

*Full Length Research*

# An Assessment of Performance Indicators in the Warehousing Industry in Cameroon

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The study is carried out in order to better appreciate warehouse performance through indicators such as time, quality, cost and productivity. This is done through a time series analysis of warehouse results between the first and second semesters of 2016. The work has as case study the Huawei Technologies Cameroon, one of the warehouses amongst the Bolloré Transport and Logistics Group chain of warehouse in the Bassa Industrial Zone. Primary data was collected from warehouse supervisors using questionnaires and secondary data extracted from the warehouse inventory management system care. A longitudinal time series analysis was used in which individual variables of warehouse quality, time, cost and productivity of the Huawei warehouse were assessed. Data was presented using tables and analyzed using graphs. Research findings revealed that though there was an increase in the quantity of goods received and issued out of warehouse within the two semesters, there was a drop in the quality of warehouse services, an increase in the time taken to perform warehouse transactions and an increase in warehouse cost. It is therefore insufficient to consider quantities as the only performance indicator for assessing warehouse performance. There is need for the incorporation of elements of quality, cost, time and productivity in order to better appreciate warehouse performance. The researcher recommends that studies should be carried out on internal control of operations in the warehousing industry.

**Keywords:** Performance Indicators, warehousing, Performance Measurement, Quality, Cost, Time and Productivity.

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## INTRODUCTION

Warehousing is one of the oldest activities in history which can be linked to ancient agriculture and trade. While rich merchants stored large amounts of produce in warehouses for subsequent trade to other parts of the world, Rich farm owners stored up large quantities of corn, wheat and barley in barns during the harvest period to consume during periods of drought and low harvest. In ancient Egypt and Rome, farms, barns, storehouses and

cattle were used as a form of measuring wealth as far back as 700BC.( Genesis 41 37-57). The 19<sup>th</sup> century saw the construction of warehouses in trading ports of Europe including the Gloucester docks in the United Kingdom, Brooklyn, Amsterdam in the Netherlands and Manchester in the United Kingdom. Warehouses were a dominant part of the urban landscape.

In Europe warehousing has become an important

enabler of globalized production networks, and quite often short lead times, volume and mix flexibility, postponed customizing in terms of assembly and packaging, as well as corporate profitability, is being achieved through warehousing outlets serving some particular trade area (Christopher et al. 2006; Baker 2007; Koskinen and Hilmola 2008; Hilletoft 2009). Even if warehousing remains as an important enabler of performance among global corporations, it is quite often outsourced (Cap Gemini 2007; Selviaridis and Spring 2007; Marasco 2008), and according to longer-term forecasts the trend will be sustained, even if economic turmoil continues throughout the world in the forthcoming years (UNCTAD 2008: 104-106).

The construction of the Douala Sea port on the river Wouri is a remarkable era in the history of warehousing in Cameroon, the area was developed by a German firm, the Woermanline in 1881. With the coming of the French in 1919, the rail way was extended and the port was port was equipped. Warehouses were built for storage of raw material destined for the western world. At independence in 1960, the structure became the department of Ports for Navigable ways and later the National Ports Authority in 1971. Today one of the major operators in warehousing in Cameroon is Bollore Africa logistics who is an operator of port concessions (Douala International Terminal) and rail concessions (Camrail). She is a specialist in logistics and major industrial projects in all the most important economic sectors in the region. With subsidiaries in Limbe, Douala, Kribi, Yaounde

## OBJECTIVES OF THE STUDY

The main objective of this work is to assess a set of warehouse performance indicators order to efficiently measure warehouse overall performance.

Hence the following sub objectives:

- Assess various quality related warehouse performance indicators
- Analyze various warehouse time response performance indicators.
- Assess warehouse cost and expense determinants.
- Evaluate the various warehouse productivity performance indicators

## RESEARCH QUESTIONS

- What are those performance indicators required for assessing warehouse performance in Cameroon?.

Hence the following sub-questions;

- What are the various quality related indicators that can be used to measure warehouse performance?
- What are the various time response related indicators that can be used to measure warehouse performance?
- How can we use cost indicators in measuring warehouse performance?
- Which are those indicators that can be used to evaluate the productivity of warehouses?

## LITERATURE REVIEW

### Theoretical Framework

#### The Supply Chain Performance Measurement Theory (USAID, the Delivery Project)

This theory postulated by USAID is the result of a research carried out to provide better logistics conditions for pharmaceuticals. It can be said that this is a completion of Sagam's theory. The study makes use of both qualitative and quantitative information to come out with a set warehouse performance indicators which can be used to measure warehouse performance. This theory postulates five categories of supply chain performance indicators hence: Production selection/Forecasting/Procurement, Sourcing, Warehousing/Storage, Inventory, Management/Logistics Management Information Systems/Customer Response and Distribution/Transport. Each of these indicators is further divided into aspects of quality, cost, time and productivity.

