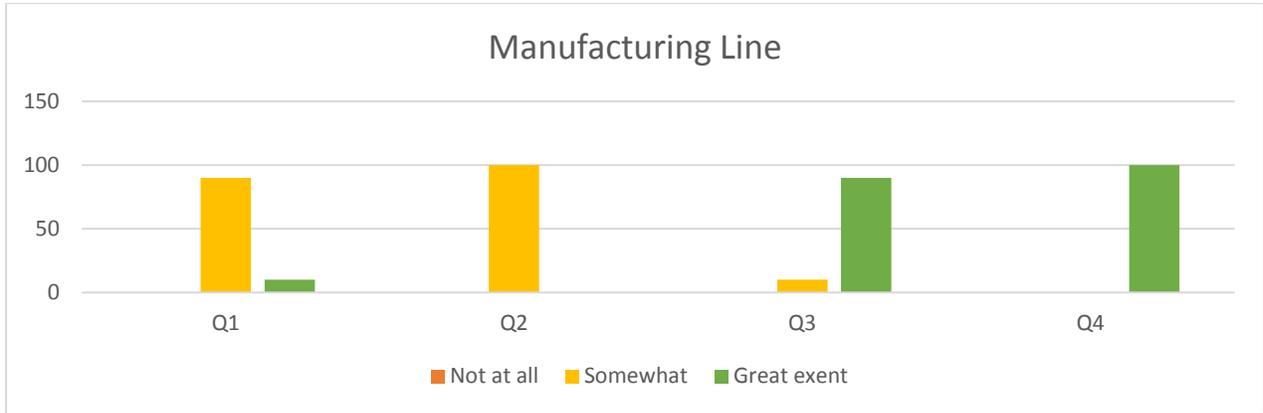


Figure 4.1: Manufacturing Line Perspective

In manufacturing line employees' point of view, 50% is neutral on the subject of whether inventory management and supply chain impact on the performance of the organization. Whereas, 50% have a strong believe that to a great extent these principles have an impact on the organizational performance.

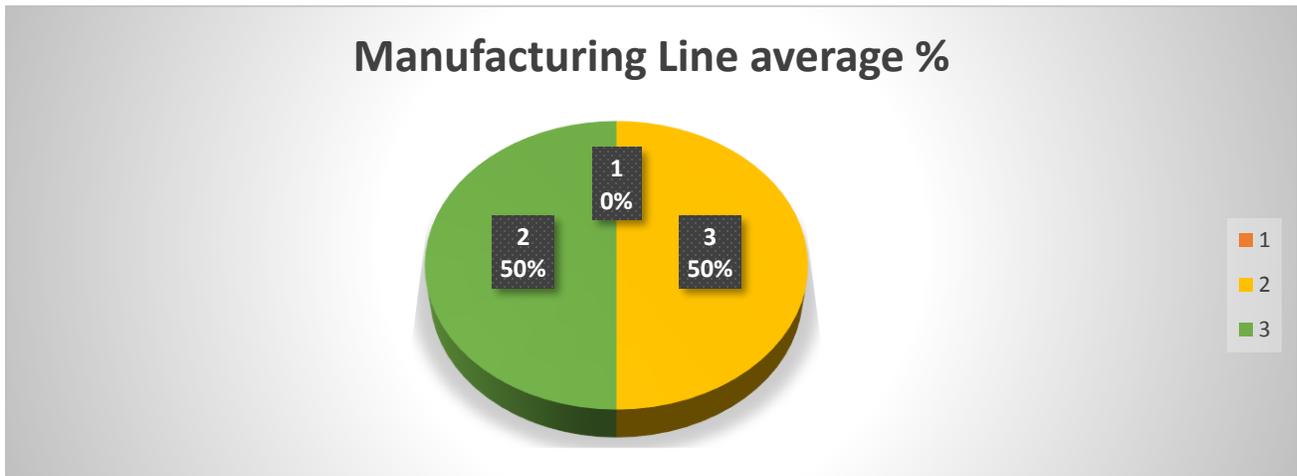


Figure 4.2: Average % of Manufacturing Line Employees Perspectives

## Discussions

The point of this examination is to demonstrate the connection between the systems utilized as a part of Inventory Management and the Supply Chain Management. The data collected is analyzed to determine the impact and importance of each department on the performance of the Company X. All the figures below are represented in a percentage form.

