Siber Journal of Transportation and Logistics (SJTL)
E-ISSN : 2987-1050
P-ISSN : 2987-1026
Siber Nusantara Research
+62 812 1046 7572 https://research.e-siber.org research.siber.info@gmail.com Jalan Marina Indah Raya No. 1 Pantai Indah Kapuk, Kamal Muara, Penjaringan, Jakarta Utara, Indonesia.
DOI: https://doi.org/10.38035/sjtl.v1i4
Received: March 12nd, 2024, **Revised:** March 19th, 2024, **Publish:** March 26th, 2024

Multimoda Analysis, Information Technology, Communication and Order Consolidation on Logistics Cost Efficiency

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Abstract: The Influence of Multimodal Transport, Information and Communication Technology, and Order Consolidation on Logistics Cost Efficiency is a scientific literature review article within the field of logistics. The aim of this article is to build hypotheses regarding the influence of independent variables on the dependent variable, which will be used in future research. The research objects include online media libraries such as Google Scholar, Semantic Scholar, Elsevier, Zotero, and other online journal platforms. The analysis uses a qualitative descriptive approach. The results of this article are: 1) Multimodal transport influences logistics cost efficiency; 2) Information and communication technology influences logistics cost efficiency; and 3) Order consolidation influences logistics cost efficiency.

Keywords: Logistics Cost Efficiency, Multimodal Transport, Information and Communication Technology, Order Consolidation

INTRODUCTION

Background of the problem

Logistics has become an important part of company operations, especially in managing the movement of goods from producers to consumers. However, logistics cost efficiency is still a problem faced by many companies, especially in Indonesia. High logistics costs can be caused by several factors, such as expensive transportation costs, inefficient warehouse costs, and non-integrated management facility costs. High logistics costs can have a direct impact on economic growth and company performance. Logistics costs are considered to be increasingly expensive, which has an impact on the competitiveness of national exports (Bisnis Indonesia, 2016). The contribution to logistics costs is not only focused on transportation costs, but also includes warehousing, storage and transportation insurance costs. With the demand for innovation and decreasing logistics costs in many logistics nodes, ICT offers more choices. Companies that have effective and efficient logistics costs can increase market share and increase profits. On the other hand, inefficient logistics costs can hamper a company's growth and reduce its competitiveness in the market. In order to increase logistics cost efficiency, companies must be

able to manage logistics processes effectively and efficiently. This can be done by developing an integrated logistics system, using better information technology, and improving adequate logistics infrastructure. Thus, logistics costs can be reduced, and company performance can increase (Eva Septiana Pane, 2016)

The growth of goods transport in recent decades has been extraordinarily high, so steps need to be taken to optimize goods transport. This step, according to Raza (2015), can be done, among other things, through the following things: (1) building integrated networks and service routes for various modes of transportation, including road, sea, air, rail and dry-port, as well as integrated transportation services; (2) building infrastructure networks, both nodes and traffic spaces; (3) building integrated terminals and transfer service facilities for fast and comfortable movement of goods; and (4) building rail access to international ports and airports. The influence of the multimodal system on logistics cost efficiency has been proven through government regulations and research results as follows. Regulation of the Minister of Transportation Number 15 of 2010 concerning the Blueprint for Intermodal/Multimodal Transportation, especially in the attachment, in the form of directions for the development and development of intermodal/multimodal transportation in order to smooth the flow of goods and passenger flow as well as support an effective and efficient national logistics system . (Wibowo & Chairuddin, 2017)

Consolidation and determining the type of shipping transportation is important in an industry, the main goal is to minimize logistics costs. In an effort to reduce logistics costs and make it easier to monitor goods, it is necessary to carry out an effort to consolidate goods delivery. The addition of Distribution Center (DC) facilities as a consolidation center for goods to be sent to retailers can make the distribution process more efficient. The facility and material handling costs incurred in the DC can be compensated for by lower transportation costs. (Fatma & Manurung, 2021)

Based on the background, **the aim of writing** this article is to build a hypothesis for further research, namely to formulate: 1) The Effect of Multimodal on Logistics Cost Efficiency; 2) The Influence of Information and Communication Technology on Logistics Cost Efficiency; and 3) The Effect of Order Consolidation on Logistics Cost Efficiency;

METHOD

The method for preparing literature review articles is by using a literature review method of previous articles that are relevant to the discussion of variables in qualitative analysis based on findings from Google Scholar, Semantic Scholar, Elsevier and other online journal publication media. The design used in this research is a literature review or literature study. Literature review is a search and research of the literature by reading and reviewing various journals, books and various other published manuscripts related to the research topic to produce an article relating to a particular topic or issue.

