

SUSTAINABLE MODE OF TRANSPORTATION FRIENDLY TO THE ENVIRONMENT

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Abstract

One of the biggest problems with the study is that it only looked at a small number of case companies. Also, the study only includes people who work in the automotive industry. In the future, the study's scope can be widened to include more sectors, which will make the model more complete. The biggest problem with the proposed comprehensive search method is that it can only be used to solve problems that aren't too big. This is because it takes a long time to compute. Possible metaheuristics can be used to solve this problem with many goals. In the future, studies can look at how to deal with CAP while taking into account how unpredictable consumer demand is. The model proposed to address the issue assumes that carriers' combinatorial bidding capabilities are present in the market. Auctions like this are only done in the most developed economies and by a very small number of businesses in developing economies. Because of this, it is very hard for us to find out how far the implementation went. The study shows how important it is to cut down on empty haul transportation to protect the environment. It's possible, but only if trucking companies are allowed to use their vehicles in different ways.

Keywords:

1. Introduction

In this study, we look at truckload transportation services from the shipper's point of view to see how different environmental sustainability and non-price factors affect how they are bought. Case studies have been done in the automobile and logistics industries. For the data to be put together, there have been many chats and in-depth interviews. In this study, we use the Analytical Hierarchy Process, which is a common way to make decisions based on a

number of factors at the same time. Based on the results of the case study, the companies that were looked at in the research have employees who care about protecting the environment. In order for businesses to meet carbon emission standards, they will need to optimise their routes and reduce their carbon footprint. Because of this, companies should support efforts by their carriers to reduce carbon dioxide emissions. People think that getting goods to customers on time is the most important thing to do to meet demand further down the supply chain and make customers happy, even though environmental concerns are often given more weight than non-price factors. This is because getting products to customers quickly is seen as the most important part of meeting their needs. So, the carrier's past delivery performance must be taken into account when deciding how to divide up the lanes. The AHP method's results are also put through sensitivity analysis to figure out how reliable they are. The results of the sensitivity analysis show that cargo insurance plays a much bigger role in deciding who wins the truckload procurement auction when the weights of two primary parameters, environmental sustainability and non-price, are switched for the service provider. This happens when the relative importance of two different things is switched. Importantly, the study suggests that managers learn how the factors that go into route optimization affect the carbon footprint and the total cost of arranging transportation services. The study ends with this very important idea. Also, loosening some of the rules in their contract can make it more likely that they will get the different benefits. They will be able to take advantage of things better now. When transportation services are bought through an auction, one of the most important things to do is to assign lanes to different carriers. This is sometimes called the "Carrier Assignment Problem." The goal is to cut transportation costs as much as possible, so it is very important to figure out how those lanes will be shared among the participating carriers. We look at the NP-hard carrier assignment problem in the context of buying transportation services for a full truckload. Responses to requests for bids put out by businesses in emerging markets are a good way to get information about the real world. The way the company actually does things is that carriers can only bid on individual lanes, not on multiple lanes at once. But combinatorial bids are still a part of this study because they could be useful and are generally accepted by all types of businesses. Carriers can put in their bids as many different bundles as they want, and these bundles don't have to be the same. The real-world data was used to build the single-objective CAP model, which can be solved using the complete search method and the heuristic approach. This research looks at how transportation services are bought from the point of view of sustainability. A numerical

