DEVELOPMENT OF E-LOGISTIC SUCCESS MODEL IN INDONESIA

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Abstract: Logistics companies in the world started to shift from traditional logistics business models to E-Logistics business models that benefited digitalization and Information Communication Technology. For the successful implementation of a system that implemented e-logistics, the success factors for adopting e-logistics needed to be studied in order to achieve efficient and effective e-logistics implementation. The purpose of this research was to build a successful model of E-logistics adoption. This study used a Systematic Literature Review to identify the success factors of e-logistics adoption, conducted interviews with experts for validation, and performed quantitative validation through questionnaires and was analyzed using the Spearman correlation test to see the relationship of each factor to the adoption of E-Logistics. This research succeeded in creating a successful model for E-Logistics adoption in Indonesia. The results of the Spearman correlation test showed that all hypotheses were accepted. This could be seen from the correlation value of each factor, which had a positive value towards E-Logistics adoption. The HBS factor had a value of +0.458, the FAO factor had a value of +0.481, the EIF factor had a value of +0.548, the OTD factor had a value of +0.499, the FDC factor had a value of +0.640, the GVS factor had a value of +0.598, the EPM factor had a value of +0.764, the ETC had a value of +0.601, the ECB factor had a value of +0.651, the WDS factor had a value of +0.844, the TIS factor had a value of +0.771, the TMS factor had a value of +0.590, and the FIS factor had a value of +0.498 on the success of E-Logistics adoption. All of the hypotheses were accepted, and it was hoped that the model in this research could become a standard and reference in the development of E-Logistics theory and the development of E-Logistics systems in Indonesia.

Keywords: e-logistics, information technology, logistics, supply chain, systematic review

Abstrak: Perusahaan logistik di dunia mulai beralih dari model bisnis logistik tradisional menjadi model bisnis E-Logistik yang menguntungkan digitalisasi dan Teknologi Komunikasi Informasi. Untuk keberhasilan implementasi suatu sistem yang mengimplementasikan e-logistik maka faktor sukses adopsi e-logistik perlu dipelajari untuk mencapai implementasi e-logistik yang efisien dan efektif. Tujuan dari penelitian ini adalah untuk membangun sebuah model sukses adopsi E-logistik. Studi ini menggunakan Tinjauan Literatur Sistematis untuk mengidentifikasi faktor-faktor sukses adopsi e-logistik, melakukan wawancara dengan ahli untuk validasi, dan melakukan validasi secara kuantitatif melalui kuesioner dan dianalisis menggunakan uji korelasi spearman untuk melihat hubungan setiap faktor terhadap adopsi E-Logistik. Penelitian ini berhasil membuat model sukses adopsi E-Logistik di Indonesia, Hasil dari uji korelasi spearman menunjukkan bahwa semua hipotesis diterima, hal ini dapat dilihat dari nilai korelasi dari masing-masing faktor memiliki nilai positif terhadap adopsi E-Logistik. Faktor HBS memiliki nilai +0.458, faktor FAO memiliki nilai +0.481, faktor EIF memiliki nilai +0.548, faktor OTD memiliki nilai +0.499, faktor FDC memiliki nilai +0.640, faktor GVS memiliki nilai +0.598, Faktor EPM memiliki nilai +0.764, faktor ETC memiliki nilai +0.601, faktor ECB memiliki nilai +0.651, faktor WDS memiliki nilai +0.844, faktor TIS memiliki nilai +0.771, faktor TMS memiliki nilai +0.590, dan faktor FIS memiliki nilai +0,498 terhadap adopsi E-Logistik. Dengan diterimanya seluruh hipotesis maka model dalam penelitian ini diharapkan dapat menjadi sebuah standar dan acuan dalam pengembangan teori E-Logistik maupun pengembangan sistem E-Logistik yang ada di Indonesia

Kata kunci: *e-logistik, teknologi informasi, logistik, rantai pasok, tinjauan sistematis*

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INTRODUCTION

The development of industry in the last decade has changed into a digitalization era and this has fundamentally changed the dynamics of business competition including in the logistics services industry sector (Cichosz et al. 2020). Information technology has become an enabler for the industry's digitalization process by facilitating information exchange and virtualization of technology in logistics processes (Naumov, 2018). E-Logistics can be defined as using digital systems and their tools as a transaction medium for controlling and maintaining a logistics process (Zunder and Islam, 2011). E-logistics can be very helpful in terms of efficiency and effectiveness for logistics companies in the following areas: supply chain planning systems, transport orders, inventory management systems, warehouse management systems, invoicing systems, cargo route management systems, and tracking systems, fleet management, commerce applications, EDI, and supply chain execution system (Zunder and Islam, 2011).

