# The Relationship Between Inventory-Management Policies and Customer Service in Manufacturing Industries Logistics in Gauteng Province, South Africa

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*Abstract:* **-** Inventory management is one of key logistical activities that help companies generate revenue, keep customers, and grow. Despite many published papers dealing with inventory management in the business literature, a limited number of studies have been dedicated to the relationship between inventory-management policies and customer service, particularly in the South African context. The study seeks to determine the relationship between inventory-management policies and customer service in the manufacturing industries logistics located in Gauteng Province, South Africa. To achieve the objective, the empirical data were collected through a survey questionnaire from manufacturing industries logistics in Gauteng Province. Fisher's exact test for a (2x2) contingency table was used to analyse the primary data. The results show that inventory-management policies positively influence customer service in manufacturing-industries logistics in Gauteng Province, indicating that the use of inventory-management policies increases customer satisfaction, and extends the market share in manufacturing industries logistics. It is recommended that a periodic customer survey should be put in place to identify customers' needs and meet them effectively, and the use of technologically enabled business tools should be intensified, in order to ensure closeness with the customers.

**Key-words:** inventory, inventory management, inventory-management policies, customers' needs, customer service.

## 1 Introduction

Firms in the manufacturing industries treasure their inventory – physical or tangible assets or resources, in the form of raw materials, components, work-in-progress and finished products – acquired, stored, transformed and/or used, in order to meet intra-and interfirm business needs. The role played by inventory in ensuring revenue generation and customer keeping remains unquestionable in firms; and it will continue to be at the core of strategy formulation and strategy implementation in the manufacturing industries. Echoing the importance of inventory in business, [39] assert how senseless and unwise it is for any firm to operate optimally without carrying some form of inventory. They add that the absence of an inventory dissatisfies customers [39]. Frustrated and dissatisfied customers tend to explore other alternatives, including substituting products and switching to rival companies, which decreases the volume of sales and revenue. Sharing information on inventory status remains paramount in ensuring better financial performance and

increasing corporate value in the manufacturing industries.
In a study on the relationships between liquidity management, operating performance, and corporate values in Japan and Taiwan, it was found that inventory is the major capital investment affecting cash flow and profitability [59]. Similarly, [25] points out the positive contribution of inventory for corporate profitability. [7] investigated the relationship between inventory and financial performance in the United States, using a public database and listed manufacturing industries from 1980 to 2005. The study found a positive correlation between all the various forms of inventory (raw materials, work-in-progress and finished products) and financial performance – both within and across the manufacturing industries. The study also found that in most industries, firms that use inventory performance as an operational strategy outperform their rivals that pay less attention to inventory performance.

There are costs involved when companies hold inventories in anticipation of internal and external customers' needs. Inventory managers should exercise caution in terms of costing models used to achieve their organisational objectives; since the principle of cost minimisation and profit maximisation should guide their inventory decision in meeting customers' requirements and/or needs. Observing this fundamental principle is the key to companies' efficiency and positive performance. [38] investigated the linear relationships between inventory holding and firm performance in Greek manufacturing firms (food, textile and chemicals). He found that a strong linear relationship exists – but only in the chemicals sector [38].

In their simulation study in the telecommunication and automotive industries on how to improve the performance of supply-chain processes through the co-ordination of inventory management and capacity management, [35] demonstrated that the use of co-ordination in inventory management and capacity management results in a decrease in inventory holding costs, and in an improvement in delivery performance.

[42] emphasise that no matter the approach selected, companies must align their inventory decisions and the associated costs with customer-service requirements. [62] argue that because of a large share of inventory costs in the total cost structure of most of the manufacturing companies, effective inventory management is a determinant for sustaining the competitive advantage, lowering costs, and improving profitability. However, for manufacturing-industries logistics to provide goods and services that meet their customers' requirements, adequate inventory-management policies are needed.

Despite the existence of many published papers that deal with inventory management in the business literature, limited studies have been dedicated to the relationship between inventory-management policies and customer service – in both the developed and the developing worlds. This knowledge gap motivates this current study conducted in the South African context. The objective of this study is to determine the relationship between inventory-management policies and customer service in the manufacturing-industries logistics located in Gauteng Province, South Africa.

The study starts with a literature review on inventory management, and inventory-management policies, as well as customer service. This is followed by research methodology and the research results, and a discussion of the research results and the managerial implications and recommendations. This is then followed by the conclusion of the study.

## 2 The Literature review

### 2.1 Inventory-management policies

In order to cope satisfactorily with customers' demands, inventory management policies are essential. The efficacy and efficiency of inventory-management policies generally depend on how inventories are controlled. Inventory control supports a firm's decision-making process in terms of the review sequence (how often) in inventory levels, in order to determine the appropriate time and quantity to order. [1] state that inventory control is important for manufacturers, wholesalers and retailers in their daily transactions.

