Reduction of Turnaround Time for Outbound Logistics (Finished Goods only) in a Food Processing Industry

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Comments by the Faculty

Logistics is that part of supply chain management that is responsible for the effective movement of the goods from the point of origin to the point of consumption in the least possible time incurring least cost and satisfying the customers' requirement in terms of quantity, quality, and variety. Without the support of logistics it would not be possible for the supply chains to ensure safe and timely delivery of the materials and finished goods to the concerned customers. Hence every effective supply chain needs to focus on the logistics part to ensure production and distribution without any interruption.

A manufacturing company usually will have inbound logistics, which brings in all the raw materials, semi-finished goods, components, and packing items, and the outbound logistics that carry the finished products from the company to the dealers, distribution centers, and sometimes directly to the retail shops and customers. It is imperative that the outbound logistics system works efficiently to ensure that the finished goods are dispatched from the company's premises as soon as the manufacture is over so that the goods reach the destination at the earliest possible time. This in turn ensures meeting the demand at the destination points and leads to increased sales and in the long run enables customers' loyalty.

The present project carried out at Nestle India limited at their Nanjanagud plant in Karnataka, India, primarily focused on minimizing the outbound logistics time so as to improve the overall efficiency. First the entire outbound logistics pattern that involved the movement of the carriers which are nothing but two types of trucks was studied by mapping the process. Then all the steps involved in the logistics operation, namely documentation, record keeping, loading, weighing, and waiting times were systematically studied using a sample of 5 trucks on each day for a period of ten days. This data of 50 trucks helped in noting down the various issues that were responsible for the total time of operations along with the bottlenecks in the process. By using Pareto chart the two major contributors responsible for the delay were observed and then appropriate modifications were carried out. After implementing the pilot plan the activities were again measured for their time of operation and a substantial reduction in time was noticed. It was indeed obvious that with the improvement in time of operations of the two major activities which constituted for almost 75% of the total time, the total time was substantially brought down. Thus the project was able to achieve objectives of improving the performance of the outbound logistics operation.

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Introduction

Supply chain management

A supply chain involves facilities, functions, and activities for producing & delivering product or service from suppliers to customers. Supply chains usually include four functional components: (1) demand planning, (2) manufacturing-planning and scheduling, (3) supply planning, and (4) transportation planning. Supply chain management (SCM) spans all the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption, (Chopra & Meindl, 2003). SCM draws heavily from the areas of operations management, logistics, procurement, information technology and strives for an integrated approach. The main objective of SCM is to minimize supply chain costs while keeping a reasonable service level leading to customer satisfaction/quality/on time delivery, etc., (Christopher, 2011).

Logistics

Logistics refers to the management of the flow of resources between the point of origin and the point of consumption in order to meet some requirements, for example, demand from customers or corporations. The resources managed in logistics can include physical items, such as food, materials, equipment, liquids, and staff, as well as abstract items, such as time, information, particles, and energy. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The complexity of logistics can be modelled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation. (Mentzer, 2004).

Outbound Logistics

The movement of material associated with storing, transporting, and distributing goods to its customers or distribution centers.

About the Company

Nestlé is the world's leading Nutrition, Health and Wellness Company that continues to delight consumers and create economic value for society. Their mission of **"Good Food, Good Life"** is to provide consumers with the best tasting, most nutritious choices in a wide range of food and beverage categories and eating occasions, from morning to night.

After nearly a century-old association with the country, today, Nestlé India has presence across India with seven manufacturing facilities and four branch offices spread across the region. Nestlé India's first production facility, set up in 1961 at Moga (Punjab), was followed soon after by its second plant, set up at Choladi (Tamil Nadu), in 1967. Consequently, Nestlé India set up factories in Nanjangud (Karnataka), in 1989, and Samalkha (Haryana), in 1993. This was succeeded by the commissioning of two more factories - at Ponda and Bicholim, Goa, in 1995

and 1997 respectively. The seventh factory was set up at Pantnagar, Uttarakhand, in 2006. The 8th Factory was set up at Tahliwal, Himachal Pradesh, in 2012.