The first section analysis how each department perceives the importance of another department, in making the Company for effective and productive. The study focuses on the communication, information flow, working relationship and current implemented procedures between Inventory Management department and Supply Chain Department.

From the data collected it is evident that both departments view the importance of another equally important. For an individual department to be effective, it is required to work with the other one.

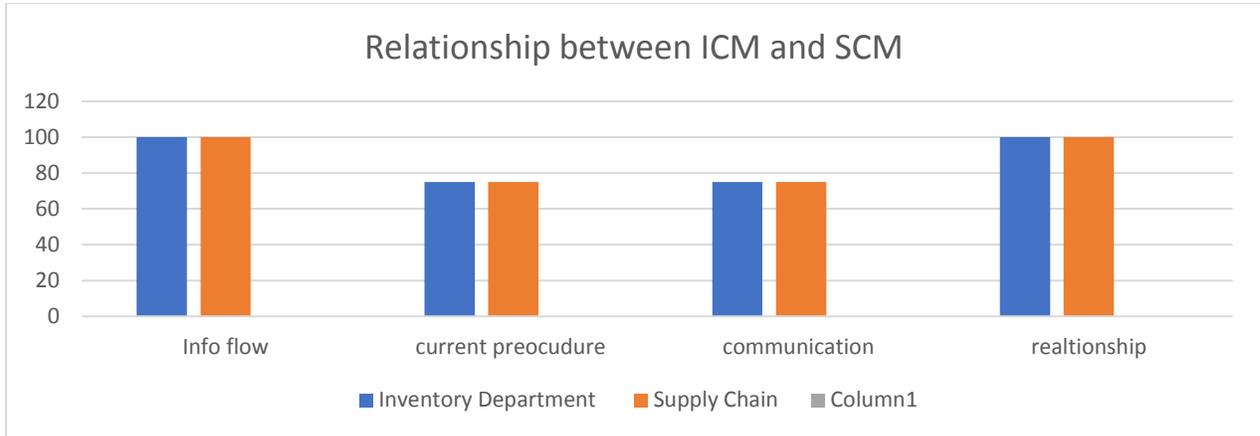


Figure 5. relationship between Inventory Management and Supply Chain Management.

The second section deal with the views of the four management members on the effectiveness of the two departments working together (Inventory Management and Supply Chin) to improve the organization.

From the study conducted it is evident that management members strongly agree that the two departments have an impact on each other, which then results in affecting the performance of the manufacturing line.