RESULT AND DISCUSSION

Results

Based on the phenomena, objectives and analytical tools used in analyzing the previous article, the following conclusions can be drawn from the research results:

Logistics Cost Efficiency

1. According to (Palupi & Zahroh, 2016), **efficiency** is the accuracy in carrying out something. Cost efficiency is an important thing that must be done by companies to achieve optimal profits.
2. **Logistics costs** are the total costs that must be incurred in the entire series of logistics processes with indicators, namely 1) cheap, 2) stable, 3) competitive, 4) guaranteed, and

5) flexible (Mulyadi, 2005; Hamzah, 2013; Tnunay, 2013; & Gunawan 2014). (Nugraha et al., 2017)

From several theories it can be concluded that **Logistics Costs** are a factor that greatly influences the competitiveness of companies and countries. For companies, logistics costs will affect the selling price of the final product. Meanwhile for countries, aggregate logistics costs will influence export and import markets. Reducing logistics costs is always a concern for both company managers and regulators. Logistics costs will increase the acquisition price of materials and products. In inbound logistics activities, logistics costs for warehousing activities and material transportation from suppliers to factories. Meanwhile, in outbound logistics activities, logistics costs for warehousing, transportation and distribution activities from factory warehouses to distributors, retailers, to final consumers. These logistics costs include all cost components for goods movement activities in the supply chain process. The more efficient logistics costs in the supply chain process, the more competitive the final product price will be. (Zaroni, 2017)

Multimoda

1. According to (Wibowo & Chairuddin, 2017) **Multimodal** is goods transportation using at least 2 (two) different modes of transportation on the basis of one contract as a multimodal transportation document from one place where the goods are received by the multimodal transportation business entity to a place determined for delivery of the goods to the recipient of the multimodal transportation goods.
2. **Multimodal** according to Government Regulation Number 8 of 2011 concerning Multimodal Transportation is defined as the transportation of goods using at least two different modes of transportation on the basis of one contract as a multimodal transportation document from one place where goods are received by a multimodal transportation business entity to a designated place for delivery. goods to recipients of multimodal transport goods. Movement of these goods can occur between islands, provinces, or between countries with additional procedures such as customs duties, etc.

From several theories above, researchers synthesize that **multimodal** is the process of transporting goods that uses more than one mode of transportation, such as trucks, trains, planes, ships, or a combination of several of these modes, in one single contract. In multimodal, transportation is carried out by one company which is responsible for managing the entire journey, including deliveries using different modes of transportation. For example, a company may use trucks to transport goods from the factory to the warehouse, then use ships to transport the goods to the port, and finally use trains to transport the goods to their final destination. (Sitorus, 2022)

Information and Communication Technology (ICT)

1. According to the Oxford Dictionary (1995) **ICT** is the study or use of electronic equipment, especially computers, to store, analyze and distribute information.
2. According to UNESCO (United Nations Educational, Scientific and Cultural Organization) **ICT** is an inseparable unity, including the use of tools to process and transfer data from one device to another. ICT aims to make human work easier and keep up with the progress of world technological developments

With ICT technology, it is possible to make road transportation systems more efficient through the implementation of intelligent transport systems. ITS technology has the potential to improve the performance of transportation systems, especially those on highways, such as

mobility, safety, smoothness, the environment and other things related to road transportation systems. ITS technology is one of the ICT applications for various transportation system services as a result of integration of conditions. traffic such as: drivers, vehicles and transportation infrastructure. ICT technology can help in optimizing delivery routes by using more effective algorithms, thereby reducing transportation costs and increasing logistics efficiency. (Wahyuni & Rachmawati, 2019)

Order Consolidation

Order Consolidation is a new shipping fulfillment approach based on FIFO. In this approach, some shipments are sent as FIFO, while other shipments have the opportunity to be delayed at the shipping station. Delayed delivery
will be consolidated with upcoming shipments and delivered to customers in less time. Compared to FIFO, order consolidation has the potential to lower shipping costs due to fewer shipments by combining multiple shipments. However, consolidation will incur inventory costs at shipping stations. Therefore, in the order consolidation approach, *a tradeoff must be made* between increasing inventory costs and reducing shipping costs. (Zhang et al., 2019)

