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The effectiveness of an inventory management system at a Tobacco Manufacturer

A Minor Dissertation Submitted in Partial Fulfilment of the Degree of

Master of Philosophy Engineering Management

in

POSTGRADUATE SCHOOL OF ENGINEERING MANAGEMENT

at the

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

of the

UNIVERSITY OF JOHANNESBURG

by

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201130468

SUPERVISOR: PROF. A. TELUKDARIE

2018
DECLARATIONS

I Fumani Ngobeni, student number of 201130468, is a registered student in Master of Philosophy (MPhil) Engineering Management (CW) 2018, at the University of Johannesburg. I am pursuing the second year of the above-mentioned programme with my Minor Dissertation.

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Name: Fumani Ngobeni
Student number: 201130468

Signed .......................................................... Date: .........................................................
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ABSTRACT

This study investigates the effectiveness of business logistics systems, focussing on the inventory management system at a South African tobacco manufacturing company, herein after referred to as ‘Tobacco Manufacturer’. Challenges encountered at Tobacco Manufacturer concerning inventory management, includes inventory-outs, misaligned stock levels, causing difficulties tracking and monitoring stock movement. The research develops research objections and questions, addressing these challenges. This study is a qualitative research, following a case study approach. It is conducted in one organisation. The study uses an open-ended questionnaire and a 5-point Likert scale questionnaire for data collection. The interviews are conducted through face-to-face meetings. A scheduled meeting appointment, using Microsoft Outlook email, is used to contact possible participants. The established questionnaire is pre-tested through a submission at the Ethical Department at the University of Johannesburg. This research uses purposive sampling, with 12 participants of the supply chain, procurement, warehouse, production, planning and scheduling. A recording instrument is used during the face-to-face interviews. Data analysis involves coding and statistical graph tabulation. Participants signify executive managers, managers and non-managers, with an age range of below 30 to above 50. The study reveals that Tobacco Manufacturer uses both pull and push systems, dependent on whether it is a domestic or an export order. TM is a company, still in denial of Industry 4.0. The company subsequently, conquered challenges of overutilization and underutilisation with the ‘push system’ for domestic supply.

Keywords: Inventory, inventory management systems, supply chain, logistics, logistics systems order processing, freight transportation, Industry 4.0
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<tbody>
<tr>
<td>ABC</td>
<td>Activity-based costing</td>
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<tr>
<td>EOQ</td>
<td>Economic Order Quantity</td>
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<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<td>GMES</td>
<td>Global Manufacturing Execution System</td>
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<td>HR</td>
<td>Human Resource</td>
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<td>IIoT</td>
<td>Industry, the Internet of Things</td>
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<td>IOT</td>
<td>Internet of Things</td>
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<td>IS</td>
<td>Information Systems</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>ITS</td>
<td>Intelligent Transportation System</td>
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<td>IWS</td>
<td>Work Integrated Systems</td>
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<tr>
<td>JIT</td>
<td>Just-in-time</td>
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<td>KPI</td>
<td>Key Performance Indicators</td>
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<td>MRP</td>
<td>Material requirement planning</td>
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<td>OLT</td>
<td>Operations Leadership Team</td>
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<td>OTIF</td>
<td>On time in full</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<td>RF</td>
<td>Radio Frequency</td>
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<td>RFID</td>
<td>Radio Frequency Identification</td>
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<td>RL</td>
<td>Reverse logistics</td>
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<td>RLEC</td>
<td>Reverse Logistics Executive Council</td>
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<td>STO</td>
<td>Stock Transfer Order</td>
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<td>TM</td>
<td>Tobacco Manufacturer</td>
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<tr>
<td>TMS</td>
<td>Transportation Management System</td>
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<tr>
<td>WIP</td>
<td>Work-in-progress</td>
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<tr>
<td>WMS</td>
<td>Warehouse Management Systems</td>
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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Tobacco Manufacturer (TM) is one of the largest tobacco manufacturing companies with the largest factory accounting for a significant total production for domestic consumption and for export into the wider Southern African region. The company receives its main raw material in the form of tobacco leaves, imported from various suppliers. The tobacco leaves are blended to preserve the uniformity and distinctive character of each brand. The completed tobacco products are packaged into shipping case boxes that varies in size, indicating the specific brand. The case boxes are transferred on a conveyor belt for weight marking and bar coding, where after it is shipped to the relevant warehouse.

TM comprises a market supply chain, primary logistics, supply chain development, and supply chain networking, ensuring that an efficient and effective system is attained. Figure 1 indicates the logistics and supply chain structure.

Figure 1: Tobacco Manufacturer logistics and supply chain structure
The first part of the chapter provides the research background of logistics and inventory management systems and the challenge statement, encountered by TM, providing the research purpose. The research focus and objectives are described in detail.

1.2 RESEARCH BACKGROUND

The perception of stock-keeping is mostly connected to cost for companies. Keeping too much inventory, ties the funds in the inventory, whilst conversely, insufficient stock can lead to a loss of sales. Dumas (2008) states that much of a company’s costs can be attributed to the amount invested in inventory, inventory handling, transportation and management costs. Effective inventory management is crucial in an organisation’s profitability. The Council of Supply Chain Management Professionals (CSCMP) in the United States, outlines logistics management as “that component of supply chain management that strategizes, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin to the point consumption to meet customer requirements” (CSCMP, 2012).

According to Grant et al., (2015), business logistics management activities basically comprises incoming and outgoing freight transportation, warehousing, handling of material, fulfilment of orders, inventory management and of the third-party logistics (3PL) service providers. The focus of logistics activities is in three segments (Satellite Transportation, Inc., 2015):

- **Order processing** involves documenting and managing contractors, purchasing and demanding processing, and actual source of material from a basis of the supplier to the manufacturer.
- **Inventory management** involves handling, tracking, monitoring and managing raw materials, work-in-progress and finalised products.
- **Freight transportation** involves the transportation and the actual delivery of products from the manufacturer to the consumer.
The efficiency of inventory management system is important in any business to remain economic and competitive. Ganapathi and Nandi (2015), support the purpose of logistics, comprising purchasing and sourcing, scheduling of production and planning, wrapping and offering customers the best service.

1.3 PROBLEM STATEMENT

There is an increasing number of illegal trading in the tobacco industry during 2015 to 2018. Consequently, production volumes reduced significantly. This causes pressure to TM to remain competitive. The company is committed to customer satisfaction, efficient and effective manufacturing of products and on-time customer delivery. The company is often penalised with late deliveries, misaligned inventory stock levels, incurring excessive completed goods inventory. This is owing to a range of factors, such as:

**Order processing system**: The challenges encountered with the inventory management system includes:

- Ordering more or less than required. This is owing to an outdated bill of material specifications.
- Misalignment between the raw materials stores and the procurement department.
- A lack of paperwork from the suppliers and unscheduled deliveries.

**Inventory management system**: The challenges encountered with inventory management includes:

- Poor communication between the planning, procurement and warehouse employees.
- Inventory-outs and inaccurate forecasting.
- The material requirement planning (MRP) function within SAP is not fully utilised, rendering it difficult to track work-in-progress inventories and stock levels.
**Freight transportation system**: The problems encountered with freight transportation includes:

- Maintaining on-time delivery.
- The company outsources delivery trucks. When the demand is high, scheduling of trucks becomes challenging.
- Double handling of finalised products.

### 1.4 RESEARCH OBJECTIVES

The research problem statement covers a holistic scope of business logistics systems challenges encountered at TM. This research addresses the inventory management related challenges as emphasised in the problem statement. It endeavours to focus and investigate the effectiveness of inventory management systems. The main objective of this research is:

“To determine the effectiveness of inventory management system at a Tobacco manufacturing company”.

The supporting research objectives are developed to comprehend in achieving the main research objective. The supporting research objectives are stated below:

- To determine the most suitable inventory management systems in a manufacturing company.
- To understand who is responsible for controlling inventory management system in a manufacturing company.

### 1.5 RESEARCH QUESTIONS

The research questions correspond to a variable in the context of investigating the effectiveness of inventory management systems at TM. The research questions are designed to establish insight that extends to the research objections. Answering the questions will accomplish the purpose of this study and add value in addressing the problem. The major research question is”
“How effective is the inventory management system at a Tobacco manufacturing company?”

The supporting research questions seeks to provide further investigation so as to answer the major research question which feeds into the research topic. The supporting research questions are stated below:

- What is the most suitable inventory management system in manufacturing companies?
- Who is responsible for controlling inventory management system in a manufacturing company?

1.6 SIGNIFICANCE OF THE STUDY

To remain competitive in the market, it is a requirement for any organisation to meet the customers demand by delivering what the customer need, in the way it is needed and at the time when needed at an affordable cost. This research considers challenges encountered at the company concerning the effectiveness of logistics systems. The reviewed practices are implemented to provide a solution to overcome the encountered challenges. It aims to offer solutions to overcome the challenges experienced and eliminate the seven forms of waste, optimising due date delivery performance. The benefits of the outcomes of this study include, accuracy in demand forecasting, increased on-time delivery performance, presentation to Operations Leadership Team (OLT) members on Industry 4.0, importance of barcoding, training to all staff at the warehouse on using SAP when invoicing raw material.
CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

A literature review is undertaken to gain understanding the topic, to incorporate what is already known in this field and to review collected data of other researchers. This study uses a computer-based search, keywords, databases and search engines, such as Google Search, Google Scholar, Emerald, Science Direct, ProQuest dissertations and thesis, Ebscohost and textbooks, to collect theoretical knowledge.

2.2 LOGISTICS BACKGROUND

The term logistics initiates from the earliest Greek and Latin term “Logistikos” and the “Logisticus”, translating to knowledge of computing and cunning (Kain et al., 2018). The term ‘logistics’ was invented by the military discipline (Islam et al., 2013). In the logistics business, major deviations occurred since the 1990s because of the prosperity of the media and rapid growth of technology communication and information (Vokoun, 2017). The usual perspective of business management in logistics systems is considered a purpose in service of an organisation’s approach, aiming to deliver the precise products at the correct time and form in a reliable way (Niine and Koppel, 2015). According to Gianpaolo et al., (2013), logistics revolves around the association, movement and the storing of material. The activities of logistics function include (Kotler, 2012):

- Customer service.
- Demand forecasting.
- Product scheduling.
- Order processing.
- Material handling.
- Distribution lines.
- Inventory control.
- Transportation.
- Procurement.
- Protective packaging.
- Warehousing.
- Storage.

The logistics term was originally used in the soldierly to define the events relating to a fighting force in the field and, in its narrowest sense, it refers to the housing multitudes. Blanchard (2014) defines logistics as “the aspect of military science dealing with the purchasing, maintenance and shipping of military material, facilities and people”. These explanations induce affirmations that the concept of logistics commenced within the military space; it later developed into the service and business space.

Logistics systems is a competitive device and was strategic in business (Miraldes et al., 2015). Madhani (2017) states that logistics processes are responsible for handling the company’s products and services effectively and efficiently with the crucial aim to have costs reduced, an improved customer service and for competitive advantage. It is the method of executing, monitoring the effective, operative flow, placing of completed goods, facilities, and information to be distributed from one place to another for consumption, to adhere to the customer’s needs (Hasliza, 2013). To obtain an efficient and effective logistics system, system management is a major component for the success of the company. Lastly, logistics concentrates on satisfying the customers demand. It offers location and time utility, by ensuring that the product is with the customer, undamaged at the right place, at the agreed time.

According to Ganapathi and Nandi (2015) logistics is about the combination of purchasing and planning, managing of stock, management of warehouses, management of transport and management of distribution centres. These activities are crucial as they deliver space and time value to the system. They offer the required materials for manufacturing and assist to put stock on the shelves for the vendor.
Supply chain is strongly associated to logistics. It covers the whole variety of activities, conveying materials from raw materials, through production processes to the point where the product reaches the customer. It is inclusive of the components, production and assembly, storage and stock location, managing of the orders’ receipt, distribution channels, delivery to the customer and information systems (IS) required to control this activity range (Miraldes et al., 2015). Presently, the concept of logistics is not regarded as a stand-alone aspect, as it is part of the supply chain concept.

The Council of Supply Chain Management Professionals in the United States logistics, states that supply chain is “that part of supply chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin to the point of consumption order to meet customer requirements” (CSCMP, 2012). Kain et al., (2018) identify logistics as the method of scheduling, executing and monitoring the actual movement of material and finalised products from the place of manufacture to meet the requirements of the customer at a certain profit margin. It is a method that enhances the material flow and stock in the company and its procedures to the end-user, as indicated in Figure 2.

