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The Effect of Lean Inventory Management on Final Product

The Case study: Dal Group Company – (Coca-cola)

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Abstract

This study aimed to shed light on the impact of lean inventory management on the final product in Dal Food Company (Cola) group with a focus on explaining inventory management, determining the impact of the application of lean inventory management on the company, determining the methods of waste disposal and recycling in the three types of inventory, identifying challenges / opportunities in using lean stocks. The study is considered a qualitative study with the use of a descriptive investigative approach (case study) in the group of Dal Food Company (Cola). The methodology of this research is summarized in two primary and secondary sources: The first source is through interviews with three of the following departments' directors: Factory manager, inventory manager, and plastic industry manager. The second source of data using secondary sources of books, references, websites and articles. The study reached a number of results that emphasized the importance of reducing waste and recycling in order to maintain continuous improvement.

Finally, the study made some recommendations to Dal (Cola) to improve and develop the lean system by improving the use of an appropriate information system for demand forecasting, Incorporating many principles and methods of a lean waste management system and inventory to present all the ideas that can contribute to achieving a common vision. The principles and methods mentioned above contribute effectively to engaging employees in a culture of continuous improvement that naturally encourages reducing waste, using resources and preventing pollution. There is a lack of information about the lean management, and they are using the 5S method it is suggested to apply or work with the six sigma.

Introduction:

The following chapter provides a general framework about the study including research problem, objectives, questions, the methodology used, and the organization of the study. A component of supply chain management, inventory management supervises the flow of goods from manufacturers to warehouses and from these facilities to point of sale. Lean management seeks to eliminate any waste of time, effort or money by identifying each step in a business process and then cutting out steps that do not add value to the production.

Lean management systems reduce the cost of carrying inventory and ensure that the supply of raw material and finished goods remains continuous throughout the business operations without having or remaining waste.

1.1 Background of the Study:

1.2 Problem Statement:

Most of the manufacturing companies have waste in producing their product; there should be minimization of waste and recycling in order to sustain continuous improvement. waste in inventory is categorized as; the waste in raw materials, work in process and finished goods, and is dealt with each and every one as final product, and by implementing the lean inventory management on the industrial sector waste is minimized and continuous improvement is sustained. Basically companies seek to reduce cost of its production and the carrying cost of inventory and how to add value to its operations to maintain its competitive position. It becomes interesting to investigate how one of the biggest companies in Sudan deal with its inventory and how its lean manages with the concepts of lean management.

Accordingly, this research is an attempt to investigate the practice of lean inventory management in Dal group and analyze how it's being implemented

1.3 Research Questions:

- 1: What is lean inventory management?
- 2: What is the Impact of applying lean inventory management on the company?
- 3: How waste is eliminated and recycled in the three types of inventory?
- 4: What are the challenges/ opportunities of using lean inventory?

1.4 Research Objectives:

- 1: To explain the lean inventory management.
- 2: To identify the impact of applying lean inventory management on the company.
- 3: To determine the ways of eliminating and recycling waste in the three types of inventory.
- 4: To identify the challenges/ opportunities of using lean inventory.

1.5 Research Methodology:

1.5.1 Scope of the Study:

The study was carried out during the period October 2019 until March 2020. It was conducted in Dal Food industrial sector with special focus on the coca cola company. The selection of Coca Cola was based on the fact that it use different method of continous improvement to eliminate the waste through applying the lean inventory system. It is one of a few companies that participate in protecting the environment.

1.5.3 Population and Sampling Techniques:

Population of the study is the total number of people used in the research. The population of this research includes all individual in Dal company (coca cola)

The sample of the study selected purposively using non- probability sampling. Therefore three individuals were selected from three different positions:

Plant manager, Inventory manager and Plastic manufacturer manager.

1.5.4 Data Collection Techniques:

1.5.5 Data Sources:

In the research there are two (2) sources of data that has been used:

Primary data: information that one can collect specifically for the purpose of a Research project. It is specifically tailored to research needs (Shawn Grimsley, 2002). For the purpose of this research the primary data has been collected through interviews.

Secondary data: data that have been already collected by and readily available from other sources (Grimsley, 2002). The secondary data used of this research are from books and references, websites and article.

1.5.6 The Data Analysis Techniques:

The qualitative approach was analyzed by interpreting interviews and gathering and combining information manually.

