WASTE MANAGEMENT IN SOUTH AFRICAN POST OFFICE USING LEAN PRINCIPLES AND ENVIRONMENTAL LAWS

D. Mafokoane¹ and M. Motsemme²
¹,²Group Sustainability
South African Post Office
¹dineo.mafokoane@postoffice.co.za
²moratwe.motsemme@postoffice.co.za

ABSTRACT

Conservation and prudent use of resources plays an important role in sustainable development. Waste management is one of the scopes that forms part of the Sustainability strategy that is adopted by the South African Post Office. The paper aims to highlight different process that mail goes through in mail operations, and the waste generated during operations. It will further highlight how the use of Lean Process and the implementation of various environmental laws such as National Environmental Management Act (NEMA) Act no 107 of 2008 can offer a better waste management strategies and tools in the inventory centre.

Mail operation is the major service provided by the South African Post Office and its core function is mail sorting and delivery. Currently waste is measured and managed only at administrative level, and these possess a challenge as most waste is generated through the process rather than at administrative level. This disables the organisation to measure and categorize the existing waste and to place corrects and effective strategies that will enable them to manage waste.

Lean principles will be used to address the aspects of defects and rework which is one of the major losses contributing to productivity and profitability. A site visit was conducted, and it gave insights to the challenges outlined above. It is evident from the information collected that there is a need for waste to be managed at process level and the implementation of effective strategies.
1 INTRODUCTION

1.1 General introduction

Inventory control plays a vital role in most industrial process to manage production. Companies depend on inventories to operate and plan production schedules however; Inventory inaccuracy can also have a negative impact on financial strength, customer satisfaction and competitive advantage. With growing pressure on best practice globally, lean principles among other techniques offers a better approach for inventory control strategy and operational dimension.

Various case studies on inventory waste control were conducted, and the focused was more on total quality management system, whilst others used lean principles to manage supply chain management systems and industrial processes. Generally, Total quality management systems focus on the social ethics, such as human resource management.

South African Post Office will benchmark the approach used to control inventory waste from the study that was conducted by Coca Cola in Nigeria [9]. This study will be focused on the inventory centre for mail operations known as the Return Letter Office (RLO) which is in the Western Cape. The aim is to improve the inventory centre using lean principles and Environmental laws. The objective will be to establish the current procedures in use and evaluate if these process adheres to lean principles. The study will also be conducted to establish how complaint the process is to legislative procedures and obtain an optimal inventory system that will used to effectively improve efficiency. Hypothetically, if inventory is controlled using lean principles will result in waste reduction; however with the combination of environmental laws will result in a desirable waste management system.

1.2 Process background

The National Environmental Management: Waste management Act no 59 of 2008, defines waste as any substance which is not used, whether or not that substance can be reduced, re used, recycled or recovered. Waste can further be defined as any material that no longer has any economic, social and environmental benefits. The management of waste is the process of collection, transporting and the disposal of waste. The National Environmental Waste Management Act, Emphasis every organisation to develop a sustainable waste management strategy, where if waste cannot altogether be avoided, minimised, reused or recycled therefore be disposed in an environmental friendly manner.

Lean defines waste (Muda) as activities that do not contribute to value, whether it is a total waste or temporarily necessary value adding [1]. Value is measured by the total revenue generated as a reflection of what the customer is prepared to pay for. It is also determined by time delivery, place of convenience for the customer and form (design and utility). Waste is classified into two which is value adding and non-value adding activities [1]. Lean is the system which is envisaged at creating more value with fewer resources. It is classified into five principles that specify the value from the point of view of the customer, identifying the value stream, making the value flow, setting up work for flow (pull system) and perfection [1].

Waste in the South Africa Post office ranges from general waste to hazardous waste, which is mainly generated in the mail operations. Mail operation is the major service provided by the organization. It is classified into seven processes which consist of acceptance of mail, two sorting processes, three processes of transportation and distribution to the designated areas as shown in figure 1.
Figure 1: Seven processes of mail operations (South African Post Office intranet for mail operations)

Mail operations consist of an inventory centre known as the Return letter office which is widely used internationally in the postal operations. It is used to recover mail through return addresses known as the “return to sender”. Which is the address that is used return the mail if the designated address cannot be found, or it contains insufficient data. In a case where the address is not attached or the data is also incorrect, it will be repossessed. The process is regulated by the Postal Service Act No 124 of 1998 which is integrated from Independent communication Authority of South Africa (ICASA) Act No13 of 2000. The inventory centre has been regulated to keep the contents for a year before they are repossessed. The repossession differs with the content and with respect to waste disposal; hazardous waste is also kept for a year before it can be disposed [4].