**Figure 2: Material and information flow**
Source: (Kain et al., 2018).
2.3 THE PURPOSE OF LOGISTICS SYSTEMS

The fundamental of business logistics focusses on the forward logistics, which is usually from the manufacturer to the valuable consumer. The purpose of logistics is solely to reduce the operating costs (Goyal et al., 2013). First, it is accountable for adding place utility to a product, the effectiveness of moving on materials for production and products from a manufacturing place to a sales place (Madhani, 2017). Secondly, the purpose of logistics is through contribution to place and time utilities, enabling vendors to offer ownership utility to potential customers. Logistics activities aim to add place and time as usefulness to a product. Lastly, the crucial purpose in logistics is to form fixed contracts with customers and to create formal networks where information and knowledge flows substantial influences efficiency of contributing companies (Vokoun, 2017). Figure 3 indicates the integration of logistics from a business point of view.

Figure 3: Logistics and marketing integration as an interactive model
Source: (Madhani, 2017).
Logistic-marketing integration coordinates the marketing-mix (product, price, promotion, sales policy and packaging) and the logistics-mix (transportation, warehousing, inventory management, orders’ realisation and service). The logistics and marketing-mix attain the utmost level of customer needs satisfaction. Logistics has an important potential for adding value for the company, by strategically locating its inventory when and where required (Ganapathi and Nandi, 2015).

2.4 UNDERSTANDING LOGISTICS

Logistics activities concern adding place utility to a product. A good example of place utility is having a product to move from Johannesburg to another point, such as Pretoria. The product herein can be natural resources that must be processed in the factory, work-in-progress (WIP) or finalised products that must be distributed to the end-user for consumption (Islam et al., 2013). Logistics is also regularly observed as a division of engineering, forming “people systems” rather than “machines systems”. Research indicates that logistics deals considerably with several types of IS, supporting logistics management.

According to Hasliza (2013) logistics is a business arrangement structure for managing material, service, information, incoming and outgoing of capital. The current logistics model and practice concerns the provision of cost and time effective services for commercial activities mainly. This facility involves the transportation of merchandises from one area to another, storing the products in a more appropriate warehouse. It includes managerial activities such as order processing, inventory and packaging (Fabiana et al., 2013). Figure 4 provides an overview of the logistics concept.

The logistics concept involves a cohesive approach. It is an incorporation of information, transportation, inventory, warehousing, packaging and handling of material. The order is processed and invoiced as finalised products inventory. The customer settles the account for the order. There is normally an agreement between the two parties regarding delivery or collections of finalised products that identifies the responsible person for collecting or shipping products.
Figure 4: Graphical example of logistics
Source: (Islam et al., 2013).

Table 1 highlights three primary activities of logistics.

Table 1: Primary logistics activities

<table>
<thead>
<tr>
<th>Primary logistics activities</th>
<th>Actual activity</th>
</tr>
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<tbody>
<tr>
<td>Transportation</td>
<td>• Types of transport</td>
</tr>
<tr>
<td></td>
<td>• Product Planning</td>
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<tr>
<td></td>
<td>• Batch size</td>
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<td></td>
<td>• Materials handling</td>
</tr>
<tr>
<td>Inventory</td>
<td>• Inventory level</td>
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<td></td>
<td>• Order processing</td>
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<tr>
<td></td>
<td>• Safety stock</td>
</tr>
<tr>
<td></td>
<td>• Control methods</td>
</tr>
<tr>
<td>Location</td>
<td>• Quantity of available locations</td>
</tr>
<tr>
<td></td>
<td>• Size and geographical location</td>
</tr>
<tr>
<td></td>
<td>• Private or public warehouse</td>
</tr>
</tbody>
</table>

Source: (Hasliza, 2013).

Research indicates that it is the company’s logistics coordinator who manages the primary functions of the business logistics, planning, organising and controlling. It requires an effective and efficient management to achieve a successful coordination (Hasliza, 2013).
2.5 FORWARD LOGISTICS

According to Tom (2017) forward logistics is about moving the product from the manufacturer to the market. It uses computerised IS to track the items. It ranges from product expansion to manufacturing to supply end market.

2.6 REVERSE LOGISTICS

Reverse logistics (RL) is defined as the drive of finalised products or resources in the contrasting direction of the supply chain for producing or recollecting worth (Abdullah and Yaakub, 2014). Forwarding logistics system is concerned with the movement of raw materials to the product, and from the manufacturer to the customer. Govindan et al., (2015) states that RL is the procedure of moving products from the consumer to recollect the value of the product. In addition, RL is the process of returning products from the buyer to the manufacturer. It characterises all activities related to the salvage of products and materials. According to Tom (2017) it is defined as the process of scheduling, executing and being in control of the efficient and operative flow of raw materials, WIP inventory, finalised products and other information related from the region of origin to the point of consumption. RL is the process of moving products from the end destination for apprehending worth or to dispose properly.

The Reverse Logistics Executive Council (RLEC) states that the reserve logistics is an action of moving materials from the point of ingesting to the differing direction to reclaim worth or waste disposal. The reverse activity includes the following:
• The return of damaged products.
• To enlarge and renew stock.
• To package and remanufacture materials.
• To reuse the containers.
• To renovate products and handle outdated appliances.

2.7 IMPORTANCE OF BUSINESS LOGISTICS

It is important to have a system to ascertain a good product delivery to the location, at the time requested by the end-user. The type of system creates customer satisfaction, is one of the important elements in sustaining customer long-term purchasing contracts. In supply chain, each primary business activity is critically significant as each process adds value to logistics (Fabiana et al., 2013).

There are a few reasons for the importance logistics, indicating:

• The significance of costs.
• Supply and distribution line channel.
• Customer needs.

2.7.1 The significance of costs

Research identifies cost as a common objective in companies. Companies set strategies and perform projects to reduce costs. Most companies set strategies at an executive level to set operational objectives on how to control costs. These operational objectives are set as crucial Key Performance Indicators and are communicated from top to bottom management to ensure they are achieved. The more the company reduce costs, the better the benefits are to the customers and the shareholders (Fabiana et al., 2013).
2.7.2 Supply and distribution line channel

Research indicates that companies are adopting to global strategies whereby:

- The final products are manufactured for global markets.
- The products are manufactured in the area where the cost of raw materials and labour is economical.
- The finalised products can be sold for both local and global customers.

This strategy allows the expansion of distribution channels in comparison to those products that are sold only to the local market. In addition, the logistics system performs an imperative part, concerning the movement of products, as more costs are incurred especially concerning transportation costs. The oil and fuel price and the distance drive the high transportation costs between the supplier and customer.

2.7.3 The needs of the customer

Customers are the most important asset in any business. A business without customers yields to little or no profit. It is of ultimate importance to ensure that a company should have a rapid customer response system, prepared to remain competitive in the market. Value is created when a product ordered reaches the consumer at the agreed time, with the specific quality and at the right place.

2.8 LOGISTICS SYSTEMS AND TECHNOLOGY

The ultimate method of Industry 4.0 uses the capability of cyber-physical systems to deliver intellect and communication for non-natural, technical systems, called smart systems (Anderl, 2015). According to Anderl (2015), a Smart System is a consequential replacement technology of mechatronic and adaptronic systems. He adds that the main feature is the integration of cyber-physical systems for enabling inter-system communication and self-controlled system operation.
Smart systems can be used for condition monitoring, structural health monitoring, remote diagnosis and remote control. Smart systems are a crucial component for smart products, smart factories, smart grids and smart logistics. Research indicates that business processes based on smart systems, opens the channels to establish fundamentally innovative business models where the functionality of smart systems will be extended with integrated services. This new package of systems’ functionality and services will enable innovative approaches to meet customer and market demands.

Industrial improvement and customer request for improved technology and services support the beginning of new encounters with a gradually changing business (Barreto et al., 2017). This revolution radically affects how companies manage the new inducements and ecological context alignment. Some sectors, such as locomotive, technology and environmental science industry have already taken the lead on industry changes through commitment and innovation by working as a team. According to Hason et al., (2013) this technological evolvement is evident through well-known applications, such as ERP, Warehouse Management Systems (WMS), Intelligent Transportation System (ITS) and Transportation Management System (TMS).

In an industry, the Internet of things (IIoT) framework and the challenges encountered in logistics needs:

- High transparency.
- Integrity of control (Macaulay et al., 2015).

Integrity of control herein refers to the correct products, at the agreed time with the consumer, at the right location, with the right quantity and state with the supplier.

According to a study in Spain, these technological evolutions witnessed reduced production cycles, incorporation of customer needs in real-time, autonomous maintenance, automatic completion of orders in the right manner, shipping and dispatching (Jeschke et al., 2017). The
Integration amongst technologies and services rendered in the perception of Industry 4.0 companies is indicated in Figure 5.

Figure 5: The concept of Industry 4.0
Source: (Cardno, 2018).
The link between technologies and service area in the perception of Industry 4.0 factory, identifies six critical concepts behind the Internet of things.

2.8.1 Robots are smart devices

Smart devices are automated and can quickly change to adjust and adopt to production. 3D printers are good examples of this incredibly rapidly changing space that enables dynamic printing. It is critical to comprehend that these smart devices incorporate matters at an affordable price.

2.8.2 Smart devices

People enter a world of smart devices. Smart devices are customised to meet the needs of the customer after purchasing the device. Industries are also entering the space of smart devices as an element to reduce human activities. Several items that people buy, comprise a chip and became a smart device.

2.8.3 Sensors

Sensors are getting cheap, enabling companies such as View Technologies with smart sensors that ensure and enable low-cost passive radio frequency (RF) tags to bread from large distances. RF tags process video footages; high definition footage became a massive source of data for numerous companies. The innovative technology proposes that factories are laden with sensors directing data streams never perceived before. The benefits of video monitoring are:

- People identification.
- Monitoring movement.
- Comprehend outages.
- Dramatically enrich the data streams coming from the factory floor.
2.8.4 Factory layout

A factory is a physical place where manufacturing and production occur from incoming raw materials to the final customer product. They hold layouts and logistics. The 4th Industrial revolution introduces smart logistics, whereby smart factories and data streams are combined. The data has no knowledge of the factory floor though. Smart systems are fundamentally unable to optimise knowledge.

2.8.5 Internet of systems (IOS)

Data is streamed by sensors and the machines in a smart factory. Behind these sensors and machines are systems. These systems are for monitoring and operating the smart devices and collect data from the sensors. To have a fully incorporated smart factory, there is a necessity to bring the data together from these systems and qualify the smart factory to come to life, changing and adapting to new requirements and technologies and needs.

2.8.6 Humans

Human beings are the creative force, the oversight and the exception, monitoring the smart factory. Humans need to observe and to comprehend the ramifications of the change. It is the quality of their relationship with the smart factory that will determine its success. To make this development successful, IOS humans need to stream data to view the real world. Humans need some visual display to consume the data streams in real-time. Smart factories are an incredible force that reshapes manufacturing methods. They fundamentally change what can be bought, how it can be manufactured and how production can be controlled. The trifecta of Internet of things (IOT), smart factories and mobility unlock the ability to innovate ways that are not imagined yet.
2.9 TYPES OF LOGISTICS SYSTEMS

In a supply chain, processes are allocated into two systems, depending on whether the systems are performed in response to a customer order or in expectation of an order from a customer (Kain et al., 2018). The two processes referred to herein are stated below:

- Push systems.
- Pull systems.

The business terminology of push and pull systems was initiated in logistics and supply chain management. These terms are used in the marketing sector and in the hotel distribution business (Martin and Michael, 2018).

2.10 UNDERSTANDING THE PUSH SYSTEM

The push system is driven from the top management down to lower management. The top managers, according to the logistics structure, are those with deciding authority on merchandise moving down the system and when they should be released. This type of system pushes down the merchandise (Owens and Warner, 2014). Figure 6 elaborates the push system briefly. When dealing with the push system, production starts when demand is planned to specific workstations and raw materials are available for processing (Prakash, 2011). He adds that the push system is more frequently implemented in industries, particularly manufacturing industries as it was introduced prior to the pull system. The push system indicated comparative success in industries. Errors in demand forecasting may result in excess or shortage of finalised products or WIP inventory and in overutilisation or underutilisation of capacity.

Barak (2014) adds that push system of inventory control includes forecasting inventory needs to meet customer demand. When using the push system, it is crucial for the organisation to be aware of the products’ specifications and the bill of material (BOM) that must be purchased to meet the orders according to the forecast. Several production planning devices are associated with the
push system, such as the MRP and manufacturing resource planning (MRP II). The MRP II system makes an important logic for a push systematised organisation as it ensures that raw materials and products, needed for production, are available when needed.

