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Effect Of Inventory Control Systems On Operational Performance Of Tea Processing Firms: A Case Study Of Gianchore Tea Factory, Nyamira County, Kenya

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Abstract:
Literature on supply chain management and firm's operational performance indicate increased need for improved quality of operations. Tea processing firms face problems of fluctuating inventories, inaccurate forecasts and low utilization of inventories due to inadequate coordination of operations. The existing literature indicated that not all inventory control systems were necessarily best for application in given firms. The purpose of the study was to assess the effect of inventory control systems on operational performance of tea processing firms with a focus on Gianchore tea factory. Objectives of the study were to: Determine the effect of material requirement planning on operational performance, establish the influence of continuous replenishment on operational performance, establish the extent to which distribution resource planning influence operational performance and the effect of vendor managed inventory on operational performance of Gianchore Tea Factory. The study target population was 119 respondents consisting of one (1) factory manager, sixteen (16) middle level managers, thirty six (36) factory supervisors and sixty six (66) employees working at Gianchore tea factory. Purposive sampling and stratified random sampling techniques were applied to select a sample of fifty five (55) respondents for this study. The main data collection instrument was a structured questionnaire. Quantitative data was analyzed using descriptive and inferential statistics, and regression analysis to assess the association between the variables in the study. The findings of this study are expected to be beneficial to the management of tea processing firms to improve their operational performance and also inform policy makers. The study findings will contribute towards academic paradigms and fill the gap between researched work and unresearched areas. The expected outcome in this study is that there can be a significant correlation between the use of inventory control systems and operational performance of a tea processing firm.

1.Introduction

Inventory control systems have been of concern for many years to business firms worldwide. Inventory control systems play a crucial role in enhancing effectiveness and efficiency in handling inventory of business firms. Companies have been continually in search for sources of sustainable competitive advantage in their operations. Therefore, there is need for business enterprises to embrace effective inventory management practices in order to improve their competitiveness (Rajeev, 2008). In 1980s inventories of raw materials, work-in-progress components and finished goods were kept as a buffer against the possibility of running out of needed items (Salawati, Tinggi, & Kadri, 2012). However, large buffer inventories consume valuable resources and generate hidden costs (Salawati, Tinggi, & Kadri, 2012). Too much inventory consumes physical space, creates a financial burden, and increases the possibility of damage, spoilage and loss (Nyabwanga & Ojera, 2012). On the other hand, too little inventory often disrupts business operations (Dimitrios, 2008).

Kenya manufacturing firms are facing competition in the current markets which has led to the need for coming up with better methods of managing and measuring how resources are utilized by various jobs or products, and therefore eliminate any wastage in the supply chain (Ondiek & Odera, 2012). Consequently, many companies have to adopt appropriate inventory control systems leading to reduction of inventory and improve operational performance of tea firms. Chen, Frank, & Wu, (2005) observed that the firms with abnormally high inventories have abnormally poor stock returns. They further argued that firms with slightly lower than average inventories perform best over time.

Inventories are significant portions of current assets to any business enterprise (Kotler & Keller, 2006). Tea factories hold inventory to ensure operational activities proceed uninterrupted. However the Kenya Tea Development Agency (KDTA) managed factories face problems of fluctuating inventories, inaccurate forecasts, low utilization due to inadequate coordination of KTDA's operations, unreliable and inconsistent leaf collection and processing leading to significant losses and wastage in the supply chain

(Kagira, Kimani, & Kagwithi, 2012). The factories suffer from the variability of daily deliveries and congestion as deliveries are congested. Stevenson (2006) asserts that stocking level variability is caused by factors such as deficient information sharing, insufficient market data, and deficient forecasts. Variability of inventory majorly results due to firms not applying the inventory control systems in accordance with the baseline principles. According to (Christian Partner Development Agency, 2008) the information flow between leaf collection centres and factories is inadequate contributing significantly to high operational costs. Inventory of tea leaves is a requirement for the efficient operational performance; hence inventory needs proper control as it is one of the largest assets of the factory.

To excel in competitive environment, companies have to design and operate materials management and product distribution functions effectively (Kazim, 2008). Inventory control systems enable a business to determine and maintain an optimum level of investment in inventory in order to achieve required operational performance. (Sila, Ebrahimpour, & Birkholz, 2006), expressed that the aim of inventory control is to meet customer demand. Further, Fawcett, Ogden, Magnan, & Cooper, (2006) argue that to meet customer demand, firms have to ensure that stock-outs are avoided without incurring high inventory costs.

Tea processing firms have adopted inventory control systems in order to improve their operations. Chen, Frank, & Wu, (2005), observed that the extent of emphasis on inventories among American firms and its effects can reach into the financial markets, where the rules for rewarding firms that cut inventories and punish those that did not do so. Consequently, good inventory management is viewed as fulfilling the objective of technical competence or capability with performance judged against objective benchmarks rather than an area of flexible strategic initiative. Adding value for customers and stakeholders is rather narrowly interpreted in terms of cost minimization, reliability and speed rather than as a higher order process with information-rich criteria such as the use of final goods inventory behaviour as an information base for production and pricing strategies. As such they are concerned with controls of all activities involved in the acquisition and use of all materials employed in the production of finished goods.

Materials management concepts enhance communication and coordination by bringing together all functions which are interrelated (Ondiek & Odera, 2012). O'Dennell, Maguire, McIvor, & Humphreys (2006), outline that sophisticated techniques have been applied to this reduction such as genetic algorithms to determine optimal ordering at each echelon. Similarly Mustaffa & Potter, (2009) in their study suggested that application of the vendor managed inventory system leads to higher service levels to customers and improvements in key supply chain variables such as decreasing stock-outs and elimination of the bullwhip effect. Further Kazim, (2008) identified the various inventory control systems that have been implemented by various industries as such as vendor managed inventory and forecasting and replenishment.

According to Hardgrave, Langford, & Waller, (2008) firms have to acquire the right technology of inventory control systems for managing their supply chain inventories. Brent & Travis, (2008), examined inventory control systems through collaborative models. They further discussed the integration of traditional logistics decisions with inventory management decisions using traditional control models. Inventory control systems would integrate the farmers, tea factories and customers of the tea products. However, according to Mathuva, (2013) the direction of the relationship between inventory control systems and operational performance of business firms had not been clear. Furthermore studies on the relationship between inventory control systems and performance had produced mixed results (Gill, Biger, & Mathur, 2010). This acted as the fundamental concept behind the present study.