1.6 Research Ethics:

An official letter from the research project department signed by the school of management studies dean was taken to each authority that was included in the research.

All participants are informed that their information is going to be used in academic purposes only and will be treated under high privacy, confidentiality and anonymity. Interview recording conducted under interviewee's permission and acceptance. They also informed that their participation to this study is voluntary and under no pressure.

2.1.1 Definition of SC:

“Series of steps include moving and transforming raw materials into finished products, and transporting those products, and distributing them to the end user”.(investopedia.com)

2.1.2 Definition of SCM:

The Council of Supply Chain Management Professionals (CSCMP), 2012,
“The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers”. (Grant et al., 2015)

Lee and Billingham (1995) (cited by: Kumar, 2016) also define supply chain management as:

“Integration of all activities taking place among a network of facilities that procure raw materials, transforms them into intermediate goods and final products, and delivers the final products to customers through a physical distribution system”

2.1.3 SCM functions:

The supply chain includes all functions involved in receiving and filling a customer request. This function include, what are not limited to, new product development, marketing, operation, distribution, finance, and customer service. (Chopra, 2016)

2.1.4 SCM elements:

Since materials, as well as information, flow both up and down supply chain those includes a firm internal functions, upstream suppliers, and downstream distribution channels reaching to the end customers. (Kumar, 2016)



Source (Kumar, 2016).

2.2. Lean definitions:

“Commitment process of continuous improvement that can significantly impact an organization’s competitiveness”

“Strategic tool for resolving severe organizational problems and can unite several change initiatives that are running currently in a business. (Atkinson,2006)

2.2.1 Lean management definition:

“Approach to manage an organization that supports the concept of continuous improvements along term approach to work that systematically seeks to achieve small incremental changes in processes in order to improve efficiency and quality” (Rouse, 2017)

2.2.2 Benefits of lean management:

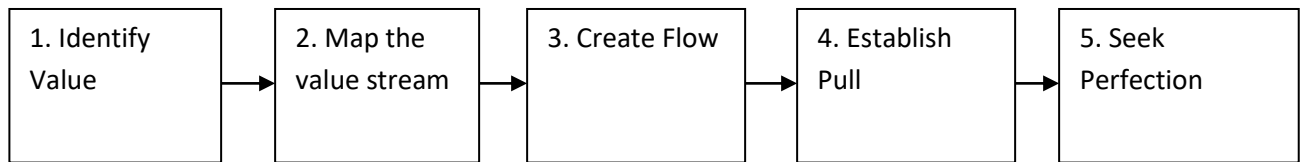
- Reduced paperwork.
- Improved work flow.
- Improved productivity.
- Better teamwork.
- Reduced staff stresses.
- Reduced overall operating costs.
- Improved customer satisfaction (internal and external).
- Improved lead times (waiting times).
- Reduced inventory levels and costs.
- Improved quality of service product.
- Engaged workers.
- Improved cycle times.
- Organized workplace. (Skhmot, 2017)

2.2.3 Principles of lean:

The principles of Lean were first introduced in the book *The Machine That Changed the World* (1991) by James P. Womack, Daniel T. Jones and Daniel Roos. The authors studied several manufacturing systems and wrote the book based on their observations at Toyota. The Lean Enterprise Institute summarized these principles to the following:

1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating whenever possible those steps that do not create value.

3. Make the value-creating steps occur in tight sequence so the product will flow smoothly towards the customer.
4. As flow is introduced, let customers pull value from the next upstream activity.
5. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, begin the process again and continue it until a state of perfection is reached in which perfect value is created with no waste. (Skhmot, 2017)



Source: (Skhmot, 2017)

2.2.4 Lean Challenges:

Though the lean concept is a significant one when correctly implemented, it is not devoid of challenges. The most common challenge in lean implementation is maintaining it. Lean is a continuous process. Maintaining lean is challenging and requires a lot of work that companies are not prepared to commit to.

Another common challenge in implementing lean is assuming that it can only be used in manufacturing, Womack and Jones introduced the concept of Lean Enterprise which entails the use of lean management throughout all departments in a company (Womack & Jones 2009, 45). This includes (but is not limited to) accounting, distribution, human resource, and marketing. (Womack & Jones 2009, 45). If lean is implemented in just one department, the immediate results may be

positive but with time, since the department is affected or affects other departments, the results would begin to wane. (Bicheno & Holweg 2009, 3).