The four branch offices in the country help facilitate the sales and marketing of its products. They are in Delhi, Mumbai, Chennai and Kolkata. The Nestlé India head office is located in Gurgaon, Haryana.

Problem/Objective of Study

The research work was carried out in the Supply Chain Management department, of Nestle India Pvt Ltd., Nanjangud (Karnataka). The company has two warehouses to handle –

- **Maggi:** The product is supplied mostly to regions in South, East and West of India
- **Coffee:** The product is supplied all over India. It is the only plant in India for Coffee production and supply across the country.

The project was about the total turnaround time for outbound logistics (finished goods), in which the objective was to understand the entire process and suggest some steps to reduce it significantly.

Turnaround Time

Turnaround time is defined as the time taken by the transport vehicles to complete the whole process of loading finished goods, starting from the point of entry to its exit from the factory premises. In Nestle India, Nanjangud the break-up of the outbound logistics process (finished goods) is shown in Figure 1. Turnaround time is probably the most important key performance indicator in any logistics operation, as stated in Bolstorff (2007). A short turnaround time is economically advantageous, making the most efficient use of time and materials. (Bowersox, Closs, & Cooper, 2002)

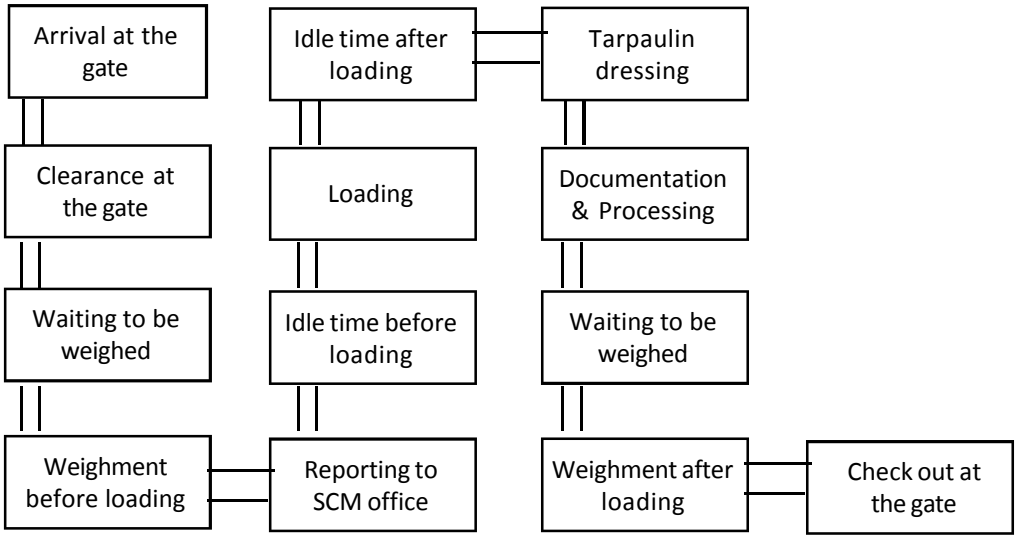

Figure 1 : Outbound logistics process in the company

In 2012, around 11000 trucks carried around 10 million cases to various distribution centers. There was an increase of 16% in number of trucks and 48% in number of cases. With the increasing number of volume of trucks each year, it was almost imperative to improve the efficiency of the process so that more number of trucks could be pushed to various distribution centers in the southern region for Maggi and throughout India for Coffee.

So, the company wanted to conduct a study to identify key drivers that increase the total turnaround time of outbound logistics, and to suggest some steps to reduce it.

The main objectives were:

- To increase efficiency of the overall logistics inside the factory
- Improve safety by ensuring that minimal vehicles are inside the factory without compromising on the loading time.