From several theories above, researchers synthesize that this kind of **order consolidation** often has the characteristics of a small number of customers with a large number of items in each order, and a long transportation cycle via long-distance vehicles. However, with the rapid development of e-commerce in recent years, some researchers have noticed the potential for large consolidation of increasingly less efficient small packages flowing via small trucks in last-mile delivery, where a large number of small trucks of packages must be delivered to individual customers in a short period of time. Inspired by nonprofit organizations, Hewitt et al. (2015) introduced a consolidation strategy for home food delivery by reducing the delivery of multiple (frozen) meals, which can minimize operational disruption and maintain client satisfaction. Considering tight order deadlines and expedited delivery options in the e-retail environment, Wei et al. (2017) present the optimal consolidation policy and its structure in a setup of up to two warehouses. (Zhang et al., 2019)

Discussion

Based on theoretical studies, this literature review article is discussed is to carry out an in-depth analysis of relevant previous articles **,** analyze the influence between variables and create a thinking structure for the research plan:

Based on the research results, the discussion of this article is to analyze relevant articles**,** analyze the influence between variables and create a thinking structure pattern for the research plan:

The Effect of Multimodal on Logistics Cost Efficiency

The influence of multimodality on logistics cost efficiency can be seen from several aspects. First, multimodal use can reduce logistics operational costs by optimizing resource use. By using various modes of transportation such as land, sea and air, companies can choose the most efficient mode for each type of goods and route, thereby reducing operational costs and increasing logistics efficiency. For example, using sea mode to send heavy and large goods can reduce transportation costs compared to using air mode.

Second, multimodal use can increase logistics cost efficiency by reducing transportation costs. By using more efficient modes for each type of goods, companies can reduce transportation costs and increase logistics efficiency. For example, using land modes for shipping goods that do not require special preservation can reduce storage and preservation costs compared to using sea modes that require special preservation.

Third, multimodal use can increase logistics cost efficiency by reducing storage and preservation costs. By using more efficient modes for each type of item, companies can reduce storage and preservation costs. For example, using sea modes for shipping goods that require special preservation can reduce storage and preservation costs compared to using land modes that do not require special preservation. Therefore, multimodal use can increase logistics cost efficiency by reducing operational, transportation, and storage and preservation costs.

The use of a multimodal system can also increase the efficiency of operational costs for goods transportation.

Analysis of vehicle operating costs per km per year shows that the use of a multimodal system can reduce vehicle operational costs. In addition, the government through statutory regulations has provided clear legality for multimodal operations, so that the implementation of work or performance of parties implementing legality related to multimodal transportation has been implemented by 80%. (Irpan et al., 2016) .

The Influence of Information and Communication Technology on Logistics Cost Efficiency

The influence of information and communication technology (ICT) on logistics cost efficiency is very significant. ICT enables logistics companies to increase operational efficiency by optimizing the use of resources. For example, the use of an automated warehouse management system (WMS) simplifies the process of packing, storing and shipping goods, reducing operational costs and increasing logistics efficiency.

In addition, ICT also helps in reducing transportation costs by optimizing transportation routes and modes. Transportation management systems (TMS) enable companies to monitor and manage delivery routes in real-time, reducing freight costs and increasing logistics efficiency. Thus, ICT helps logistics companies in reducing operational, transportation and storage costs, as well as increasing overall logistics efficiency.

The use of ICT also helps in increasing transparency and speed in logistics processes. For example, the use of digital trucking technology makes it easier for business people to get access to more accurate data and minimize errors during the delivery process. Thus, ICT helps logistics companies increase logistics efficiency, reduce costs, and improve service quality. Therefore, the use of ICT is very important in increasing logistics cost efficiency and improving the quality of logistics services. (Anandhita & Dwiardi, 2018)

The Effect of Order Consolidation on Logistics Cost Efficiency

The effect of order consolidation on logistics cost efficiency is very significant. Order consolidation, namely combining several orders into one, can reduce logistics operational costs by optimizing resource use. By combining orders, companies can reduce transportation costs, storage costs, and preservation costs, and improve overall logistics efficiency.