Yet another challenge that companies may have in implementing lean is the fact that “lean systems are inherently knowledge-intensive” (Drew et al. 2004, 7).

The knowledge of lean is not only captured in systems and processes but is also captured in the workers; they think ‘lean’. Years of lean thinking enabled large companies to know how and when respond to changes in production. Some companies may not be willing to invest so much time in developing a lean mind set in the workers. (Drew et al. 2004, 7).

2.2.5 Lean Methods:

- Kaizen (Continuous Improvement) means breaking apart the current situation, analysing it, and putting it back together to make it better. Employees at all levels of a company work together to achieve frequent incremental improvements to the production process.
- Kanban (Pull System) is a scheduling system for regulating the flow of goods. Production takes place on the 'pull' of the customer so that waste is eliminated from inventory and overproduction (McArdle Nov 8, 2017).
- 5S:
 - Sorting: Refers to sorting of all the tools, materials, etc., in a work area and keeping only essential items.
 - Simplifying: Focuses on the need for an orderly workplace.

- Cleaning: Sweeping, systematic cleaning, and shining.
- Standardizing: Developing standard work practices
- Sustaining: Maintaining and reviewing standards.
(Kerber, Dreckshage 2011)
- Lean Six Sigma is a team-focused managerial approach that seeks to improve performance by eliminating waste and defects. It combines Six Sigma methods and tools and the lean manufacturing/lean enterprise philosophy, striving to eliminate waste of physical resources, time, effort and talent while assuring quality in production and organizational processes.(
ADAM HAYES MAY 2020)

2.2.6 Types of lean:

- Manufacturing:

The disciplines have been deeply developed with an extensive history of deep thinking, tools, and methods. The work is often visual, the inventory tangible, the suppliers (should be) controllable, the product customer a visible purchaser. There seems to be little argument that there are opportunities for Lean.

- Transactional Office Services:

This field works somewhat like manufacturing, although of course doesn't involve a factory. The transactions (inventory) are often processed in some type of flow whether from person to person or "one and done". In many cases the transactions are less visible and appear as tasks or queues in a computer system. Often times the supplier is also the customer which creates an argument about what is controllable.

It can be argued that a lean process without waste is the best way to control the supplier / customer. Does any customer like to continually be “touched” for more information or to repeat or correct transactional data? Although there are different problems in these fields, sure, the same principles, tools, and methods can often be applied (with modification).

- Decision Making:

Risk decisions, research work, computer coding, market strategy, etc. The work / inventory / decisions in these fields become less tangible and visible. Some of the work is visible as tasks or queues in a computer system, but much of the work is in someone’s head! The customer may be one person, but is often several people. The work may seem to be the least applicable for lean thinking, methods, and tools, but it could be argued that at their core, in these fields we are “manufacturing” decisions. There are inputs, there’s a process for processing those inputs, and there’s output, right? How do we make the work more visible? How do we track processes? What do consumers of decisions really value? All good lean questions to ask and solve through the same principles of Lean leadership. (Vogel, 2015)

2.3 Inventory management:

2.3.1 Definition of inventory:

Inventory is the term for the goods available for sale and raw materials used to produce goods available for sale.

Inventory represents one of the most important assets of a business because the turnover of inventory represents one of the primary sources of revenue generation and subsequent earnings for the company's shareholders. (Kenton, 2019).

2.3.2 Inventory management

Inventory management refers to the process of ordering, storing, and using a company's inventory. These include the management of raw materials, components, and finished products, as well as warehousing and processing such items. (Hayes, 2019).

2.3.3 Types of inventory:

Inventory is generally categorized as raw materials, work-in-progress, and finished goods.

Raw materials

Are unprocessed materials used to produce a good. Examples of raw materials include aluminum and steel for the manufacture of cars, flour for bakeries production of bread, and crude oil held by refineries.

Work-in-progress

Inventory is the partially finished goods waiting for completion and resale; work-in-progress inventory is otherwise known as inventory on the production floor. For example, a half-assembled airliner or a partially completed yacht would be work-in-process.