Current business trends are considered time-sensitive, everybody wants to achieve the right cargo at the right time and at the right place, even though the location of the cargo is far away and consumers demand better quality of logistics services (Archetti and Peirano, 2020). Supply chain digital integration will make electronic traceability possible. Customers will be able to track and trace their cargo in order to identify earlier if there is a problem with their cargo at the time of the delivery process thereby increasing the performance of E-logistics companies (MahbubulHye et al. 2020). There are many actors involved in the logistics business such as cargo owners, customs, freight forwarders, shipping lines, trucking companies, warehouse companies, container depots.

Indonesia is an agricultural country that has advantages in terms of demography and high economic development and has an essential role in building the national economy so that the movement of goods is crucial (Putro et al. 2023). The dense movement of cargo is increasing the demand for speed and accuracy in every delivery of cargo (Archetti and Peirano, 2020) And this can be achieved through the logistics integration (Khan et al. 2022). Integration in logistics makes electronic traceability possible so that cargo owners can monitor their cargo and they can anticipate

earlier if there are problems during delivery resulting in an increase in the performance index of the logistics company (MahbubulHye et al. 2020).

Integration in the logistics business involves many parties such as goods owners, shippers, trucking companies, terminal operators, customs, warehousing, container yards, etc. and each of them plays an important role in the successful movement of goods (Lee and Song, 2018). When compared to other developing countries, Indonesia is still experiencing delays in developments in the logistics sector (Iskandar and Ramantoko, 2017). This can be seen from the Indonesian LPI which has experienced a decrease in score of 0.15 points since 2018 (World Bank, 2023). Based on the World Bank report of Indonesian LPI, the slow development is causing logistics companies to experience problems such as high distribution costs, long transit times due to inefficiencies in planning the delivery of goods, and payment methods at various points that are felt to be less effective and efficient (Imran et al. 2019; World Bank, 2023).

Previous research has successfully made an E-Logistics model for measuring Customer Satisfaction (Waseem-Ul-Hameed et al. 2018; Imran et al. 2019; Luhur Prianto et al. 2020), Identifying Factors affecting logistics with mediating role of IT (MahbubulHye et al. 2020), factors affecting E-Logistics with mediating role of trust (Cruces-Flores et al. 2019). However, all of those models or frameworks are from other countries that have different conditions from Indonesia, and the models or frameworks of E-Logistics that are specifically made for Indonesia have not yet been found and validated.

Based on the potentials and problems, it is important to identify the success factors for E-Logistics adoption and create a successful model for E-Logistics adoption in Indonesia. The research question of this research is "How to develop an E-Logistic success model for Indonesia?" The purpose of this research is to develop an E-Logistic success model in Indonesia based on a Literature Review, Expert Judgement, and Quantitative analysis. The expected result of this research is an E-Logistics Success model that has been validated and hoped that the model in this research can become a standard and reference in the development of E-Logistics theory and the development of E-Logistics systems in Indonesia

METHODS

The scope of the research is in Jakarta and this research started from 1 January 2023 until 30 June 2023. This research consists of three main phases: the factor identification and model creation phase, the expert validation phase, and the model validation with quantitative analysis phase. The research stages can be seen in Figure 1.

The first phase of this research is factor identification and model creation using Systematic Literature Reviews (SLR) with Kitchenham method. The output of this stage is the E-Logistic success factor and the initial model of the E-Logistics success model based on identified factors from the SLR.

The second phase of this research is validating the initial model by expert judgment to see the suitability of the model built from the SLR phase with the actual conditions in Indonesia so the output of the model can be implemented in Indonesia.