2.11 UNDERSTANDING THE PULL SYSTEM

The pull system is driven from the bottom management. The bottom management is responsible for ordering the merchandise as the need arise, thus drawing supplies through the system. With the pull system, production is initiated when finalised products or WIP inventory are withdrawn and parts are available for replenishment (Prakash, 2011). Figure 7 explains a pull system concept integrated with marketing. To control the optimum quantity of safety stock, there are concepts, such as just-in-time (JIT) that can be utilised. This means that consumers receive the product only when it is needed. This concept aims to achieve a zero-inventory level and it is

Figure 6: Push system

It is a scheduling system combining information company-wide to plan the activities of the manufacturing function. The questions below are frequently asked:

- What should be made?
- What does it take to make it?
- What is available to make it?
- What can be attained to make it?

Figure 7: Pull system concept integrated with marketing.
effective if applied correctly (Islam et al., 2013). The following are advantages of a requisition or push system (Owens and Warner, 2014).

- It is driven from the current information about the actual needs according to the current forecast.
- It is more precise in theory and based on the actual order book, monitored by the ERP system.
- It is less wasteful as it uses the JIT technique. The manufacturer only manufactures when there is a customer order.
- Line managers make decisions according to the scope of concern.

Figure 7: Pull system
Concerning business logistics systems, this research addresses three crucial components:

- Order processing.
- Inventory management.
- Freight transportation.

Owens and Warner (2014) states that the objective of a business logistics system is effortless. Its purpose is to move products without adding unnecessary complications within the process. As a result, it exists to receive, transport products and assets in an appropriate manner from raw materials stores to the factory floor and over to the warehouse area at a reasonable cost. Figure 8 indicates the crucial elements of logistics management.

![Figure 8: The crucial elements of logistics management](Source: (Islam et al., 2013).)
2.12 UNDERSTANDING ORDER PROCESSING

Order processing is concerned with the information flow through the system that the company uses, comprising more than one operation. The principle element enabling the logistics function to continue, is a rolling order (Ganapathi and Nandi, 2015). A customer order triggers a host of activities that originates from the transmission of physical distribution. At the confirmation of the order, the company performs various activities that ensure prompt delivery to the customers. The perception in this case is that customers expect the order delivery to be within a specific period from the date of order placement. The company acknowledges that a shorter lead-time is more satisfactory to customers; it capitalises on this factor to gain competitive advantage. The company pursues to offer good customer service through a quick customer response system. It ensures commitment on delivery dates. To retain good customer relationship, the customers must be made aware of the status of their order throughout the entire process (Gianpaolo et al., 2013).

2.13 UNDERSTANDING INVENTORY MANAGEMENT

The inventory control and management goal accounts for the effective monitoring and storage of inventory in company warehouses and facilities. The communication between the procurement group and other departments assist with the forecasting; they set levels at which to purchase additional volumes of each and notify the appropriate departments. They also control the quality of storage methods and ensure that incoming and outgoing items meet the necessary standards.

According to Binti (2017) an inventory management system is a management function and an important device for several businesses. It is a system used when tracking inventory from one process to another. Companies selling or producing products for the benefit of accounting, are mainly those implementing inventory management systems. Research indicated that the size and volume of a company can assist to dictate if inventory management is one of the vital activities in business logistics systems.
The objective of inventory management is to:

- Control stock levels to minimise operation costs, whilst satisfying customer service level requirements.
- Provide acceptable customer service (on-time delivery).
- Allow cost-efficient operations.
- Minimise inventory investment.

Inventory management of a company can take different forms. In the case of a manufacturing company, it may consist of raw materials, work-in-progress and finished goods. In the case of a trading company, it may only comprise of finished goods, while in the services organization, there may not be inventory. Tobacco Manufacturer is a manufacturing organization, thus keeps inventory in all three forms. Raw materials awaiting to be manufactured or finalised products awaiting a shipment or products sold to the customer, is recognised as inventory (Satellite Transportation, Inc., 2015). As applied to logistics, JIT is viewed as a business concept that focuses on minimising delays and inventory accumulation (Madhani, 2017). According to Ghiani et al., (2015), some examples of inventory are as stated below:

- Raw materials and WIP waiting to be manufactured or processed in a production floor.
- Inventory conveyed through the supply chain.
- Inventory kept in the distribution centre (DC) before selling to the customer.
- Inventory kept by the customer or vendor to satisfy future needs.

Companies choose to uphold inventories for a variety of reasons and this includes (Niine and Koppel, 2015):

2.13.1 Enhancing service level

To keep inventory of complete products in warehouses nearer to customers’ yields to shorter lead times. Rendering it easier to respond to customer requirements at the shortest possible time. This
is an advantage for companies measuring on-time delivery as a KPI, increasing competitive advantage.

2.13.2 Reduced transportation costs

There are various categories of products within transportation. Transportation of products falls under the economies of scale category, owing to the high fixed costs. As a result, a company may find it more pleasing to respond to customer demands from local warehouses by delivering small customer orders over lengthy distances.

2.13.3 Seasonal items available throughout the year

Some products are only available at certain periods of the year. This could be owing to climate changes or geographical locations. Seasonal products can vary from clothing to fruits and vegetables. By having these seasonal products stored in warehouses, it enables the company to sell them during alternative months.

2.13.4 Counteracting inefficient management of business logistics

Companies keep an inventory to counteract inefficient management of business logistics systems. A good example to demonstrate this is, a distribution company may hold stock, owing to its inability to coordinate supply and demand. Some companies hold stock to avoid the annual tax increases in the early months of each year.

2.13.5 Managing uncertain demand from customers and lead times

It is unpredictable what can happen, hence some companies maintain safety stock levels, which serve as back-up in cases of unexpected peaks of demand. Safety stocks allow companies to respond to customer demand.
On the contrary, Owens and Warner (2014), states that there are only four reasons for inventory to exist:

- Maximising efficiency on transportation

For any businesses dealing with transportation to engage in a single order shipment, there is no gain. Shipment occurs in batches of a size and rate of recurrence, decided by the transport system. The geographical location can also have a significant impact on this matter; shipment occurs according to location to avoid single trips to the same place.

- Safety stock

Most companies produce products in batches for packaging and handling purposes. This is performed for several reasons and unforeseen circumstances, such as trucks break down and road closure and inaccurate demand forecasting. These factors force companies to maintain safety stock level to avoid a loss of inventory during peak demand and to avoid late deliveries to customers.

- Storing capability

When a storage location nearer to the customer has insufficient storing capacity, the completed products should be kept in an alternative location within the supply chain. It should be ensured that deliveries occur more often to the facility with insufficient capacity. This reverses the transportation efficiency method but is often effective, especially on local networks.

- Anticipation

Advanced technology is compromised globally, where times are always changing; innovations are performed almost every second. Companies find it convenient to keep stock in preparation for high-unforeseen demand because of the interval between placing the order and receiving it.
Research indicated that a good inventory management policy must consider the following five crucial issues:

- The virtual significance of the end-user.
- Cost-effective is important on the various products.
- Transportation procedures.
- Flexibility of processes in production.
- The policy of one’s competitor (Niine and Koppel. 2015).

### 2.14 EFFECTIVE INVENTORY MANAGEMENT

Research indicated that for any organisation that anticipates having an effective inventory management system, management must have the following:

- A system that keep track of inventory available and on order.
- A reliable forecast of demand.
- Must be knowledgeable of lead times and its inconsistency.
- Estimates must be reasonable concerning:
  - Inventory holding (carrying) costs.
  - Ordering costs.
  - Deficiency costs.

An effective inventory management is achievable through implementing planning devices, such as MRP and MRP II. Inventory management involves a remarkable transaction amongst the benefits of holding inventory and the costs of keeping it. This means that the optimal funds needs to be capitalised in inventory so as to avoid the danger of shortage as well as surplus inventory. Inventory management concentrates on having enough inventory-in-hand of various products to shun the risk of a stock out and retaining much inventory which does not turn out to be a burden on the profit of the organization (Mittal et al., 2014). A suitable inventory management system is vital for ensuring accomplishment in the operations of the business. It is important for the
continuity and the endurance of any goal-focussed manufacturing organization (Adeyemi and Salami, 2010).

Controlled inventory management does not only bring considerable cost savings, as a result, provide an improved factory production capacity, thus saving in wage cost and time, reduction in material costs, reduced storage space, reduction in material waste and improved smooth flow of production enabling easy to control. Systematic and operative inventory management results in a reasonably high inventory utilization ratio, low write-offs of outdated or depreciated inventories and a small number of work stoppages or loss sales due to inventory-outs (Mittal et al., 2014).

2.15 FUNCTIONS OF INVENTORY MANAGEMENT

The functionality of inventory management is to manage materials for customer satisfaction, whilst maintaining a minimum inventory investment and a maximum facility and work force utilisation (Lancioni and Howard, 2008). The objectives of inventory management are to strike a balance between inventory investment and customer service. The functions of inventory include:
• To smooth production requirements.
• To decouple operations.
• To protect against stock-outs.
• To take advantage of order cycles.
• To assist hedge against price increase.
• To permit operations.
• To take advantage of quantity discounts.

2.16 TYPES OF INVENTORY MANAGEMENT MODELS

Inventory management is a vital for any industry since shortages in control can result in severe glitches. When there is incompetency in controlling inventories, it is likely that interruptions in production, dissatisfied customers and overtime costs of working capital results could occur (Lancioni and Howard, 2008). Whilst it is necessary to maintain the optimum level of inventory, it is a difficult task. Models were developed recently for determining the inventories to be maintained in the enterprise (Sinha, 2016).

2.17 DETERMINISTIC MODELS

Deterministic models are made on the statement, indicating is no uncertainty with demand and replenishment of inventories. This section discusses three types of deterministic models.

2.17.1 Economic Order Quantity (EOQ) Model

One of the important decisions in companies concerning inventory management, is how much inventory to buy at a time. EOQ identifies the optimal order quantity by minimising the total of certain annual costs that vary with one order size. It provides solutions to challenges, such as:
• How frequently to buy?
• When to buy?
• What should be reserve stock?

Assumptions of an EOQ model

• Only one product is involved.
• Annual demand requirements are known.
• Demand occurs throughout the year.
• Lead-time does not vary.
• Each order is received in a single order.
• There are no quantity discounts.

2.17.2 Activity-based costing (ABC) analysis

The ABC analysis of discerning inventory is built on the logic that in any large number, there is normally a “significant few” and “insignificant many”, indicating that the objects with the most value are identified as “A Items”. The objects with moderately low value are identified as “B Items” and the objects least valuable are identified as “C Items”. This is true in the case of inventory. A company sustaining different types of inventories, exercises various degrees of control. In the case of ABC analysis, strict control is imposed on “A Items” preserving bare minimum necessary level of inventories. Conversely, “B Items” are kept under reasonable control and “C Items” are kept under simple control (Sinha, 2016).

2.17.3 Inventory turnover ratio (ITR)

Inventory can be managed by using accounting rations, such as an inventory turnover ratio. It establishes the relationship between average inventory and the cost of inventory consumed or sold during the period.
\[ ITR = \frac{\text{Cost of goods consumed or sold during the year}}{\text{Average inventory during the year}} \]

2.18 PROBABILISTIC MODELS

Probabilistic models take cognizance that there is some degree of uncertainty associated with the demand pattern and lead-time of inventories (Sinha, 2016).

2.19 TECHNOLOGY USED TO IMPROVE INVENTORY MANAGEMENT

Research indicates that radio frequency identification (RFID) technology gaining abundant attention in industry and academically. The main study concludes that the cost of RFID tags started to decline to the stage where large-scale application in the consumer space are possible. The physical size and form of RFID tags are now practical for several potential applications, such as tracking inventory (Lee et al, 2008). The manufacturer-retailer supply chain was widely identified as a crucial area for business applications of RFID technology (Lee et al, 2008). There are two types of benefits that the RFID technology introduce: Direct and indirect benefits.

2.19.1 Direct benefits

The most obvious use of RFID is an automatic version of bar code scanning. As a more sophisticated automation device, RFID provides the advantages of:

- Eliminating or reducing labour.
- Eliminating delays in recording inventory movements.
- Improving the accuracy of inventory records.
- Having larger data capacity for additional information such as selling price.
- The ability to detect or count inventory at any time with little or no marginal cost.
2.19.2 Indirect benefits

Results from dynamic effects of small changes by RFID in an area of a supply chain, raised after a business process transformation. This is done to take advantage of the information.

2.20 ORGANISATIONAL STRUCTURES

The corporate organisational structure is designed to create the most favourable environment to achieve business objectives. No universally usable optimal organisational structure exists. For each organisation, there is mostly a self-made structure, according to the needs of the company; it should primarily support implementing corporate strategy. Classical organisational structures experienced a long evolution. According to Jakes (2016), they achieved some stability and transparency in the functioning of the company and created important preconditions for high discipline in fulfilling tasks. Organisational structures are complex and difficult to control. In addition, they are often inflexible and adaptable (Jakes, 2016).

