

# **Increasing Productivity and Efficiency for Third Party Logistics Service**

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## **Abstract**

The study considered a company which is among the most in demand 3PL service provider that caters one of the largest manufacturing facilities in the Philippines. The research involved evaluation of the warehouse and distribution operations in the facility to measure its productivity and efficiency level. Significant findings on operating times such as total time stayed inside the distribution center (DC), case picking time, total unloading time and gap time were observed which contributed to warehouse inefficiency. Through facility design and systems improvement, the warehouse and distribution operations were re-designed, and a model was developed and tested through simulation. The model presented a significant improvement in the DCs operation which will consequently increase its productivity and efficiency level.

## **Keywords**

supply chain, warehouse, distribution center, third-party logistics, productivity

## **1. Introduction**

Supply chain's dynamic characteristics involves the constant flow of information, product, and funds between suppliers, manufacturers, distributors, retailers and customers (Chopra, 2013). The presence of distributors or logistics service provider, one of the key players in a supply chain, contribute to achieving supply chain efficiency since they are responsible not only in the sourcing of raw materials and supplies but also in the distribution of finished goods to customer (Ceniga and Sukalova, 2015). In the present time, companies, especially the multinational ones with wide geographic market, are now more aggressive to outsource logistics services with the aim of reducing cost and improving operational efficiency. Outsourcing logistics functions enables a company to focus on its core competencies and utilize their resources to the fullest (Hong et al., 2004, Lieb and Bentz, 2005, Kain and Verma, 2018). In such practice, a company may take advantage of selecting the best in the field of third-party logistics or 3PL, utilize the best technology available, and reduce operational costs.

In the Philippines' supply chain industry, data of the last two years presented in Table 1 showed that transport, storage and communication component posted the lowest growth rate of 5.8% among the industries (PSA, 2018).

Table 1. Philippine Supply Chain Industries Economic Performance of 2016 and 2017

Supply Chain Component (Industry)	Gross Value for 2016 (in Million Pesos)	Gross Value for 2017 (in Million Pesos)	Growth Rate (%)
Agriculture, forestry and fishing	426,071	465,878	9.3%
Manufacturing	941,300	1,002,782	6.5%
Transport, storage and communication	235,822	249,452	5.8%

Wholesale and retail trade, Repair of motor vehicles and motorcycles, Personal and household goods	749,884	830,041	10.7%
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For such group however, storage and services incidental to transport --- where 3PL belongs --- gained the highest growth with a rate of 10.4% as shown in Table 2. This attests the demand for this sector to improve its viability to contribute more on the GDP of the country.

Table 2. Transportation, Storage and Communication Industries Economic Performance of 2016 and 2017

Industry	Gross Value for 2016 (in Million Pesos)	Gross Value for 2017 (in Million Pesos)	Growth Rate (%)
1. Transport and storage	129,918	137,219	5.6%
a. Land	72,663	76,045	4.7%
b. Water	5,985	5,952	-0.6%
c. Air	20,564	21,316	3.7%
d. Storage and services incidental to transport	30,706	33,907	10.4%
2. Communication	105,904	112,233	6.0%
Gross Values Added	235,822	249,452	5.8%

Demand for the services of 3PLs is very evident especially in the distribution of retail and consumer goods such as food and beverages, alcoholic beverages and tobacco, clothing and footwear, and household and personal care. This is manifested in the domestic consumption of goods where food and non-alcoholic beverages are the most consumed with a value of 45% (PSA, 2018). Since the Philippine economy is dominated by corporate giants involved in the manufacture and sale of such retail and consumer goods, this proved that 3PL service providers should ensure highly efficient and reliable services to its clients in order to be more competitive.

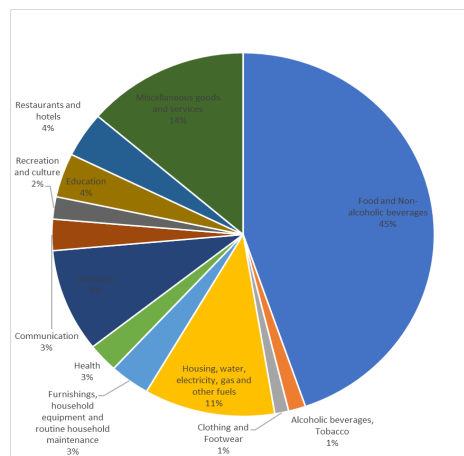


Figure 1. Household Final Consumption Expenditure of 2017

The logistics study conducted by Langley (2014) proved that many 3PL companies offer the critical experience, capital expenditure, time, and resources essential to helping retailers facilitate the strategic management and distribution of dynamic inventory and support execution of in-demand services. They have also found that majority of both the shippers and 3PLs have experienced a successful working relationship that brought improvements on order fill rate and order accuracy and average reductions in logistics, inventory and fixed logistics cost. Among the services commonly outsourced include domestic and international transportation, warehousing, freight forwarding, and customs brokerage. Another notable element in 3PL is the use of information technology or IT in operations