1.1. Statement Of The Problem

Literature revealed that the Kenya Tea Development Agency managed factories faced problems of fluctuating inventory, inaccurate forecasts and low utilization of inventories collected due to inadequate coordination of tea factory's operations (Kagira, Kimani, & Kagwithi, 2012). The tea factories suffered from the variability of daily deliveries and congestion as deliveries were concentrated. Further Christian Partner Development Agency, (2008) revealed that the information flow between leaf collection centres and factories was inefficient thus significantly contributing to slow response to customer demand and high operational costs. Bai & Zhong, (2008) argues that inventory investment and its control systems for a business make up a big percentage of the total budget. Literature indicated that inventory control was one of the most neglected management areas in most firms thus straining on a business' operations. Further Mathuva, (2013) expressed that the direction of the relationship between inventory control systems and operational performance of business firms has not been clear over time. Furthermore previous studies on the relationship between inventory control systems and performance had produced mixed results (Gill, Biger, & Mathur, 2010). In this view, the study proposed to assess the effect of inventory control systems on the operational performance of tea processing firms with particular focus on Gianchore Tea factory in Nyamira County, Kenya.

1.2. Objectives Of The Study

The general objective of the study was to assess the effect of inventory control systems on operational performance of tea processing firms, with particular focus on Gianchore tea factory in Nyamira County, Kenya.

1.3. The Specific Objectives

- To determine the effect of material requirement planning on the operational performance of Gianchore Tea Factory in Nyamira County.
- To establish the influence of continuous replenishment on operational performance of Gianchore Tea Factory in Nyamira County.
- To establish the extent to which distribution resource planning influences the operational performance of Gianchore Tea Factory in Nyamira County.

- To establish the effect of vendor managed inventory on operational performance of Gianchore tea factory in Nyamira County, Kenya.

1.4.Research Questions
- What is the effect of material requirement planning on operational performance of Gianchore Tea Factory in Nyamira County?
- What is the influence of continuous replenishment on operational performance of Gianchore Tea Factory in Nyamira County?
- To what extent does the distribution resource planning influence the operational performance of Gianchore Tea Factory in Nyamira County?
- What is the effect of vendor managed inventory on operational performance of Gianchore Tea Factory in Nyamira County?

1.5.Justification of the Study
In order to minimize the operational costs and inaccurate forecasts arising from inadequate application of inventory control systems, and enhance supply dependability and speed of production scheduling; detailed study was needed to assess the effect of inventory control systems on operational performance. Hence this study is justified as it helped in providing information useful on effects of inventory control systems on operational performance of the tea firms in Kenya.

1.6.Significance Of The Study
This study was of great significance to a number of stakeholders among them tea factory managers and future researchers. The tea factory managers were expected to benefit immensely from the findings of this study as it may challenge them to embrace the inventory control systems to enhance the operational performance of the tea factories they manage thus increase their competitive advantage in ever changing business environment. This study also made available literature on the effect of inventory control systems on operational performance of tea processing firms for future researchers since the topic had not been thoroughly researched. This bridged the gap of contingency issues in procurement.

1.7.Limitation Of The Study
The researcher anticipated a limitation in accessing information as many institutions were not openly willing to give information freely to anybody.

2.Literature Review

2.1.Theoretical Review on Inventory Control Systems
Different theories have been employed to help bring clarity to the study of the effects of inventory control systems on operational performance of tea factories. The study borrowed from the theory of constraints, contingency theory and lean theory to build the critical concerns on effects of inventory control systems on operational performance in tea processing firms.

2.2.Theory Of Constraints
The theory of constraints is a management philosophy that seeks to increase manufacturing throughput efficiency or system performance measured by sales through the identification of those processes that are constraining the manufacturing system (Goldratt, 2004). Kazim, (2008), argues that theory of constraints is based on the principle that a chain is only as strong as the weakest link or constraint and to elevate and manage the constraint as necessary. The difficulties in the theory of constraints are: very long lead times, large number of unfulfilled orders or they are executed with much extra effort (overtimes), high level of unnecessary inventories or lack of relevant inventories, wrong materials order, large number of emergency orders and expedition levels, high levels of devolution, lack of key customers engagement, frequent changes or absence of control related to priority orders, which implies on schedule conflicts of the resources (Goldratt, 2004). These are the bottlenecks tea factories are likely to face warranting their application of inventory control systems in order to enhance their operations to meet the projected operational performance. The theory is founded on the belief that an organization that maximizes the output of every machine will not perform as well as one that ensures optimization of the flow of materials and value created through its operational performance.
Theory of constraints emphasizes focus on effectively managing the capacity and capability of these constraints if they are to improve the operational performance of their organization. This can be achieved by tea processing firms applying appropriate inventory control systems. Companies have struggled to invest in the technology and organizational structures needed to achieve to-date systems synchronization that enable coordinated inventory flows (Fawcett, Ogden, Magnan, & Cooper, 2006). The Theory of Constraints methodology proposes that operational performance is dependent on the application of inventory control systems in tea processing firm. Theory of constraints is a methodology whose basis is applied to production for the minimization of the inventory. In reality, it is difficult for a tea firm to forecast with precision the consumption of its specific product at a specific region with sometime prior to production and supply of the same product.
Under Theory of Constraints, performance measurements are based on the principles of throughput, inventory dollar days and operating expenses (Umble, Umble, & Murakami, 2006). Theory of Constraints measurements are based on a simple relationship that highlights the effect of inventory control system on progress toward the operational performance. The proof of effectiveness

for any inventory control system is the degree to which it improves operational performance of business firms. For tea processing firms to ensure that the bottlenecks on their operations run smoothly they have to embrace the use of inventory control systems that can facilitate operational efficiency. This may result in the acquisition of additional capacity or new technology of inventory control systems that lift or break the constraints. Improving the performance of the constraint leads to improvement in the operational performance of the entire system. The tea processing firms depend on inventory as a resource in their operations. The theory of constraints contributes a lot to the building of literature in this study. Boyd & Gupta, (2004) in their studies introduced a theoretical model for Theory of Constraints on Manufacturing Resource Planning and Just-In-Time in manufacturing firms, they suggest that a positive relationship between each of the three Constraints principles and ideas can be used to improve operational performance of tea processing firm in Kenya. Gupta & Boyd (2008) in their research on 'theory of constraints can serve as a general theory in operations' revealed that theory of constraints provides approaches to operations that avoid pitfalls of local optimization by reaching a cross functional boundaries in organizations. They also noted that while the theory appears to meet the criteria of a good theory, it has not been empirically tested for the most part. Criticism that has been leveled against theory of constraints includes its sub optimality. Trietsch, (2005), argues that the theory is inferior to competing approach. The theory to establishing an optimal product mix that is likely not to yield optimum results Linhares (2009).