There was inherent delay in the overall process from the arrival of the trucks at the security gate to its dispatch as felt by the management authorities. Objective is to identify and reduce time taken by various activities before and after loading of finished goods (Maggi and Coffee), at respective warehouses.

Methodology

Keeping in mind the requirements of the company, it was decided to use several, well established analytical and graphical tools. The tools used are briefly described below.

PDCA Cycle

PDCA Cycle is the core of the whole analysis leading to the execution of the project involving reduction of total turn-around time for outbound logistics (finished goods only).

The concept of (Plan, Do, Check, Act) PDCA is based on the scientific method, as developed from the work of Francis Bacon. The scientific method can be written as "hypothesis"–"experiment"–"evaluation" or plan, do and check. The father of Statistical Quality Control Walter Shewhart described manufacture under "control"—under statistical control—as a three step process of specification, production, and inspection. He also specifically related this to the scientific method of hypothesis, experiment, and evaluation. Shewhart (1980) says that the statistician "must help to change the demand [for goods] by showing how to close up the tolerance range and to improve the quality of goods." Clearly, Shewhart intended the analyst to take action based on the conclusions of the evaluation. PDCA was made popular by Dr W. Edwards Deming, who is considered by many to be the father of modern quality control; however, he always referred to it as the "Shewhart cycle". Later in Deming's career, he modified PDCA to "Plan, Do, Study, Act" (PDSA) because he felt that "check" emphasized inspection over analysis. Deming preferred plan, do, study, and act because "study" has connotations in English closer to Shewhart's intent than "check".

Rate of change, that is, rate of improvement, is a key competitive factor in today's world. PDCA allows for major "jumps" in performance ("breakthroughs" often desired in a Western approach), as well as Kaizen (frequent small improvements). In the United States a PDCA approach is

usually associated with a sizable project involving numerous people's time, and thus managers want to see large "breakthrough" improvements to justify the effort expended. However, the scientific method and PDCA apply to all sorts of projects and improvement activities.

The steps taken to implement PDCA cycle are shown in Figure 2.:

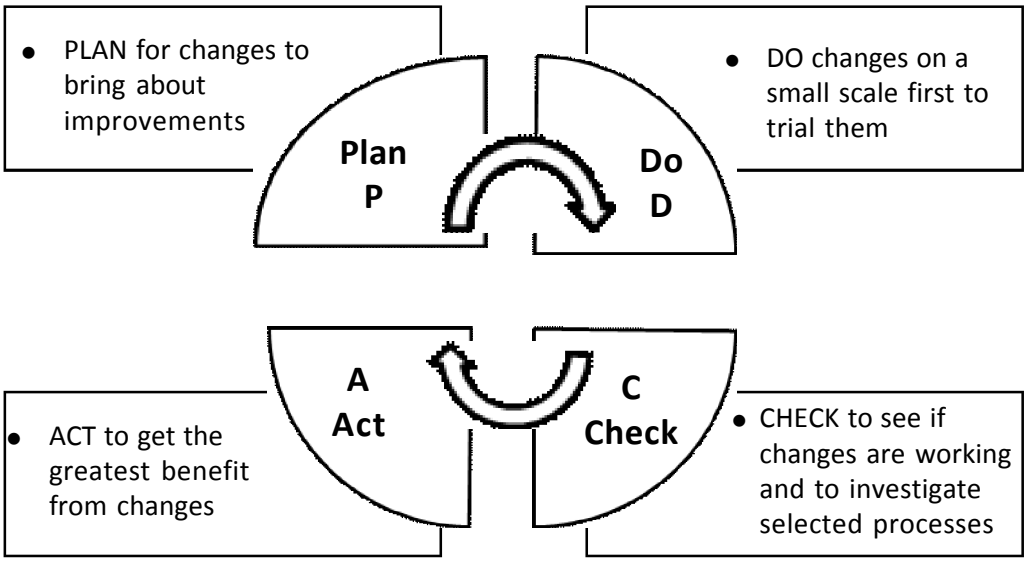

Figure 2: The P D C A Cycle of Quality Improvement

Plan

The objective of the process was to analyze the entire data for a suitable sample size (both open and container type trucks) and suggest practical ways of implementing the recommendations in phases before the start of the season.