1.3 Problem statement

Currently there is no formal address structure, other than the bulk mail guideline. Name and address data capture is a highly error-prone action, usually with no verification or correction function. If not corrected at source, it is at times difficult and costly to correct further downstream. There is a very poor data quality checking and correction which result in high rejected rate from defects. In postal operations, defects results from letters and parcels. A defect is referred as the imperfections that exceed certain limits or standards ranging from those that can be traceable to hidden defects [2]. Defects results from raw material, in the process or in the end of the process.

Defects are then identified at the later stage of the sorting process and mostly, prohibited goods (parcels) are processed in the operations and only are identified at the Return letter office. There is no record of what is in the contents due restrictions to confidentiality and protection to the goods. Traces of these items were established to be hazardous, pharmaceutical, chemical, and radioactive contents.
2 METHODOLOGY

2.1 Area of study
The study is conducted at the Return Letter Office (RLO) also known as the Inventory centre for the mail operations. It is geographically located corner showground and mail street, Western Cape. It is estimated to covers 200$m^2$ with an average capacity to store 10,000 letters and parcels on a monthly basis.

2.2 Measurements
Qualitative and quantitative methods were used in the research [2]. The quantitative study was focused on high rejection rates of product volumes and root causes of defect work. The measured parameter was the process efficiency and the effectiveness of the inventory centre. The quantitative study was used to determine if the inventory system currently in place is effective and to also establish the major contributors to high rejection rate.

\[
\text{[Efficiency]} = \left( \frac{\text{output}}{\text{input}} \right) \times 100\%
\]  

The output refers to letters which were recovered in the Return letter office, whereas the input refers to the rejected mail that was handed to the Return Letter Office.

The qualitative evaluation was based on the potential risks resulting from the waste generated, the procedures of handling the material, capacity utilization, skills and training offered to the employees and safety precautions. The quantitative study was used to establish how effective the lean principles were applied and the how compliant the process is to the environmental laws.

2.3 Data collection
The data collected for this study includes observation and documentation analysis, for the Return letter office (RLO) and mail operations. The data encompass of a five year data analysis (2009-2013) for input product volumes, processed volumes, rejected volumes and disposed volumes.

2.4 Data analysis
Lean principles will be used to assess the standard procedures used, defect analysis and opportunities that will be used to improve the current operation. Qualitative analysis will be conducted using the environmental laws. Environmental legislative framework will be used to question the hierarchy sequence used to manage waste, and legislative procedures followed to conduct the service.
3 RESULTS

Table 1: Total product volumes vs. rejection rate in percentage in the mail operation

<table>
<thead>
<tr>
<th>Product</th>
<th>Received</th>
<th>Processed</th>
<th>Inventory</th>
<th>Rejection rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered letters</td>
<td>104,887,550.00</td>
<td>103,402,856.00</td>
<td>1,484,694.00</td>
<td>1.416%</td>
</tr>
<tr>
<td>Standard letters</td>
<td>6,157,340,515.00</td>
<td>6,151,352,888.00</td>
<td>5,987,627.00</td>
<td>0.097%</td>
</tr>
<tr>
<td>Parcels</td>
<td>25,812,971.00</td>
<td>25,672,725.00</td>
<td>140,246.00</td>
<td>0.543%</td>
</tr>
<tr>
<td>Nonstandard Letters</td>
<td>1,578,739,884.00</td>
<td>1,578,667,877.00</td>
<td>72,007.00</td>
<td>0.005%</td>
</tr>
</tbody>
</table>

Table 1 present the actual volumes of products received over a period of five years. The data shows how many letters or parcels were processed and how many were send to inventory which is also represented as rejected rate in percentage. Standard letters is the major product, whilst registered letters are the most rejected product.