Order consolidation can also increase logistics cost efficiency by reducing shipping costs. By combining several orders into one, companies can reduce shipping costs because the number of shipments can be reduced. In addition, order consolidation can also help in reducing storage and preservation costs because the number of items stored can be reduced. Therefore, order consolidation can help logistics companies reduce operational, transportation, and storage and preservation costs.

Order consolidation can also increase logistics cost efficiency by increasing transparency and speed in the logistics process. By combining several orders into one, companies can monitor and manage logistics processes more effectively, thereby increasing delivery speed and improving the quality of logistics services. Therefore, order consolidation is very important in increasing logistics cost efficiency and improving the quality of logistics services. (Lin et al., 2016)

Research Conceptual Framework

Based on the findings of the problem formulation, very relevant previous research and research discussion, the conceptual framework of this article is structured as in Figure 1.

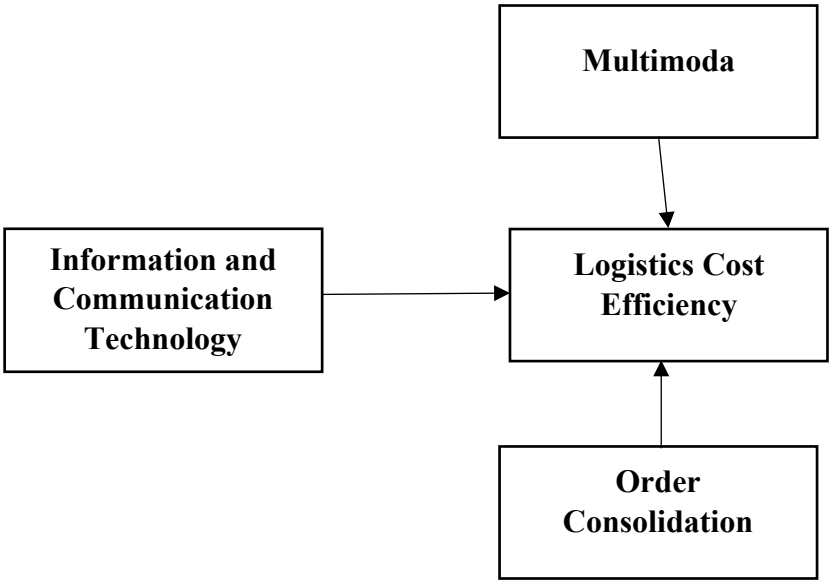

Figure 1: Conceptual Framework

Based on the conceptual framework above, then: Multimodal, Information and Communication Technology, and Order Consolidation affects Logistics Cost Efficiency. Apart from the three independent variables that influence the dependent variable, namely Logistics Cost Efficiency, there are still several other variables that can influence Logistics Cost Efficiency, including the following:

1) X4 : Outsourcing Opportunities
2) X5: Maintaining Customer Satisfaction
3) X6: Single Submission Carrier System

CONCLUSION

Based on the objectives, results and discussion, the conclusion of this article is to formulate a hypothesis for further research, namely:

1. Multimodal has a significant and influential effect on Logistics Cost Efficiency
2. Information and Communication Technology has a significant and influential effect on Logistics Cost Efficiency
3. Order Consolidation has a significant impact on Logistics Cost Efficiency

Multimodal analysis, information and communications technology (ICT), and order consolidation show that this combination can significantly increase logistics cost efficiency. The use of ICT enables more efficient planning, execution and monitoring of logistics, while multimodal transport systems enable the delivery of goods at lower costs. Order consolidation, on the other hand, reduces logistics costs by performing logistics activities in one application. The study found that multimodal transport systems have a strong relationship with logistics cost efficiency, with a correlation coefficient of 0.89. By integrating all of this, logistics costs can be reduced, and logistics performance can be improved. Although multimodal analysis, ICT, and order consolidation have positive implications for logistics cost efficiency, there are still several challenges to be overcome. One of them is the availability of adequate infrastructure.

Indonesia, for example, still faces the problem of inadequate infrastructure, which causes logistics costs to be higher. To realize Indonesia's logistics vision 2025, significant investment in infrastructure and the development of more advanced technology is needed. By integrating multimodal analysis, ICT utilization, and order consolidation, logistics costs can be reduced significantly, which in turn will increase the efficiency and competitiveness of the logistics industry in Indonesia.

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