It is believed that inventory control is the factor that organises the products' availability to customers [61], ensures an adequate level of stock, and satisfies demands with respect to quantity, quality, time and place; and it controls prices [32]. It also detects any mistakes that have been made, or it identifies areas that need immediate attention [14]. [55] outline the fact that there are trade-offs between operational efficiency and customer service when controlling inventory.

According to [46], "the typical trade-off is between high holding and obsolescence costs of excessive stock, on the one hand, and poor service and high shortage costs, resulting from low inventory levels, on the other [hand]". In order to address the above issue (trade-off), an efficient inventory- control policy is needed.

[63] indicate that developing effective inventory control systems to reduce waste and stock-outs in the manufacturing or the service organisations is a complex process. However, what drives and differentiates best-performing manufacturing industries from poorly performing ones is the ability to design inventory-management policies that satisfy their customers' changing requirements, while minimising costs and maximising their profitability. [42] assert that the aim of an inventory-control policy is to determine when to place a purchase order – and what quantity to order. In the supply chain management (SCM) literature, there are two main traditionally accepted inventory management policies – periodic review and continual review. These policies are mathematically-based and their efficacy in companies generally depends on how they are applied.

According to [26], a supply chain is a network of independent entities, which work together, in order to provide a product or a service to the final customer. [13] view SCM as the management of resources – facilities, people, products, information and funds – in order to maximise SC profitability.

In periodic review systems, companies review their inventory level at fixed intervals; and they determine their re-order quantities by calculating the difference between the actual and the target-inventory levels [30]. The main features of a periodic review technique include variation in order sizes for different sequential periods, and the constancy of the review-ordering time [48]. [6] point out that, under periodic review, the basic re-order requires adjustment – with extended intervals between the reviews. However, there are drawbacks that companies should consider when using periodic-review systems. [53] mention two major drawbacks associated with the use of periodic-review techniques. These include longer-term protection against stock-out and higher stock-out probability. These authors propose a timely and emergency replenishing-based periodic review system, in order to address this problem [53].

There are many authors in operations research and in SCM, who have studied and provided insightful information on how to solve inventory-control problems in periodic-review systems, using optimisation models and simulation procedures. For instance, [21] consider a single item, periodic review-inventory systems under capacity-constrained finite production and uncertain demand. The study shows that the optimality of a stationary policy – for both finite and infinite horizon problems – is achieved if the initial stock level is inferior to a single critical number.

Another study by [22], which analysed a periodic-review stochastic problem, in which demands for a single item in consecutive periods are uncertain, and under dynamic price and full backlogged stock-outs. To gain insights into the optimal policies structure and its associated sensitive parameters, a computational test (numerical analysis) was conducted [22]. The test uses the data collected from a retailing firm that sells formal and sport high-end women's clothing throughout the United States. The results show a decrease by 14.8 per cent in total expected profits when the firm uses a single-order strategy for the whole season. The results show insignificant loss in expected profits with restricted replenishment benefits, when the firm uses a dynamic pricing strategy. The results show widespread benefits in bi-directional price changes under restricted replenishment benefits, and an increase by 19.3 per cent in expected profits, when the firm adopts a single replenishment order, and by 11.18 per cent when two replenishment opportunities exist.

[7] consider a single product: a periodic-review stochastic-inventory problem with finite independent planning horizons, and with concurrent fixed and proportional shortage costs. The study reduces the stochastic dynamic finite-horizon inventory problem to a simple computational optimisation problem achieved by the use of a stationary base-stock policy. This computational model surpasses the previously-proposed models, as shown in the analytical results and the numerical experiments.

[27] investigated various inventory control policies for a make-to-order inventory-production system composed of a production facility and a warehouse. The study shows the optimality of the stationary replenishment policy and analyses the behaviour of such policy in complex supply chain models. [9] views a stationary policy as “one under which each facility receives a constant batch (facility specific) in equal time intervals (facility specific)”. This study argues that the use of stationary policy is crucial for firms operating under make-to-order production-inventory system to achieve the overall system performance, since it enables firms to fulfill customer orders timely.

In make-to-order (MTO) system, also called pull system, the firm produces finished good inventory based on customer demand. This is a stockless production approach [37; 44]. The elimination of inventory holding costs in MTO can serve as inventory control mechanism for achieving efficiency in the firm and across the supply chain. MTO from make-to-stock (MTS), many authors point out that in MTO, finished-product inventories are not held in advance, but the production process only begins after customer order is received, whilst in MTS, also called push system, finished-product inventories are produced and kept in advance in a warehouse to meet customer demands [9; 37; 44]. In MTS, the production of products is informed by the firm’s forecasts rather than customer actual demands [37].

