

Optimization of Supply Chain System by Implementing Milk Run Logistics Method - An Implementation Paper

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ABSTRACT: Over the past seventy years, supermarkets and grocery stores have evolved into some of the most convenient and diverse businesses in the world. This evolution would not have been possible without effective supply chain management. This management must be present at all levels of the supply chain and in all aspects of business in order for it to be truly effective and foster growth and success within the industry. This paper is presented to provide the brief detail about the optimization of the supply chain system of the Ondoor Concept, Bhopal which has grocery retail business by presenting current value stream mapping and improving the supply chain by implementing milk run logistics method after that showing the results of improvement by modified value stream mapping for their system. The study results indicate that the supply chain of Ondoor Bhopal works at efficient level bringing benefits for both its customers and the retail chain itself. Improving the procurement method by implementing milk run logistics method some outcomes has seen which are, decreasing in the total distance, total cost and also time. In last, a result has shown by final value stream mapping.

KEYWORDS: Milk Run Logistic Method, Supply Chain, Value Stream Mapping

I. INTRODUCTION

The main purpose of each and every supply chain is to maximize the profitability or overall generated value. The profit a supply chain generates could be presented as a simple mathematical operation: the difference between the prices that customer pays for the product and all the efforts (labor force, time, and money) required for its production. The total profit accumulated across all supply chain stages is called supply chain profitability. For the more successful the supply chain the supply chain profitability should be higher. The success of supply chain is measured in terms of profitability of the whole integrated logistics activities consist in the supply chain, but on no account in terms of profits at an individual stage.

Milk-Run logistics is a generic name of a logistics procurement method that uses routing to consolidate goods by the buyer. It is a method of goods collection in which the user (i.e. car assembly manufacturer) dispatches one truck at a specified time period to visit various suppliers (i.e. parts supplier) following a predefined route to collect parts or products, and deliver them to the factory (Source WCE).

Jones and Womack (2002) introduce a perfect definition of Value stream mapping; "Value Stream Mapping is the simple process of directly observing the flows of materials and information, summarizing them visually, and then visualize the future state with much better performance." Value stream mapping is a means for showing the value stream with numbers and symbols and it helps to understand the entirety of the transformation in a company.

Purpose of Study

The purpose of this thesis is to improve the supply chain system of Ondoor concept by implementing milk run method and presenting value stream map of the company. The thesis proposed in order to improve-

- ✓ The routes travel by the vehicles for the procurement of the products from different suppliers.

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- ✓ The cost of procurement of goods and products.
- ✓ The total cycle time for processing.

In this thesis proposed different routes and found out more efficient route for improving the supply chain system.

II. LITERATURE REVIEW

Marcella Anjani (2016) [1] aim was to redesign the supply chain system in an automotive industry in order to obtain space reduction in the inventory by using tailored logistics network. The redesigning process by tailored supply chain will combine all possible shipment methods including direct shipment, milk-run, milk-run via distribution center and Kanban delivery. The current supply chain system in Nissan goes rather well when the production volume is in moderate level. However, when the production volume is high, there is a capacity problem in the warehouse to accommodate all delivered parts from suppliers. Hence, the optimization of supply chain system is needed in order to obtain efficient logistics process and effective inventory consumption. The study will use primary data for both qualitative and quantitative approach as the research methods. Qualitative data will be collected by conducting interviews with people related to procurement and inventory control. Quantitative data consists of list of suppliers with their condition in several parameters which will be evaluated and analyzed by using scoring method to assign the most suitable transportation network to each supplier for improvement of inventory reduction in a cost efficient manner.

Sanne Schilder (2014)[2] studied about the Supply Chain Resilience, increased length and complexity of supply chains; companies nowadays are becoming more vulnerable to supply chain disruptions. Building supply chain resilience helps to reduce the impact of a disruption and provides the ability to recover quickly from a disruption when it does occur. Previous research indicates that there might be an effect between the strength of a buyer supplier relationship and the resilience of the supply chain. However, it is not clear how relationship strength may help in building resilience. By means of multiple case study research, this is explored in order to generate more in-depth insights. Concluding, stronger relationships lead to more collaboration related to disruptions. This helps to improve visibility, velocity and flexibility and in that way leads to more resilience in the supply chain.