Do

A total of 50 trucks were taken for a period of ten days. The average number of trucks entering the premises to be loaded in a day was forty, with a deviation of five trucks. With the help of statistical tools, we determined the sample size to be five trucks per day (with 95% confidence level, where minimum samples required was four). The collected data was analyzed on the basis of time taken in each stage of the outbound logistics, with the help of Pareto chart and other statistical tools.

Check

The results were then analyzed. Charting data make it much easier to see trends and to convert the collected data into information. This information is then used in the next step "ACT".

Act

After analyzing the data, several suggestions were given on reducing the turnaround time mainly by targeting the bottlenecks, i.e. documentation and processing time & idle time before loading. The changes to be applied were determined that included improvement of the process.

Overview of the Sampling Plan

Population

There are two warehouses, i.e. Coffee and Maggi, where the finished goods are stored and then loaded into the trucks. Two types of trucks are used to supply goods to various distribution centers around India, namely Open trucks and Containers.

Sampling

Sampling is done in two stages. Firstly, we are using random sampling, to select strata, which are:

- Open truck, and
- Container

After selecting our strata we used convenient sampling to select the trucks. They were selected on the basis of:

- Product to be loaded:
  - Maggi
  - Coffee
- Trucks to be loaded in 1st and 2nd shift.

Sample Size

A total of 50 trucks was taken for a period of 10 days, among which

- Number of Open trucks: 42
- Number of Containers: 8
- Number of trucks carrying Coffee : 14
- Number of trucks carrying Maggi : 36

Analysis of the Data

The data of fifty trucks, related to time consumed by each of the 12 activities pertaining to outbound logistics in a period of ten days, was collected and analyzed by using various tools, one of which is Pareto Chart, (Asaka, 1990). This chart helps to find out the vital few as compared to the trivial many. The top two bottleneck processes were identified from analysis of Pareto charts as shown in Figure 3.

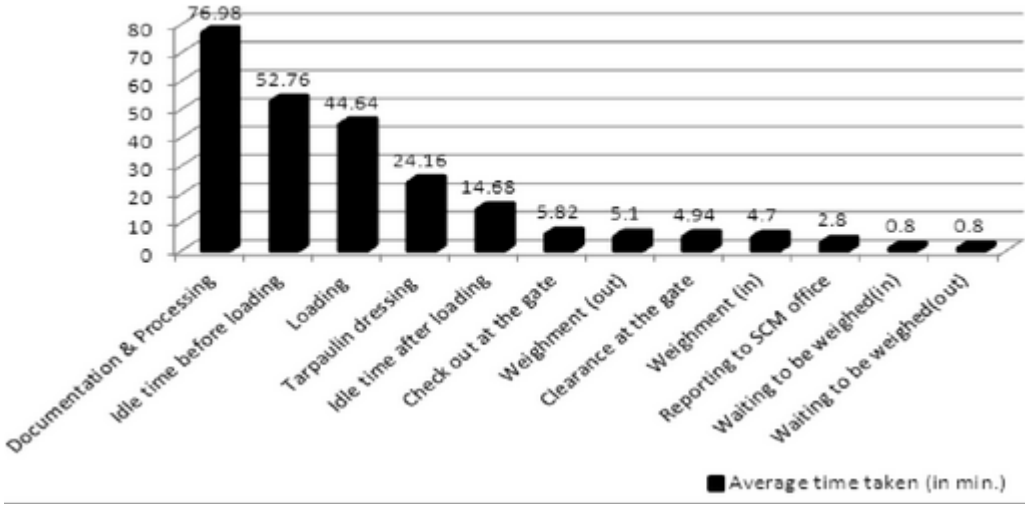

Figure 3: Pareto Chart showing the time spent in each of the activity

Overall Findings

- ***Documentation and the processing"*** time consuming close to twice the time of loading.
- This is followed by the "***idle time before loading***".
- Shift change-over and breaks to be streamlined with loading operations
- Pick slip generation not in line with vehicle availability, slips generated for vehicles which aren't available while no slips for those available in yard.