[11] studied the production/inventory co-ordination-control problem for a periodically reviewed single-item, finite horizon inventory system with simultaneous pricing under randomly different and independent demand periods. The paper obtains an inventory-control policy and pricing strategy that maximises the objective function with expected profits over the specified period. The study shows that the cumulative-demand model leads to k-concave profit-to-go functions, with an (s, S, p) optimal policy (where s and S = inventory levels and p = price). Such a policy requires the period inventory to be managed in alignment with the classical (s, S) policy, whereby price determination is obtained or derived from the inventory position at the start of each period.

The (s,S,p) policy refers to a simplified computational approach developed by [54] to determine the optimal price and production for two inventory levels $s_n$ and $S_n$ (similar to s, S points) with random demand [54]. The policy basically operates as follows: “whenever the inventory level is less than or equal to s, an order is placed to order-up-to level S; when the inventory level is larger than s, no order is issued; the price p is specified by the inventory level” [60].

In an effort to extend the optimally controlled inventory control model under exogenous demand, [33] studied a stochastic, single-stage periodic-review policy in the face of fixed ordering costs and a variety of sales parameters (pricing, advertising, and others). The study used a set of completely different argumentative paths to support the optimality of (s, S)-type policies under exogenous demands inspired by [58] selected general assumptions (where s and S = inventory levels). The study also provides some guarantees for achieving the optimality of (s, S) policy by facilitating the computation of the value function from the dynamic mechanism.

[28] considered a two-stage inventory model in the supply-chain environment, where the demand for a single product is stochastic, which is observed periodically. The study shows that the optimal replenishment solution is myopically obtained, and influenced by the initial inventory level in the supply chain. The study of [50] shows how to optimise the inventory-control problem for a periodic-review system with a single-stage system and two suppliers or delivery modes. The study

proposes a two-class policies generalisation inspiration from [57]'s; and it provides important analytical results that can be used in optimising policies in the first class (that deals with orders made by emergency suppliers). On the other hand, the study used derived bounds of the optimal-order quantity to determine the effective policies in the second class (designed to address the problem related to the orders combination from two suppliers.

While periodically reviewed systems provide better replenishment co-ordination for various itemised goods, continuously reviewed systems generally requiring a low-level inventory display better performance for individual items [20]. [18] argue that continuous review inventory is a mathematical approach specifically designed to determine when to replenish the inventory, and what quantity should be ordered.

[27] presented a stochastic model for a single product with no constraints. This model is built on assumptions and estimations, in order to determine optimally the order quantity and the re-order point for a given product. In their study, [5] presented a multi-stage, continuous review inventory-control system with a stochastic and stationary demand. In an attempt to extend the findings of [27], a cost model with joint replenishments and relatively prime-order frequencies was introduced to minimise the expected holding inventory costs and the expected back-order cost. The paper by [23] conducted an investigation on a stochastic, budget-restricted multi-product inventory control policy subjected to a continuously reviewed system and backorders. This paper builds on the study of [29] in considering a budget variable, a constraint that was not considered in either the work of [27] or that of [5]. The proposed model assumes that the purchasing costs payment is done at the arrival of products restricting the probability of total-inventory investment to exceed a defined amount. To solve the objective function, a Lagrange-multiplier method is used [23]. Similarly, [47] explored the continuous review-inventory technique, using the mathematical model (the Lagrange-multiplier technique) to optimise the re-order-point inventory with a service-level constraint. Their proposed optimal inventory solution shows the trade-off between the inventory cost needed to decrease the lead time and the increase in the associated-service level. This requires a balance between the re-order point inventory variables – inventory cost, the lead time and the service level – as they are inter-related.

Because of complexity and the rapidly changing business environment, companies in the manufacturing industries should put in place proactive and working inventory-management policies, in order to meet their customers' needs, and to be able to maintain the competitive advantage.

## 2.2 Customer service

Manufacturing companies procure raw materials from the suppliers; and they process them into finished goods, in order to be consumed by their customers. Understanding and meeting customers' needs remains one of the critical challenges for business organisations: either in the public or in the private sector; since it is the barometer or yardstick whereby the level of customer service is measured or determined. Companies that understand customer service requirements experience some level of effectiveness and efficiency in the decision-making process relative to manufacturing, logistics, and marketing; and they are better positioned in the design of a customer-service strategy that satisfies the customers' needs.

Emphasising logistics value from the perspective of most senior managers, [6] state that the main aim of any company's logistics system is to harmonise the customer requirements with cost effectiveness. They add that most senior managers acknowledge how important the concept of customer service is; but they are unable to provide or construct an adequate definition and explanation of customer service.