since IT enable information sharing across supply chain partners (Marinagi, Trivellas, and Sakas, 2014); reduces cost, improves operational efficiency and process improvement, provides quality, reliability, and accuracy of information, integration and collaboration, and differentiation of products or services (de Barros et al, 2015); and enhances performance over and above the presence of trust and relational governance (Singh and Teng, 2016). To sustain competitiveness, however, organizations should know how to properly utilize IT to achieve alignment, adaptability, and agility (Gunasekaran, Subramanian, and Papadopoulos, 2017).

## 2. Methodology

This study considered the case of a 3PL service provider that caters to one of the largest manufacturing facilities of consumer goods in the Philippines. It involved three phases which are review of the current system, data collection and analysis and improvements and innovations using simulation to increase productivity. In the review of the current system, the drivers of supply chain were also identified to see the different entities that were affected by the distribution operations. Simulation was used to better analyze the processes inside the distribution center, identify what is the “bottleneck” or the process that slows down the whole operation, and measure the current efficiency level. After the review and data analysis, a new design of the facility was developed and simulated to improve the facility’s productivity and operational efficiency.

## 3. Results and Discussions

### 3.1 The Consumer Goods Supply Chain

The supply chain for consumer goods starts with the purchase of the necessary raw materials, components and other supplies. This is followed by manufacturing and conversion of materials into finished goods which are then moved or transported to the main distribution center (DC) or warehouse. The DC represents the case company which is a 3PL provider who manages the logistical flow of goods across the supply chain. It is also tasked to ensure that goods are flowing quickly and safely towards demand points, which are the retailers/sellers. Figure 2 exhibits the actors of supply chain considered in this study.

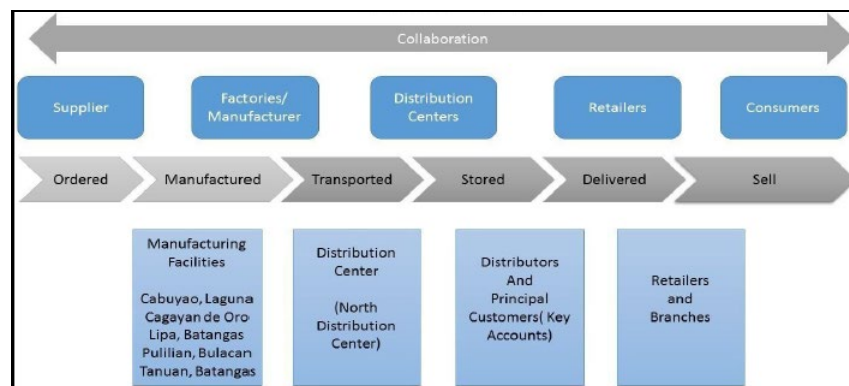


Figure 2. Supply Chain Actors

The 3PL company manages all the services that include end-to-end logistics coordination and management, technology integration (such as transportation management systems and warehouse management systems), global shipping functions as well as warehousing/distribution support of the goods. Currently, the company has a strong army of 4,500 people serving/deployed across the Philippines and a total of 400 lift trucks across all 60 warehouses around the country.

### 3.2 Operational Issues and Challenges

To be familiar with how things work inside the DC, a service blueprint for the inbound and outbound processes were created as shown in Figures 3 and 4. Inbound operation starts with an email advice from the host management system regarding the incoming volume to be received. An appointment is then scheduled at an available receiving door and information about the purchase order's item and quantity. Afterwards, the material planner will send incoming stocks for receipt and the lead man will provide bay assignment for unloading. Once stocks are received, receipts are then collected and purchase orders (PO) are matched. Reverse logistics will be responsible in cases of defective goods and value-added services like labeling. There are two ways in which the stocks are transferred/moved inside the warehouse: push pulls to unload palletized stocks from trucks or manual unloading of stocks. After the creation of transfer orders, stocks will then be available on system location which are fed and transported to a storage area or specific location (*put away*) to be available in bin location.