Finished goods

Are products that have completed production and are ready for sale. Retailers typically refer to this inventory as "merchandise." Common examples of merchandise include electronics, clothes, and cars held by retailers.(WILL KENTON, Jul 10, 2019)

2.4 Lean inventory:

“Is the minimum inventory necessary to keep a perfect system running. With lean inventory, the exact amount of goods arrives at the moment it is needed, not a minute before or a minute after”.(HEIZER, RENDER , MUNSON,SCHAN,2017)

2.4.1 Benefits of lean inventory management:

- Cost Reduction:

First and foremost, lean inventory management will help you reduce waste and drive down your costs.

- Fulfillment Time:

You will be able to speed up your order fulfillment time and improve customer service.

- Stock Turnover:

High inventory turnover implies good business health to management.

- Cash Flow:

With less capital tied up in your inventory levels, you have freedom to invest or pursue other business projects. (Freepik, 2017)

2.5 Waste:

2.5.1 Definition of Waste:

In lean, waste, or “muda” in Japanese, refers to

“Any part of the whole operation that does not, neither directly or indirectly, add value to the final product”

Also waste is defined as

“Any activity that does not add value to the good or service in the eyes of the consumer”. (Monczka, Handfield, Giunipero, Patterson, 2009)

2.5.2 Waste itself is split into seven categories:

1. Overproduction

- Are you producing more than consumers demand?
 - Work should only be triggered by customer pull.
 - Producing more than needed; wasted money, effort, space.

2. Waiting

- decrease productivity and efficiency.
 - Queue times can be eliminated by flowing work.

3. Inventory (work in progress)

- Are your supply levels and work in progress inventories too high?
 - Work should be passed on in smaller quantities.

4. Transportation

- Do you move materials efficiently?
 - Co-location of processes allows quick hand-offs.

5. Over-processing

- Do you work on the product too many times, or otherwise work inefficiently?
 - Communication eliminates redundant steps.

6. Motion

- Do people and equipment move between tasks efficiently?
 - Workstations should be designed to eliminate searching, etc.

7. Defects

– How much time do you spend finding and fixing production mistakes?

- Errors and rework can be caught by in-process checks.
- Defective goods not only cost money directly, but they also cause stops and delays. (Muller, 2003)

2.6 Final Product:

“Are goods and services that are consumed by end-users”

(Pass, Lowes, Davies, 2005)

2.7 Recycling:

“The practice of reusing items that would otherwise be discarded as waste”

Variations of recycling include upcycling, which involves adding value to an item for reuse and downcycling which involves breaking down an item or substance into its component elements to reuse anything that can be salvaged. (Rouse, 2012).

This chapter outlines and present the background of Dal Group vision, mission, goals, and the structure of it.

3.2 Firm: DAL FOOD INDUSTRIES (ONE OF DAL GROUP COMPANIES.)

3.2.1 The Coca-Cola Company:

The origins and goals of the Coca-Cola Company

Coca-Cola entered Sudan for the first time by Mr. Abdel-Moneim Mohamed in the early fifties, who was one of the largest economically influential figures at the time.

In 1967, Coca-Cola stopped filling in Sudan as a result of the Arab boycott of American products and entered for the second time by Mr. Ibrahim Malik in 1983,

In 1986 it also left Sudan again for political reasons. In 1992, Coca-Cola entered



Sudan for the third time at the hands of the Modern Industries Company, which is a Sudanese company owned by a Sudanese Greek family, and in 1996 it left Sudan but this time it was leaving for financial reasons and because the company did not commit an international standard, in March 2001, DAL Food Industries, one of the DAL Group companies, obtained a license to fill Coca-Cola, and became the sole owner of the brand in Sudan.

Construction of the factory began in mid-2001 in its location in Khartoum North, on the latest urban model. The factory is the first of its kind in the food and other industries in Sudan.

It was founded in 2002, DAL Food Industries (DFI) is dynamic company bringing refreshment and enjoyment to the people of Sudan wherever they live, work, study, or play. DFI became the sole bottler and distributor of Coca-Cola brands in Sudan, later adding bottled drinking water and juices.

3.2.2 Mission :

- Contribute to the on-going development of Sudan and the region through the provision of high quality, value added products and services to our customers.
- Grow profitably by pursuing opportunities that leverage our expertise and operational excellence.
- Provide employees with a working environment that stimulates innovation, diversity, teamwork, learning and development, while offering challenging

and satisfying work opportunities with recognition and reward for outstanding performance.