#### Warehouse Performance Measurement Theory (Classification and Mathematical Expression of indicators)

A concept brought to light by Francielly Staudt, Maria Di Mascolo, Gulgun Alpan, and Carlos M. Taboada Rodriguez. In an article titled Warehouse performance measurement: classification and mathematical expression of indicators.

The objective of this research was to identify the indicators used to measure warehouse performance and to synthesize indicator definitions and delimitations and transform them into measurable equations. The study concludes all warehouses carry out similar warehouse performance measurement activities including the Receiving activity; (Gu et al., 2007), Storage operations (Yang & Chen, 2012; Mentzer & Konrad, 1991), Replenishment; product transfer from reserve storage area to forward pick area (Manikas & Terry, 2010), Order Picking; De Koster et al., 2007, Shipping; (Gu et al., 2007) Delivery; transit from warehouse to Customer.

## EMPIRICAL REVIEW

### Assessment of Warehouse Key Performance Indicators in the Warehousing Industry in Bangladesh, Asia

A research carried out in Bangladesh, a dissertation presented to the institute of governance studies of BRAC University, Dhaka, Bangladesh. The main objective of this study was to compare the warehouse management practices at REB in 2015 with industry best practices to eventually identify the non performing areas and limitations through the case study of the REB central warehouse at Dhaka. This research covered areas of warehouse performance measurement such as; staff management, management of stock, security concerns, storage system, warehouse design and layout, information and communication technology used for store management. Sayeed used research methodology such as; Participatory rural appraisal (PRA), Participant observation, Key informant interviews (KIIs), Focus group discussions (FGDs), Visual methods, Appreciative inquiry (AI), Triangulation. Sayeed concludes that the REB is a not for profit making organization hence any reduction in cost or value addition through its functions can directly contribute to the improvement of its customer service. Even though the conventional wisdom is that warehouse functions only add cost, this is not always the case. In some cases, value can be added to the supply chain in a number of ways through the warehouse functions.

### Performance measurement system for warehouse activities based on the Supply Chain operations Reference (SCOR) Model.

Another research was carried out in collaboration with Condafel logistics AB, Sweden. The research carried out by Per Axelsson & Jonathan Frankel and presented to the Department of Industrial Management and Logistics, Division of Engineering logistics, Lund University, Sweden.

The main objective of this study was to put in place and efficient warehouse management system for Consafe Logistics AB given that the company has no standardized model used to define warehouse metrics. Also to investigate that a performance measurement system could be developed based on the SCOR model and how it could be applied to offer enhanced customer satisfaction. Empirical data was also collected using a combinatory approach of qualitative pre-study and a quantitative web-based survey. The SCOR metrics was also stratified into indicators such as; Inbound metrics(receiving metrics, put away metrics), Storage metrics(item location accuracy, inventory days of supply, SKUs available when needed, Outbound metrics, picking metrics (pick product cycle time), packing metrics(pack

product cycle time), shipping, loading and delivery metrics(products shipped per delivery, delivery item accuracy), Return metrics(Missing), Failure metrics; damage metrics(Orders delivered without damages), quality metrics.

The researchers concluded that it was possible to implement the SCOR model for warehouse performance management at Consafe Logistics however the company was supposed to divide

## METHODOLOGY

### Research Design

The survey design was used as the study made use primary data. This was used to collect information from respondents by use of questionnaires. Questionnaires were used to collect warehouse information such as time put in at work, per head count for number of employees. Secondary data was also extracted from the warehouse management system such as cost related information, quality and productivity. The observatory method was also used to collect information such as the total units inbound and outbound from warehouse daily. Data collected was stratified into the various categories of warehouse performance indicators, presented using tables and analyzed using graphs and histograms to show the shifts, increase or drop in performance for each category between two semesters.

### Model Specification

The study specifies a simple analytical model which stipulates that the value for warehouse performance is the sum of the measure of performance from quality, cost, time and productivity.

Hence Total performance is given by

$$P_E = T_0 + Q_0 + C_0 + P_0$$

Where:

$P_E$  = Total Performance

$T_0$  = Time Performance Indicators,  $Q_0$  = Quality Performance Indicators

$C_0$  = Cost Performance Indicators,  $P_0$  = Productivity Performance Indicators

## DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

### Analysis of Quality of KPIs

### Description of Quality KPIs

The red line represents Semester 2 (S2) and the blue



**Figure 1: Graph for Quality KPIs**

Semester 1 (S1). There is a general fall in the value of quality elements judging from the position of the red line and by the direction of the arrows.