example shows how much CO₂ emissions can be cut by using combinatorial bidding in conjunction with the proposed model for the CAP. Implementing unrestricted combinatorial bidding is a big step toward making the environment last for a long time. In the scenario that was looked at, which was not very important, CO₂ emissions were cut by 32,4 tonnes. Also, one big thing I learned from studying how real-world businesses get transportation services was that some shippers include in the contracts they sign the requirement that the carrier give them vehicles that are only used to move their freight. You can't say enough about how important this insight is. Shippers who want to reduce the number of empty haul moves should let carriers carry the goods of other shippers on their way back. Because of this, the carriers will be better able to make the most of this chance. Carriers can work together to cut down on the number of empty hauls by sharing routes. There will be a lot of benefits, such as better fuel efficiency, less carbon dioxide pollution, and lower costs overall. The shipper and the carrier can share the savings, which is good for both of them. It works out well for everyone involved. Instead, carriers can use combinatorial bidding to take advantage of economies of scope, which means less empty movement within a network. Empty movement should be kept to a minimum as much as possible because it saves money and reduces carbon emissions. In today's market, companies need to act quickly to put in place plans that will lead to long-term, financially rewarding growth. This shows how important it is for carriers to be able to make combinatorial bids and change how they use their trucks to meet changing demand patterns. The proposed heuristic method works well even for very large cases, which shows that it can be used on a large scale. Even though exhaustive enumeration can produce good results even as the size of the problem grows, it takes more and more time to do so as the problem gets bigger. So, it is currently not possible to solve very large cases. Even though the heuristic approach can handle big problems, the quality of the solution it gives is much lower than what you would get with the exhaustive enumeration approach. Based on the results of the case study technique, a multi-objective CAP model is built and solved using the same heuristic as a single-objective CAP model. This model took into account the most important things. Here are some examples of how this study adds to what we already know: I. The study of a real-world truckload service procurement issue to learn from practise. II. The development of a transportation service procurement framework that takes into account environmental and non-price factors. III. The disclosure of how different factors affect the winner of a truckload procurement auction. IV. The creation of the Complete search algorithm. (v) putting in place a comprehensive plan for getting and providing truckload

transportation services plus (vi) Perhaps most importantly, the study shows how important it is to think about how the truckload transportation service affects the environment when making a purchase.

2. Related work

First Lessons Learned From The Study As a result of the literature review, this section analyses the main findings and talks more about how they were analysed.

The state of the problem Getting services for truckloads has always been done through an auction. In the BGP part of the process, the carriers put in their bids, and in the CAP part, the shipper chooses the successful BGP bidders for each lane. When it comes to the problems that have been looked into, more studies have focused on CAPs than on BGPs. This is because CAPs are much harder to solve than BGPs. This difference is because CAPs are harder to solve. In the online truckload allocation market as it is now, it is hard to make bids. To help carriers settle BGPs in spot and contract markets, bidding advisors are being made. In this age of combinatorial bidding, it is especially important to be able to solve BGPs. Also, CAP solutions take more work to set up than BGP solutions.

2.1 Bid type

The results show that using combinatorial bidding to get TL transport services has a lot of potential. Combinatorial auctions can be helpful, according to research by Ledyard et al (2002). (2002). Carriers can put in separate bids for each channel in a combinatorial auction. If a bid is accepted, the winning carrier has the sole right to run on all of the lanes in the bid's package. If carriers are only given part of low-value lanes or lose money by serving an incomplete set of won lanes because of costs related to repositioning, they are protected from loss because they are not required to ship an incomplete set.

2.2 Type of Market

Contract markets have been used a lot by academics because they are better than spot markets in many ways. For example, carriers can haul more loads and agreements last longer (shippers and carriers). Every legal relationship starts with an agreement between the two people involved. The most important parts of the work have been making the contracts and keeping them up to date. Spot markets and then online markets are the best places to buy transportation services one time only. Regarding this specific topic, a lot of studies have looked at the different ways that people buy things in spot markets. Also, not many authors

have thought about how agent technologies could be used to learn TL. In future studies, it might be helpful to use more realistic data or different measures of carrier performance, or both.

When the contract is in effect for the next period of allocation.

Collaboration The existing literature talks about how shippers and carriers can work together. When shippers and carriers work together, the main goal is to cut down on empty truck runs. When shippers and carriers work together, the main goal is to make more money. Also, studies from the past have pointed out how important it is to use the right methods to keep the cooperative framework going. Even so, the results of the survey show that very few studies have been done with a focus on collaboration. Real-time information and data about shippers' and carriers' efforts to work together could help strengthen the current findings.