Björn Ingo Seitz (2013)[3] find out, if Kverneland should stay with its current setting of sourcing spare parts or if the group should implement the proposed purchasing strategy The top management of the Kverneland Group, a Norwegian MNC which develops, produces and distributes agricultural machinery, wants to improve the performance of its spare parts supply chain and considers making some adjustments of its current purchasing strategy. In the present setting, all spare parts which are needed at the central warehouse are ordered from the Kverneland factories which developed the machines to which the respective parts belong. However, since most of the spare parts are not manufactured in-house by Kverneland factories but produced externally, the factories usually have to order the required parts from external suppliers on behalf of the warehouse. According to the proposed future purchasing strategy, the warehouse would order the parts directly from the external suppliers and they would also be delivered directly to the warehouse. Against this background, this thesis analyzes possible consequences of a change from the current to the future setting for the Kverneland Group, the Business Area after Sales and the Kverneland factories. The proposed purchasing strategy would especially affect the administrative ordering and physical order handling activities which are currently executed by the factories on behalf of the warehouse. Furthermore, the future setting would affect the total lead times of spare parts which have a high influence on the stock levels and the capital tied up in inventory at the central warehouse. The main purpose of this study is to find out if Kverneland should stay with its current setting of sourcing spare parts or if the group should implement the proposed purchasing strategy. At the end of this thesis, main conclusions and recommendations are drawn which can be used as guidelines for the implementation of the proposed purchasing strategy. Furthermore, this study discusses which compensation fees the warehouse should pay towards the factories if the future setting would be realized.

Ramaa.A,K.N.Subramanya,T.M.Rangaswamy, (2012)[4] carried out to evaluate performance levels and enhance productivity of the manual warehouses. In a supply chain, warehousing function is very critical as it acts as a node in

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linking the material flows between the supplier and customer. In today's competitive market environment companies are continuously forced to improve their warehousing operations. Many companies have also customized their value proposition to increase their customer service levels, which has led to changes in the role of warehouses. This paper highlights the findings of the study carried out to evaluate performance levels and enhance productivity of the manual warehouses Background: In extended periods at the end of 2011 Lærdal experienced increasing stock-out situations at the inventory facility in the Netherlands, for subsequent periods they struggled to maintain the inventory at a desirable level. The unexpected increase in demand was due to health workers in Switzerland changed the training procedures to apply the CPR doll 'Little Junior' in favour of the previous used CPR doll. The focus of this thesis is to investigate whether a change in Lærdal's inventory policies and improved information sharing will have a positive effect on decreasing these stock-outs periods in the future, while the costs are kept at a minimum level in order to try to improve Lærdal performance. The results: Quantitative results are obtained based on five Excel models where each is created to show Lærdal with different settings and strategies. An attempt was made to change Lærdal's current inventory policies in such a way as to improve control of the inventory, in addition to investigating the information shared between Lærdal and customers/suppliers. Both of these areas have been in focus to be able to reduce potential uncertainty in the supply chain and future stock-outs for Lærdal. It was shown that Lærdal could save a total of 7.8 % in total cost and improve the fill rate by 5% if they altered the inventory policies used today. On the other hand it showed that information sharing between Lærdal and the customer would not improve the service level, however holding cost and variability decreased. Main conclusions and recommendations: Based on the results of the created models, the main conclusion in this thesis is to recommend Lærdal to change the inventory policies currently used to potentially reduce the costs and improve the customer service level and create better relationships in the supply chain where information is shared, in order to reduce the existing variability.

Maren Aareskjold (2012)[5] Studied of the Effects of Supply Chain Performance through Inventory Policy Improvements and Information Sharing and investigated some important problems in the supply chain management (SCM) for the process industry to fill the gap in the literature work, covering production planning and scheduling, production, distribution planning under uncertainty, multiobjective supply chain optimisation and water resources management in the water supply chain planning. To solve these problems, models and solution approaches are developed using mathematical programming, especially mixed-integer linear programming (MILP), techniques. First, the medium-term planning of continuous multiproduct plants with sequencedependent changeovers is addressed. An MILP model is developed using Travelling Salesman Problem (TSP) classic formulation. A rolling horizon approach is also proposed for large instances. Compared with several literature models, the proposed models and approaches show significant computational advantage. Then, the short-term scheduling of batch multiproduct plants is considered. TSPbased formulation is adapted to model the sequence-dependent changeovers between product groups. An edible-oil deodoriser case study is investigated.

III. METHODOLOGY

Milk-Run logistics is a generic name of a logistics procurement method that uses routing to consolidate goods by the buyer. It is a method of goods and product collection in which the user dispatches one truck at a specified time period to visit various suppliers following a predefined route to collect products and parts, and deliver them to the destination. In milk-run shipment using warehouse, goods from several suppliers are collected in warehouse before then picked up to the Stores with the help of distributors. Milk-run with warehouse is good to be applied if the lot sizes of the goods are small and the location of buyers or suppliers to the manufacturing plant is in long distance.