2.3.Lean Theory
Lean theory is an extension of ideas of just in time. (Kros, Falasca, & Nadler, 2006), elaborate just in time as a pull-based system designed to align the production and business processes throughout the supply chain. (Green & Inman, 2005), assessed the impact of lean theory on financial performance. They say that theory may eliminate buffer stock and minimize waste in production process. (Eroglu & Hofer, 2011), found that leanness positively affects profitability of a business firm. They argue that inventory leanness is the best inventory control tool.
The theory elaborates on how manufacturers gain flexibility in their ordering decisions, reduce the stocks of inventory held on site and eliminate inventory carrying costs. Feinberg & Keane, (2006), discuss their findings of reducing inventories at firm level. They go on saying that at the aggregate level, the empirical strength of the lean explanation lies both in the timing and the magnitude of the adoption. However in the theory, inventory constrains a firm's ability to respond to fluctuations in demand (Feinberg & Keane, 2006). Scholarly studies indicate that companies successfully optimize inventory through lean supply chain practices and systems to achieve higher levels of asset utilization and customer satisfaction leading to improved organizational growth, profitability and market share (Waller, Tangari, & Willians, 2008).
Another study suggesting a positive relationship between inventory management and performance was that of (Eroglu & Hofer, 2011) in which their study focused on US manufacturing firms covering the period of 2003-2008. They found that leanness positively affects profit margins. According to Eroglu & Hofer, (2011) firms that are leaner than the industry average generally see positive returns to leanness. They used empirical leanness indicator as a measurement for inventory management. Contrary to the present study, their study focused on assessing the relationship between inventory performance and overall firm performance. Criticism leveled against the theory is that it can only be applicable when there is a close and long-term collaboration and sharing of information between a firm and its trading partners.

2.4.Contingency Theory On Operational Performance Management
Most management research focuses on the determinants of performance. The present study will adopt contingency theory on management of tasks in different operational settings. The essence of contingency theory is that best practices depend on the contingencies of situation. According to Carton, (2004) the changes in dependent measures are considered to represent performance caused by variations in the independent measures. Following Carton's hypothesized relationship, inventory control systems are determinants of changes in operational performance of tea processing firms. In this respect changes in inventory control systems will represent operational performance. The essence of operational performance is creation of value. Value creation may be a combination of financial and non financial objectives (Carton, 2004). Successful operational performance of a firm can be equated with successful value addition.
Organizations' operational performance can be judged by many perspectives. Each tea processing firm has a unique set of circumstances making operational performance measurement inherently situational. The contribution of inventory control system in operational performance of the organization is focused on financial and non financial benefits, efficiency of procedures and effectiveness of procurement activities (Department of public works, 2006). On the contrary Lex, (2006) the theory faces challenge of being static.

2.5.Material Requirements Planning (MRP)
Material requirements planning is standard system for calculating the quantities of components, sub-assemblies and materials required to carry out a production programme for complex products (Rushton, Phil, & Baker, 2011). The MRP process starts with a production programme which schedules the products to be completed week by week during the planning period. It is based on customer orders, sales forecasts and manufacturing policy (Farrington & Lysons, 2006).
Material requirements planning systems help manufacturers determine precisely when and how much material to purchase and process based upon a time-phased analysis of sales orders, production orders, current inventory and forecasts (Farrington & Lysons, 2006). They ensure that firms will always have sufficient inventory to meet production demands, but not more than necessary at any given time. The inventory control system may be critical to maintaining an appropriate stock level of all products to avoid shortages or oversupply. This may have the effect of ensuring supply reliability of the business firm. Su & Zhong (2009), argue that consistent product availability stimulates consumer demand. According to Kotler & Keller (2006)

inventories are a significant portion of the current assets of any business. The study was conducted in Europe. They noted that business firms hold inventory to ensure uninterrupted business operations. Inventory needs proper control as it is one of the largest assets of a business.

Material requirement planning system uses master production schedule which it explodes into a bill of materials (Jacobs, Berry, Whybark, & and Vollmann, 2011). Allowing for stock and orders due in, a net requirement of components required is produced. This initiates purchase and work orders taking account the lead times. The process can be computerized using specially designed software packages and is appropriate for depended items for which there is 'lumpy' demand (Rushton, Phil, & Baker, 2011). In manufacturing firms, a high proportion of operational expenditure is expended on inventory (Oniwon, 2011). Inventory represents the major component of a tea processing firm's operational performance. The study insists that inventory has to be available at the right time, right place, right quantity, right quality and right place in order for a firm to generally perform well.

Material requirements planning system may play a critical role in speeding up production scheduling execution. Scheduling entails generation of a plan with reference to the sequence of time allocated for the completion of an item (Cousens, Szweszewski, & Sweeney, 2009). Production planning involves the acquisition and allocation of limited resources to meet customers' demand over a given time horizon (Quesada, Gazo, & Sanchez, 2012). The system may regulate the rate at which inventory flow and hence affecting the speed of firm's operations. MRP will even schedule purchase orders and production orders for just-in-time receipt (Rushton, Phil, & Baker, 2011). Sticking to scheduling policy can lead to reduced lead times and higher production rates (Quesada, Gazo, & Sanchez, 2012). According to (Silva, 2013) scheduling preserves systems capacity utilization and directly affects the speed of response to customer demand. The inventory control system has implications on effectiveness of scheduling and scheduling effectiveness has impact on speed of customer service delivery (Silva, 2013).

