Galgotias University

Conceptual Project

Topic

Cost optimization in logistics

BBA Logistics and supply chain management 6th Sem

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Signature

Certificate

This is to certify that Nandita Majumdar (18SLAM1010008), final year student of BBA Logistics and supply chain management of Galgotias University has made her conceptual project on the topic "Cost optimization in logistics " under the guidance of Prof. Ashok Kumar Sharma (H.O.D Logistics and supply chain management) in October 2020.

Signature

Declaration

I hereby declare that the work done on the conceptual project made on the topic of "Cost optimization in logistics "is solely done by me. No part of it is taken from any other source and is my original work.

Nandita Majumdar

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Abstract

This Project report is how can we optimize cost in logistics . It has been made with the view to know more about the factors on which someone has to keep a note before taking the decision in the logistics . In this report all the importance is also covered to get a wide knowledge about the topic.

Introduction

The environment in which managers operate today is radically different from predecessors .

It is common in today's environment for a company to design a product in one country , source in other , manufacture and assemble in yet another , and finally sell globally .

The importance of logistics as a critical link in today's business environment has increased the Just – In -Time business philosophy . The JIT impact on logistics has been discussed by many authors , who have been pointed to the essential role of logistics as the provider of consistent , low lead time , damage free deliveries . Shipments are being made within narrow time limits to effect cost advantages in manufacturing and inventory , while transportation providers and vendors are called upon to meet exacting time demands requiring efficient logistics information systems .

Define Logistics

Logistics is generally the detailed organization and implementation of a complex operation. In a general business sense, logistics is the management of the flow of things between the point of origin and the point of consumption to meet the requirements of customers or corporations. Logistics is used more broadly to refer to the process of coordinating and moving resources – people, materials, inventory, and equipment – from one location to storage at the desired destination. The term logistics originated in the military, referring to the movement of equipment and supplies to troops in the field.

Components

The management of logistics can involve some or all of the following business functions, including:

- Inbound transportation

    Inbound logistics refers to the transport, storage and delivery of goods coming into a business.

- Outbound transportation

  Outbound logistics refers to the same for goods going out of a business.

- Fleet management

  Fleet management is the management of: Commercial motor vehicles such as cars, vans, trucks, specialist vehicles, forklifts, and trailers Private vehicles used for work purposes Aviation machinery such as aircraft Ships Rail cars.

- Warehousing

  Warehousing is the act of storing goods that will be sold or distributed later. While a small, home-based business might be warehousing products in a spare room, basement, or garage, larger businesses typically own or rent space in a building that is specifically designed for storage.

- Materials handling

  Material handling is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal.

- Order fulfilment

  Order fulfilment is in the most general sense the complete process from point of sales inquiry to delivery of a product to the customer.

- Inventory management

  Inventory management refers to the process of ordering, storing and using a company's inventory. This includes the management of raw materials, components and finished products, as well as warehousing and processing such items

- Demand planning

Demand planning is the process of forecasting the demand for a product or service so it can be produced and delivered more efficiently and to the satisfaction of customers.

Importance

Although many small businesses focus on the design and production of their products and services to best meet customer needs, if those products cannot reach customers, the business will fail. That's the major role that logistics plays. But logistics also impacts other aspects of the

business, too. The more efficiently raw materials can be purchased, transported, and stored until used, the more profitable the business can be. Coordinating resources to allow for timely delivery and use of materials can make or break a company. And on the customer side, if products cannot be produced and shipped in a timely manner, customer satisfaction can decline, also negatively impacting a company's profitability and long-term viability.

Define supply chain

A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer. This network includes different activities, people, entities, information, and resources. The supply chain also represents the steps it takes to get the product or service from its original state to the customer. Companies develop supply chains so they can reduce their costs and remain competitive in the business landscape.

Understanding Supply Chains

A supply chain involves a series of steps involved to get a product or service to the customer. The steps include moving and transforming raw materials into finished products, transporting those products, and distributing them to the end-user. The entities involved in the supply chain include producers, vendors, warehouses, transportation companies, distribution centres, and retailers.

The elements of a supply chain include all the functions that start with receiving an order to meeting the customer's request. These functions include product development, marketing, operations, distribution networks, finance, and customer service.

Supply chain management is a very important part of the business process. There are many different links in this chain that require skill and expertise. When supply chain management is effective, it can lower a company's overall costs and boost profitability. If one link breaks down, it can affect the rest of the chain and can be costly.

Importance of supply chain

1. Better collaboration

Information flow is a prominent challenge for companies. According to Oracle, 76% of companies lack an automated flow of information across the supply chain, and half of companies say fragmented information results in lost sales opportunities. Integrated software solutions remove bottlenecks and allow for the seamless sharing of information, providing a big-picture view of the supply chain from end to end

2. Improved quality

 Quality control issues follow the rule of 10, explains Arshad Hafeez, Global Expert for Supply Chain Management and Quality Control, SCM-Group Function (GF) in an article for CIO Review. According to the rule of 10, the cost to replace or repair an item increases by tenfold at each step of the progression, resulting in significant costs for companies when quality issues arise.