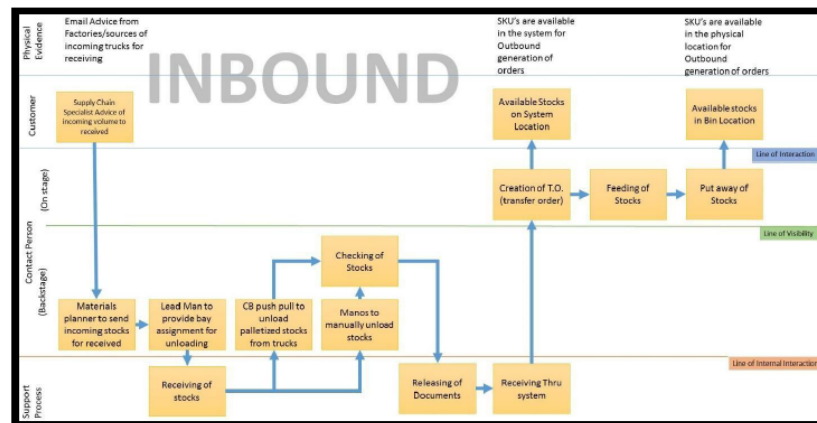


Figure 3. Inbound Logistics Process

The outbound operation starts with the confirmation of deliveries. Then outbound deliveries and transfer order will be created followed by the generation of outbound wave to pick customer orders. This results in both re-stocking inventory from reserve storage location (replenishment) and pulling products from storage areas to complete customer orders (pick activities). There are two main ways in which the stocks are picked: case-picking or pallet picking. Pickers will case pick the stocks and at the same time, a checklist will be created for checking after fulfillment of order (sweeping). On the other hand, a reach truck or RT will pallet-pick the stocks and will be subjected to reconciliation. After picking, stocks will be loaded to the truck and documents will be released. The outbound trucks are available based on scheduled delivery dates and are loaded based on orders.

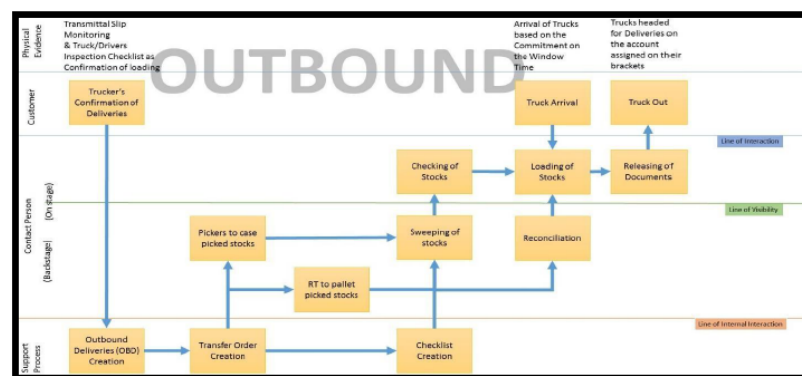


Figure 4. Outbound Logistics Process

The key processes identified from the DC operations were inbound process, sweeping, feeding, outbound process, case picking, pallet and replenishment. The key performance indicators or KPIs to measure productivity and operational efficiency include the loading and unloading time, feeding time, put away time, picking time, case picking time and the dwell time of trucks inside the distribution center. All these indicators were considered in simulating the current system where the target is to deliver all customer orders at the given time. Presented in Figure 5 is a model of the current operation showing the processing times and outputs in pallets to better analyze the activities inside the DC and identify what is the “bottleneck” or the process that slows down the whole operation.