The data was analyzed further on the basis of departments, i.e. Maggi department and Coffee department.

Maggi Department

Some of the challenges which were faced regarding the outbound logistics (finished goods) in the Maggi department, along with the Pareto chart, are discussed below. Figure 4 displays the Pareto Chart (Maggi) showing the time required for different activities in the outbound logistics**. The Pareto chart indicates that the time spent on two activities namely documentation and processing followed by idle time happen to be major time consumers.**

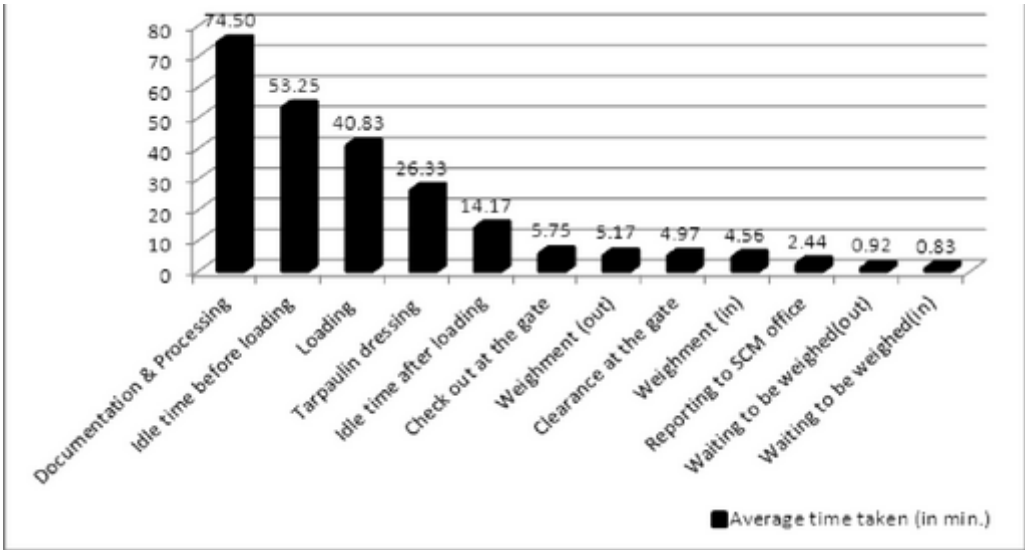

Figure 4 : Pareto Chart showing the time spent in each of the activity in the Maggi plant

Challenges faced

- In case of ad-hoc issues such as delay in generation of pick slip (quality issue) cannot be predicted and hence vehicles should not be allowed to enter the premises under such circumstances.
- Delay in reporting by the workers at the time of shift change and a longer break while sometimes is the case for security guards too.
- No empty slots for goods loading, which increases the idle time before loading
- Vehicles loaded in the evening / night are cleared only the next day morning and some are extended till noon awaiting completion of documentation, loading receipt etc.
- Documents are prepared in the coffee warehouse and shunted every time resulting in more delay
- Transport representatives are yet to understand the Turnaround time and usually don't take the same on priority

Coffee Department

Similarly, some of the challenges faced regarding the outbound logistics (finished goods) in the coffee department are shown in the Figure 5.