Conversely, the present time holds turbulent change and requires companies to cope continuously with these changing conditions. Quality requirements are constantly increasing with the development of information and communication technologies (Jakes, 2016). The current trends in managing the organisation, are ensuring the availability, flexibility and ability to adapt to the changes that occur in the market by competition and in the global environment. The main trend is to reduce organisational levels, as this direction enables highly efficient and flexible management (Jakes, 2016).

2.21 UNDERSTANDING FREIGHT TRANSPORT

The ability of a country to compete in the market can be affected by an uncompetitive freight logistics system. Freight transportation is the most crucial supply chain element, ensuring the well-organised movement and timely accessibility of raw material and finalised products. The need for freight transportation results from manufacturers and customers who are geographically
far apart from each other (M. SteadieSeifi and Dellaert et al., 2014). When travelling on any of the public highways, several trucks moving almost persistently in either direction, may be encountered. Why do so many trucks crowd the highways, day and night? The answer lies in that trucks are involved with transporting products from one part of the country to another. This can be products that is available for purchase at a wholesale store, or it can be industrial goods that should be available when manufacturing another product (Ganapathi and Nandi, 2015).

The trucks are all involved in an essential activity that has a huge impact in the functioning of business companies. airplanes, motor vehicles, marine transport, railway. Multi-modal transport workers are the leading transportation services that work jointly with suppliers to distribute sales of products (Teodorović and Janić, 2017). The crucial task of distribution logistics is to deliver the final product to the customers.

Transportation of freight holds an imperative part in the modern economy. It supports manufacturing and depletion at places that are far apart. Freight transportation is responsible for about two-thirds of the logistics costs and has an influence on consumer services (Satellite Transportation, Inc., 2015). In support of the statement, Ghiani et al., (2013) state that logistics is a main expense for companies, thereby affecting and being affected by other economies of scale. The role of transportation planning is a magnificent part in business logistics management for several companies. In return, the marketplace is wider, therefore encouraging competition amongst the producers from various nations, inspiring companies to adventure on cost effectiveness (Niine and Koppel, 2015).

Produced products must reach the desired customers, alike the raw material required for production that must reach the company. The two stated scenarios need direct transportation of goods, either from the dealer’s properties to the manufacturing premises of the company or from the manufacturing centres to a warehouse or to a customer. Companies in advanced countries takes more advantage of cheap labour in manufacturing than in developing countries. Consumable merchandises are available in the market globally. The goal of transportation is to ensure that products are available where they are in demand, creating a place utility.
Transportation is an essential feature in logistics in local and global movements. This is owing to lengthy distances where products must be moved. A company may have less production centres, whilst the market spread over an outsized geography. This, as a result, may call for an extensive physical movement of products prior to arriving at the end customer. The selection of transportation modes is limited for the local logistics; there are more transport varieties available for the global logistics. A company relies on road or rail transportation for local distributions; another avenue is through marine (water) and air transportation, endeavouring to reach global customers.

The leading modes of transportation methods used in logistics system management are ship, rail, truck, air and pipeline. They are joined differently to achieve a door-to-door service. Wholesale transport is economically affordable, especially for extensive distance shipments. It is more energy efficient than the marginal. Companies mostly use trucks to transport WIP and finalised products. This is owing to the capacity to transport large volumes of these products. This is performed through the truckload or by a partial truckload. Air transport is mostly used with road transportation to deliver door-to-door facilities.

Concerning the warehousing and transport, the merchandise is packed, based on the nature of the product. A bill of loading (B/L) is a document used by the receiver when receiving material from a customer. It is distributed by transport service providers, explaining how loading and packaging of products should be performed from the initial stages to the end. B/L comprises the cargo of the product shipped with the title of the shipment to the stated end-user (Islam et al., 2013). Figure 9 indicates various types of warehouses.
Inventory and transportation strategies are entangled. The section below discusses three strategies that can be used for product distribution (Ghiani et al., 2013):

**2.21.1 Direct shipment**

A direct shipment transports the products directly from the manufacturer to the vendor. When this type of shipment is implemented, the finalised products are transported directly from the production plant to the customer. Direct shipment eradicates the expenditures of running a DC and it shortens the lead times. Conversely, if a distinctive customers’ batch quantity is small and the end-users are distributed over an extensive geographical location, using a larger group of trucks is essential.
Direct shipment is universal and mainly used to respond to perishable products as required by the customers, as it is timely. This type of distribution assumes that the ultimate products are dispersed from the production plant directly to the customer as indicated in Figure 10.

**Figure 10: Direct shipment distribution**
Source: (Teodorović and Janić, 2017).

### 2.21.2 Warehousing

The most significant functional area in logistics is warehousing management (Madhani, 2017). Warehousing is an ancient method of receiving and storing products through various methods, such as reservoirs, pallet racks and shelves. When an order arrives through the ordering process management system, products are retrieved, packed and transported to the customer as indicated in Figure 11. There are four major functions that warehousing comprises: receiving products from the supplier, storing the products as raw materials, order selection according to the customers’ requirements and transporting. Upon the arrival of an order, these functions must be performed repeatedly.
The larger the number of warehouse facilities, the higher the inventory costs and the lower the transportation costs. This is a complex situation since there are cases where more than one warehouses are a need. When attempting to solve these scenarios, the following must be considered: The current demand, the available financial resources, the equipment required by the DC, material handling processes and the various environmental and transportation issues (Teodorović and Janić, 2017).

2.21.3 Crossdocking

According to crossdocking is a modern warehouse management concept. The finalised products are delivered to a warehouse by inbound trucks at the receiving docks. All finalised products are delivered with no delay. All is organised by the destination on the sortation systems, directed and located into outbound trucks on the shipping docks (Teodorović and Janić, 2017).
A cross-dock is a transhipment location whereby products, arriving from various production plants, are organised. The finalised products are combined with other products, according to the sortation process. The products are and transported directly to the departing trucks, then to the customer. This means that the arriving products are kept at the crossdocking facility for several hours; holding costs are not incurred at this stage. The crossdocking scenario is indicated in Figure 12.

2.22 LITERATURE REVIEW SUMMARY

This chapter clearly defines logistics, provides the concepts of business logistics systems, explaining in detail. There is a common agreement that logistics initially started in the military, describing the activities associated with maintaining a fighting force in the field. It is concerned with the organisation, movement and storage of material and people.

Logistics systems performs a crucial part in business and the need to respond to a customer order is equally important. There is a divergence between companies and using information technology systems to manage the ordering process. Automotive industries, amongst others, industrialised their factories through the adoption of Industry 4.0 to achieve flexibilisation, automation, quality improvement, value chain participation, high value information and customer intimacy. The results of this technological evolvement yield to reduced production cycles and improved customer services. The push and pull systems are inventory management functions, frequently implemented in manufacturing industries. SAP, which is an ERP system, is one of the adoptions that companies can use to manage the business logistics systems. Inventory management is a management function and an important device for several businesses. There are varying reasons in companies to maintaining an inventory. Companies choose to uphold inventory in response to customer service, reduced transportation costs, safety stock, managing uncertain demand from customers and lead times. An effective inventory management system is achievable through implementing planning devices, such as MRP and MRP II; it requires commitment from the top
management of an organisation. There is no moulded organisational structure, as each organisation hold self-made structures, according to the needs of the company.

This study uses a computer-based search, keywords, databases and search engines, such as Google Search, Google Scholar, Emerald, Science Direct, ProQuest dissertations and thesis, Ebscohost and textbooks to collect theoretical knowledge.
CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

A literature review is conducted to gain an understanding of the topic, to integrate what is already known in this field and to review accumulated knowledge of other researchers. This study uses a computer-based search, keywords, databases and search engines, such as Google Search, Google Scholar, Emerald, ScienceDirect, ProQuest dissertations and theses, Ebscohost, textbooks to collect theoretical knowledge. A theory verification study aims to test a preposition derived from theory, whilst a theory generation study aims to develop a theory to explain an empirical phenomenon (Punch, 2016). The main functions of the literature review are to make a technical basis available for theory and to do a logical analysis on the inventory management. The study does not generate a new theory.

Former research have shown that there are several management systems influencing the effectiveness of inventory management in the organization. There was a lack of researchers performing research in the tobacco manufacturing industry in South Africa. This study however is not the first to be conducted; it is an addition to the existing learnings. Chan et al., (2017) published a case study conference article on the factors influencing effectiveness on inventory management in manufacturing small and medium-sized enterprises (SMEs). The outcomes from the conference study is adapted as a guideline.

3.2 RESEARCH DESIGN

This study uses a qualitative method. A qualitative research is mainly investigative. It is used to increase understanding of fundamental reasons, views and motivations. It affords perceptions into the problem or helps develop hypotheses for potential qualitative research. A qualitative approach to research aims to understand how people make meaning of the social world. This approach is committed to multiple views of social reality in that a researcher’s respondent becomes “the expert”. It is the respondents view of reality that researcher seeks to interpret. One
primary method of a qualitative approach includes values reflection and listening with the goal of empowering and giving voice to respondents’ experiences. Lastly, a qualitative approach privileges the exploration of the process of human being (Hesse-Biber, 2010). Furthermore, McKim (2015) argues studies that uses a qualitative methods approach gain a deeper, broader understanding of the subject. This argument justifies the adoption of using a qualitative research design when studying the effectiveness of inventory management systems at Tobacco Manufacturer.

3.3 RESEARCH QUESTIONS

Theories are close to a research question that is a verbalised declaration about concern referred to as the effectiveness of inventory management system herein. Research questions in qualitative studies are open questions, they aim to answer a “What”, “How”, “Which” or “Why” (Stake, 2014). The purpose of research question is to provide insight into perspectives of people or provide information on experiences, needs or consideration (Stake, 2014). Some research questions descend from theory, some from observation and some from intuition (Vanderstoep and Johnson, 2016). Research questions stated in section 1.5 of this study descend from theory and fully referenced. The research questions are designed to answer the “What”, “How”, “Which” and “Why” questions at the company, TM. Based on the above statement, the research question method has been adopted to this study as the research questions in section 1.5 aims to answer the “What”, “How”, “Which” and “Why”. Directing a research question serves to narrow ones focus on the topic of interest.

3.4 RESEARCH APPROACH

There are several designs that can be used in research. Dumas (2008) states that more popular research designs used by researchers, includes extended literature reviews, relative analysis, content analysis, survey-based research, evaluative research, case studies, action research and theory development. This study uses a case study research design. In a case study research, information is collected through a variety of data sources, including direct observation, focus
groups and interviews (Yin, 2009). Case studies conducted for research purposes, have the two distinct characteristics:

- Understanding complex matters.
- Extended employees’ experience.

Hesse-Biber (2010) conducted a qualitative case study research focussed on ‘Studying Gender Inequality in the Workplace’. The study was conducted in one organization with the focus of understanding the gender-wage gap amongst exceptionally performing workers. The study used qualitative in-depth interviews (open-ended questions) which predicted to provide a deeper understanding of potential ways in which the workplace environment operates to cause gendered inequities. Hesse-Biber (2010) justifies that this approach yielded desired results. According to the above mentioned justification and the similarities on the nature of the study, this study aims to adopt the same cross-sectional research approach. This case study aims to bring an understanding and extend experience into the research topic.

3.5 RESEARCH METHOD

This research is conducted in a form of a cross-sectional study. Cross-sectional are mostly observational and are known as descriptive, not causal or rational (Lavrake, 2008). This means that one cannot use a cross-sectional study to determine the cause of something. This study uses an open-ended questionnaire, whilst conducting interviews with all the participants’ population sample of 12 participants. All the participants are from the same organization referred to as Tobacco Manufacturer herein. The same questionnaire is used amongst the participants. This supported by Stake (2014) who states that research questions in a qualitative study are open-ended. This allows participants to elaborate on each question without limitation (Monette et al., 2010). Yin (2009) argues that information in a case study is collected through interviews amongst other methods. Based on this argument, interviews for this study are conducted in a form of a face-to-face meeting through a scheduled meeting appointment through Microsoft Outlook.
emails. A recording device is used during the interview sessions as a back-up for any missed data.

Benoun (2017) states that a 5-point Likert scale can also be used in a qualitative study as a tool to gather an individual’s impression or opinion. An additional questionnaire is developed for this study, using the 5-point Likert scale. The questionnaire is used to collect data containing the participant’s position title, age, duration employed in the position, inventory management theories and policies. A Likert scale uses various techniques to generate items and then select options that are valid (Dumas, 2008). Participants are informed on the purpose of this questionnaire; voluntary responses must be collected on the experience they have concerning an inventory management system. This data assists the researcher not to be biased during the results analysis.