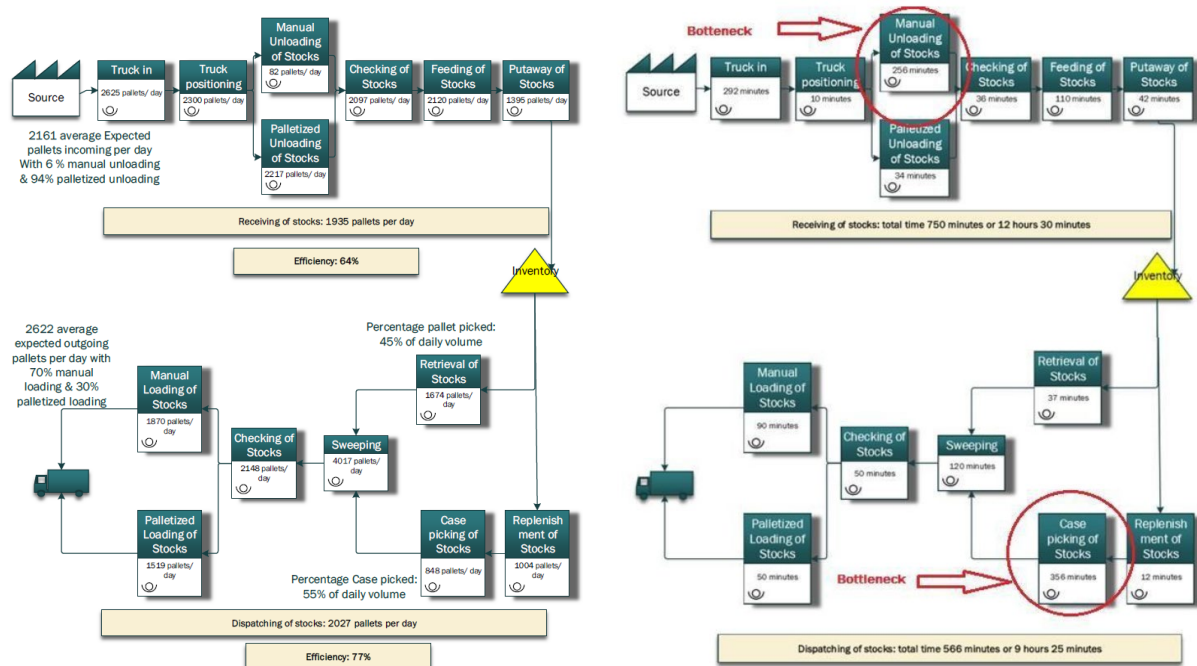


Figure 5. Model of the Current System

With the current rate and output of finished goods received and dispatch, the DC’s current efficiency level was only 64% and 77%, respectively. The DC’s warehouse management system was found to be incompetent to cater to its current requirements since not all orders are delivered. Knowing that the goods received by the warehouse are in pallet count, the increase in number of order triggers for the process time to prolong. The bulk order of cases from the clients caused huge bottleneck in its operations particularly in the loading and dispatching processes. As illustrated in the model, the manual loading of pallets slows down the process of receiving of stocks. While for dispatch activities, case picking was considered as the bottleneck within the warehouse. This then resulted to low productivity and inefficiency which implied that improvement in the existing transport (inside the warehouse) system and streamlining of warehouse operations are necessary.

Additionally, the DC has three major bays which include finger dock, plain dock and the front bay. Data collected revealed that the bays were either underutilized, overutilized or exceeded the standard number of trucks being catered per day. Incidents of inventory batch adjustments were also observed. Batch adjustment is done when a picking error happens such as over picking, short picking, or double picking. Other issues identified were warehouse congestion, radio frequency malfunction, idle time due to unavailable operator, damaged/lost stock code, untracked stocks, incomplete material to pick, and lack of staging area.

### 3.3 Supply Chain Drivers for 3PL Operations

The identification and evaluation of factors affecting productivity across the supply chain can be helpful in devising strategies to reduce inefficiencies and improve facility performance. Facilities as the actual physical placement of raw material, work in process material and finished goods is the most integral part of a warehouse and distribution center. The physical characteristics of a facility include size, number of items handled, space utilization and dock

used while the physical operations may include automation, loading and unloading, order picking, replenishment and manpower. Inventory, as the second important driver, considers the flow of raw material and finished goods in the supply chain. The spoilage and misplacement of goods not reconciled on a real-time basis is the primary source of inventory inaccuracy in the supply chain of consumable goods (Biswal, Jenamani, and Kumar, 2018). At present, warehouse management systems are being employed to improve efficiency of processes and reduce inventory inaccuracies. One of the most utilized solutions in a warehouse management system is the Radio Frequency Identification or RFID technology which provides information visibility and help reduce cost brought by inventory inaccuracy (Zhong, et al., 2016). On another note, materials handling automation can never be ignored to increase warehouse productivity and this involves using a storage and retrieval operations made in sequence (Ghiani, Laporte and Musmanno, 2004). An automated storage and retrieval system along with a belt conveyor could be used in storing and picking loads from the warehouse. This technique is proven to earn savings in labor costs and floor space, increase reliability and reduce error rates (Roodbergen and Vis, 2009).