[52] view customer service as a process that takes place between a buyer, a seller and a third party, resulting in value addition to the product, or service exchanged, and in accordance with the contract timeframe (short-term or long-term). According to [40], customer service is "a process for providing [the] competitive advantage and adding benefits to the supply chain to maximise the total value to the ultimate customer".

Several authors believe that customer service comprises a range of value-adding tasks performed, so as to make a customer keep a positive experience of a product or a service provided after the initial sale [45;17]. Customer-service decisions influence both the internal and the external customers, as well as the structure of the entire logistics system. This shows the critical role that customer service plays in the logistics system of companies [24]. Agreeing with the above, [4] add that the effectiveness of an integrated-logistics system is defined by the customer-service strategy. According to [15], the cornerstones of a firm's customer-service strategy include: dependability, time, convenience, communication. [25] adds honesty as another component of a firm's customer-service strategy.

[2] conducted a study on revenue estimation for logistics customer service offering; and the findings show that low levels of customer service lead to loss in sales caused by back-ordering, shipment delays, inventory unavailability, slow order-processing, and erroneous order-processing. On the other hand, it was found that higher levels of customer service reduce sales losses, and increase the demand in a given market share. One of the ways to increase the level of customer service, and therefore to drive sales losses down, is to audit the customer service and to ensure an improved supply chain performance. [3] states that companies strive to analyse the frequency of perfect-order processing and delivery and the associated costs as a way of measuring their supply chain performance.

As competition between companies and supply chains at both local and global scales increases, innovation, efficiency and operational performance emerge as vital drivers for high levels of customer service, and competitive advantage; and therefore, they lead to improved financial performance. Maintaining high levels of customer service and competitive advantage should be supported by continuous market-need anticipation (innovation) in terms of products and services and customer-service audits. This initiative or effort requires greater intra- and inter-firm commitment and collaboration for better outcomes.

A study conducted by [56] on the customer-service determinants in reverse logistics, validates consumer sensitivity to both hard-level and soft-level factors of customer-service elements and consumers' service evaluation – and their frequency involvement aligned with the recent self-reported behaviour in recycling. The study shows that a greater emphasis is placed on the hard level than on the soft level.

[62] draw a distinction between reactive and proactive customer service. They say that customer service is reactive, when the firm is able to solve problems encountered by customers. On the other hand, proactive customer service is harder for businesses to provide, but when well-implemented, it often exceeds customer expectations and enhances customer relationships significantly. In their call for better customer-service management, [36], state that firms need to understand customer expectations, and to understand the competitive forces in the business environment, and manage their expectations more effectively.

[31] have identified three types of customer expectations: predicted service, desired service, and adequate service. While predicted service refers to a probability expectation, where customers anticipate the occurrence of the level of service, because of their familiarity with a company, desired service is an ideally expected service that a customer receives when compared with that which was actually predicted. On the other hand, adequate service is a minimally expected level of service that a customer is willing to accept, based on his/her experiences.

Customer service plays a ligamentary role in supporting other supply chain activities and ensuring the timely provision of different types of inventories and services to customers, and thereby generating maximum value-adding benefits to the supply chain. A well-designed and implemented customer-service strategy is a determinant for operational effectiveness and financial performance for companies – in both the manufacturing and the service industries. On the other hand, a poorly designed customer-service strategy contributes to a company's halt. The success or failure of companies is the outcome of a company's customer-service strategy; since this has either a positive or negative impact on the achievement of corporate goals.

# 3 Research design and methodology

## 3.1 The research approach and the sample

The approach followed in this study combines the research into primary data and secondary data. The secondary data consist of the literature review on inventory-management policies and the customer service to provide a theoretical basis for the study. To determine or establish the relationship between inventory-management policies and customer service in the manufacturing-industries logistics, the primary data analysed in the form of an empirical study, were used. These industries were located in Gauteng Province (especially in Pretoria and Johannesburg; as no manufacturing-industries logistics company was found in Vereeniging) operating in various sectors, including Machinery and Equipment, Textiles, Chemicals and Food, Beverage and Agro-Industrial Products.

The sampling approach followed to identify inventory management and customer- service users from the target population (manufacturing-industries logistics) is illustrated in Figure 1.