3.6 RESEARCH POPULATION

The target population comprises the supply chain department, procurement department, planning and scheduling department, production department and warehouse and distribution as in Figure 13. Participants are permanent staff at TM, based in the South African region.

![Figure 13: Departmental interview channel](image)

Figure 13: Departmental interview channel
3.7 PRE-TEST

The established questionnaire is pre-tested on an individual basis with a sample of business associates. The main purpose of this pre-test is to establish the suitability and the credibility of the questions, and whether there are some questions that needs to be included in the questionnaire (Hilton, 2015). The questionnaire is approved by the university Ethics Department. A questionnaire designed for this study, is attached as an Appendix. The questionnaire is used with the participants during the interview sessions. It aims to answer the research objectives and questions. All the questions in the questionnaire are derived from literature. Academic supervisor and co-supervisor forms part of the questionnaire pilot testing.

3.8 SAMPLING

This study uses the purposive sampling method. The sample is mainly used in qualitative research and is most effective when an individual need to study a certain cultural domain with knowledgeable experts (Panday, 2016). This research population sampling follows a homogeneous sampling. Homogeneous means a specific position or level in the organization or a certain type of employee and it normally occurs between 12 to 15 people (Latham, 2013). The sample of this study is 12 participants as detailed in Table 2.


Table 2: Interview participants

<table>
<thead>
<tr>
<th>Department</th>
<th>Participants</th>
<th>Participants No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain</td>
<td>Site supply chain Manager</td>
<td>Participant 1</td>
</tr>
<tr>
<td></td>
<td>Finalised products Execution Manager</td>
<td>Participant 2</td>
</tr>
<tr>
<td></td>
<td>Logistics Controller</td>
<td>Participant 3</td>
</tr>
<tr>
<td>Procurement</td>
<td>Procurement Execution Manager</td>
<td>Participant 4</td>
</tr>
<tr>
<td></td>
<td>Buyer</td>
<td>Participant 5</td>
</tr>
<tr>
<td>Planning</td>
<td>Scheduling and Planning Manager</td>
<td>Participant 6</td>
</tr>
<tr>
<td></td>
<td>Production Scheduler and Planner</td>
<td>Participant 7</td>
</tr>
<tr>
<td>Production</td>
<td>Cell Manager</td>
<td>Participant 8</td>
</tr>
<tr>
<td></td>
<td>Quality Manager</td>
<td>Participant 9</td>
</tr>
<tr>
<td></td>
<td>Line Manager</td>
<td>Participant 10</td>
</tr>
<tr>
<td>Warehouse and Distribution</td>
<td>Leaf and WMS Execution Manager</td>
<td>Participant 11</td>
</tr>
<tr>
<td></td>
<td>Local WMS and Leaf Manager</td>
<td>Participant 12</td>
</tr>
</tbody>
</table>

3.9 DATA ANALYSIS

The data analysis for this follows a descriptive method. The qualitative data analysis practical strategies textbook and statistical tables are used to interpret the data (Bazeley, 2016).

3.10 LIMITATIONS

This research is a case study studying only one organisation, herein referred to as TM. The literature reviewed is limited to the research scope of this case study. The findings and recommendations are also limited to this case study. Since this research is a case study, the results cannot be generalised. Findings are restricted to the time of study.
3.11 ETHICAL CONSIDERATION

The company, TM, is not obliged in any way to participate in this study. Should it happen that the company rejects or abstain from implementing the recommendations from this study, no legal action will be taken against the company.

3.12 CHAPTER SUMMARY

This study uses a qualitative research design to investigate the literature findings on the effectiveness of inventory management systems at TM. This study follows a case study approach. A purposive sample of 12 participants is obtained from the supply chain, warehouse, production, planning and scheduling. Participants are questioned, using the 5-point Likert scale questionnaire, through a face-to-face interview session. The questionnaires are submitted at the University of Johannesburg for ethical approval, which is successfully obtained. The qualitative data analysis practical strategies is used to interpret the data (Bazeley, 2016).
CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

This study is based on a complete study of literature related to the objectives asked with a purpose to gather important data regarding inventory management to determine effective and efficient inventory management models. Literature on the following topics regarded as important were: inventory, inventory management systems, supply chain, logistics, logistics systems, industry 4.0. The relevant information was gathered from various publication such as textbooks, journals, articles and computer-based search engines.

According to (Labaree, 2009), the result section is where the findings of the study are reported, based on the methodology applied to collect information. The results section identifies the findings of the research, arranged in a logical sequence, without bias or interpretation.

4.2 RESEARCH METHODOLOGY AND STATISTICS

This study is a qualitative research, using a case study approach to collect information through various sources. A qualitative research method is investigative, gaining subject insights and understanding. This study uses two types of questionnaires to collect data:

- Open-ended questionnaire.
- Likert scale questionnaire.

Collective knowledge from various authors on inventory management systems, develops the open-ended questionnaire, referenced from the literature section of this study. This is performed to afford participants with background knowledge prior to responding to the questions. The questions are designed to be open-ended, allowing participants to provide detailed responses without limitations. The 5-point Likert scale questionnaire is a multiple choice of five possible
answers where specific questions are directed, regarding inventory management policies and practices. These questionnaires are distributed to five targeted departments, indicating, supply chain, procurement, planning, production, warehouse and distribution. The sample tested comprises 12 participants responsible for inventory management at TM in South Africa.

5-point Likert Scale Questionnaire

The search criteria for this part of the study includes articles, textbooks, and journals from the last 9 years (2008 to 2018 October), following which a total of 62 journal articles and conference papers. The data presented is collected via the 5-point Likert Scale questionnaires. The 5-point Likert scale questionnaire is structured in a multiple-choice type format, such that 5 possible varying responses are available to select from in each question. Figure 14 demonstrates the structure of the 5-point Likert scale questionnaire.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. How long have you worked in this position?</td>
<td>Under 12 months</td>
</tr>
<tr>
<td>3. Which age category do you fall into?</td>
<td>Under 20 years</td>
</tr>
</tbody>
</table>

Figure 14: 5-point Likert scale questionnaire
Face-to-face Open-ended Questions

The search criteria for this study includes articles, textbooks, and journals from the last 9 years (2008 to 2018 October), following which a total of 85 journal articles, textbooks and conference papers. The data presented is collected from the face-to-face interviews (open-ended) questions. These set of questions allows for detailed explanations from the participants.

4.3 MANAGERIAL POSITION OF THE RESPONDENTS

The first question on the 5-point Likert scale questionnaire, aims to identify who is responsible for inventory management and the systems used to control inventory. This question required the participants to state their job titles, no selection was required.

<table>
<thead>
<tr>
<th>Participant No:</th>
<th>Job Title</th>
<th>Managerial Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site supply chain Manager</td>
<td>Executive Manager</td>
</tr>
<tr>
<td>2</td>
<td>Finalised products Execution Manager</td>
<td>Executive Manager</td>
</tr>
<tr>
<td>3</td>
<td>Logistics Controller</td>
<td>Non-manager</td>
</tr>
<tr>
<td>4</td>
<td>Procurement Execution Manager</td>
<td>Executive Manager</td>
</tr>
<tr>
<td>5</td>
<td>Buyer</td>
<td>Non-manager</td>
</tr>
<tr>
<td>6</td>
<td>Scheduling and Planning Manager</td>
<td>Manager</td>
</tr>
<tr>
<td>7</td>
<td>FG Scheduler and Planner</td>
<td>Non-manager</td>
</tr>
<tr>
<td>8</td>
<td>Cell Manager</td>
<td>Manager</td>
</tr>
<tr>
<td>9</td>
<td>Quality Manager</td>
<td>Manager</td>
</tr>
<tr>
<td>10</td>
<td>Line Manager</td>
<td>Manager</td>
</tr>
<tr>
<td>11</td>
<td>Leaf and WMS Execution Manager</td>
<td>Executive Manager</td>
</tr>
<tr>
<td>12</td>
<td>Local WMS and Leaf Manager (Planning)</td>
<td>Manager</td>
</tr>
</tbody>
</table>

This table reveals that four participants are executive managers, five are managers and three are Non-managers. The assumption can be made that executive managers and managers are
responsible for controlling inventory management within the supply chain, procurement, production, warehouse, planning and scheduling. An inventory management system is a management function and an important device for several businesses (Binti, 2017), this statement is confirmed based on Table 3, the results reveals that 4 participants are managers and 3 participants are executive managers and are in control of inventory. According to the human resource (HR) policy of TM, an executive manager is on the highest-grade level. These individuals represent the operations leadership team (OLT). They are an influential group in the company.

4.4 THE NUMBER OF YEARS THAT PARTICIPANTS ARE EMPLOYED IN THEIR CURRENT POSITION

Employment duration is divided into six categories, ranging from under 12 months to beyond five years. The details are indicated in Table 4.

Table 4: Employment duration

<table>
<thead>
<tr>
<th>No:</th>
<th>Category</th>
<th>Actual Numbers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Under 12 months</td>
<td>2</td>
<td>16.5</td>
</tr>
<tr>
<td>2</td>
<td>1 to 2 Years</td>
<td>2</td>
<td>16.5</td>
</tr>
<tr>
<td>3</td>
<td>2 to 3 Years</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>3 to 4 Years</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>4 to 5 Years</td>
<td>2</td>
<td>16.5</td>
</tr>
<tr>
<td>6</td>
<td>Longer than 5 years</td>
<td>2</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4 indicates that two (16.5%) participants are appointed in their current position for a period, less than 12 months; one is a non-manager and the other is a manager. Two (16.5%) participants are employed one to two years; one is an execution manager and the other is a manager. Whilst three (25%) of participants are employed for two to three years, are managers; only one (8%) participant is employed for three to four years (non-manager). Two (16.5%) participants are employed for four to five years; one represents a non-managerial position and the other, an executive manager.
The results indicate a fairly spread of two participants, amongst the categories. Only one participant is employed in a position for three to four years, whilst three participants are employed for two to three years. These results are not anticipated as it is assumed that skills, competency and experience is accumulated over five years in a position. The HR team contends though, that participants are well equipped for the position that they hold; the department promotes growth, skill and empowerment. This is achieved through rotating qualified employees over a three-year cycle, indicating that an employee is employed a position for three years and is thereafter promoted. It can be a good exercise from the HR perspective, though it can also cause a lack of stability and consistency in other departments. This contradicts Saks and Waldman (2012), contending that holding numerous prior positions (job-hopping), may be viewed as negative for newcomers in an entry-level position. Occupation habits and expectation are derived in prior jobs, which may not be perceived as beneficial for a newcomer in a position. Newcomers may be less open to change and social influence during the socialisation process. ‘Job-hopping’ may be a symbol of an individual with uncertain career goals.

4.5 AGE CATEGORIES OF THE RESPONDENTS

The aim of this question is to identify whether age impacts controls inventory positions and correlation between age and position title.

<table>
<thead>
<tr>
<th>No:</th>
<th>Category (Years)</th>
<th>Actual Numbers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Under 20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>21 to 30</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>31 to 40</td>
<td>6</td>
<td>49</td>
</tr>
<tr>
<td>4</td>
<td>41 to 50</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>Older than 50</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

According to Table 5, none of participants are below 20 years. There are two (17%) participants between 21 to 30. Six (49%) participants are between 31 and 40 years, whilst two (17%) are in
the remaining categories of 41 to 50 and 50 or older, respectively. The executive managers, managers and non-managers range across the categories, confirming the findings in Table 5 that all participants control or manage the inventory. All participants are professional adults. The even range of age variance anticipate a comparison in knowledge and skills between younger employees, middle aged employees and older TM employees.