The third phase of this research is validating the model from expert judgment using quantitative analysis by spreading a questionnaire it is set on a 5 Likert Scale and the result of the questionnaire is analyzed by SPSS with the Spearman Correlation Rank Test method for validating the model that has been validated by experts' judgment. The output of this stage is the validated E-Logistics Success Model.

Kitchenham Systematic Literature Review

The first stage in this research is a literature review. Kitchenham Systematic Literature Review is implemented as a method for conducting literature reviews. There are three main phases in this research, namely Planning, Implementation, and Reporting which can be seen in Figure 2.

Model Validation (Expert Judgment)

After the model is built, the next step is to validate the model through interviews with experts to see the suitability of the model built with the actual conditions in Indonesia. Expert biography can be seen in Table 1. This research uses a semi-structured interview method. Semi-structured interviews are a cross between structured interviews and unstructured interviews, which can allow standardization of questions and the freedom to explore and add new questions if unexpected topics arise.
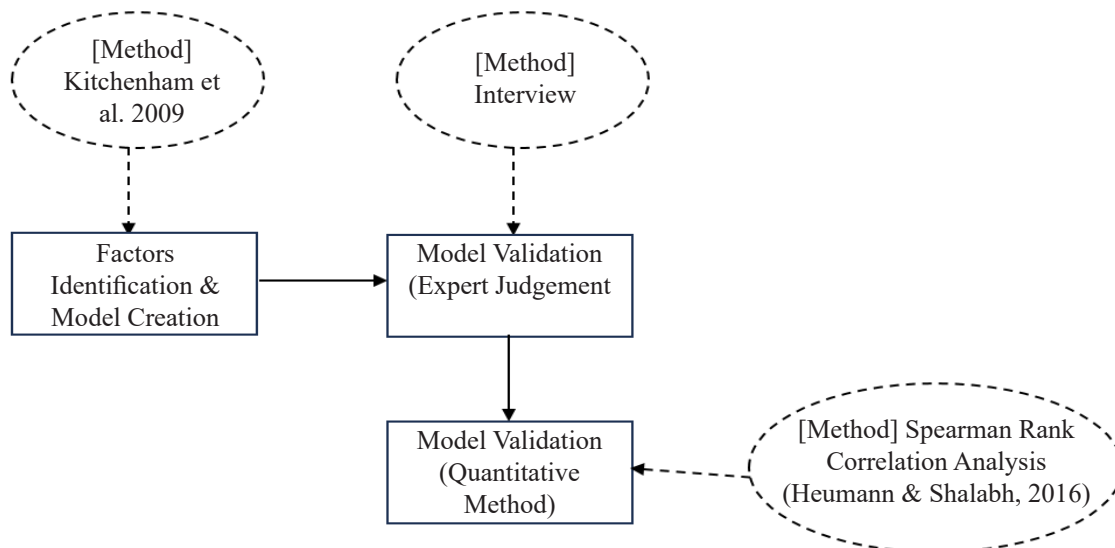

Figure 1. Research stages

Tabel 1. Experts Biography

Initial	Years of experience	Area of expertise	Status
BIM	25 Years	Logistic	Logistic Consultant, and Academics
HRS	25 Years	Logistic	Logistic Consultant, and Director of Logistics Company
MHP	15 Years	Logistic, IT	Logistic Consultant, IT Head in Logistics Digital Platform

- Identification of SLR needs
- Preparation of Review Protocol

- Research Identification
- Literature Selection Result
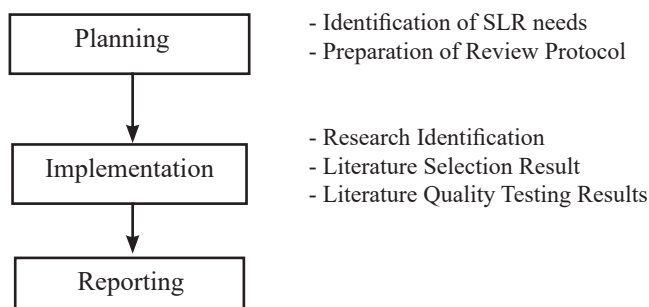- Literature Quality Testing Results

Figure 2. Kitchenham SLR Phase

All of the experts are chosen based on several criteria as they must have more than 10 years in the Logistic Industry, and each of the experts must have a different specialization in logistics so the results of this research will be rich and can be seen in many perspectives like from IT perspective, academic perspective, and organization perspective. All experts were interviewed face to face by prior agreement.