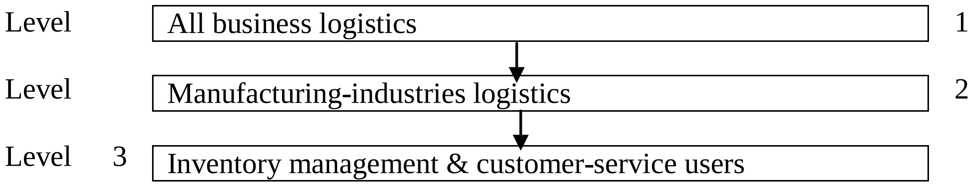


Fig. 1. Sampling model

Level 1 consists of the respondents of the entire business logistics, which includes both the manufacturing and the service industries. Level 2 narrows the scope of respondents down by excluding service industries, and focusing only on manufacturing-industries logistics. Level 3 narrows the scope of respondents down even further to those dealing with inventory management and customer service, in order to achieve the objective set for this study. This means that more emphasis was placed on level 3 in the design of the questionnaire statements. The numerical sample of the respondents per sector and per area is depicted in Table 1.

Table 1. Sampling table

| AREAS / SECTORS | JOHANNESBURG | | | PRETORIA | | |
|---|---|---|---|---|---|---|
| | Population Sample | Planned Sample | Realised Sample | Population Sample | Planned Sample | Realised Sample |
| Machinery & Equipment | 28 | 14 | 7 | 15 | 10 | 10 |
| Textiles | 56 | 27 | 10 | 9 | 5 | 4 |
| Food, Beverage & Agro-Industrial Products | 47 | 24 | 7 | 14 | 7 | 3 |
| Chemicals | 19 | 8 | 4 | 6 | 3 | 2 |
| Total | 150 | 73 | 28 | 44 | 25 | 19 |

The population sample extracted from the list of companies registered with the Department of Trade and Industry, as illustrated in Table 1, shows that there is a total number of 194 manufacturing industries in Gauteng Province (respectively 150 for Johannesburg and 44 for Pretoria). The planned sample of manufacturing industries in Gauteng Province was 98, of which there were 73 manufacturing industries for Johannesburg and 25 manufacturing industries for Pretoria. This sample is regarded as reasonable; and it ensures validity in the design of the questionnaire distributed to inventory and customer-service managers, the target population of this study.

It should be noted that the realised sample represents 47 (47.96%) of manufacturing industries in Gauteng Province, of which 28 % were for Johannesburg and 19 % for Pretoria. The differences between the planned and the realised samples are due mainly to the poorly completed and returned questionnaires, and no return of questionnaires sent to some of the manufacturing-industries logistics managers, dealing with inventory management and customer service, despite multiple time extensions.

### 3.2 The data collection

A survey questionnaire, consisting of ten open-ended statements, framed from insights out of the literature review, and mailed to inventory management and customer-service users in different manufacturing industries logistics in Gauteng Province was used to collect the data. This was pilot-tested by the logistics managers from Immediate Electrical Power and Distribution, Accutech Weighing Service (Pty) and Vector Logistics Solutions for clarity and practicability in manufacturing-industries' logistics, and enabled one to capture the users' perceptions regarding inventory management and customer service. In this study, the data collection took place from January 2005 to August 2005.

### 3.3 The data analysis

The Chi-Square test was invalid for this study because of the small realised sample size (47 manufacturing industries logistics). Because of this, Fisher's exact test for a (2x2) contingency table was used, in order to establish the variable relationships, as indicated above. [48] point out that Fisher's exact test (P test of significance) for a (2x2) contingency table is used in cases where n is small, or where the expected frequencies under Ho are not at least 5.

It should be noted that the Fisher's exact test is valid only for 60 per cent of the results of this study; and the remaining 40 per cent of the results are merely reported.

## 4 The Results

In order to achieve the objective of this study, quantitative analysis of dimension relationships is undertaken. In this study, the 0.05 level of significance table is used. Therefore, if p-value > 0.05, it indicates that the P value is below that needed for establishing the 0.05 level of significance. If p-value > 0.05, it shows that there is no statistically significant difference between the two variables. Otherwise, if p-value < 0.05, the null hypothesis

(Ho) indicates that there is no relationship between the two variables; and the population can be rejected. If the alternative hypothesis Ha shows there is a relationship between the two variables in the population, the population can be accepted. In order to present the results meaningfully, the relationships between the dimensions of the data are used.

### 4.1 The use of a managerial system to co-ordinate inventory requirements across multiple locations (vv1) versus interdepartmental relationships (v12)

Table 2 shows from a column percentage view that, 86.96 % of the respondents were in agreement that interdepartmental collaboration may lead to external customers' satisfaction. While 10.87 % of the respondents indicated that mutual support among the departments may satisfy external customers' needs, 2.17 % of the respondents mentioned that communication may lead to external customers' satisfaction. In terms of row percentage, Table 2 shows that 86.96 % of the respondents, of whom some 'definitely agreed' and the others 'agreed', used a managerial system to co-ordinate the inventory requirements across multiple locations, and to respond to the channel members' needs through distribution channels. The rest of the respondents, who represent 13.06 %, showed a neutral view on this issue.