4.6 ANALYSIS OF THE FACE-TO-FACE RESEARCH QUESTIONNAIRE RESULTS

The literature review section teaches that in an agile supply chain, logistic processes can either be a pull or push system if the organisation focusses on high volumes and customer satisfaction. The first interview question aims to investigate and identify the supply chain systems used for inventory management.
### 4.6.1 The type of system used

**Table 6: Type of logistic system**

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Uses both push and pull systems. Local supply uses a push system and global supply uses a pull system. Global company&quot;.</td>
<td>&quot;Uses both systems. It is dependent on End Market. RSA based on forecast, other countries based on order placed&quot;.</td>
<td>&quot;Both systems, mostly push system. Make to stock. Stock build period occurs every September to February each year&quot;.</td>
<td>&quot;Participant specializes on raw materials. Warehouse uses a push system. We keep raw material stock. JIT system not applicable&quot;.</td>
<td>&quot;Both systems but push system is dominant. Keep raw material stock. About 15 components required to produce one SKU&quot;.</td>
<td>&quot;Push system. Distribution centres maintain safety stock levels. Also build up stock for the following&quot;.</td>
</tr>
<tr>
<td>&quot;Participant 7&quot;</td>
<td>&quot;Participant 8&quot;</td>
<td>&quot;Participant 9&quot;</td>
<td>&quot;Participant 10&quot;</td>
<td>&quot;Participant 11&quot;</td>
<td>&quot;Participant 12&quot;</td>
</tr>
<tr>
<td>&quot;Push system. Build-up stock on the majority of the SKU’s&quot;.</td>
<td>&quot;Not sure, but currently using SAP for everything&quot;.</td>
<td>&quot;Both. Push system used for supplying or distributing Mega depots. Pull system used for other End Markets with a SLA for stock holding policy&quot;.</td>
<td>&quot;Work based on customer demand so that will be push system&quot;.</td>
<td>&quot;Push and Pull system. Works on customer demand&quot;.</td>
<td>&quot;Uses both systems. For local supply it uses push (Make-to-Stock). For export orders, it uses the pull system (Make-To-Order)&quot;.</td>
</tr>
</tbody>
</table>
Table 7: A summary of the type of logistics system

<table>
<thead>
<tr>
<th></th>
<th>Push</th>
<th>Pull</th>
<th>Both</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>4</td>
<td>-</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

SAP is mainly used

Table 7 contains the detail responses of all participants on the type of system used at TM. Table 7 reveals that seven participants respond, indicating that TM uses both push and pull systems. Whilst four participants indicate that the company uses a pull system. Four participants emphasise that responses are based on their scope of work; one participant indicates that TM largely uses SAP.

Seven participants explained that a pull system is used for export (global orders). Products comprise three executive managers, four managers aged 21 to 30, 31 to 40 and beyond 50. These participants share a mutual understanding of the type of logistics systems. These responses from executive managers and managers lack in-depth explanations. According to Saks and Waldman (2012), experience in an individual’s line of work was found to be positively related to position performance. This is not the case with the responses of participants aged 50 and beyond. A push system uses a top-down management system, opposed to a pull system that uses bottom-up management system" (Owens and Warner, 2014). The push system has indicated comparative success in industries and has overcome the following errors:

- In demand forecasting causing excess/lacking finalised products or WIP.
- In the overutilisation/underutilisation of capacity in achieving actual demand.

A push system of inventory control includes forecasting inventory needs to meet customer demand (Barak, 2014). The push system uses a planning device, such as MRP and MRP II, whilst the push system uses concepts, such as JIT. This concept aims at a zero-inventory level. It is effective if applied correctly (Islam et al., 2013). The aforementioned statement is a typical response expected from executive managers and managers in a position for more than five consecutive years.
Participant eight is a manager, aged between 31 and 40. The participant is uninformed concerning the system used, which is a concern to the interviewer. This may confirm job-hopping as a negative practice. Table 4 reveals that this participant is appointed for less than 12 months in the position. Age norms represent beliefs regarding the standard or appropriate age for an individual, holding a position or occupation (Saks and Waldman, 2012). The age norms are often based on actual age distributions of individuals in a peer group. A person aged 21 or 22 just completed their secondary education. It is at an entry-level for the position (Saks and Waldman, 2012). The company does not benefit from rotating Participant 8 at a managerial level. Participant 8 does not fall into this category; the results should not be influenced by the responses of Participant 8. The majority have a full understanding of the systems. Participant 3 is a non-manager, adding that the company uses the push system to keep stock to avoid the annual tax increases in the early months of each year.

4.6.2 The type of ERP software used by Tobacco Manufacturer

The study sought to comprehend the type of ERP software used by TM.
Table 8: The ERP System

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“SAP”.</td>
<td>“SAP. Weekly cycle counts and a monthly wall to wall count”.</td>
<td>“SAP”.</td>
<td>“SAP”.</td>
<td>“SAP. Company uses SAP”.</td>
<td>“SAP”.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>“SAP and GMES”.</td>
<td>“We are using SAP”.</td>
<td>“SAP and GMES”.</td>
<td>“We are using SAP”.</td>
<td>“We are using SAP or SAP Tao”.</td>
<td>“SAP. We have recently launched GMES which is a production function in SAP”.</td>
</tr>
</tbody>
</table>
Table 9: The ERP vendor system

<table>
<thead>
<tr>
<th>No:</th>
<th>ERP System</th>
<th>Actual Numbers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SAP</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>BaaN</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ORACLE</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>JDEWARDS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>None</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

According to Tables 8 and 9, all 12 participants report SAP as the manufacturer of the organisation’s ERP system. All participants are cautious and knowledgeable on the inventory management system. It is observed that three participants state that the manufacturer also uses Global Manufacturing Execution System (GMES) at production level; this is a function within SAP. The three participants who further provided information on GMES, are two managers and one executive manager, aged between 31 to 40 and 21 to 30. The globalisation of the economy and the related factors of increasing effectiveness in production, reducing innovation cycles and safeguarding high excellence are constantly increasing the pressure on the production business (Meyer et al., 2012).

It is important for the organisation to remain competitive, even by the systems used in production, allowing prompt response to customers. These are reasons for implementing GMES as justified by Participant 12 who is less than 30 years old. This signifies that age is less important; the individuals’ skills are significant. There is more variability in work performance within age groups than between age groups (Truxillo, 2009).

Participant 11 further states that TM integrated SAP with Test Acceleration and Optimisation (TOA) under SAP solution manager for customer support. The participant is unclear of the full functions and benefits of SAP TOA and made a referral to the information technology (IT) team for further explanations regarding the system’s benefits.
4.6.3 Tobacco Manufacturer's management of reverse logistics

Several advantages having a RL process in supply chain network exist; an improved customer satisfaction and loyalty are signified by paying more attention to faulty products and repairing the products. This statement aims to investigate whether TM prepared a process that manages logistics for the benefit of the vendors.

Table 10: Management of reverse logistics

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“There is a process in place. Not in my scope of work. Makes a referral”.</td>
<td>“Non-Spec material returned to Supplier with a return Stock Transfer Order (STO)”.</td>
<td>“A SOP document is created”.</td>
<td>“Vendors raise a return STO to the supplier”.</td>
<td>“Should it happen if there is a non-compliance in raw materials from the supplier, then I raise a return STO to the supplier”.</td>
<td>“A return STO is initiated by the vendor to the supplier and is received and inspected by the Quality team”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 7</th>
<th>Participant 8</th>
<th>Participant 9</th>
<th>Participant 10</th>
<th>Participant 11</th>
<th>Participant 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A return to vendor purchase order gets created to send back to supplier. We are the supplier”.</td>
<td>“Non-Conformance Material process which uses GMES. It triggers Warehouses to block stock on SAP and relative Departments are contacted”.</td>
<td>“Material gets quarantined for non-conformity and a return to vendor purchase order gets created to send the stock back to supplier”.</td>
<td>“Non-spec material returns back to us with as suppliers with a return STO”.</td>
<td>“Standard Operating Procedure is a document available on SAP and deals with reverse logistics and vendors uses the document”.</td>
<td>“A return to supplier purchase order is created by the vendor and the products are quarantined at the supplier”.</td>
</tr>
</tbody>
</table>
Several organisations consider that the return process should be unnoticed. Companies that implemented an effective RL workflow realise several benefits. Amongst others, the following are indicated:

- Closed-loop in the supply chain that necessitates a smooth and economical bi-directional material flow between the point of creation and the point of collection.
- Determine a lot-streaming policy to optimise the inventory control across the supply chain.

Table 10 indicates that TM has a process prepared for managing RL and seven of 12 participants state that a return stock transfer order (STO) is created by the vendor, to return to the supplier. Participant 1 is an executive manager, in the position for more than five years. The participant states that “There is a process in place. Not in my scope of work”. The participant did not respond to the question, it was unexpected for a person holding the highest-grade level, according to the companies HR policies. This justifies the criticism that older employees may depend more on younger employees (Truxillo (2009). This is evident with Participant 1 referring to a younger worker, Participant 11, for further explanation on the RL management process.

The quality team receives the returned products. They inspect and accept the goods, which is then quarantined. According to RLEC (2016), profitability is the most important reason to adapt strategies of reverse logistics. Participants commonly refrain from providing any information concerning the RL process’ benefitting or disadvantaging the organisation’s profitability. It remains unclear whether executive managers and managers are cautious about the RL process.

4.6.4 Applicable reverse logistics activities to Tobacco Manufacturer

RL is defined as the drive of completed products or resources in the contrasting direction of the supply chain for producing or recollection worth (Abdullah and Yaakub, 2014). This statement aims to investigate and identify RL activities applicable to the organisation.
Table 11: Applicable reverse logistic activities to Tobacco Manufacturer

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Return of products which are damaged. Enlarge and renew inventory. Package material, remanufacture. Reuse the products and to renovate&quot;.</td>
<td>&quot;Return of products which are damaged. Enlarge and renew inventory. Package material, remanufacture. Reuse the products and to renovate&quot;.</td>
<td>&quot;Return of products which are damaged. Enlarge and renew inventory. Package material, remanufacture. Reuse the products and to renovate&quot;.</td>
<td>&quot;The return of products which are damaged&quot;.</td>
<td>&quot;Damaged products&quot;.</td>
<td>&quot;Damaged products&quot;.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>&quot;The return of products which are damaged. Reuse of products&quot;.</td>
<td>&quot;Return of products which are damaged. To reuse the products&quot;.</td>
<td>&quot;The return of products which are damaged. Package material and remanufacture&quot;.</td>
<td>&quot;The return of products which are damaged&quot;.</td>
<td>&quot;The return of products which are damaged&quot;.</td>
<td>&quot;Package material and remanufacture. Renovate the containers for leaf and to use for import&quot;.</td>
</tr>
</tbody>
</table>

All participants respond that the RL applicable and managed at TM, includes:

- Return of damaged products.
- Reuse of products.
- Package material and to remanufacture.
- To renovate.
- To enlarge and renew stock.
Participants are clear minded and cautious concerning RL and further provide practical examples on how it is daily managed. Participant 12 is a manager; he explains that raw materials in the form of tobacco leaves, arrive from various suppliers, local and globally, are packed in containers. The organisation is responsible for processing the leaf for use in production and to supply other branches. The same containers are renovated to eliminate waste and are used for imports when supplying other branches. This manager clearly understands the activities within RL and uses the opportunities.

4.6.5 Logistics service focus at Tobacco Manufacturer

The position of logistics continues to develop in importance. It is driven by organisational structures of enterprises concerning globalisation, development of innovative technologies and developing importance of logistic chains (Jakes, 2016). This statement investigates and acquires understanding the type of logistic services the organisation focusses on.
Table 12: Logistic services focus

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>The current structure is formed to support primary logistics, marketing”</td>
<td>“Network optimisation, reducing footprint, improve ISPI’s and SWIM”</td>
<td>“Network optimization”.</td>
<td>“On time in full (OTIF)”</td>
<td>“Inventory management, transportation and warehousing”.</td>
<td>“Inventory management, warehousing and transportation”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 7</th>
<th>Participant 8</th>
<th>Participant 9</th>
<th>Participant 10</th>
<th>Participant 11</th>
<th>Participant 12</th>
</tr>
</thead>
</table>

From Table 12 it is evident that there is a focus on a variety of logistical services. Participants 4, 11 and 12 state that logistical services focus on OTIF. Participant 5, 6, 7 and 9 identify logistical service as transportation, inventory and warehouse management. Conversely, Participant 2 and 3 report logistical services focus is network optimisation. Participant 1 and 10 state that logistics services focus on marketing and customer satisfaction respectively, whilst Participant 8 indicate a lack of knowledge regarding the focus on logistics service. Participant 1, an executive manager, further explains that the logistics is an integrated function between primary logistics and marketing. In support, Madhani (2017) states that logistics and marketing are normally concerned with satisfying the customer needs and wants respectively through their supply and demand functions in a marketing channel. The logistics activity may depend on the marketing activity in a marketing channel and conversely. Participant 1, in the position for more than five years, explains that inadequate coordination between logistics and marketing can impact the company’s performance concerning prolonged transit times, higher levels of damage and loss, higher transport costs and higher packaging costs. Participant 1 emphasises the inter-functional dealings between logistics and marketing in Figure 15. This response of Participant 1 proves that older employees are typically in high positions, competent in their work (Truxillo, 2009).
Figure 15: Integration on logistics functions
### 4.6.6 Supply Chain structure at Tobacco Manufacturer