The gap between the blue and red line represents the total negative difference in quality performance between S1 and S2, even though there was a slight increase in the put-away accuracy hence a fall in the quality of warehouse operations. (Figure 1)

### **Analysis of Time Response KPIs**

#### **Description of Time Response KPIs**

As far as time is concerned, the gap between the blue and the red lines represents the total increase in time used to carry out warehouse operations between Semester 1 and Semester 2. There was an upward shift in time response graphs, beginning from Order processing time towards average vehicle arrival time. The time taken to transfer unloaded parts from the docks into storage area also increased by more than 50%. There was also an increase in the average delivery time while the average vehicle unloading time more than doubled. This implies the warehouse wasted more time in unloading shipments in Semester 2 than in Semester 1. (Figure 2)

### **Analysis of Cost/Financial KPIs**

#### **Description of Warehouse KPIs**

Figure 3 illustrates the behavior of the elements of total

warehouse cost. The gap between the two curves represents the amount by which cost increased between S1 and S2, with the highest difference being the distance between the two curves for total cost. There was more than 100% increase in total cost between S1 and S2. The value of damaged products increased more than four times, probably due to an increase in the quantity of goods to be unloaded and stocked as well as high holding cost. The warehouse labor cost increased by 40%. The gap between the two lines shows the increase in cost between S1 and S2. We can therefore conclude that there was an increase in cost between S1 and S2 which can be interpreted as poor performance given that the warehouse team were unable to minimize these elements of warehouse cost between the months of S1 and S2.

### **Analysis of Productivity KPIs (P4)**

#### **Description of Warehouse Productivity KPIs**

As shown in the histogram of figure 4, there was a general increase in the level of productivity between S1 and S2 in Huawei Warehouse. However, an increase in elements of productivity does not necessarily mean positive performance. There was an increase in storage capacity by more than 50% which can be directly related to the amount of space needed to accommodate the additional quantities inbound. There was a further increase in the units moved carried from docks into the warehouse per person per minute. This was due to an increase in the number of goods received over the same number of