3. On time delivery

There is a efficient and effective delivery of the goods.

4. Higher efficiency rate

Having real-time data on the availability of raw materials and manufacturing delays allows companies to implement backup plans, such as sourcing materials from a backup supplier, preventing further delays. Without real-time data, companies often don't have time to initiate plan B, resulting in issues such as out-of-stock inventory or late shipments to end consumers.

5. Keeping up with demand

If consumer sales increase by 5 percent in a given week, a retailer could end up ordering 7 percent more product in response to the increase and a feeling that demand will continue," according to a report by VISA. "The next link in the chain, observing what appears to be a 7 percent increase in demand, then orders a larger increase on his supplier. Eventually the factory may observe an inflated 20 percent increase in orders."

6. Shipping optimization

According to Logistics Management's The State of Logistics Report, freight transportation costs increased by 7% from 2016 to 2017, while private and dedicated trucking costs increased by 9.5%. Less-than-truckload costs rose by 6.6%, and full truckload costs rose by 6.4%. Due to rising costs, shipping optimization is a priority for supply chain leaders. Identifying the most efficient shipping methods for small parcels, large bulk orders and other shipping scenarios helps companies get orders to customers faster while minimizing costs.

7. Reduced overhead cost

   With more accurate demand predictions, companies can reduce the overhead costs associated with storing slow-moving inventory by stocking less low-velocity inventory to make room for higher-velocity, revenue-producing inventory. Warehouse fulfilment costs contribute significantly to overhead. Reduce these costs by optimizing your warehouse layout, adopting the right automation solutions to improve productivity and implementing a better inventory management system.

8. Improved risk mitigation

   Analysing big-picture and granular supply chain data can reveal potential risks, enabling companies to put backup plans in place to readily respond to unexpected circumstances. By taking proactive action, rather than reacting to supply chain disruptions, quality control issues or other concerns as they arise, companies can avoid negative impacts. Understanding risks also helps companies achieve leaner operations.

9. Improved cash flow

   The benefits discussed above allow companies to make smarter decisions, choose the right partners, accurately predict and respond to market and demand changes and reduce supply chain disruptions, but that's not all: they also improve the company's bottom line. For example, working with reliable suppliers not only means fewer disruptions and more satisfied customers, but it also improves cash flow by allowing you to invoice (and get paid for products and services) sooner. Implementing more cost-effective solutions to eliminate wasteful spend and reducing overhead costs also contribute to positive cash flow.

Methodology for cost optimization in logistics

1 – The composition of quality cost of logistics service

the quality cost composition of logistics service are as follows: cost prevention-the cost invested by logistics service providers in order to prevent poor quality of service. Identification cost— the cost invested by logistics service providers to control the whole logistics service to meet the satisfaction level of customers. Internal cost of loss—the cost invested by logistics service provider to correct the service that does not conform to the standard before the customer enjoys the logistics service. External cost of loss—the cost invested by logistics service providers to correct the service that does not meet the level of customer satisfaction after the customer enjoys logistics service. The cost also includes recessive costs, such as the decline of market share and the reputation caused by the loss of customers.

2 - Quality Cost Identification of Logistics Service

: the quality cost identification of logistics service is based on the problem of logistics service supply chain construction. Therefore, taking the integrated logistics service provider as the starting point, the identification step is to analyze the composition of the quality cost under the system of logistics service supply chain. According to the constitution of quality cost, the logistics service supply chain system is taken as the research object, and the cost in the actual operation of enterprises is identified according to the principles of applicability, practicability and goal oriented principle . It mainly includes two parts: first, determine whether a particular cost is a quality cost. Second, judge the category of quality cost according to the cost project of the quality cost concept. For a particular cost, it is determined whether the activity triggering the cost is to avoid the service that has not reached the level of customer satisfaction . If it is, it belongs to the prevention cost of logistics service quality. If it is not, continuously determining whether the service has reached the level of customer satisfaction. If it is, it belongs to the appraisal cost of logistics service quality. If it is not, determining whether this activity is caused by the service that does not meet customer satisfaction level. If it is, and the quality problem occurs before the service transaction, then it belongs to the internal loss cost of the logistics service. If it happens after the service transaction, it belongs to the external loss cost of the logistics service. If it is not, it is non-quality cost.