#### Table 13: Logistics structure

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;The current structure is formed to support Marketing, Primary Logistics and Networking&quot;.</td>
<td>&quot;Structure is formed to support On Time in Full (OTIF). To ensure product is where it should be when it should be&quot;.</td>
<td>&quot;Current structure is effective as it is integrated and focusses on Supply Chain, Primary Logistics, and Marketing, network development, Scheduling and Planning.&quot;</td>
<td>&quot;It supports procurement amongst the other functions&quot;.</td>
<td>&quot;I will send the structure to via mail&quot;.</td>
<td>&quot;The Head of Supply Chain has the Marketing, Primary Logistics and Networking managers reporting directly to him&quot;.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 7</th>
<th>Participant 8</th>
<th>Participant 9</th>
<th>Participant 10</th>
<th>Participant 11</th>
<th>Participant 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;The structure has recently changed but some of the functions includes Scheduling and Planning&quot;.</td>
<td>&quot;Material Requirement Planning, I think it is deterministic&quot;.</td>
<td>&quot;Structure is formed to support both Warehousing and Transportation to meet business requirements&quot;.</td>
<td>&quot;Structure has recently changed, I will send it you on email&quot;.</td>
<td>&quot;Structure is formed for the benefits of supply chain activities&quot;.</td>
<td>&quot;Structure is formed to support Scheduling, Warehousing and Transportation&quot;.</td>
</tr>
</tbody>
</table>
The relationship reveals that the logistical structure is formed to drive the logistics services. From Table 12 and 13, it is alluded that the supply chain structure is formed to support logistics, transportation, warehousing, planning and scheduling. Three participants refrain from discussing their views on the current structure; Participant 8 is unaware of the current logistics and supply chain structure, whilst Participant 5 and 10 indicate that the structure recently changed and could not provide additional information. This cautioned that participants are either unclear of the current structure or lack an understanding of the importance of the structure. Participant 1 contends at an executive level, that there is no existing organisational structure to benchmark. The participant adds that an organisational structure employed effectively at an automobile industry, might not yield the same results in a manufacturing company. This is supported by Jakes (2016), stating that for each organisation, there is customarily a self-made structure, according to the needs of the company. It should primarily support implementing a corporate strategy.
4.6.7 The inventory models and principles used in the organisation

It is important to obtain the optimum level of inventory in the enterprise as it assists manage inventory-outs, obsolete inventory and mismanagement of stock. The inventory principle should be influenced by the organisation’s inventory control system. These statements aim to investigate inventory model types and the inventory principles used by TM.

Table 14: Inventory model

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“We use deterministic inventory model. We use the Economic Order Quantities (EOQ), ABC analysis and the inventory turnover ratio”</td>
<td>“APO and TLB. Stock holding policy”</td>
<td>“Both models. The main one is deterministic as it is based on demand. We use probabilistic as a back-up, should there be uncertainties”</td>
<td>“Deterministic, works on forecast”</td>
<td>“Raw Materials works with deterministic. Orders materials based on safety stock level and uses the EOQ”</td>
<td>“Deterministic model. We work on a forecast (demand)”</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>“We use the Economic Order Quantity”</td>
<td>“MRP”</td>
<td>“Safety stock levels are defined and Economic Order Quantities (EOQ) uses replenishing stock”</td>
<td>“We use the deterministic model. Models such as EOQ and the likes”</td>
<td>“I think it is deterministic which is based on demand”</td>
<td>“Deterministic, works on a forecast. Planning and Scheduling to provide more info”</td>
</tr>
</tbody>
</table>
Table 15: Inventory principles

<table>
<thead>
<tr>
<th>No:</th>
<th>Inventory principle</th>
<th>Actual numbers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EOQ</td>
<td>8</td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>JIT ordering</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>ABC inventory analysis</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>MRP</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>None</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>1 (Inventory Turnover)</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 15 reveals that nine participants report that TM uses a deterministic model; two participants respond that the organisation uses EOQ; one participant states that the organisation uses MRP, whilst another added that they use Advanced Performance and Optimisation (APO) and Transport Load Builder (TBL). The responses are influenced by two factors:

- The varying departments of the participants.
- The managerial position of the participants.

There is a mutual agreement that the deterministic model is based on customer demand. Participant 9 contends from the production managerial view that safety stock levels are defined and uses EOQ to replenish stock. Participant 3 asserts from an executive level view, that a probabilistic model is also used as a back-up model, should there be any uncertainties on uses of the previous year’s forecast. Participant 2 provides an explanation that TBL and APO function interchangeably:

“The builder orders the transport purchase requisitions concerning scheduling requirements and amount restrictions and then generates optimal transport orders which ensures that the container capacity is utilized as much as possible”.

According to Table 14 and 15, all participants respond that the MRP is used to obtain an optimum level of inventory; three (25%) of participants respond to JIT ordering; eight (67%) of participants respond to EOQ; four (33%) of participants respond to ABC inventory analysis. The most shared
The inventory principle is the MRP, though it is evident that TM uses a variety of inventory principles to obtain inventory levels.

A relationship exists between the inventory model and the inventory principles, as mentioned by the participants. According to Sinha (2016), a deterministic model uses three main principles, indicating EOQ, ABC analysis and ITR.
4.6.8 Model effectiveness

The follow-up question on Question 7 from Appendix A and Question 4 from Appendix B, aim to comprehend and identify a correlation between the inventory model and inventory principles.

**Table 16: Model effectiveness**

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“It is effective. At times there’s a misalignment between the system and the physical stock”.</td>
<td>“This model is 99% effective”.</td>
<td>“I think it is effective”.</td>
<td>“It is effective. There is misalignment where material is replenished at the Warehouse but not at SAP. This is rectified during the monthly stock”.</td>
<td>“It is effective. Demand can change at any time. It is controlled from the United Kingdom (UK)”.</td>
<td></td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>“Very effective”.</td>
<td>“Effective”.</td>
<td>“Very effective. Now, the System automatically generates purchase order based on stock at hand”.</td>
<td>“It is effective, requires a bit of housekeeping” .</td>
<td>“It is effective. Miscommunication at times between production and the warehouse”.</td>
<td>“It is effective though not 100% owing to the human factor”.</td>
</tr>
</tbody>
</table>
According to Table 16, participants’ successful responses reflect to the following:

- Effective.
- Very effective.
- Fairly effective.

Seven participants add that models responded to in Question 4.6.8 are effective; there are certain measure that must be prepared to achieve a total effective model. Some participants emphasised misalignment at times, between the stock reflected on the system and the actual stock. This is owing to the human factor. The frequency of this occurrence indicates monthly. It is then rectified every month end during the stock counts.

Participants added that by adopting the EOQ model, the organisation could resolve challenges, such as:

- How frequent to purchase raw material (stock)?
- When to purchase.
- What should be reserved stock?

This decision inventory model is amended to the company’s stock holding policy. The stock holding policy is not disclosed herewith.

4.6.9 Smart Industry strategic manufacturing plans at Tobacco Manufacturer

The fourth industrial revolution is currently the topic of several organisations and institutions. It has advanced and functions in other continents, apart from Africa. This statement aims to comprehend whether TM has any intention adopting to this technology.
<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Ideally, as a company, we would like to operate in a Smart Industry, but we are not there yet”.</td>
<td>“Introduction of SAP TOA system. TOM structure defining lines of focus and responsibility”.</td>
<td>“They are still in the stages. We do have plans prepared to operate in a Smart Industry”.</td>
<td>“There are plans in place”.</td>
<td>“I’m not sure”.</td>
<td>“I’m not sure. It is not in my line of expertise”.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>“I do not know about this one”.</td>
<td>“We currently using Work Integrated System (IWS) that assists the business to achieve their targets especially on efficiency and utilization of resources”.</td>
<td>“Integrating SAP with GMES”.</td>
<td>“We currently running with Work Integrated Work systems I think it is an amazing device for a Smart Industry”.</td>
<td>“I am not sure, I can refer you to someone who can assist you with this one”.</td>
<td>“Some parts of our factory. The Palletizer is fully robotic, only robots are performing all the functions. They inspect products against the Production order, weight, date etc. Plan the sequencing and do barcoding”.</td>
</tr>
</tbody>
</table>
The decisive method of a smart industry or Industry 4.0 as it is sometimes called, uses the ability of cyber-physical systems to provide intellect and communication for non-natural, technical systems (Anderl, 2015). Numerous manufacturing companies especially in the developed countries has adopted to these technologies. According to the responses provided in Table 17, four participants are not knowledgeable concerning smart industries; three participants state that the organisation did not adopt this technology, although future strategic plans to transform into this technology of cyber systems and artificial intelligence exist. Varying responses from the remaining five participants are detailed below:

**Participant 2**

“Introduction of SAP TOA system. TOM structure defining lines of focus and responsibility”.

**Participant 8**

“We currently using Work Integrated System (IWS) that assists the business to achieve their targets especially on efficiency and utilization of resources”.

**Participant 9**

“Integrating SAP with GMES”.

**Participant 10**

“We are currently running with Work Integrated Work (IWS). This is a problem solving methodology. I think it is an amazing device for a Smart Industry”.
**Participant 12**

“Some parts of the factory. The Palletizer is fully robotic, only robots are performing all the functions. They inspect products against the Production order, weight, date etc. Plan the sequencing and do barcoding”.

Participants did not reveal an understanding of the Industry 4.0 concepts. There is an attempt from Participant 12. The four executive managers state that there are future strategic plans prepared; there is no mention though of the plans or indication when these plans will realise. This proves that the executive managers are in denial of smart industries. Research indicates that countries, such as Spain concerning technological evolvements, witnessed reduced production cycles, incorporation of customer needs in real-time, autonomous maintenance, automatic completion of orders in the correct manner, shipping and dispatching (Jeschke *et al.*, 2017). The opportunities and benefits from this study yield a presentation to executive managers and managers in Industry 4.0.
<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Yes”.</td>
<td>“Yes, through shipping cases. RFID tags containing the material type, SKU, product quantity, shipping case labels, pallet identification, product date, SSCS labels and batch quantity”.</td>
<td>“Yes. Especially with Finalised products inventory. All shipping cases must have a tag containing the Quantity, SKU, Product, Date of Manufacture, Time and Site location”.</td>
<td>“Yes, we do have RFID scanners”.</td>
<td>“Yes, we scan all materials upon delivery with a scanner and it is GR’d into SAP”.</td>
<td>“Yes, especially on our finalised products”.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>“Yes. All Finalised products are shipped with these tags”.</td>
<td>“Yes. We scan our materials”.</td>
<td>“No”.</td>
<td>“Yes, we do have a system prepared for barcoding”.</td>
<td>“Yes. The Warehouses are using Barcode scanning”.</td>
<td>“Yes. The Palletizer is fully robotic, only robots are performing all the functions. They inspect products against the Production order, weight, date etc”.</td>
</tr>
</tbody>
</table>
Table 18 reveals that 11 participants responded that TM uses RFID technology. There is a contradicting response from Participant 9 whose response is, that the organisation does not use RFID technology. It can be assumed that this were an error in responding to the question. Participants appear to understand question 4.6.10 differently; responses depends on job position.

According to Lee et al., (2008) the most obvious use of RFID is an automatic version of bar code scanning. As a more sophisticated automation device, RFID provides the advantages of:

- Eliminating or reducing labour.
- Eliminating delays in recording inventory movements.
- Improving the accuracy of inventory records.
- Having greater data capacity for additional information, such as the selling price.
- The ability to detect or count inventories at any time, with little or no marginal cost.

Participants further explain that the RFID tags are applicable on finalised products inventory. Participant 2 and 12 respond at management level that there is a department herewith referred to as Palletiser, which is a fully robotic department. The activities within the department include:

- Inspection of finalised products.
- Count inventory.
- Apply barcode tags which contain:
  - Product quantity.
  - Shipping case labels.
  - Label identification.
  - Product date, month and time.
  - Batch quantity.
  - Weight.
  - Stock keeping unit (SKU).
  - Manufacturer location (Lee et al., 2008).
4.6.11 Warehouse storage method

Table 19: Warehouse storage method

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;There is Warehouse management system. Refers to one of the employees for more information&quot;.</td>
<td>&quot;Enterprise Resource Planning (ERP). Batch management to ensure First in First out&quot;.</td>
<td>&quot;Racking system. We utilize space to accommodate all raw materials&quot;.</td>
<td>&quot;We use bin location&quot;.</td>
<td>&quot;Racking and blocking. Refursing, there are some raw material which temperature are controlled&quot;.</td>
<td>&quot;Racking. There is warehouse management system&quot;.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>&quot;We have racks in the warehouses&quot;.</td>
<td>&quot;Bin location system&quot;.</td>
<td>&quot;Binning system&quot;.</td>
<td>&quot;Racking system&quot;.</td>
<td>&quot;Racks and block stacking. Refursing at times&quot;.</td>
<td>&quot;Block stacking&quot;.</td>
</tr>
</tbody>
</table>

According to Table 19, there are varying methods used by TM to manage the warehouse space. The methods include:
- Batch management to ensure FIFO.
- Racking.
- Bin location/system.
- Block stacking.