Model Validation (Quantitative)

This research uses the Spearman Rank Correlation Test as a quantitative method. The Spearman rank correlation test was used to see the relationship between success factors and the success of E-Logistics adoption in Indonesia. The statistical technique of the Spearman rank correlation test is appropriate to use because the data type used in the research is ordinal data type and ordinal data type.

Number of Samples

This research uses the Slovin sampling method to determine the number of respondents. All of the respondents are practitioners who represent logistics companies. Based on a survey from BPS, the number of logistics companies in Indonesia has reached 1.3 million companies (Badan Pusat Statistik, 2019). So, the number of minimum respondents in this study is 200 Respondents.

RESULTS

Kitchenham SLR Result

Based on the results of previous research literature filtration using the Kitchenham method, 11 Success factors of E-Logistics adoption were found. Figure 3 shows the initial model which was built based on these 11 factors and grouped into three groups it is Technology, Organization, and Environment based on the TOE Framework. The TOE framework is appropriate to use as a basis for grouping success factors because the TOE framework takes into account environmental and organizational aspects so that it provides a more holistic approach by considering these three aspects they are technology, organization, and environment (Ullah et al. 2021). The following is a table of factors that have been identified and their grouping which can be seen in Table 2.

Tabel 2. Factors Grouping

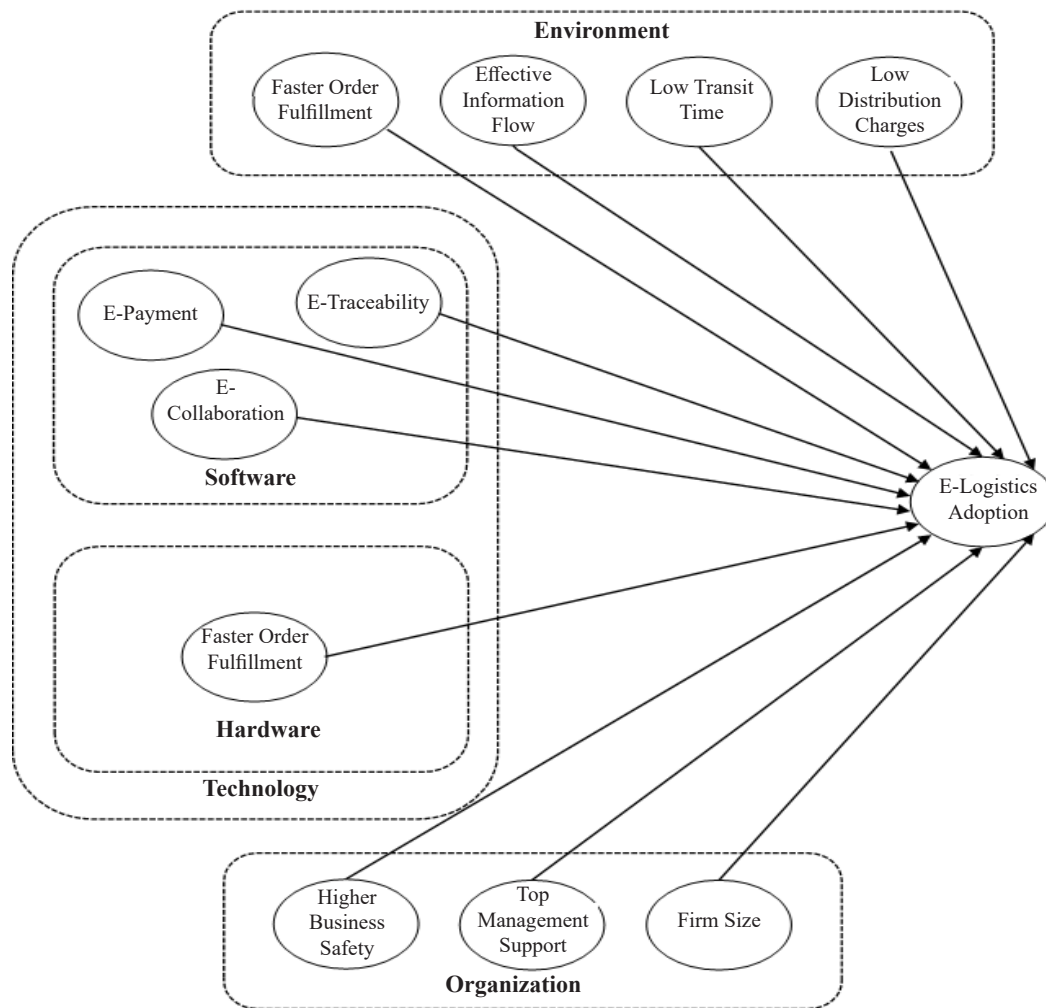| Factors	Group
Faster Order Fulfillment (Luhur Prianto et al. 2020)	Environment
Effective Information Flow (Luhur Prianto et al. 2020)	
Low Transit Time (Subramanian et al. 2014; Imran et al. 2019; Luhur Prianto et al. 2020)	
Low Distribution Charges (Imran et al. 2019)	
E-Payment (Waseem-Ul-Hameed et al. 2018;MahbubulHye et al. 2020;Miraz et al. 2020)	Technology
E-Traceability (Waseem-Ul-Hameed et al. 2018; MahbubulHye et al. 2020; Miraz et al. 2020)(Cruces-Flores et al. 2019)	
E-Collaboration (MahbubulHye et al. 2020; Pateman et al. 2016)	
Technological Infrastructure (Khan et al. 2022)	
Higher Business Safety (Luhur Prianto et al. 2020)	Organization
Top Management Support (Iskandar and Ramantoko, 2017)	
Firm Size (Iskandar and Ramantoko, 2017)	