Table 2: Rejected work per product vs. product recovered in percentages for inventory centre

<table>
<thead>
<tr>
<th>Product</th>
<th>Received</th>
<th>Processed</th>
<th>Disposed</th>
<th>Process efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered letters</td>
<td>1,426,802.00</td>
<td>1,382,480.00</td>
<td>44,322.00</td>
<td>97%</td>
</tr>
<tr>
<td>Standard letters</td>
<td>4,979,917.00</td>
<td>4,167,053.00</td>
<td>812,864.00</td>
<td>84%</td>
</tr>
<tr>
<td>PE Parcels</td>
<td>116,818.00</td>
<td>5,998.00</td>
<td>110,820.00</td>
<td>5%</td>
</tr>
<tr>
<td>PA Parcels</td>
<td>12,990.00</td>
<td>822.00</td>
<td>12,168.00</td>
<td>6%</td>
</tr>
<tr>
<td>RI Registers</td>
<td>57,892.00</td>
<td>57,892.00</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Foreign Parcels</td>
<td>10,438.00</td>
<td>2,872.00</td>
<td>7,566.00</td>
<td>28%</td>
</tr>
<tr>
<td>Speed service</td>
<td>72,007.00</td>
<td>6,378.00</td>
<td>65,629.00</td>
<td>9%</td>
</tr>
<tr>
<td>Foreign ordinary mail</td>
<td>1,007,710.00</td>
<td>1,007,710.00</td>
<td>-</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 present the total number of volumes received by the inventory centre per product. It also shows how much was recovered and how much was repossessed. This table simplifies if the inventory process is effective and efficient. It is observed that parcels are the least recovered.

4 DISCUSSION

The study was about managing waste in the South African Post office, specifically to manage the waste generated in the inventory centre and improve the current procedure used. The study was based on a two evaluations being to assess if the current procedures followed lean
principles and adheres to environmental laws. The initial goals for having the inventory was to fulfil the customer’s needs with the objective of recovering 100% letters that are sent to the inventory centre.

The data collected at table 1 shows how much in percentage of production was rejected, however at the same time in table 2, it illustrate how much of it was recovered. The process can be referred as efficient; however it does not adhere to lean principles completely. The inventory centre in itself generates waste as table 2 shows that Parcels are the most rejected products. Lean stipulate that less resources should be utilized to produce more, however it is observed that more resources are utilised and in excess, waste is generated.

The procedure of handling and storing these items is not regulated; some of them possess a safety and environmental risk that infringes with Section 24 of the Constitution. As it stipulates that “everybody has the right to an environment that is not harmful to their well-being and to have the environment protected [5], for the benefit of present and future generation”. South Africa has extensive legislative and regulatory framework governing various aspects of the generation, handling, storage, transportation and disposal of waste that might have a potential to harm or degrade the environment as shown in table 3

Chapter 8 of the National Traffic Act no 93 of 1996 regulates responsibilities of all people involved in handling and transportation of Hazardous goods by road, of which most of the defect items are transported to RLO from various mail centres by road, it further prescribes operational norms and standards on how hazardous goods should be marked, packaged, secured and transported. The implementation of these standards (SANS 10228, SANS10229, and SANS 10231) will enable us to know the content of the parcel from packaging, as it would have been marked per regulated standards, and we will not have to wait for the allocated timeframe to know the content. Specialized vehicles would be designated to transport only such parcels as to compile with the said standards.

RLO is a storage facility for all the defects waste. It is termed a temporary storage facility for the work still in process. The National Environmental Management Waste Act no 59 of 2008 stipulate that a temporary waste storage facility should store waste for a period of 90 days before disposal and therefore RLO facility shouldn’t be regarded as a temporary storage as it exceeds the allocated timeframe. Any waste storage facility should be free from nuisances such as odour, visual impact and ensures that breeding of vectors don’t arise and ensure that pollution of the environment and harm to health are prevented. Most of the defect waste kept in the RLO has the potential to cause nuisance odour from meat products that are found there.

According to the Western Cape Health Care Waste Management Act no 7 of 2007 [7], all pharmaceutical waste must be stored separately in a secure waste container, it further stipulate that the storage facility should have adequate ventilation and lighting and must comply with Specialized vehicles would be designated to transport only such parcels as to compile with the said standards. The vehicle will be registered, and fitted with appropriate placards which include, an orange diamond in front of the vehicle, as well as placards on the sides and rear of the vehicle as outlined in the National Road Traffic Regulation published in the GNR 225 on the 17 March 2000.