2.3 Demand consideration

Most of the studies above oversimplified the problem by assuming that the unit demand existed for all lanes, which is obviously not the case (i.e., the number of loads in each lane is equal to one). Several studies have tried to figure out how much demand there will be by using different forecasting methods. But in the real world, there is always some uncertainty about the exact amount of cargo that will be moved along each lane. During truckload procurement auctions, the amount of goods to be moved along the majority of lanes is often estimated. Because of this, lanes are often set up before the number of cars is known. Even when volume uncertainty is taken into account, the best way to divide lanes among carriers may not be the best way. For example, a carrier that wins a certain set of lanes may have to deliver less cargo than it was originally given. This cuts into the carrier's potential profits. It's likely that the actual volume will be much higher than the estimated volume, and may even be higher than the number of truckloads that the designated carrier can handle. Shippers might have to pay more for third-party services if they only use their own resources to meet the actual volume need. In every situation, uncertainty can make things worse, and the CAP should take this into account. I think that Ma et al. are the only ones who have talked about demand volatility (2010). So, researchers might look into how lane estimates and random patterns of demand in truckload procurement are related.

3. Methodology

We look at two situations, one with the same amount of weight and the other with the opposite amount of weight, to test how stable the weightage is. This step is very important to make sure that the end result is correct. When the weights of two main criteria, environmental sustainability and non-price, are switched in the case of a logistics service provider, a sensitivity study shows that cargo insurance plays a much bigger role in deciding who wins an auction for a truckload. Based on what we found, we suggest that the CAP use a model with multiple goals that takes into account the things that matter most for the final product. Both heuristic and exhaustive search methods are compared in terms of how good their solutions are and how long they take to run. We also do a sensitivity analysis on the final solution for both methods by putting in lane limits and looking at the changes that happen as a result. In the same way, heuristic solutions to CAP models are compared to find out how important it is to think about things like the environment and service level in addition to cost.

Providers of transport services When there aren't enough resources in-house, Procurement Industries will often hire a third party to handle this logistical task. A two- or three-year contract between the manufacturer and the transportation companies will make this happen. Truckload transportation includes both full truckload and less-than-truckload services. When transporting a full truckload, the same truck is used from pick-up to delivery. When moving less than a truckload, on the other hand, many smaller shipments are combined into one larger one and moved by a single vehicle. Since there are no stops along the supply chain, full truckload deliveries are very common in industry. This is the case because of the special moves that fleets have to make. We know that our packages will get where they need to go on time this way. Less-than-truckload services for transfers can be hard to set up. Full truckload shipping is the most common way for companies in the manufacturing and processing industries to get goods from their facilities to customers. In the first group are companies that make cars, motorcycles, and other vehicles. In the second group are cement, oil, and chemical companies. The following language has been used for this study because of the technical complexity and importance of different ideas involved in buying transportation services.

The goal of the study is to rank how important things like cost and environmental impact are when choosing a truckload transportation provider. Case studies are done in the car business and with logistic service providers to learn more about these things. A case study is a way to do research that follows a predetermined line of thought, uses specific ways to gather data,

and comes up with its own unique way to look at that data. Case study research can be done in a lot of different ways. For the finding to be meaningful, at least four and no more than ten cases should have been looked at. In order to do this, the research here looks at a range of sample sizes, from one to five cases in total. A thorough analysis of the literature was done, and the results were used to make a list of things that, in addition to price and environmental sustainability, play a role in choosing the winning bidder for truck load service. To get the information we need, we use a questionnaire made with the Analytic Hierarchy Process (AHP). It's broken up into two parts. In one part of the survey, people are asked to rate the importance of several factors that were taken into account during the research. In Section B, people are asked about their background and what kind of business they work for. The information is gathered through interviews, and people are asked to rate different statements on a 9-point scale to answer the questions. The people who filled out the survey work for a wide range of auto companies and one logistics company. If the logistics service provider chosen for the study can't meet demand with their own staff, they will, as a matter of course, hire a third party to do the work. In this method, the analysis can be more thorough if the shipper's point of view is looked at from the carrier's perspective.