Of the 86.96 % of the respondents in favour of interdepartmental collaboration within the manufacturing-industries' logistics:

(a) 90.00 % of the respondents either agreed 'definitely', or 'agreed' that they use a managerial system to co-ordinate the inventory

requirements across the multiple locations, and to respond to the channel members' needs through the distribution channels.
(b) 10.00 % of the respondents held a neutral position regarding this statement

Table 2. The relationship between the managerial system, in order to co-ordinate the inventory requirements and interdepartmental relationships

| vv 1 | v 12 | | | |
|---|---|---|---|---|
| **Frequency Expected Per cent Row Pct Col Pct** | 1 | 2 | 3 | Total |
| 1 - 2 | 36 | 4 | 0 | 40 |
| | 34.783 | 4.3478 | 0.8696 | |
| | 78.26 | 8.7 | 0 | 86.96 |
| | 90 | 10 | 0 | |
| | 90 | 80 | 0 | |
| 3 | 4 | 1 | 1 | 6 |
| | 5.2174 | 0.6522 | 0.1304 | |
| | 8.7 | 2.17 | 2.17 | 13.04 |
| | 66.67 | 16.67 | 16.67 | |
| | 10 | 20 | 100 | |
| Total | 40 | 5 | 1 | 46 |
| | 86.96 | 10.87 | 2.17 | 100 |

Frequency missing = 1

**4.2 The use of a managerial system to co-ordinate the inventory requirements and to respond to the channel members' needs (vv1) versus customers' complaints about service quality (vv13)**

Table 3 shows that, of the 68.09 % of the respondents of whom some 'disagreed' that customers within the manufacturing-industries logistics complained about service quality; while the rest were 'neutral', there are:

(a) As many as 90.63 % of the respondents 'definitely agreed'; or they 'agreed' that they should use a managerial system to co-ordinate the inventory requirements across multiple locations and to respond to the channel members' needs.
(b) Only 9.37 % of the respondents were 'neutral'.

Table 3. The relationship between the managerial system to co-ordinate the inventory requirements and the customers' complaints

| vv 1 | vv 13 | | |
|---|---|---|---|
| **Frequency Expected Per cent Row Pct Col Pct** | 3 - 4 | 5 | Total |
| 1 - 2 | 29 | 12 | 41 |
| | 27.915 | 13.085 | |
| | 61.7 | 25.53 | 87.23 |
| | 70.73 | 29.27 | |
| | 90.63 | 80 | |
| 3 | 3 | 3 | 6 |
| | 4.0851 | 1.9149 | |
| | 6.38 | 6.38 | 12.77 |
| | 50 | 50 | |

| | | | |
|---|---|---|---|
| | 9.37 | 20 | |
| Total | 32 | 15 | 47 |
| | 68.09 | 31.91 | 100 |

As indicated in the table below, the P test of significance, as reflected in the value of $p > 0.05$, leads to the conclusion that there is no statistically significant relationship between the use of a managerial system to co-ordinate the inventory requirements across multiple locations, and to respond to the channel members' needs through distribution channels, and the customers' complaints regarding service quality (P: P= 0.3670 > 0.05).

| Fisher's exact test | |
|---|---|
| Cell (1, 1) Frequency (F) | 29 |
| Left-sided Pr < = F | 0.9275 |
| Right-sided Pr > F | 0.2826 |
| Table Probability (P) | 0.2102 |
| Two-sided Pr < = P | 0.3670 |

Sample Size = 47

### 4.3 The use of a managerial system to co-ordinate the inventory requirements and to respond to the channel members' needs (vv1) versus service/product to customers at the right time and in the right condition (v14)

As shown in Table 4, of the 89.36 % of the respondents who were in agreement that customers within the manufacturing-industries logistics receive the service/product at the right time and in the right condition, there were:

(a) As many as 88.10 % of the respondents 'definitely agreed'; while the others 'agreed' they use a managerial system to co-ordinate the inventory requirements across multiple locations and respond to the channel members' needs through distribution channels.

(b) Only 11.90 % of the respondents were 'neutral'.

Table 4. The relationship between managerial systems, in order to co-ordinate the inventory requirements and the service or product received at the right time, and in the right condition

| vv 1 | v 14 | | |
|---|---|---|---|
| **Frequency<br>Expected<br>Per cent<br>Row Pct<br>Col Pct** | 1 | 2 | Total |
| 1 - 2 | 4 | 37 | 41 |
| | 4.3617 | 36.638 | |
| | 8.51 | 78.72 | 87.23 |
| | 9.76 | 90.24 | |
| | 80 | 88.1 | |
| 3 | 1 | 5 | 6 |
| | 0.6383 | 5.3617 | |
| | 2.13 | 10.64 | 12.77 |
| | 16.67 | 83.33 | |
| | 20 | 11.9 | |
| Total | 5 | 42 | 47 |
| | 10.64 | 89.36 | 100 |

As shown in the table below, the P test of significance, as reflected by the value $p > 0.05$, leads to the conclusion that there is no statistically significant relationship between the use of a managerial system to co-ordinate the inventory requirements across multiple locations and to respond to the channel members' needs through distribution channels and the availability of a timely and quality service/product to customers within the manufacturing-industries logistics (P: p = 0.5115 > 0.05).