Improvements in the inbound and outbound operations of the DC company were made since it was determined that the case picking process was the bottleneck on warehouse operation. This include the use of a conveyor system to reduce manual handling and increase the speed of the process. A model simulator Flexsim was used to come up with the new warehouse design. The model showed that with the new conveyor system, utilization rate of resources will increase to 92%. The improved case picking process starts with checking the ordered stocks for picking at monitor of the conveyor system. The picker now will no longer need to go to the location of stocks to be picked, check the batch code of the stocks and scan the tag just to pick the goods. With the introduction of the new conveying system, the goods will be readily available at the staging location where the stocks are sorted. Tedious inspection and recording of items picked will be eliminated in the process since the new system will perform these tasks. Figure 6 shows the design of the new system where a conveyor system will be introduced.

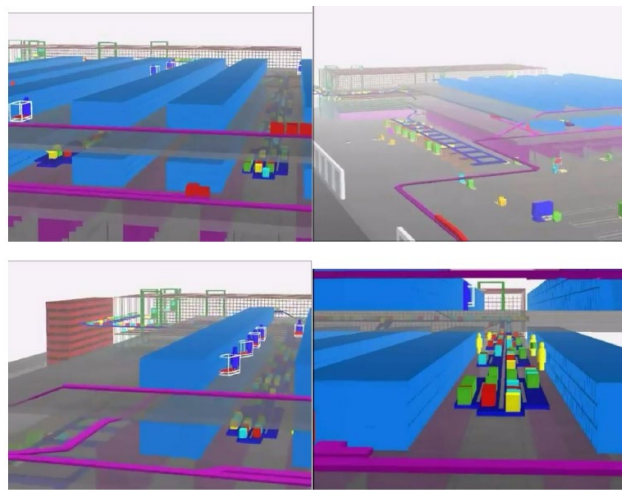


Figure 6. Model of the New System

Figure 7 presents the simulated model of the new system showing the processing time. Significant improvement in the cycle were observed where the total processing time for receiving goods will be reduced to 631 minutes (15.86% reduction) while the dispatching time will become 304 minutes (46.29% reduction). Consequently, the case picking productivity increases by more than 160% from 30,720 cases to 80,100 cases picked per day with an increase in expected output from 120 cases to 900 cases. Other tangible benefits of the proposed system include manpower utilization, increase in capacity, and reduction in pallet usage.



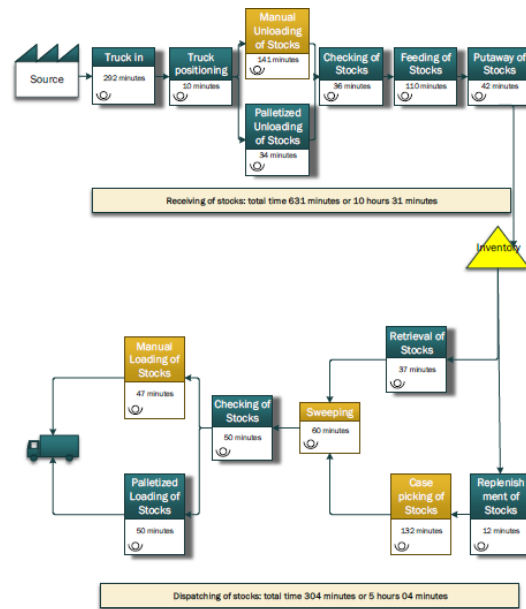


Figure 7. Simulation of the Proposed Model

## 4. Conclusion

3PL services are highly utilized for the distribution of retail and consumer goods. These services offer responsiveness to consumer demand and help reduce distribution costs in the supply chain. Warehouse and distribution management involves a complex task to ensure on-time delivery of quality goods to customers when needed. The study made a review of the current warehouse and distribution operation of a 3PL service provider in the Philippines. It was found that bottlenecks in the receiving and dispatching goods were present which made the productivity and operational efficiency lower than targeted. The use of simulation enabled the researchers to better analyze the processes, identify bottlenecks in the operation, and measure the efficiency level. The important elements that affect productivity and efficiency include the method of loading and unloading process, availability or type of material handling equipment used, and manpower accessibility. Considering these drivers, a model simulator was used to develop a new warehouse design utilizing a conveyor system. The new system will not only increase efficiency but will also improve utilization rate of resources, increase productivity, and increase capacity.

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## Biographies

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