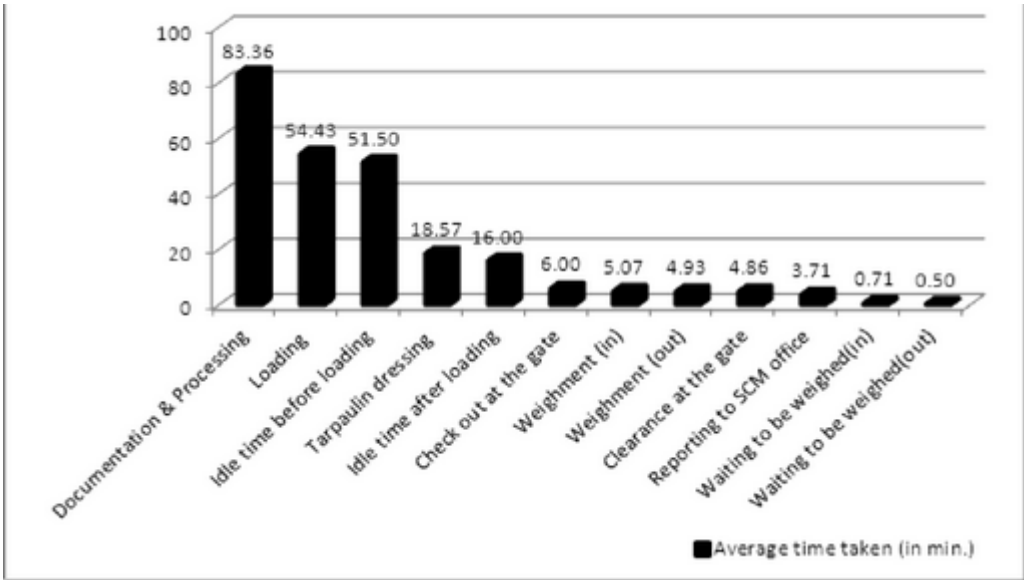

Figure 5: Pareto Chart showing the time spent in each of the activity in the coffee plant

Challenges faced

- Malfunction of loading gates (this may not be major factor during lean season and towards month end for stock clearance). Also, only 2 sets of workers at a time for loading activities could be a major block during peak season.
- The process in the coffee warehouse is time consuming because of significant manual efforts.
- Same set of workers are used for finished goods, semi-finished goods, and packaging material.

Implementation

On analyzing the data, the problem areas identified are as following:

- *Documentation and Processing time*
- *Idle time before loading*

On identification of the above mentioned problem areas, an improved process was implemented on a sample of four trucks. On the basis of the data collected after this implementation, those improved steps were suggested to the department for reducing the total turnaround time.

Steps Implemented

The steps implemented to attack the above mentioned problem areas, and to decrease the total turnaround time are as following:

1. *Pick slip* was handed over to the truck driver at the entry gate, after the security personnel checks all the documents.
2. The truck driver hands over the pick slip to the security personnel at the warehouse for *batch identification*
3. *Challan generation* was initiated after the completion of loading
4. The challan and other documents, *except Loading Receipt*, are handed over to the driver along with the keys by the security personnel.
5. The driver was allowed to exit the factory premises with the challan, checklist and count slip.
6. *Loading Receipt* is collected by the driver after exiting the factory premises.

These steps were implemented keeping in minds all the rules and regulations required to be followed.

Improvement Achieved

On implementing the previously mentioned steps, and proper supervision, substantial improvements were noticed. The time taken by the two bottlenecks was decreased to a substantial level, along with the total turnaround time. A comparison of the time taken before and after improvement is shown the Table 1.

Table 1 :
Improvement Achieved

Activity	Average time taken (in min.)		Difference
	Before Implementation	After Implementation	
Clearance at the gate	4.94	3.50	**1.44**
Waiting to be weighed(in)	0.80	1.75	**-0.95**
Weighment (in)	4.70	3.25	**1.45**
Reporting to SCM office	2.80	3.25	**-0.45**
Idle time before loading	52.76	10.50	**42.26**
Loading	44.64	38.75	**5.89**
Idle time after loading	14.68	9.50	**5.18**
Tarpaulin dressing	24.16	39.00	**-14.84**
Documentation & Processing	76.98	6.00	**70.98**
Waiting to be weighed(out)	0.80	2.50	**-1.70**
Weighment (out)	5.10	3.25	**1.85**
Check out at the gate	5.82	4.25	**1.57**
Total time taken	**238.18**	**125.50**	**112.68**