4. Objectives

The main goal of most of the studies, whether they are about BGP or CAP, is to find ways to cut costs without losing effectiveness. Some non-price goals, like service level, the share of new loads that are accepted, response time, and accurate billing, have gotten less attention than others. To keep cooperative structures going, new ways of making effective lane cycle formations and cost-sharing mechanisms between partners are needed. This means that the existing literature on collaboration needs to be looked at in a more focused way.

5. Analysis

In this section, we look at how people learn TL using a wide range of criteria. This method is also used to look at things other than price and the environment, which are both talked about in logistics literature. Concerning how to frame the question, it's possible that combining non-price criteria with cost-related goals could lead to results that are useful for truckload procurement auctions. Combinatorial bidding was used in earlier tests, which will help the effort to cut down on the number of trips taken by empty vehicles. Everyone in the shipping industry, from shippers to carriers, stands to gain from this change. It has been shown that real-world case studies are almost never done in developing countries. From the point of view

of modelling, CAPs are usually seen as single-objective problems. But as problems get more complicated, you need to think about multi-objective frameworks more and more. Another important finding is that the shipper has not yet thought about how to get transportation services in a way that is sustainable for the environment, even though this is a very important thing to do. Given what has been said, the main goal of this investigation is to find out what factors, besides cost and environmental sustainability, the shipper should think about when negotiating the terms of the contract for the transportation of the freight. It has been suggested that CAP be modelled with real-world data and take combinatorial bids into account. However, this data will need to be collected from one of the expanding economies. Using real-world data, you can decide if you really need a simulation model. Also, CAP is modelled within a multi-objective framework that takes into account the things that the case study research found to have the most effect on environmental sustainability and other things that don't have to do with price. In the end, the right methods can be used to solve both single- and multi-objective CAP models.

6. Case company :

To put it simply, this firm is India's leading exporter of passenger automobiles and the country's second-largest carmaker. It has its headquarters in Chennai, the capital of the southern Indian state of Tamil Nadu. Nearly 120 countries in Europe, Africa, the Middle East, Latin America, Asia-Pacific, and Australia stock its products. Over 1,045 service centres and 397 dealers in India add up to a robust supply network for the business. With operations spanning the globe, the corporation is cognizant of its impact on local communities, national economies, and the environment as it strives to maintain its profitable status. In order to lower their carbon footprint, the firm has implemented measures such as reducing emissions of greenhouse gases (GHG), finding new ways to recycle, and reducing the usage of hazardous materials in their manufacturing process, all of which are highly promising. The logistics and supply chain of the firm rely on the combined efforts of about twenty-one persons. They pick a logistics partner solely on the basis of cost and performance history. The case firms and responses are described in detail in the 1.

As a component of route allocation and truckload contracting from the shipper's perspective, the impact of various environmental and non-price issues is investigated and examined. This research is crucial because modern businesses must address environmental concerns if they are to survive for the long term (Rainey, 2006) and if they are to fulfil their obligations as

socially responsible enterprises. It's crucial to consider factors outside pricing when making a service purchase, as previous studies have demonstrated. This case study's data was gathered through in-depth interviews with professionals in the automotive and logistics sectors. The Analytical Hierarchy Process (AHP) is used in this investigation since it is a typical method for evaluating many criteria simultaneously. Sustainability in the natural environment emerged as a key factor among the firms studied. As a first step, it's safe to assume that the world's largest corporations recognise the value of conducting their operations in a way that doesn't negatively impact the environment because they all have environmental certification. Companies may improve their environmental sustainability by reducing their carbon footprints and optimising their travel patterns.

7. Conclusion

A review of recent publications shows that academics are paying more and more attention to sustainable logistics. Academic research into the many aspects of sustainability has mostly focused on third-party logistics (3PL), reverse logistics, logistic operations, and bespoke logistics. In the area of getting transportation services, nothing like this is done at the moment. The biggest worry for manufacturers who want to be sustainable in all parts of their business is not knowing how criteria related to sustainability will affect the choice of a transportation service provider.

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