3.2.3 Vision: DAL Food wants to feed the nation. DAL food's vision is to be the regional powerhouse of affordable, high quality food products, serving local and regional markets in responsible and sustainable approach , through an efficient distribution network with unparalleled reach. Armed with strategic clarity and operational effectiveness, we will strive to further cultivate our capabilities and continue to raise standards with utmost consideration to our consumers, our communities, and our environment.

3.2.4 Objective: To provide high standard product.

DAL Food's contributions to the food industry are represented by brands well known for their quality, innovation, and integrity. We proudly represent a portfolio that touches the lives of people across Sudan and beyond. From stable foods to inventive products, refreshing drinks, and traditional favorites, we are honoring our commitment to provide affordable, quality food for every household.

3.2.5 Values :

focus on our customers, offering them best-in-class products and services while building long-term relationships

strive to maintain a diverse workforce where people are valued and treated solely on merit and competence, irrespective of gender, beliefs, and ethnicity.

build world-class operations, leading the way for others in the region, and are committed to the social, environmental and economic development of Sudan and the region.

have no political affiliations, observe the law at all times, and act with integrity and honesty.

aim to be a global leader in responsible business and do not engage in activities that harm people or the environment.

3.2.5 Production strategy:

Company strategy is to sell fresh products, so production plan is bases in:

- Sales forecast.(sales plan)
- Sales rolling estimate.(actual sales volume-historical data)

3.2.6 Supply chain:

Raw and packaging materials import from out Sudan, some primary packaging brought from local market.

3.2.7 Transfer of experience :

- Normally, importing high calibers to work in the company, to increase the local staff capability, also sending our staff to have a lot of training courses outside country.
- Also corporate with the group to use the professionals in suchaway, and increase productivity.

3.2.8 Use of technology:

- They are using the high technical technology in bottling around the world.
- Also they are trying to be updated in communication tools(emails).
- Now about to upgrade our ERP system, to use the best practice around the world.

3.2.9 Impact of internal and external environment:

Internal is our market , external is our suppliers.

3.3 Production cost evaluation:

Working all along to minimize cost, one of the key performance indicator.(KPIs)

3.3.1 Future of the production:

Creativity of the new products is one of the strategic ideas.

This part of the research is devoted to present the analysis of the interviews conducted with managers involved in operation management at Dal Group (Coca-Cola). The interview were conducted to reflect on how waste elimination is perceived and maintained.

This chapter illustrated how the company dealt with the minimization of waste and recycling in order to sustain continuous improvement for waste in inventory is categorized into three levels;

- Waste in raw materials,
- Work in process and
- Finished goods,

Each is dealt with and considered as final product, companies vary in its system of wastes disposal relevant to the nature and type of production and based in lean operation system. An interview conducted with three different managers in Dal group (Cola company).

The analysis of data was performed using descriptive analytic method. The findings are attempted to make links with the research framework and research objectives. The interview guiding questions are reported in Appendix...

4.2 Interviewees profile:

All interviewees were top manager from three different departments, Plant manager, Inventory manager and Plastic manufacturer manager.

The participants aged between (45-55 years old) who have more than ten years of experience in the company. Their education degrees were bachelor in engineering, while others obtain certificates in the field of management and mechanical engineering.

4.3 Interview analysis and discussion:

1. Lean management perspective:

According to the responses of the participants, they mentioned that lean management was basically waste management from the view of waste manger, while inventory manager see lean management as cost reduction, pooled in saving time that gives optimal opportunity for maximizing profitability of the company. They also add that lean management also considered as a system for sustaining and controlling waste.

This statement was combined with (Atkinson, 2006) who defined lean management as: “Commitment process of continuous improvement that can significantly impact an organization’s competitiveness” “Strategic tool for resolving severe organizational problems and can unite several change initiatives that are running currently in a business”. While (Rouse, 2017) add that, lean management is “an

approach to manage an organization that supports the concept of continuous improvements along term approach to work that systematically seeks to achieve small incremental changes in processes in order to improve efficiency and quality” The researcher’s opinion is positively and clearly matched their management studying concerning plastic manufacturer manager in terms of waste management based on lean system of waste disposal. The more the company give concern to minimize wastes, the more efficiency is applied in terms of saving and controlling over materials.

Question two:

Description of Lean management process at Coca Cola company:

The participants stated that, they don’t fully apply lean inventory management in the company, but they attempted to get the most benefit from waste in controlling material based on efficiency and effectiveness.