All waste defects are kept at RLO for a period of a year before being disposed or actioned. Disposal should be seen as the last option in waste management hierarchy, as other option of avoid, reduce, recover, recycle should be explored before resorting to disposal. Waste is mainly disposed to the landfill site. Waste assessed in terms of the Norms and Standards for assessment of waste landfill disposal set in terms of Section 7 of the National Environmental Waste Management Act no 59 of 2008 must be disposed at a licensed landfill site.
Business waste not containing hazardous waste should be disposed only at a Class B landfill, which is designed in accordance with Section 3(1) and (2) of the standard and norms as specified in the minimum requirements for waste disposal by landfill (2nd Ed, Department of Water Affairs and Forestry).

Hazardous waste defects should be disposed only at Class A licensed landfill site in accordance with the requirement of Hh landfill as specified in the minimum requirement for waste disposal by landfill (2nd Ed, Department of Water Affairs and Forestry).

5 CONCLUSION AND RECOMMENDATIONS

The study was conducted to evaluate if the current procedures used in the inventory centre adheres to lean thinking and environment laws. It was observed that the procedures favours the lean thinking however it does not adhere to the principle completely. Various section of the process could be improved using 5s. This inventory centre varies to other inventory centres globally which makes it even difficult to adopt other approaches developed by other industrial companies. The procedures where reviewed and it was found that the cause of inventory waste is defects such untraceable address or incorrect address input for letters and parcels. The received letters are kept for a year which opposes the legislative procedures.

This concludes that the process has more environmental risks, due to long retention period of letters and parcels. The current process flow does not satisfy and comply with the environmental laws. Keeping the parcels for a longer period possesses a high risk to health and the environment. The employees within the working environment get exposed to the hazardous waste and they are not trained to handle these items. It is therefore proposed that all the employees be trained and be offered personal protective equipment. The public should also be offered training and awareness on how to write the addresses on the letter and the type of parcels that are acceptable.

6 REFERENCES


## APPENDIX

### Table 3: Operational procedure for Return letter office

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Letters</th>
<th>Parcels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>The procedure is to open the letter and to check the return to sender address, if it attached the employee will re-write the address and sort it per postal area or region. If the letter doesn’t have sufficient data it will be shredded and be recycled.</td>
<td>If a customer did not claim the parcel within a period of a year, the South African Post Offices serves the right to dispose the contents. The method of repossession will be either disposal or auctioning of the products.</td>
</tr>
<tr>
<td>Method</td>
<td>All the sorting processes are done manually. The letters are moved by roll-tainer and stored in minitainer</td>
<td>All the sorting processes are done manually. The parcels are moved by roll-tainer and stored in minitainer</td>
</tr>
<tr>
<td>Documents</td>
<td>There is a standard procedure for the handling and disposal of mail. The process is regulated by the Postal Service Act of 1998 (Act No. 124 of 1998)</td>
<td>There is no Standard procedure for parcels, however they are regulated by the Postal Service Act of 1998 (Act No. 124 of 1998) No material data sheets are placed in the storage or working centre</td>
</tr>
<tr>
<td>Manpower</td>
<td>Only one employee is responsible for collecting, storing, sorting and sorting the parcels. Training has been provided for the standard operating procedures. there is a total number of 14 employees at the RLO</td>
<td>Only one employee is responsible for collecting, storing, sorting and sorting the parcels. No skills or training has been offered to the employees exposed to parcels. There is a total number of 14 employees at the RLO</td>
</tr>
<tr>
<td>Environment</td>
<td>The letters are stored in a storage area and they are stored according to the years in which they were received. The storage area is exposed to moisture and there is no ventilation. There is no labelling, demarcations, safety precautions and there is poor 5S utilization</td>
<td>The parcels are stored in a storage room; they are stored according to the years in which they were received. The risk is that the parcels differ and they are mixed and may result in chemical reactions, since they are kept for a longer period. the product are not labelled, poor 5S tool utilization and no ventilation</td>
</tr>
</tbody>
</table>
Table 4: Graphical images of the Return letter office process

- Waste is transported to RLO using the operational vehicles
- The waste is stored inside the mail operations bags and then stored in the mini containers and roll-tainer
- The storage area for received parcels
- Sorting process, per classified waste
- The labelling method used in the RLO
- Awaiting disposal