On implementing the suggested steps mentioned above, following improvements were seen:

- Around 80% reduction in *idle time before loading* [(52.76-10.50)/52.76]
- Around 92% reduction in *documentation and processing time* [(76.98-6)/76.98)]
- The *total turnaround time* was reduced to 125 minutes, a drop of around 47% [(238.18-125.5)/238.18]

Recommendations

After the completion of the study and pilot run, following suggestions were given for decreasing the total turnaround time of the outbound logistics:

- *Pick slip* to be handed over at the entry gate to the driver so as to ensure that all vehicles come inside the factory with a loading advice.
- *Prior intimation to truck drivers* about tentative completion of load so that they are ready for loading.
- *Bill generation and other documentations* like challan, etc. can start as soon as the loading ends.
- *Challan and other documents for Noodles section* to be printed at the Maggi warehouse.
- Handing over *the bill and other documents to the truck driver*, after the completion of loading (or tarpaulin dressing), by the security personnel.
- *Loading Receipt* should be collected by the driver only once the vehicle exits the premises.
- Decrease in *maximum number of vehicles* in the factory premises from 10 to 6, at any point of time.
- Coordination between *FG supervisor and the security personnel* to be improved for effective implementation
- Document generation during 3rd shift to avoid overnight stay of the loaded trucks
- An extra worker for *tarpaulin dressing***,** probably all logistics representatives can poll in one person who can act as a common resource.

Upto 70% of the suggested steps were accepted and seem useful for the company.

The project was also presented in a "DIMAC" project to the Factory HODs, by our supervisors for further approval and implementation.

Assumptions/Limitations

Understanding the sequence of the process at times was not easy as different people had different versions of their own for the same activity. However, repeated discussions with the concerned people including our organization guides was helpful in the matter, clarifying our doubts just at the right time.

Conclusion

Nestle India Pvt Ltd. has been fortifying its place as a leader in nutrition, health and wellness for more than five decades in India. SCM has played a vital role in meeting the target volumes for market expansion. The whole exercise of the project to reduce the turnaround time for finished goods was crucial from this angle. With the increasing number of volume of trucks each year, it was almost imperative to improve the efficiency of the process so that more number of trucks could be pushed to various DCs in the southern region for Maggi and throughout India for Coffee. Simple elimination of steps by virtue of segregation of responsibilities between logistics representatives and transporter agents was quite fruitful in improving the situation during the pilot run. It could reduce the average turnaround time to nearly 3 hours if these steps are implemented before the start of the peak season.

There are many challenges in day to day work of the SCM department that needs to be addressed and it involves all the people starting from the top management to the workers at the loading bay, for a better coordination and timely information dissipation can always help improve the productivity and service commitments.

Once the recommendations are religiously implemented and strictly enforced on a full time basis, the company will definitely help improve the business process and smoothen the likely fluctuations.

References

Asaka, T. (1990). *Handbook of quality tools, the Japanese approach*. Cambridge, Mass.: Productivity Press.

Bolstorff, P. (2007). Supply Chain Excellence. AMACOM.

Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2002). *Supply chain logistics management*. Boston, Mass.: McGraw-Hill.

Chopra, S & Meindl, P. (2003). *Supply Chain Management: Strategy, Planning and Operation,* (2nd Edition). USA, Prentice Hall.

Christopher, M. (2011). Logistics & supply chain management (4th ed.). Harlow, England: Financial Times Prentice Hall.

Mentzer, J. T. (2004). *Supply chain management*. Response Books, New Delhi.

Shewhart, W. A. (1980). *Economic Control of Quality of Manufactured Product* , USA, American Society for Quality Control.