MRP modules take the guesswork out of purchasing by automatically calculating material requirements, and coordinating purchase orders and production orders for timely receipt. However, Ketchen, Thomas, Hult, & Slater, (2007) state that supply chain predictability should be sought, but not at expense of creating inflexibility in general performance of a business firm. Flexibility is the ability of the firm to react and adapt to changes in the market and inventory control systems enhance flexibility of operations of the firm (Quesada, Gazo, & Sanchez, 2012). They assert that this has an effect of enhancing the capability and speed to providing products that meet individual customer's demand.

Materials management concepts enhance communication and coordination by bringing together all functions which are interrelated (Ondiek & Odera, 2012). Denkena, Apitz, & Liedtke, (2006), confirmed that the system of controlling inventory has the potential to reducing inventories, shorten lead time, raise quality and enhance flexibility. According to Ciambrone, (2008) material requirement planning systems are able to improve scheduling effectiveness. His study indicates that computerized material requirement planning systems can effectively manage the flow of thousands of components throughout a manufacturing facility. However the study is not clear on the effect of material requirement planning on operational performance.

MRP as a tool determines requirements based upon master production schedule (MPS) a module that offer ways related to inventory more relevant and current (Rushton, Phil, & Baker, 2011). For instance, production orders may be scheduled based upon current customer orders or inventory levels, thus accommodating both ''make to order'' and ''make to stock'' procedures. The MPS may include product forecasts, which can be calculated automatically using data from sales or production history (Rushton, Phil, & Baker, 2011). Despite its simplicity, MRP systems hold great potential for making significant contributions in the quest for productivity that would allow small firms to compete in an international marketplace. However, in their zeal to quickly correct several decades of poor manufacturing practices, many small companies rushed to introduce MRP which they viewed to be magical and simplistic method of doing business (Farrington & Lysons, 2006). In this context manufacturers may have overlooked its implementation which is a very important aspect of MRP systems.

An improved extension of MRP is MRPII which stands for manufacturing resource planning (Mathuva, 2013). Mathuva, (2013), points out that MPRII is computer based planning and scheduling designed to improve management's control of manufacturing and its support functions. MRP II provides priority planning in that 'rush' jobs can be brought forward in time and others put back in time and necessary adjustments made to material delivery schedules (Baily, Farmer, Barry, Jessop, & David, 2008). It provides integration of related functions into the system (in particular capacity planning, inventory management and shop floor control) allows feedback from them, making sure that the production plan is constantly kept up to date (Baily, Farmer, Barry, Jessop, & David, 2008).

He argues that MRPII is termed as enterprise resource planning (ERP) which represents a group of software programs designed to tie together disparate company functions to create more efficient operations in the firms. Enterprise resource planning system is a complete enterprise business solution to problems of inventory control. According to Jacobs, Berry, Whybark, & and Vollmann (2011) the enterprise resource planning system consists of software support modules such as marketing and sales, procurement, distribution, production and inventory control. They further argue that Enterprise resource planning is the equivalent of the organization's central nervous system, sensing information about the condition of different parts of the business and relaying the information to other parts of the business that need it.

Hendricks, Singhal, & Stratman, (2005), researched on the effect of investments in Enterprise Resource Planning on a firm's long-term stock price performance and profitability. Their study was based in USA. The findings of their study indicated mixed results. Their findings indicated evidence of improvement in profitability but not in stock returns. According to Ahmed & Ayman, (2011) enterprise resource planning is adopted in many firms in attempts of improving business performance. Federici, (2009), outlined reasons for firms acquiring enterprise resource planning systems as providing better operational and management of information.

There is feedback from vendors, the production shop, and store when a problem arises in implementing the production plan, which enables adjustments to be made to overcome these problems immediately (Baily, Farmer, Barry, Jessop, & David, 2008). MRPII is used for simulation purposes (Emmett & Granville, 2007). The system will simulate the consequences for order releases,

current order schedules, inventories, work in progress, finished product, labour costs and cash flow. If this is not a viable proposition then an alternative can be tested, and once this found the necessary adjustments can be made throughout the system. It is used for financial plans, reduction plans and inventory levels (Emmett & Granville, 2007).

2.6.Continuous Replenishment (CRP) System

Continuous Replenishment is an inventory control system that can be adopted by a tea processing firm. The aim of continuous replenishment is to develop free flowing order fulfillment and delivery systems, so that pipeline inventories can be substantially reduced (Baily, Farmer, Barry, Jessop, & David, 2008). According Farrington & Lysons, (2006), influential thinkers in supply chain management have suggested that inventory is waste and should be avoided wherever possible. The reasons behind this view are stocks of material can adversely impact any organization because they tie up capital. However they did not clarify the solution to excess inventory held by business firm. It is also argued that stocks are frequently held for wrong reasons sometimes to mask inefficiencies in the management of organization (Rushton, Phil, & Baker, 2011). Dimitrios (2008), adds that too little inventory often disrupt business operations. It is further argued that too much inventory consumes physical space, creates a financial burden and increases the possibility of damage, spoilage and loss (Nyabwanga & Ojera, 2012).

Continuous replenishment systems use up-to-the-point-of-sale information systems to identify real time demand and to pull product through directly from the supplier through the distribution centre (DC) and on the retail outlet (Baily, Farmer, Barry, Jessop, & David, 2008). CRP systems are thus able to synchronize this flow of product by focusing on the end-user requirements via the use of real-time demand, linked to flow-through distribution systems that allow for cross-docking, store ready packaging and automated handling (Baily, Farmer, Barry, Jessop, & David, 2008).

Inventory is a critical resource and maintaining it is necessary for tea processing firms. Inventory control system may be adopted for purposes of reducing storage costs and factory overall costs. The system provides the organizational structure and the operating policies for maintaining and controlling goods to be stocked (Jacobs, Berry, Whybark, & and Vollmann, 2011). According to their study raw materials ordering frequency is indentified as an important factor contributing to inventory cost. Frequent ordering in small quantity is considered as an important strategy for choosing inventory control system (Jacobs, Berry, Whybark, & and Vollmann, 2011).