While the second manger mentioned that, lean inventory management is a process of controlling waste, by internal waste policies in different departments to manage waste, the third manger reviewed that, it is not fully implemented, only in limited range.

These statement was matched similarly with (Skhmot, 2017). who mentioned that, “Benefits of lean management: Reduced paperwork. - Improved work flow. - Improved productivity. - Better teamwork. waste is categorized as; the waste in raw materials, work in process and finished goods, and is dealt with each and every one as final product - Reduced staff stresses. - Reduced overall operating costs. - Improved customer satisfaction (internal and external).- Improved lead times

(waiting times). - Reduced inventory levels and costs. - Improved quality of service product. - Engaged workers. - Improved cycle times.- Organized workplace.

It was noticed that, inventory management in (Cola Company) is giving great concern to apply scientific inventory management based on lean inventory management system. Many factors were involved in managing inventory like:

- Classification of wastes,
- Reducing an overall operation costs and
- Improved quality of products and services.

Question three:

The use of the lean inventory management in the three types of inventory (raw materials, work in process, finished goods):

It was noticed that two of the responded managers agreed that they applied lean inventory in the three types of inventory while only one specified raw materials.

In this respect (Grant et al., 2015 cited by: Kumar, 2016) defined supply chain management as: “Integration of all activities taking place among a network of facilities that procure raw materials, transforms them into intermediate goods and final products, and delivers the final products to customers through a physical distribution system”

Question four:

Waste definition and how it is controlled internally and externally with its partners

In answering the above question, the managers mentioned that, anything that can be reuse, and control it through inspection. While the others mentioned that, cost needed to be controlled firmly in order to maximize the opportunity for profit. The process explained into industrial waste by segregating wastes into either plastic, carton or glass as a classification system.

(Atkinson, 2006) defined Commitment process of continuous improvement that can significantly impact an organization's competitiveness" "Strategic tool for resolving severe organizational problems and can unite several change initiatives that are running currently in a business"

(Kumar, 2016) mentioned that "Since materials, as well as information, flow both up and down supply chain those includes a firm internal functions, upstream suppliers, and downstream distribution channels reaching to the end customers."

Question five:

The impact/value(benefits) of using lean inventory management:

Manager of plastic and waste management in (Cola Company) replied that: Cost reduction in raw materials estimated 50% while the second manager stated that, waste is cost reduction helps in sustaining work and surrounding environment, the third manager focuses on waste calculation and control it to attain social responsibility.

Improving productivity according to (Skhmo, 2017). Better teamwork. waste is categorized as; the waste in raw materials, work in process and finished goods, and is dealt with each and every one as final product - Reduced staff stresses. - Reduced overall operating costs.- Improved customer satisfaction (internal and external).-

Improved lead times (waiting times). - Reduced inventory levels and costs. - Improved quality of service product. - Engaged workers. - Improved cycle times.- Organized workplace.

Question six:

Methodology used to eliminate waste in the operation:

All managers mentioned above of (Cola Company) denied using any other method than crate. (Crates are a plastic boxes in a rectangular shape that are used for handling different types of bottles and the company utilizes it as carrying tool).

It as clear that, Cola company pursued a strategy of reducing their reliance on imported raw materials applying (crate) in favor of developing sourcing solutions with the local market, thereby increasing soft drinks security and developing local suppliers and businesses.

(Atkinson, 2006) mentioned that, “Commitment process of continuous improvement that can significantly impact an organization’s competitiveness” “Strategic tool for resolving severe organizational problems and can unite several change initiatives that are running currently in a business”

Question seven:

Type of lean method you use in the three types of inventory?

In general the three managers responded that there is not specific methods from the known lean methods that is being adopted in the Coca Cola company, below are their responses.

Both waste manger and operational and manufacturer management of (Cola Company) mentioned that, lean waste management adopted as plastic manufacturer

manager responded that had no idea about lean methods, while the Inventory manager replied by denying using any specific type of lean methods while the plant manager responded that six sigma method is suggested in process to be implemented”.

(Kenton,2018) mentioned that “Lean Six Sigma is a team-focused managerial approach that seeks to improve performance by eliminating waste and defects. It combines six sigma methods and tools and the lean manufacturing/lean enterprise philosophy, striving to eliminate waste of physical resources, time, effort and talent while assuring quality in production and organizational processes.”