TM uses private warehouses. A warehouse holds a crucial involvement in the supply chain. A clean, efficient warehouse keeps the business functions to run efficiently and effectively, therefore, the way a warehouse is organised can either build or break the business main core function (Pontius, 2018).

All participants are cautious on the various warehouse storages; there are no contradicting responses, even from the explanations. The reasons provided for using the binning, racking and block stacking, included easy accessibility for picking and visibility during daily stock counts and applying FIFO.

4.6.12 Delivery performance of Tobacco Manufacturer on customer service (on-time delivery)

This section aims to investigate performance concerning customer satisfaction. Emphasised in the challenge, is that the company incurs penalties from customers, owing to late deliveries.
Table 20: Performance delivery

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I think 96%&quot;.</td>
<td>&quot;99%&quot;.</td>
<td>&quot;It is good. I think 96%&quot;.</td>
<td>&quot;We Strive for this. I would say 98%&quot;.</td>
<td>&quot;I think we are 98%&quot;.</td>
<td>&quot;I think we are 98%&quot;.</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Participant 8</td>
<td>Participant 9</td>
<td>Participant 10</td>
<td>Participant 11</td>
<td>Participant 12</td>
</tr>
<tr>
<td>&quot;Great. 98%&quot;.</td>
<td>&quot;100% OTIF. There is a system prepared to measure this performance&quot;.</td>
<td>&quot;It is great. 98%&quot;.</td>
<td>&quot;98%&quot;.</td>
<td>&quot;98%&quot;.</td>
<td>&quot;98%&quot;.</td>
</tr>
</tbody>
</table>

According to Table 20, all participants indicated that the performance on-time delivery is a priority for the company. Participants rated an average of 98% on delivery performance. This happens to be a minimum target set with a maximum of 100% for delivery performance. The average performance rated indicates that TM is performing well. Participants identified a prepared system, measuring this performance. Considering the lead times, it is based on the planned delivery date versus the actual delivery date.

4.7 RESULTS AND DISCUSSION

The Cambridge Advanced Learner’s Dictionary 3rd Edition, defines research as a detailed study of a subject, specifically to discover new information or reach a new understanding. This study is a qualitative research, using a case study approach to collect information through a variety of sources. A qualitative research method is investigative and involves gaining insights and understanding on a subject. The questionnaires are in two forms, open-ended and 5-point Likert scale questionnaire. These questionnaires are distributed to five targeted departments, indicating supply chain, procurement, planning, production, warehouse and distribution. The sample tested
comprises 12 participants responsible for inventory management at TM in South Africa. Participants’ managerial position varies: Four are managerial executives, six are managers and two are non-managers. None of the participants are below the age of 20. Mature individuals provided the findings. They have a clear understanding of inventory management methods and principles used at TM. The main function of the literature review is to provide an engineering basis for theory concerning previous research on this similar topic, constructing a logical analysis on the effectiveness of inventory management system.

An organisational effectiveness in the context of this study, is defined as “Doing the right thing”. The effectiveness is evaluated through the internal processes of an organisation (Libby et al., 2017). This study evaluates effectiveness through internal auditing of the inventory management systems at TM. A combination of executive managers, managers and non-managers dominate these departments and participants are appointed in their current position positions for an average of two years. The HR department states that growth and empowerment is part of its talent development strategies, assisting the organisation to remain a top employer.

The inventory management systems are based on well-known inventory techniques; though the techniques are developed several years before, these techniques are still used by several organisations. EOQ identifies the optimal order quantity, minimising the total of certain annual costs, varying with one order size (Sinha, 2016). This approach is used at TM, assisting the company to resolve inventory issues that addressed inventory-outs on raw materials and over producing of finalised products

The push system in inventory control, includes forecasting inventory needs to meet customer demands. When using the push system, it is crucial for the organisation to be aware of the products specifications and the BOM, which must be purchased to meet the orders according to the forecast (Barak, 2014). TM uses a push system for most of the local customer or domestic orders, whilst a pull system in production is initiated when completed products or WIP inventory are withdrawn and parts are available for replenishment (Prakash, 2011). Participants further explain that the pull system is also used, but less often than the push system. The pull system is
used in response of an export orders, whilst the push system is used for stock build for the following year. TM accumulates and stores stock to avoid the annual tax increases during the subsequent year. An ERP system is an integrated management system for core business processes. It is mediated by software and technology often, in real-time. Some of the largest ERP systems are SAP, Baan, ORACLE and JDEWARDS. TM uses SAP; not all participants working with this system are competent as human errors occurs monthly, causing imbalances in inventories.
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

In the business environment of increasing competition, it is essential for the manufacturing industries to remain competitive in the market, continuing to meet customer service requirements. An increase in illegal trading in the tobacco industry from the year 2015 to 2018 are indicated, pressuring TM to remain committed to its customer satisfaction values, efficient and effective manufacturing of products and on-time deliveries. Statistics indicate that 15 million illegal tobacco products are consumed daily in South Africa. The main objective of this study is to investigate the effectiveness of inventory management systems at TM. The following discussion concludes with recommendations, based on the findings of this study implied in the preceding chapter.

5.2 CONCLUSION

A conclusion can be obtained, identifying TM is one of the largest manufacturing companies with the largest factory and accounts for a significant production for domestic consumption and export into the Southern African region. This is evident from Question 5 in Appendix B; all participants responses indicate that TM is classified as a large-sized business. This study targets the supply chain department, production, warehouse, planning and scheduling departments. The supply chain department focusses on primary logistics, networking and marketing, ensuring that efficient and effective systems are constantly attained.

The TM corporate organisational structure is designed to create the most favourable environment to achieve business objectives. Participant 1, an executive manager, contends that no universally usable optimal organisational structure exists. This is supported by Jakes (2016), stating that for each organisation, there is mostly a self-made structure according to the needs of the company. It should primarily support, implementing a corporate strategy. TM has a self-made structure that responds to the logistical requirements of the organisation. Logistical services include OTIF, warehousing, transportation, inventory management, network optimisation and reducing footprint.
Several organisations are still repudiating on how Industry 4.0 could impact their business. Whilst these organisations struggle to identify the talent or knowledge to adopt this technology for various scenarios, several organisations implement changes in their factories, preparing for potential smart devices, improving their businesses. TM is one of those organisations still in denial concerning Industry 4.0. The four executive managers state that there are strategic plans prepared, whilst others provide scenarios on a fully automated department, using RFID tags.

A warehouse’s participation is crucial in the supply chain. A clean, efficient warehouse ensure the business functions to run efficiently and effectively; the way a warehouse is organised establishes the business’s main core function (Pontius, 2018). TM manages the warehouse space, using various methods, such as racking, bin location, stacking and blocking, as tested in question 11 in Appendix A. The organisation invested in a system through SAP, measuring the delivery performance monthly. This measure forms part of the businesses’ KPIs and it has significantly improved, averaging 98%. Certain participants do not hold theoretical knowledge on inventory management, control devices and systems; these participants did not contribute as anticipated.

5.3 RECOMMENDATIONS

The research recommends that training should be provided to the staff members, responsible for managing inventories in the business. Training will provide staff members theoretical knowledge and background on devices used in managing inventory. It is also recommended that internal auditing should be performed bi-annually on all the business processes. This will assist TM to identify challenges at an increased frequency. This is study is conducted on a small population, comprising 12 individuals, employed in various departments at TM. The findings are concluded, based on one organisation. Future research should be embarked on to include several organisations.
REFERENCES

A Cardno. 6 Critical ideas behind the Smart Factory and Internet of things. Available at: https://blog.vizeexplorer.com/6-critical-ideas-behind-the-smart-factory-and-internet-of-things-iot/.


CA, McKim, 2015. The Importance of Likert Scale in Quantitative Research


DK. Sinha, 2016. Inventory Control: Forms and models of inventory management.


https://www.westernsydney.edu.au/research/researchers/.../dest_definition_of_research.9


APPENDIX A

The Effectiveness of Inventory Management System: The case of TM

Inventory Management and Logistics System Questionnaire

1. In a supply chain, logistics processes are allocated into two systems (push and pull) dependent on whether system is performed in response to a customer or in expectation of an order from a customer (Ravi Kain et al., 2018). Which logistics system are you using and why this system?

2. According to (D.F Binti, 2017) inventory management system is an important key device for several businesses as it is a device used when tracking inventory from one process to another. Which inventory management system is Tobacco Manufacturer using to track and monitor stock from one process to another?
3. Reverse logistics is defined as the drive of finalised products or resources in the contrasting direction of the supply chain for producing or recollection worth (N. Abdullah, S. Yaakub, 2014). The reverse logistics activities include the following:
   • The return of products which are damaged
   • To enlarge and renew inventory
   • To package materials and remanufacture
   • To reuse the products
   • To renovate
   How do you deal with RL?

4. Which of the RL activities are applicable to TM? How is it managed?
5. The position of logistics continues to grow in importance and is driven by organisational structures of enterprises, in the context of globalisation, development of new technologies and growing in importance of logistic chains (J. Jakes, 2016). What is the focus of your logistics services?

6. The role of logistics in the organisational structure of companies takes several forms (J. Jakes, 2016). How is the current logistical structure formed in the organisation?
7. It is critical to preserve the optimal level of inventory, studies indicated that it is so easy. There are models such as Deterministic and Probabilistic, that were developed recently to assist determine the optimum level of inventories to be maintained in the enterprise (Sanhi, 2016). Which inventory model do you use?

8. How effective is this model?
9. The fourth industrial revolution has progressed and has been implemented in other countries. This is a tactical method for combining innovative control systems with internet technology allowing communication between humans, products and complex system (R. Anderl, 2014). What strategic plans has/is the company put prepared to operate in a smart industry concerning manufacturing?

10. According to (YM. Lee et al, 2008), the manufacturer-retailer supply chain was broadly identified as one crucial area for business applications of RFID technology (Barcoding Technology). Is TM using this technology?
11. How do you manage your warehouse storage space? What warehouse system do you use?

12. The most mutual points of inventory management are to:
   - Offer satisfactory level of customer service (on-time delivery).
   - Allow cost-efficient operations.
   - Reduce inventory investment.

Rate the performance of TM on customer service (on-time delivery).
APPENDIX B

Research Questionnaire

This questionnaire comprises two sections, please mark the box nearer to the opinion of your choice to the questions in Section A and B.

Section A

1. What is your current job position

2. How many years have you been in this job position?

Less than 12 months

Less than 3 years

Less than 4 years

Less than 5 years

More than 6 years

3. Which age group do you categorize yourself into?

Younger than 20 years
Between 21 to 30 years

Between 31 to 40 years

Between 41 to 50 years

50 years and older

4. What is your gender?

Female

Male

Section B

Section B please select the answers that are applicable to your organization. The answers can be more than one.

1. Please select the ERP systems merchants which is the constructor of your ERP system?

SAP

BaaN
2. If you selected not applicable on the above question, please name used as an ERP system

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<tr>
<td>JDEdWARDS</td>
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<tr>
<td>N/A</td>
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3. Which of these inventory principles is your organisation using?

<table>
<thead>
<tr>
<th>Material requirement planning (MRP)</th>
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</thead>
<tbody>
<tr>
<td>Just-in-time ordering system</td>
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<tr>
<td>ABC inventory analysis</td>
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<tr>
<td>Economic order quantity (EOQ)</td>
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<tr>
<td>Other</td>
<td></td>
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</table>
4. If you selected answer was *other* on the above question, state please the inventory principle that your company uses.


5. What are problems with regards to holding inventories do you experience in your company?

- Excessive holding costs
- Damages and theft
- Out-dated inventory
- Inventory-outs
- Negligence on inventory

6. How would you rate the frequency of these problem occurring?

- Once in 24 hours
- Weekly
- Monthly
- Yearly
It never happens

7. How would you rate the frequency of evaluating inventory performance?

- Daily
- Weekly
- Monthly
- Yearly
- Never

8. Which of the below options can be regarded as the standard lead times for receiving raw material inventory from your suppliers?

- Weekly
- Forth Nightly
- Every Three Weeks
- Monthly
Longer than a month

9. How long does it normally take to complete and keep good stock before it is sold?

Daily

Weekly

Forth Nightly

Every Three Weeks

Monthly

10. In your own opinion, is there a well-organized and efficient control over the finished goods stock?

Yes

No