Inventory control can be defined as the policies and procedures which systematically determine and regulate which things are kept in stock and what quantities of them are stocked (Rushton, Phil, & Baker, 2011). For each item stocked decisions are needed as to the size of the requirement, the time at which further supplies should be ordered and the quantity which should be ordered. However decisions regarding the amount of inventory that a company should hold and its location within a company's logistics network are crucial in order to meet customer service requirements and expectations (Baily, Farmer, Barry, Jessop, & David, 2008).

According to Kumar & Suresh, (2008) inventory control ensures that the financial investment in inventories is minimal. They further create a linkage between efficient utilization of working capital and minimization of cost due to deterioration, obsolescence, damage and pilferage of inventory. They conclude that inventory control promotes economy in purchasing. However their study did not indicate the extent to which inventory control systems reduce cost of the firm. This study proposes to assess the effect of cost reduction on operational performance of the firms.

Kumar & Suresh, (2008), argue that effective control on inventory is a must for smooth and efficient running of the production cycle with least interruptions. They proceed with their argument that this is warranted by varying intervals between receiving the purchased parts and transforming them into final products. They further argue that inventory control would ensure adequate supply of products to customers and avoid shortages and ensure timely action for replenishment. Inventory control systems may ensures smooth production and hence no stock-out.

2.7.Distribution Resource Planning (DRP) System

Distribution Resource Planning is a system for forecasting or projecting requirements for finished products at the point of demand (Farrington & Lysons, 2006). DRP systems are designed to take forecast demand and reflect this through the distribution system on a time-phased requirement basis (Baily, Farmer, Barry, Jessop, & David, 2008). From these projections, aggregated, time-phased requirements schedules for each echelon in the distribution system can be derived (Rushton, Croucher, & Baker, 2011).

Distribution resource planning system acts by pulling the product through the distribution system once demand has been identified (Baily, Farmer, Barry, Jessop, & David, 2008). According to Rushton, Phil, & Baker, (2011) the system works to the elimination of inventory. The distribution resource planning system tries to combine the need for lower inventory investment with improved customer service. According to Hansen & Mowen (2007) lowering inventory level would give organization a competitive advantage due to production of quality products at lowering prices and it will respond faster to customer needs. Businesses seek ways to reduce the time to bring products and services to market place to gain competitive edge (Hanke & Wichern, 2009). It enables physical resources requirements to be planned together with production and purchasing control. It controls the entire logistics system (Baily, Farmer, Barry, Jessop, & David, 2008).

Inventory control systems have effect of smoothing the operations of the firm hence reducing lead time (Cousens, Szweszewski, & Sweeney, 2009). According to (Langfield-smith et al, 2009) time delays in production affect operational performance negatively. They assert that cycle-time management can be used as competitive advantage. However Cousens, Szweszewski, & Sweeney (2009) are of contrary opinion that reduction of lead time can only be beneficial if does not affect negatively operations of the firm.

The control system may have an implication on predictability of future demands and speed of the firm's production scheduling to meet customer demand. DRP serves a central role in coordinating the flow of goods inside the factory with the system modules

that place the goods in the hands of the customer (Farrington & Lysons, 2006). Predictability of future demands, resource requirements and consumer needs may contribute to flexible operational performance. Bowersox, Closs, & Cooper (2007), state that competency of a firm can be measured by how well it is able to adapt to unpredictable situations. Accurate forecasting may have an effect on a firm's inventory level. Chang & Lin (2010) state that bullwhip effect is an example of predictive inaccuracy. Hanke & Wichern (2009), add that capacity of operational activities of the firm will be such that its output just matches demand. They say that excess capacity is wasteful and costly; too little capacity means dissatisfied customers and lost revenue. They argue that having the right capacity requires having accurate forecasts of the demand and the ability to translate forecasts into capacity requirements. DRP system take forecast demand and reflect this through the distribution system on a time-phased requirements basis (Rushton, Croucher, & Baker, 2011).

According to Quesada, Gazo, & Sanchez, (2012) accurate demand and sales forecasts help a firm out of stock-out situations and allow a business firm provide high level of customer service. The control system is fronted as to facilitate accurate prediction of customer demand and hence timely response to their requirements. DRP provides the basis for integrating the manufacturing planning and control system from the firm to the field (Farrington & Lysons, 2006).

2.8. Vendor Managed Inventory (VMI)

Vendor Managed Inventory (VMI) is where the manufacturer is given responsibility for manufacturing and controlling inventory level at the retailer's distribution centre and in some instances at the retail store level as well (Baily, Farmer, Barry, Jessop, & David, 2008). VMI is a process that falls under the 'push' stock management processes Irungu & Wanjau (2011). These are processes that can be triggered by a tea processing firm's interpretation of an expected demand in inventory and supply is scheduled to meet this demand.

A well designed and developed approach to VMI can lead not only to reductions in inventory levels in the supply chain, but also to secondary savings arising from simplification of systems and procedures (Rushton, Croucher, & Baker, 2011). This is because there is potential for great improvement of operational performance of tea processing firm. This is due to elimination of delays in both information and material flow for the tea processing firm. The achievement of delivery on time is a standard procurement objective. If goods and material arrive late or work is not completed at the right time, sales may be lost, production halted, and damages may be invoked by dissatisfied customers (Baily, Farmer, Barry, Jessop, & David, 2008). Failure to achieve supply on time may slow down the cash to cash cycle, thus reducing the organization's efficiency or profitability (Baily, Farmer, Barry, Jessop, & David, 2008).

VMI provides the opportunity to develop a much close relationship and binding relationship among the retailers and the manufacturers as well as giving a much better visibility of the real demand. The supplier takes the responsibility for operational management of the inventory within a mutually agreed framework of performance targets which are constantly monitored and updated to create an environment of continuous improvement (Baily, Farmer, Barry, Jessop, & David, 2008). Users receive improved service levels, and cash flows, and vendors enjoy better visibility of changing demand and greater customer loyalty (Emmett & Granville, 2007). Reduced administrative costs due to elimination of the need to monitor levels, paper to computer entries and reduced re-ordering costs (Farrington & Lysons, 2006).