Despite the managers denied applying any specific method in eliminating wastes based on lean waste system management, but they had their alternative plans and system that suit their manufacturing process.

Question eight:

Indicators used to ensure effective lean inventory management:

Company representative managers together replied that, during manufacturing (working process) the machines automatically gives a sign if there is any damage, tracking shipments and general inspection in the three types of inventory and checking, confirming the implementation of the 5s.

This statements were supported by (Kumar, 2016). who stated that, since materials, as well as information, flow both up and down supply chain those includes a firm internal functions, upstream suppliers, and downstream distribution channels reaching to the end customers.

- And (Kerber, Dreckshage,2011) mentioned that 5Ss:
- Sorting: Refers to sorting of all the tools, materials, etc., in a work area and keeping only essential items.
- Simplifying: Focuses on the need for an orderly workplace.
- Cleaning: Sweeping, systematic cleaning, and shining.
- Standardizing: Developing standard work practices.
- Sustaining: Maintaining and reviewing standards.

Question nine:

Continuous improvement for eliminating the waste in the operation (the three levels of inventory):

Respondent managers mentioned that concerning continuous improvement for eliminating wastes indicated that they perform this by continuously converting and recycling waste into beneficial and helpful outcome, by improving and updating the handling tools and using “Yield” method “the proper usage of the materials, therefore it indicates that the raw materials is increased while waste is decreased”.

Corporate communication as a set of activities involved in managing and orchestrating wastes of all internal and external sections and personnel aiming at creating favorable point of view among materials suppliers on which the company depends. Receive an email when you submit your application to confirm it has been received.

(Chopra, 2016) mentioned that, supply chain includes all functions involved in receiving and filling a customer request. This function include, what are not limited

to, new product development, marketing, operation, distribution, finance, and customer service.

Question ten:

Reasons behind recycling the crate boxes specifically?

The managers of manufacturing, waste and inventory management of Company, mentioned that, reasons behind recycling the crate boxes were due to the long lead time and high purchasing cost so it could be as a result of Qeasily crushed and reused, which lead to huge cost reduction and it is recycled because of its high weight and to decrease the import percentage of raw materials.

(Kumar, 2016). mentioned that, materials, as well as information, flow both up and down supply chain those includes a firm internal functions, upstream suppliers, and downstream distribution channels reaching to the end customers.

To this end, Cola company works with local suppliers of varying sizes soft drinks to its numerous collection centers at guaranteed prices to enable them to plan their business.

Question eleven:

When recycling crate without 50% of the new raw materials, is it the same after adding it?

The statement which managers of Cola company mentioned regarding to recycling crate without 50% of the new raw materials, is it the same after adding it, definitely no, the crate lifetime will not be the same While others agreeing it and added that, it is as lifetime duration will be minimized from 4-6 years to 2-3 years depending on good handling.

This statement supported by (Kumar, 2016) who also mentioned that “Integration of all activities taking place among a network of facilities that procure raw materials, transforms them into intermediate goods and final products, and delivers the final products to customers through a physical distribution system”

Question twelve:

Lean inventory management system and its role in fulfilling company objectives.

Participants managers indicated that lean inventory management system fulfill their company objectives, and agreed that it achieved the objectives which are cost and time savings and strategically, the company aims to three goals; profit, market share and trade markets and finally replied by calculating and controlling the cost of the waste, all objectives are achieved.

This goes in line with (Chopra, 2016) said, all functions involved in receiving and filling a customer request. This function include, what are not limited to, new product development, marketing, operation, distribution, finance, and customer service.

Question thirteen:

Lean management implementation challenges

Mangers concerning the challenges that the company faced in the implementation of the lean management, good designing and establishing the machines, environmental issues on the social responsibilities as well as the culture and attitude of the employees.