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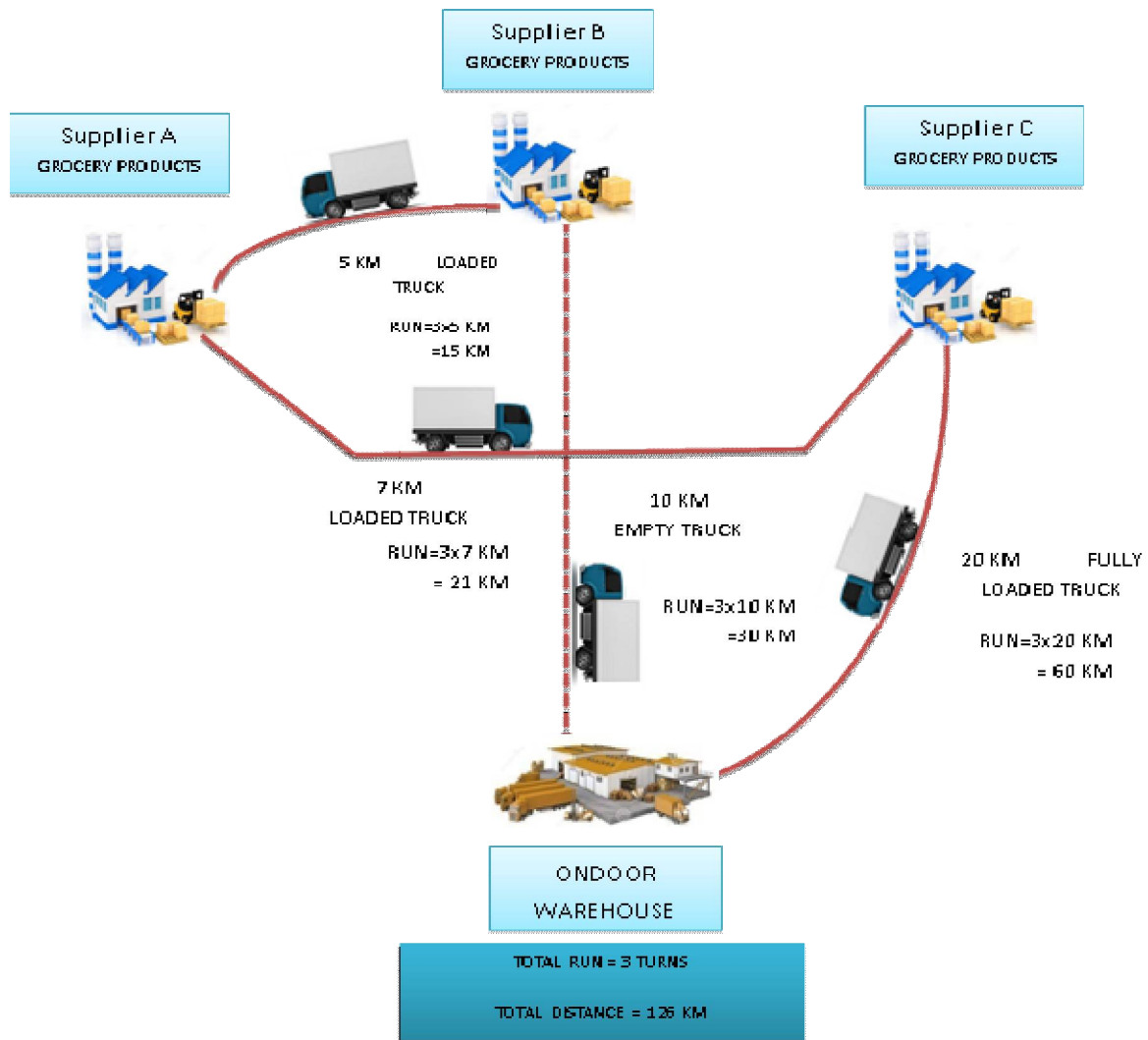
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Suggested Route I, II, and III travelled by truck

S. No.	Suggested Routes	Total Distance Travelled per turn (km)	Total Distance Travelled per turn (km)	Total Cost (60 rupees/km) (rupees)	Total Cycle Time per route (hours)
1.	W-C-B-A-W	70	210	12600	5.25
2.	W-B-A-C-W	42	126	7560	3.15
3.	W-B-C-A-W	62	186	11160	4.65