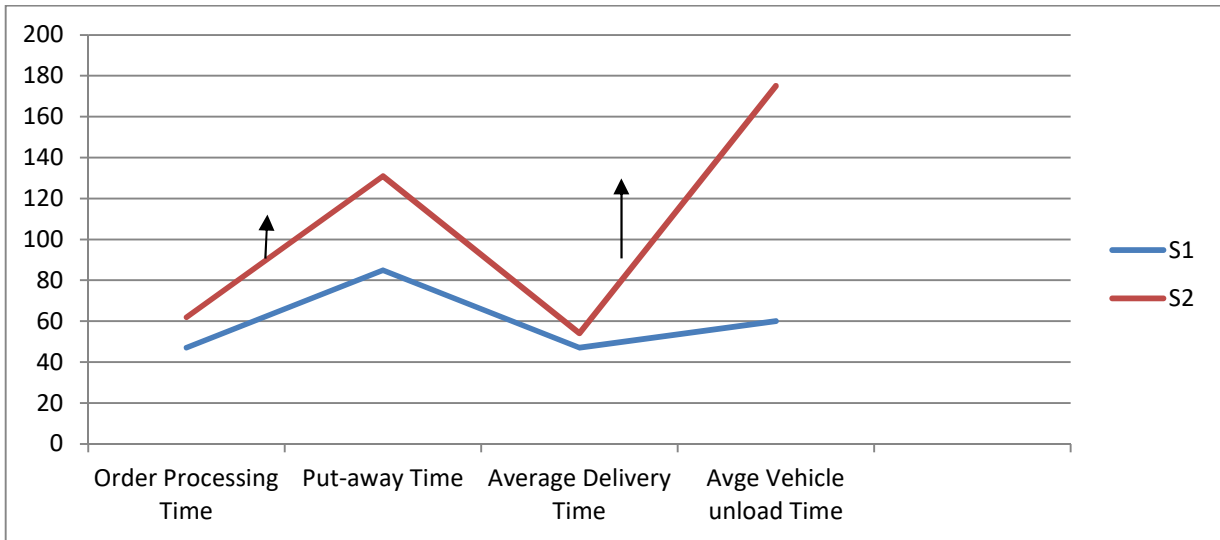


Figure 2: Graph for Time Response KPIs

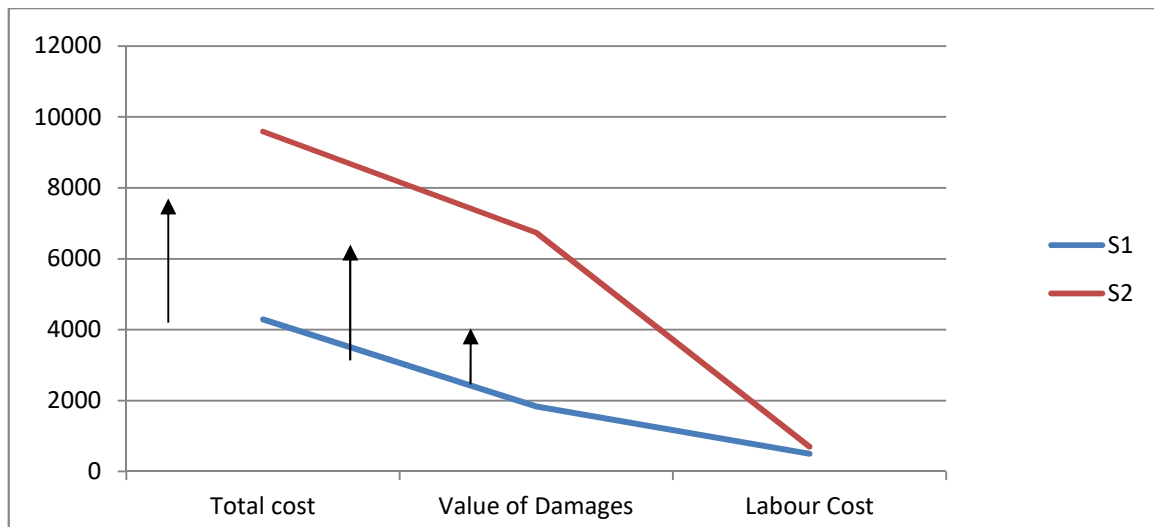


Figure 3: Graph for Cost/Financial KPIs

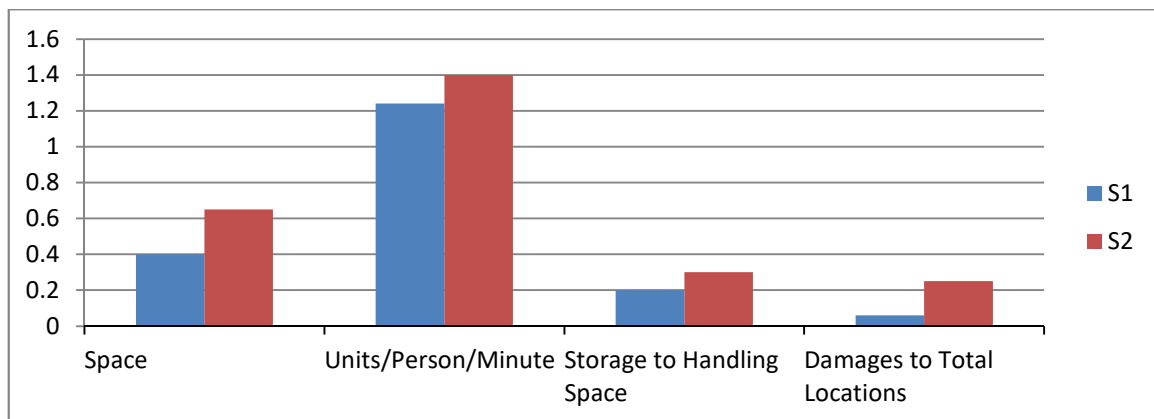


Figure 4: Histogram for Productivity KPIs

warehouse employees. Similarly there was more than 10% increase in the ratio of handling to storage space. With the increase in the amount of damages, there was more than 100% increase in the number of locations with damaged goods compared to the number of locations inventory locations between S1 and S2. This indicates poor performance. Generally one can say there was an increase in warehouse productivity between the periods of S1 and S2. -

## **SUMMARY, CONCLUSION, RECOMMENDATIONS -**

### **Summary**

This research was carried out to assess warehouse performance indicators in the warehousing industry with case study as Huawei central warehouse Douala-Cameroon. In this research we also introduced various categories of warehouse KPIs and elements of each category. The aim of this study is to prove the fact that warehouse performance can only be completely assessed if elements of cost, time, quality and productivity are taken into account.

### **CONCLUSION**

After taking into account the data collected by use of questionnaires, presented using tables from table one to five and analyzed in the previous chapter using histograms and graphs, we can summarize our findings as below:

- There is a negative change in the quality of warehouse operations
- There is an increase in the time with which warehouse are operations are carried out
- There is an increase in the cost of warehouse operations
- There is an increase in warehouse productivity

We can therefore conclude with certainty that an increase in the volume of goods received or shipped does not necessarily mean an increase in warehouse performance. Unless warehouse indicators such as those related to quality, time, cost and productivity are put in place it would be impossible to evaluate warehouse performance correctly.

### **SUGGESTIONS FOR FURTHER STUDIES**

Warehouse key performance indicator measurement might not be a very new concept but its application in Cameroon is not popular. There are however other

related fields which could add to the existing body of knowledge in warehousing as a whole. The following suggestions could be considered for further research as far as warehousing in Cameroon is concerned

Analysis of warehouse concentration in Cameroon and economies of location.

Classification of warehouse cost within the warehousing industry in Cameroon.

Warehousing as a profit center and strategic business unit.

Internal control for operations in the warehousing industry in Cameroon.

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