“Commitment process of continuous improvement that can significantly impact an organization’s competitiveness” “Strategic tool for resolving severe organizational problems and can unite several change initiatives that are running currently in a business”

While (Rouse, 2017) add that, lean management is “an approach to manage an organization that supports the concept of continuous improvements along term approach to work that systematically seeks to achieve small incremental changes in processes in order to improve efficiency and quality”

4.4 Discussion:

To explain the lean inventory management the research reached to Inventory manufacturers suggests that in order to achieve small incremental changes in processes to improve efficiency and quality of the company a lean inventory management system must be applied. It was observed from the study that DAL group (Cola) explained lean inventory management from different point of view; waste management, cost reduction and a system for sustaining and reducing waste. Although by identifying the impact of applying lean inventory management on the company according to the analysis of the interviews and the case company it was found that DAL Company (Cola) is getting a positive impact of applying lean inventory management; reducing paperwork, cost reduction that helps in sustaining work and surrounding environment, and finally focuses on waste calculation and control it to attain social responsibility. The company determines the way of eliminating and recycling the waste by using a technical method to determine the early types of waste or damage that occurs during the manufacturing in the three

types of inventory and the continuous improvement is achieved to eliminate the waste by continuously converting and recycling waste into beneficial and helpful outcome, by improving and updating the handling tools and using “Yield” method. Finally, the challenges/ opportunities of using lean inventory resulted in good designing and establishing the machines which took a long period of time to reach the required specifications, environmental issues on the social responsibilities as well as the culture and attitude of the employees. This research was carried out during the period of 2019- April 2020 and intended to shed light on manufacturing companies in waste system management, Cola company based on Lean waste management and inventory system, was chosen as case study, the interviews were conducted with three managers (plant, inventory and plastic manufacturer managers) were purposively selected respectively as they were the concerned with waste management. The research used both primary and secondary data. The primary data was collected through interviews, while secondary data collected from reference, reliable websites, and records of close reference of the study subject. A structured interview was developed to address research questions and objectives, which was then conducted with the concerned managers, the statements were analyzed interpreted in line with literature review, the following results were concluded: Lean system refers to a technique developed with the aim of minimizing the process waste and maximizing the value of the product or service to the customer, without compromising the quality. (business jargon)- There should be a clear minimization of waste and recycling in order to sustain continuous improvement. Waste inventory is categorized as; the waste in raw materials, work in process and

finished goods, and is dealt with each and every one as final product. By implementing the lean inventory management on the industrial sector waste is minimized and continuous improvement is sustained. Cola also committed to growth in existing business and new ones, all along aiming at the highest operating standards. It is this commitment that motivates our considerable investment in innovation, product development and quality systems.

5.2 Recommendations:

- 1.** An information system appropriate for demand forecasting and management control must use feed forward as well as control based on lean waste management feedback.
- 2.** Integrate several principles and tactical methods of lean waste and inventory management system bringing all ideas that can contribute in achieving our common vision versus doing it 'solo' or based on isolated thinking.
- 3.** These principles and methods effectively engage employees in a continuous improvement culture that naturally encourages waste minimization, optimizing use of resources and pollution prevention.
- 4.** There is a lack of information about the lean management and they are using the 5s method and it is suggested to apply or work with the six sigma.

Appendix

Interview Questions

Procurement and Supply Chain Management Concentration

This study is conducted to describe the effect of lean inventory management on final product. It designed with the objectives : to explain the lean inventory

management , to identify the impact of applying lean inventory management on the company , to determine the ways of eliminating and recycling waste in the three types of inventory , to identify the challenges/opportunities of using lean inventory. The following information is obtained from the interviews will be used for Educational purpose only, and no kind of pressure was faced in answering any question.

The following questions were asked in form of an interview which was Conducted individually with three different positions managers of DAL Group Company(coca-cola) which include : Plant manager, Inventory manager and Plastic manufacturer manager.

1-How do you define the lean management from your point of view?

2-Describe the process of lean inventory management in your company ? And how do you apply it?

3-Do you eliminate or use the lean inventory management in the three types of inventory (raw materials, work in process, finished goods)?

4-How do you define the waste and you control it? Do you have the control over the external inventory? (external partners)

5-What is the impact/value(benefits) of using lean inventory management in your company?

6-Do you have another methodology that you use to eliminate waste in the operation other than the crate?

7-What type of lean method you use in the three types of inventory

8-What are the indicators you use in lean inventory management methods or check points to make sure that the sys been used is effective?

9-How do you continuously improve eliminating the waste in the operation (the three levels of inventory)?

10-What are the reasons behind recycling the crate boxes specifically?

11-When recycling crate without 50% of the new raw materials, is it the same after adding it? (quality wise)

12-How the lean inventory management system fulfill your company objectives? And what are your objectives and did you achieve it or not?

13-What are the challenges that your company faced in the implementation of the lean management?

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