Method of Procurement for Route II

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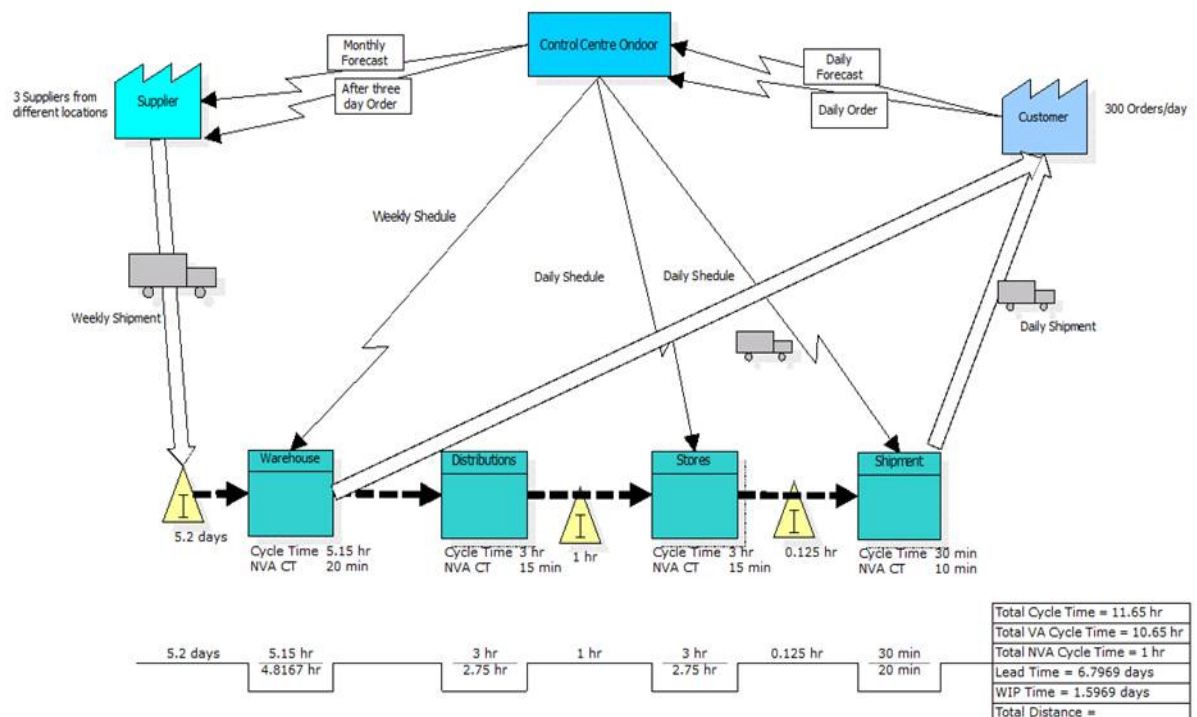
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IV. RESULT

After modification in the current value stream mapping by implementing Milk run Method the value streaming mapping obtained in which reduce the total lead time and cycle time, it is obtained that the total time is decreased from the warehouse up to the shipment of the product due to decrease in the time from the supplier to the warehouse. After implementation of the milk run method the number of runs decreases from the value of 8 to 3, decrease in the total distance travelled by the trucks per week and also decreases in the cycle time taken from the supplier to the warehouse as well as decreases in the total cost of the procurement of the products.

S. No.	Routes	Total Distance Travelled per turn (km)	Total Cost (60 rupees/km) (rupees)	Total Cycle Time per route (hours)
1.	W-A-W, W-B-W, W-C-W	220	13200	5.5
2.	(Route I) W-C-B-A-W	210	12600	5.25
3.	(Route II) W-B-A-C-W	126	7560	3.15
4.	(Route III) W-B-C-A-W	186	11160	4.56

Indoor Procurement



Modified Value Stream Mapping for Route II

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V. CONCLUSION

This paper presented the implementation of the milk run methods and proposed various route for the procurement of the products from the different suppliers.

After the implementation of milk run methods we have achieved:

- ✓ Cost efficient route for the procurement of the material.
- ✓ Decreases in the number of turns
- ✓ Decreases in the inventory at the warehouse
- ✓ Decreases in the total lead time
- ✓ Decrease in the WIP time.
- ✓ Improvement in the warehouse management and fast delivery of goods and products
- ✓ Decreases distance traveled by the trucks and also decrease in the number of trucks Rapid Time to Value
- ✓ Cost effective. By this way they have improved their supply chain process.

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