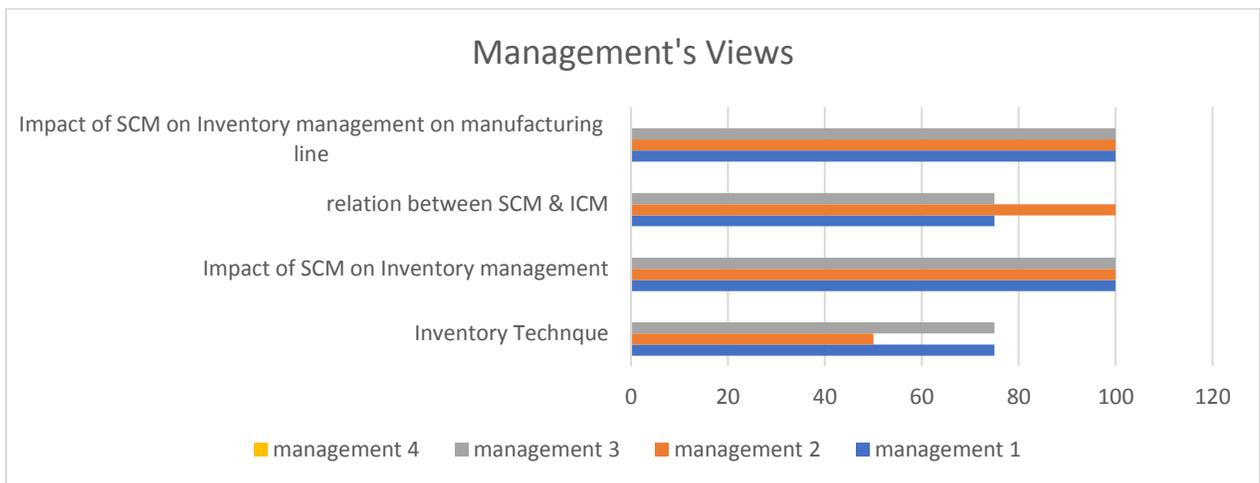


Figure 6. Management Results

The last session of the study focuses on the employees working in the manufacturing line.

From the study conducted, it is evident that the relationship between Supply Chain and Inventory Control does have an impact on the performance of the employees working in the manufacturing line. The quality of the final product and the quantity of the final product is influence by the implemented inventory management technique, as it determines the availability of the materials needed and the available working space.

How the departments communicate with employees in the manufacturing line has an impact on the performance of employees. Employees depend on the departments on information regarding materials, and the quantity required of the final product.

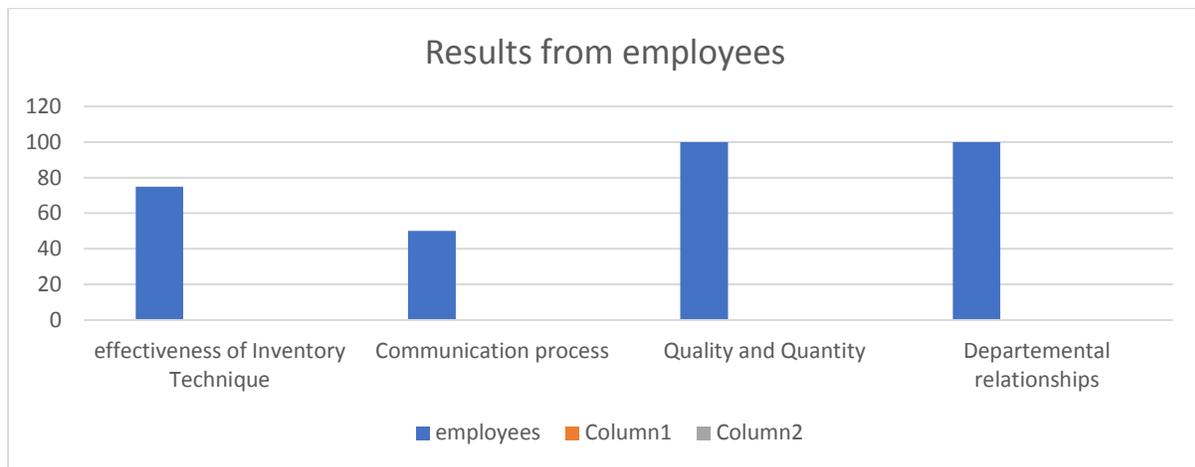


Figure 7. Results from employees

### **Conclusion and Recommendations**

From the study conducted it can be concluded that inventory management and supply chain does have an impact on the performance of the Company X. How the two departments work can influence how employees in the manufacturing line perform and the type of product they produce.

It is therefore recommended that management takes the initiative of ensuring that the two departments have a good working relationship, and also with the manufacturing line. The inventory management department is recommended that they improve their inventory control technique, by implementing the JIT system, ensuring that each manufacturing line has just enough of materials needed for the production and provide enough working space in the manufacturing line. The JIT system will also allow the company to avoid a situation of having too much or too little materials in its storage facility and also decrease the storage costs.

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