 This can lead to significant reductions in inventory holding right through the supply chain (Rushton, Croucher, & Baker, 2011). The vendor is able to schedule deliveries efficiently, as it has better visibility of the client's requirements and it can incorporate these requirements at an early stage its product schedules (Rushton, Croucher, & Baker, 2011). VMI is likely to smooth demand. Companies that can react promptly and accurately to the needs of their customers are more likely to attract orders than those that cannot (Baily, Farmer, Barry, Jessop, & David, 2008). If a company is seeking competitive advantage of becoming better able to respond to customer needs as they arise, then it follows that the company will require a greater degree of responsiveness from its own suppliers (Baily, Farmer, Barry, Jessop, & David, 2008).

VMI information improves forecasts of customers' requirement, thereby enabling manufacturers to plan production to meet customer demand (Farrington & Lysons, 2006) . It enhances operational flexibility. It enables production times and quantities to be adjusted to suit the suppliers (Farrington & Lysons, 2006).

While VMI has been voted best by the retail managers, it has its shortcomings associated with trust, turnover of suppliers and small scale suppliers who lack financial capacity to implement VMI system sustainably (Irungu & Wanjau, 2011). They further argue that sometimes this interferes with customer satisfaction as some goods on VMI become one-offs due to the high turnover of suppliers because some new suppliers are yet to develop credibility in their respective area of supply. The VMI effectiveness as a system is affected by inventory flow, the quality of ICT and quality of information and sharing but is not affected by the quality of relationship. Most of the empirical studies addressing the issue of VMI have focused on manufacturing firms and retailers (Vigtil, 2007; Kauremaa, Smares, & Holmstrom, 2009).

Irungu & Wanjau, (2011), argued that vendor managed inventories systems could be used to gain competitive advantage by leveraging on inventory supplier reliability and strong buyer/supplier relationships to grow revenue and reduce risk. Their findings suggest that vendor managed inventory has been effective in retail supermarkets by improving stock management, cash flow and risk management. Irungu & Wanjau, (2011), stressed that vendor managed inventory system has a goal of accomplishing deeper integration and collaboration between the members of the supply in order to cope with the ever decreasing time windows for product and service fulfillment and the requirement for operational improvement of operational efficiency.

Classen, Weele, & Raaij, (2008), testify empirically that implementation of the Vendor-Managed Inventory system leads to improved service levels rather than cost reductions. Vendors and clients have linked computer systems often using Electronic Data interchange (EDI). This allows the vendors to monitor levels of inventory. Further the Vendor-Managed inventory initiative has

the goal of accomplishing deeper integration and collaboration between the members of the supply chain in order to cope with requirements for the improvement of operational efficiency (Irungu & Wanjau, 2011).

Stevenson (2006) observed that stocking level variability is caused by factors such as deficient information sharing and deficient forecasts. He found out that variability of inventory majorly results due to firms not applying the inventory control systems. He enumerated the effects of inventory variability as inaccurate forecasting leading to periods of not having enough capacity leading to inadequate customer service and high inventory costs.

Operational performance of tea processing firms can be measured from increased trustworthiness of the firm due to adoption of appropriate inventory control system which may enhance visibility of demand. Inventory control systems would enhance procurement efficiency and effectiveness of purchasing function and hence improve performance of the firm (industry-trade, 2008). Inventory control systems give feasibility in operation functions. Fawcett, Ogden, Magnan, & Cooper, (2006) appreciate the fact that companies have struggled to invest in technology of inventory control systems and organizational structures needed to achieve data and systems synchronization that enable coordinated inventory flows. This enhances timely inventory replenishment hence ensuring availability of supply as demand arises.

According to Baily, Farmer, Barry, Jessop, & David, (2008) it is vital to get the balance of cost and service right. They argue that specific inventory targets are agreed and it is the responsibility of the manufacturer to ensure that suitable inventory is always available. They continue arguing that such depend on timely information and suitable computerized inventory control systems which have become available in recent years. However they fail to clarify whether the situation has improved than before or not. Therefore the current study intends to clarify the same.

2.9.Determinants Operational Performance In Tea Processing Firms

According to Bourne, Kennerley, & Franco-Santos (2005) performance measurement is traditionally concentrated on financial measures. In this context operational performance is a measure of change of operations of tea processing firms or their outcome resulting from use of inventory control systems. According to Department of public works (2006) it is significant that what measured is not only important to the business firm but should also cover all core areas. Operational performance provides the basis for a tea processing firm to assess how well it is progressing towards its predetermined objectives. According to Atrill (2006) there is need to analyze the costs of maintaining certain levels of inventory as there are costs involved in holding too much stock and there are also costs involved in holding too little inventory. In the cost structure of most of the products manufactured the cost of materials exceeds 50% of the total cost (Ramakrishna, 2005). Ramakrishna (2005), argues that inventory control systems provides an opportunity to reduce manufacturing costs and be treated as a profit centre, this may affect the operational performance of tea processing firms.

According to Lardenoije, Van Raaij, & Van Weele (2005) financial measures ignore market dynamics and increased complexity in acquisition of goods and services for business firms. They are of contrary opinion that firms have to assess the complexity of acquisition of inventory and on how to control in order to improve operational performance of the firm. According to Dias, (2005) the function of inventory control is to measure and monitor the stocks on which is major concern to the administrators. The study challenges the entrepreneurs to find formula to reduce inventory without compromising production and without increasing cost.

Rajeev (2010) argues that inventory management practice is a way of acquiring competitiveness. Their study was carried out in Bangalore, India with reference to machine tools small scale enterprises. Variables of his study were inventory management practices as independent variable, and cost reduction as dependent variable. The findings of the study indicated positive relationship between variables. The present study has slightly different variables.

Dettoratius, Raman, & Craig, (2013) state that a lot of revenue is lost due to stock-outs induced inventory inaccuracy. Salawati, Tinggi, & Kadri, (2012), analyzed the impact of inventory management on performance. They empirically examined the relationship between inventory management and firm performance on a sample of financial data for 82 construction firms in Malaysia for a period 2006-2010. They employed regression and correlation technique to analyse their findings. Their finding was that inventory management is positively correlated with firm performance. Their study focused only on general performance of the firms using financial change as a performance indicator.