3 - Selection Model of Functional Logistics Service Provider Based on Quality Cost

the following assumptions are made to facilitate the model construction: the cost of prevention, that is, logistics service costs, is made up of fixed costs, warehousing costs, transportation costs and value-added services. The unit prices of warehousing costs, transportation costs and value-added services are fixed values. The transportation cost of the logistics business is only related to the distance and the volume of transportation. The cost of the storage and the value-added services is only related to the amount of treatment . As the integrated logistics service providers of core business, when selecting functional logistics providers to build logistics service supply chain, they usually choose optimal cost as the basis to achieve higher return on investment.

4 - Cloud Adaptive Genetic Algorithm

The main feature is to operate directly on the structure object, and there is no limitation of the derivation. It has better global optimization ability. Using the probabilistic optimization method, the optimized search space can be automatically obtained and guided. It adaptively adjusts the search direction and does not require certain rules. Therefore, the genetic algorithm has inherent hidden parallelism and global spatial search ability, and has good robustness. Now, it has been widely used in various fields .

The calculation process of genetic algorithm is more intuitive. The calculation is simple and it is easy to program and understand, while the calculation and programming of the traditional algorithm are more complex. Although genetic algorithm provides a common way to solve problems. Compared with traditional algorithm, it has greatly improved. There are still some shortcomings in genetic algorithm. The main manifestations are as follows: precocious convergence problem: the genetic algorithm simply uses the fitness to determine the advantages and disadvantages of the solution. Therefore, when the fitness of an individual is large, the individual's gene will spread rapidly in the early stage of the operation. It causes the population to lose the diversity too early, and the adaptability of the solution stops improving and falls into the local optimal solution. The problem of local search ability of genetic algorithm: genetic algorithms have excellent performance in global search, but their local search ability is insufficient .

2.5 Selection of Quality Cost Model

The quality cost model based on exponential function is used to analyze the quality cost in detail. As shown in the following formula, based on the quality cost mathematical model, a negative exponential function is used to represent the cost of internal and external mass loss, and an exponential function is used to represent the cost of prevention and identification:

$$L(Q) - a_1 e^{-b_1 Q} \qquad (1)$$

$$A(Q) - a_2 e^{b_2 Q} \qquad (2)$$

Therefore, the mathematical model of the quality cost is:

$$C(Q) = a1e\text{^}-b1Q + a2e\text{^}b2Q \qquad (3)$$

In the formula, a1 is the cost of the quality loss when the rate of waste product tends to 0. b1 is the increase rate of the additional cost, that is the slope parameter of the exponential function in the graph. a2 is the maximum cost when the rate of qualification tends to 100%. b2 is the growth rate of prevention–identification cost, that is, the slope parameter of the exponential function in the graph. Q is the qualified rate of the actual product. This model is used to calculate the prevention–identification cost and the cost of internal and external quality loss alone. L(Q) and A(Q) is the function of Q, indicating the direct effect of Q on L(Q) and A(Q). The change of quality level can be quickly reflected in the cost of prevention–identification cost and quality loss cost, and it is convenient for the enterprises to carry out quality control and cost control in time.

2.6 Construction of Quality Cost Model Based on Regression Analysis

Regression analysis is a statistical analysis method that the variation trend of the independent variable X and the dependent variable Y is fitted by the mathematical model based on the correlation analysis. Before the regression analysis, the correlation relationship between variables is the premise. The Y corresponding to different X is represented by a scatter plot. The effect of X on Y can be understood and intuitively. Then, the regression equation suitable for the variation of the independent variable x and the variation of the dependent variable y is fitted to determine the quantitative mathematical relation. Finally, the regression equation of the fitting is tested. By fitting a straight line, the connection between Y and X is expressed, and the expression is called the simple regression of Y–X.

The linear equation is:

$$Y\text{^} = a + bx \qquad (4)$$

In the formula, Y^ represents the estimated value of the dependent variable Y. X represents the original independent variable a and b are the undetermined parameter of the regression model.

Based on the regression analysis, the logarithm can be obtained on both sides of the formula (5)

$$\text{Ln } A(Q) = \text{In } a1e\text{^}b1Q = \text{In } a1 + b1Q \qquad (5)$$

Setting ln A(Q) = A0 (Q), ln a1 = a1 0 , then:

$$A'(Q) = a'1 = b1Q \qquad (6)$$

It can be seen that there is a linear relationship between $\ln A(Q)$ and Q. By using the principle of least square method, the coefficient a1 0 and b1 0 can be obtained and the cost coefficient a1 and b1 can be obtained. The cost model of prevention–identification has been determined.

In addition, the parameters a2 and b2 can be determined by using the above algorithm for the quality loss cost. At this point, the quality loss cost model has also been established. The total quality cost model is established. The correlation coefficient is calculated and the conformance of the equation is confirmed by the significance test.

Conclusion

We can conclude from the discussion that the overall Logistics and supply chain cost

is dependent on the factors, that are:

1. Production
2. Product
3. Market
4. Trade
5. Storage
6. Transportation
7. Politics
8. Organization

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Thank you