Fisher's exact test

| | |
|---|---|
| Cell (1, 1) Frequency (F) | 4 |
| Left- sided Pr < = F | 0.5115 |
| Right –sided Pr > F | 0.8847 |
| Table Probability (P) | 0.3961 |
| Two –sided Pr < = P | 0.5115 |

Sample Size = 47

### 4.4 The use of a managerial system to co-ordinate the inventory requirements and to respond to the channel members' needs (vv1) versus the extension of market shares (v15)

Table 5 shows that, of the 76.60 % of the respondents who were in agreement that service delivery extends market shares within the manufacturing-industries logistics, the following are highlighted:

(a) Of the 88.89 % of the respondents, some 'definitely agreed'; and others 'agreed' that they use a managerial system to co-ordinate the inventory requirements across multiple locations, and to respond to the channel members' needs through distribution channels.

(b) The remaining percentage of the respondents, representing 11.11 %, were 'neutral'.

Table 5. The relationship between the managerial system to co-ordinate the inventory requirements and to respond to the channel members' needs and the extension of the market shares

| vv 1 | v 15 | | |
|---|---|---|---|
| **Frequency**<br>**Expected**<br>**Per cent**<br>**Row Pct**<br>**Col Pct** | 1 | 2 | Total |
| 1 - 2 | 9<br>9.5957<br>19.51<br>21.95<br>81.82 | 32<br>31.404<br>68.09<br>78.05<br>88.89 | 41<br><br>87.23 |
| 3 | 2<br>1.4043<br>4.26<br>33.33<br>18.18 | 4<br>4.5957<br>8.51<br>66.67<br>11.11 | 6<br><br>12.77 |
| Total | 11<br>23.4 | 36<br>76.6 | 47<br>100 |

The P test of significance, as shown by the table below and reflected by the value p > 0.05, leads to the conclusion that there is no statistical significance between the two variables: the use of a managerial system to co-ordinate inventory requirements across multiple locations and to respond to the channel members' needs through distribution channels and the extension of market shares within the manufacturing-industries logistics (P: p = 0.6138 > 0.05).

Fisher's exact test

| | |
|---|---|
| Cell (1, 1) Frequency (F) | 9 |

| | |
|---|---|
| Left- sided Pr < = F | 0.4324 |
| Right –sided Pr > F | 0.8693 |
| Table Probability (P) | 0.3017 |
| Two –sided Pr < = P | 0.6138 |

Sample Size = 47

### 4.5 Use of a managerial system to co-ordinate the inventory requirements, and to respond to channel members' needs (vv1) versus a strategic policy to meet customers' requirements (vv16)

Table 6 shows from a column percentage standpoint that 10.87 % of the respondents were in favour of the 'right product, the right time and the right conditions' strategy to meet the customers' requirements within the manufacturing-industries logistics. The majority of the respondents (69.57 %) were of the opinion that the customers' needs and satisfaction, as a philosophy, should lead manufacturing-industries logistics to efficiently and effectively meet the customers' requirements. Only 19.57 % of the respondents were of the view that other strategic policies, such as 'sales increase companies' strength, more customers, more money, attitude, business sense and management support' are important within the manufacturing-industries logistics to respond to customers' requirements. From a row percentage viewpoint, Table 5 indicates that 86.96 % of the respondents, of whom some 'definitely agreed' and the others 'agreed' using a managerial system to co-ordinate inventory requirements across multiple locations and to respond to the channel members' needs through the distribution channel. Only 13.04 % of the remaining respondents were neutral about this statement.

In conclusion, Table 6 shows that, of the 69.57 % of the respondents who mentioned that customers' needs and satisfaction was the right strategy to effectively and efficiently respond to customers' requirements:

(a) The largest percentage of the respondents (90.63 %) of whom some definitely agreed; and the others agreed to using a managerial system to co-ordinate inventory requirements across multiple locations and to respond to the channel members' needs through the distribution channel.

(b) As many as 9.37 % of the respondents were neutral.