A company may sustain competitive advantage by employing appropriate inventory control systems. According to Rajeev, (2008) there is increasing need for business enterprises to embrace effective inventory management practices as a strategy to improve their competitiveness. Similarly Sushma & Phubesh,(2007) in their study of 23 Indian consumer electronics industry firms established that business inventory management policies had a role to play in their profitability performance. According to Ogbadu, (2009) profit is an index for measuring performance. Manufacturing operational performance is a combination of practices; hence several performance measures can be used efficiently. According to Vastag & Whybark, (2005) the most typical measures of operational performance are rejects and scrap, reworking, labour and machine productivity, product quality, inventory levels and turnover, unit manufacturing cost, manufacturing cycle time, delivery speed and reliability.

Much literature suggest that inventory control systems effectiveness and efficiency as measures of procurement performance which map onto operational performance of the organization in terms of competitive advantage, level of profitability, providing error-free goods and service, cost efficiency and increased level of output. Therefore the present study will adopt the same performance measurement indicators to measure operational performance of the tea factories in Kenya due to their application of inventory control systems.
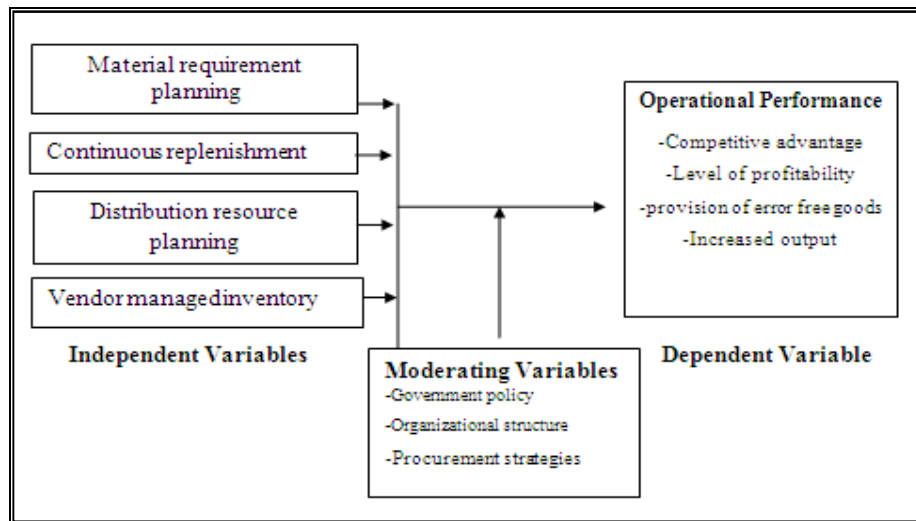
2.10.Conceptual Framework

Figure 1: Conceptual Framework
Source: (Researcher, 2013)

3.Methodology

3.1.Research Design
The study adopted a case study design on inventory control systems and operational performance of Gianchore Tea Factory in Nyamira County. This study design was considered appropriate as its aimed to make an in-depth analysis with a view to discover more information and relationship among the variables in the study.

3.2.Population
The population for the study was 119 people consisting of (1) factory manager, (16) middle level managers, (36) supervisors and (66) employees working in Gianchore tea factory. Target population referred to the entire group of the individuals to which a researcher was interested in generalizing the conclusions (Catillo, 2009). Since the study population was small, the target population was equivalent to the study population

3.3.Sample Design
The study adopted (Nasuirma, 2000) model to determine the study sample size. (Nasuirma, 2000), asserts that the sample size can be determined by:
$n= \{NC_v^2\}/ \{C_v^2+ (N-1) e^2\}$
Where: N- was the target population (119)
          C_v- was the coefficient of variation (take 0.5)
          e -was tolerance at desired level of confidence, at 95% level (take 0.05)
$n= \{NC_v^2\}/ \{C_v^2+ (N-1) e^2\}$
  $= \{119 \times 0.5^2\}/ \{0.5^2 + (119-1) 0.05^2\}$
  $= 29.75/0.545$
  $= 54.587$
  $= 55$ respondents
The study sample was 55 respondents.
The proportion of the respondents was obtained using the formula:
$$n=\sum_{i=1}^{n} p_i.n$$
Where: n was the sample (55 respondents)
          P_i was the proportion of the sub-group in the target population.
For each sub-group: Factory manager [1/119] x55=0.46, 1 respondent was selected for the sample; Middle level managers [16/119] x 55 = 7.39, 7 respondents were selected; Factory supervisors [36/119] x 55=16.638, 17 respondents were selected; Low cadre employees [66/119] x 55 = 30.405, 30 respondents were selected.
Therefore the study sample is 55 respondents consisting of 1 factory manager, 7 middle level managers, 17 factory supervisors and 30 low cadre employees.

Both purposive sampling and stratified random sampling techniques was applied to select a sample for the study. Stratified random sampling was necessary since the study had sub-groups in target population whose response was important in achieving the objectives of the study. Respondents were selected in such a way that the sample consists of sub-groups. Purposive sampling technique was also adopted because the factory manager was one and the response from this respondent was pivotal in achieving the objectives of this study.

3.4. Data Collection Instrument
Primary data was collected using a structured questionnaire. Both primary and secondary data were used in the study. The primary data related to inquiries on inventory control systems applied in the factory and their effect on operational performance. Both open-ended and closed-ended questions were used.

3.5. Validity And Reliability Of The Instruments
The structured questionnaires' validity was provided through adequate coverage of the topic under investigation as per the expert advice. According to Mugenda & Mugenda, (2003) expert opinion is used to check the content and format of an instrument to judge validity of the content. The construct validity was ascertained by defining clearly the variables to be measured.
According to Mugenda & Mugenda, (2003) the test-retest method of assessing reliability of data involves administering the same instrument twice to the same group of subjects. Reliability of the instruments was provided through a test retest conducted in the same industry by using respondents who were not part of the study sample but work in the tea processing firms and in positions relevant to the research study.

3.6. Data Analysis And Presentation Procedure
The quantitative data was analyzed using descriptive and inferential statistics. Descriptive statistics involved working out the mean, percentages and frequencies which were used to assess the correlation of the variables. The inferential statistics involved the use of regression analysis used to assess the correlation of the variables in the study; and the results thereof interpreted.

4. Results And Discussion
The main objective of this section was to use qualitative data in a process of inductive reasoning.

4.1. Material Requirement Planning
Respondent's response from the factory on their extent of agreement on material requirements' influence on operational performance were studied and tabulated as below;

	Number of Respondents	Percentage (%)	Weighted Mean
Supply Dependability	55	55	2.89
Reduction of Idle Time	55	73	3.99
Efficiency of Information Flow	55	64	3.75
Speed of Production Execution Information	55	60	3.56
Material Requirements Scheduling	55	78	4.02

Table 1: Material Requirement Planning

From the table above it is evident that material requirement scheduling has a greater influence on the operations in the tea factories as it had a greater percentage.

4.2. Continuous Replenishment
Respondent's response from the factory on their extent of agreement on continuous replenishments' influence on operational performance were studied and tabulated as below;

	Number of Respondents	Percentage (%)	Weighted Mean
Free Flowing order Fulfillment	55	45	2.01
Reduced Pipeline Inventory	55	51	2.33
Timely Inventory Replenishment	55	60	3.56
Reduced Frequency of Ordering	55	78	4.02

Table 2

4.3.Distribution Resource Planning

Respondent's response from the factory on their extent of agreement on distribution resource planning's influence on operational performance were studied and tabulated as below;

	Number of Respondents	Percentage (%)	Weighted Mean
Reduction of Lead Time	55	73	3.99
Protection of Firm's Price	55	69	3.84
Efficient forecasting	55	78	4.02
Improved Customer Service Delivery	55	47	2.10

Table 3

4.4.Vendor Managed Inventory

Respondent's response from the factory on their extent of agreement on vendor managed inventory's' influence on operational performance were studied and tabulated as below;

	Number of Respondents	Percentage (%)	Weighted Mean
Demand Visibility	55	75	3.99
Flexibility to Response	55	67	3.75
On Time Delivery	55	87	4.35
Integration of Supply Chain	55	91	4.88

Table 4

It was evident from the research that the integration of supply chain in vendor managed inventory was crucial in increasing operations efficiency in tea factories.

The study also found out that proper operational performance in tea factories leads to increased level of profitability, level of output, competitive advantage and cost efficiency.

The study also established that legal factors greatly influenced inventory control systems used by tea factories. However, the degree of relationship was not established and the research therefore recommends further research in the area.

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6.Questionnaire

Questionnaire For Employees In Gianchore Tea Factory In Nyamira County
Section A: Personal And Organisational Details

1. What is your position in Gianchore tea factory?

Position	Factory Manager	Middle level Managers	Factory Supervisor	Any other
Please tick (√)				

2. How many years have you worked in the current tea factory?

Years of service	Less than one year	1-3 Years	4-6 years	Above 6 years
Please tick (√)				

3. Please indicate the usage points of inventory control systems in the factory?
   ☐ Raw materials
   ☐ Final products
   ☐ Stores

Section B: The Effect Of Inventory Control Systems On Operational Performance Of Gianchore Tea Factory

4. Please put a tick (√) in one of the boxes under the column EXTENT that corresponds with your answer to each of the questions asked under the column TEST ITEMS numbered 4.1 to 4.5

	TEST ITEMS	EXTENT				
		Very great extent (5)	Great extent (4)	moderate extent (3)	Very small extent (2)	No extent (1)
A	MATERIAL REQUIREMENTS PLANNING					
4.1	To what extent does supply dependability affect the operational performance of Gianchore tea factory?					
4.2	To what extent does the reduction of idle time of production machines influence operational performance of Gianchore tea factory?					
4.3	To what extent does efficiency of information flow influence operational performance of Gianchore tea factory?					
4.4	To what extent do speed of production execution influence operational performance of Gianchore tea factory?					
4.5	To what extent do material requirements scheduling effectiveness influence operational performance of Gianchore tea factory?					

5. Please put a tick (√) in one of the boxes under the column EXTENT that corresponds with your answer to each of the questions asked under the column TEST ITEMS numbered 5.1 to 5.4

		TEST ITEMS	EXTENT				
			Very great extent (5)	Great extent (4)	moderate extent (3)	Very little extent (2)	No extent (1)
B		CONTINUOUS REPLENISHMENT					
5.1		To what extent does free flowing order fulfilment influence operational performance of Gianchore tea factory?					
5.2		To what extent does the reduced pipeline inventory influence operational performance of Gianchore tea factory?					
5.3		To what extent does timely inventory replenishment influence operational performance of Gianchore tea factory?					
5.4		To what extent does reduced frequency of ordering influence operational performance of Gianchore tea factory?					

6. Please put a tick (√) in one of the boxes under the column EXTENT that corresponds with your answer to each of the questions asked under the column TEST ITEMS numbered 6.1 to 6.4.

		TEST ITEMS	EXTENT				
			Very great extent (5)	Great extent (4)	moderate extent (3)	Very little extent (2)	No extent (1)
C		DISTRIBUTION RESOURCE PLANNING					
6.1		To what extent does reduction of lead time affect operational performance of Gianchore tea factory?					
6.2		To what extent does protection of firm's price influence operational performance of Gianchore tea factory?					
6.3		To what extent do efficient requirements forecasting influence operational performance of Gianchore tea factory?					
6.4		To what extent does improved customer service delivery influence operational performance of Gianchore tea factory?					

7. Please put a tick (√) in one of the boxes under the column EXTENT that corresponds with your answer to each of the questions asked under the column TEST ITEMS numbered 7.1 to 7.4.

		TEST ITEMS	EXTENT				
			Very great extent (5)	Great extent (4)	moderate extent (3)	Very little extent (2)	No extent (1)
D		VENDOR MANAGED INVENTORY					
7.1		To what extent does demand visibility affect operational performance of Gianchore tea factory?					
7.2		To what extent does flexibility to response on inventory requirement affect operational performance of Gianchore tea factory?					
7.3		To what extent does on-time delivery influence operational performance of Gianchore tea factory?					
7.4		To what extent does integration of supply chain members influence operational performance of Gianchore tea factory?					

8. On the 5-point Likert scale using a tick (√), indicate the extent to which inventory control systems adopted influence these operational performance measurement indicators of Gianchore tea factory.

Operational performance measurement indicator	Most influential (5)	More influential (4)	Moderately influential (3)	Less influential (2)	Not influential (1)
Level of profitability					
Level of output					
Operational improvement					
Competitive advantage					
Provision of error-free products in sales volume Cost efficiency					

9. What environmental factors affect the intended results of the inventory control system that you are using?