Table 6. The relationship between the managerial system to co-ordinate inventory requirements and to respond to the channel members' needs and a strategic policy to meet the customers' requirements

| vv 1 | vv 16 | | | |
|---|---|---|---|---|
| **Frequency<br>Expected<br>Percent<br>Row Pct<br>Col Pct** | 1 | 2 | 3 - 8 | Total |
| 1 - 2 | 4<br>4.3478<br>8.7<br>10<br>80 | 29<br>27.826<br>63.04<br>72.5<br>90.63 | 7<br>7.8261<br>15.22<br>17.5<br>77.78 | 40<br><br>86.96 |
| 3 | 1<br>0.6522<br>2.17<br>16.67<br>20 | 3<br>4.1739<br>6.52<br>50<br>9.38 | 2<br>1.1739<br>4.35<br>33.33<br>22.22 | 6<br><br>13.04 |
| Total | 5<br>10.87 | 32<br>69.57 | 9<br>19.57 | 46<br>100 |

Frequency missing = 1

## 5 Discussion of the results

A mean of 89.65 % of the respondents of whom some 'definitely agreed' and the others 'agreed' that using a managerial system to co-ordinate the inventory requirements across multiple locations and responding to the channel members' needs through the distribution channel would be efficacious. Inter-departmental collaboration, mutual support and communication within the manufacturing-industries logistics are determinants for co-ordinating the inventory requirements, and for enhancing the level of customer service. This prevents potential customers' complaints about service quality, by ensuring timely and quality (error-free) provision of services and products, and thereby contributing to the extension of the market share within the manufacturing industries logistics.

However, it is important to note that Fisher's exact test found no statistical relationships between the variables: the use a managerial system to co-ordinate the inventory requirements across multiple locations and to respond to the channel members' needs through distribution channels and the customers' complaints about the service quality, the use of a managerial system to co-ordinate the inventory requirements across multiple locations and to respondent to the channel members' needs through distribution channels and the availability of a timely and quality service/product to customers, and the use of a managerial system to co-ordinate the inventory requirements across multiple locations and to respondent to the channel members' needs through distribution channels and the extension of market shares.

The analysis of the objective of the study – to determine the relationship between inventory-management policies and customer service in the manufacturing-industries logistics in Gauteng – in relation to the results as reported, inventory management policies positively influence customer service in the manufacturing-industries logistics in Gauteng Province, indicating that the more the manufacturing industries logistics in Gauteng Province use inventory-management policies to ensure effective coordination of inventory requirements, the greater the level of satisfaction that customers receive; and the greater the market share becomes.

## 6 Managerial implications and recommendations

The results of this study, as reported and discussed, but with no statistical relationships between the variables, indicate how inventory-management policies positively influence customer service in the manufacturing-industries logistics in Gauteng Province. However, manufacturing-industries logistics managers should strive to become more and more effective in their operating system or strategy, and better service their customers' needs. One of the ways to achieve this would be through the implementation of adequate and proactive inventory-management policies. This requires a greater level of commitments in terms of intra- and inter-firm co-ordination and collaboration, to ensure a smooth and timely sharing of inventory information and effective logistics-making decisions; since responding to channel members' needs or customers' requirements, and thereby achieving high levels of customer service, would depend on a firm's logistics strategy or supply chain strategy.

Because of the changing business environment, manufacturing-industries logistics managers should implement a periodical customer survey, in order to respond to customers' needs. A survey questionnaire may be attached to customers' slips or receipts, when delivering products, or an electronically designed questionnaire sent to their customers. This would enable manufacturing-industries logistics to identify their customers' needs and meet them more effectively and efficiently. Manufacturing-industries logistics should also seek better ways of planning, co-ordinating and controlling processes in line with customers' requirements. In order to effectively and successfully meet customers' needs, manufacturing-industries logistics in Gauteng Province should intensify the use of technologically enabled business tools, such as enterprise resource planning (ERP), among others, to ensure closeness with their customers.

## 7 Conclusion

In this paper, the relationship between inventory-management policies and customer service in the manufacturing industries in Gauteng Province has been investigated quantitatively. This study, based on the reported and discussed results, shows that the more the manufacturing-industries logistics in Gauteng Province use inventory-management policies to ensure the effective co-ordination of inventory requirements, the greater the satisfaction that customers would receive, and the greater the market share becomes. However, manufacturing-industries logistics managers should continuously find better technological ways to enhance their operating system's effectiveness or strategy effectiveness

Implementing adequate and proactive inventory-management policies would enable manufacturing-industries logistics managers to control their inventory; and therefore, to improve logistics-making decisions.

The results presented in this study have obvious limitations; and therefore, they cannot be generalised to all the manufacturing-industries logistics located in South Africa. However, while the limitations are acknowledged, a further study should be carried out to determine the relationship between inventory-management policies and customer service in the manufacturing-industries logistics in South Africa.

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