Figure 3. Initial e-logistic success model

All of the identified factors in the model in Figure 3 are grouped into 3 big groups, they are Technology, Organization, and Environment. The group of technology is also divided into 2 small groups : hardware and software. The software group consists of E-Payment, E-Traceability, and E-Collaboration. The hardware group consists of Technological Infrastructure. The environment group consists of four factors: Faster order fulfillment, Effective information flow, Low transit time, and Low distribution charges. The organization group consists of Higher business safety, Top management support, and Firm size.

Expert Judgment for The Initial E-Logistics Success Model

In order to make the model suitable for the existing logistical conditions in Indonesia, it was validated by experts in logistics operations and Logistics Information Technology through an interview. The interviews were conducted informally and the majority of experts validated the initial model. Based on the expert's review there are some additions and changes in the factors of the initial model that can be seen in Table 3.

There are additions and changes to the building blocks of the model, namely Faster and Accurate Order Fulfillment, Fair Distribution Charges, On Time Delivery, Website Design, and Government Support. In the updated model there are some changes in the environment group factor. Faster order fulfillment changed into Faster and accurate order fulfillment, Low distribution charges changed into Fair distribution charges, and Low transit time changed into On-time delivery. Then there are addition factors,Government support and Website design. Based on the updates from experts the model also needed to be updated. The updated model can be seen in Figure 4.

Tabel 3. Factors addition and changes based on expert judgement

| Factors before	Factors after	Explanation
Faster order fulfillment	Faster and accurate order fulfillment	In the logistics process, speed in meeting logistical needs is not enough, but accuracy is needed in meeting logistical needs so that it can fulfill consumer desires and will directly impact an effective and efficient logistics process.
Low distribution charges	fair distribution charges	High distribution costs are indeed an issue that has been happening for a long time in Indonesia. However, to create an effective and efficient logistics operation, not with cheap logistics costs, but with logistics costs that meet the needs of consumers.
Low transit time	On time delivery	Today's business is very time sensitive so time is a very valuable thing. A good logistics company is a company that can ensure timely delivery of goods because if there is a delay it will create losses on the consumer side and have an impact on consumer confidence.
	Government support	In some logistic processes such as export and import, there will always be a relationship with the government like customs or quarantine. A good E-Logistics system is a system that can flow information from upstream to downstream without stopping and in this case support from the government is needed for the smooth flow of cargo information.
	Website design	Website design affects consumer perceptions about the company's service quality and capability (Kidane and Sharma, 2016). Proper designed websites can increase customer interest and reflect the quality of logistics company information technology capability.
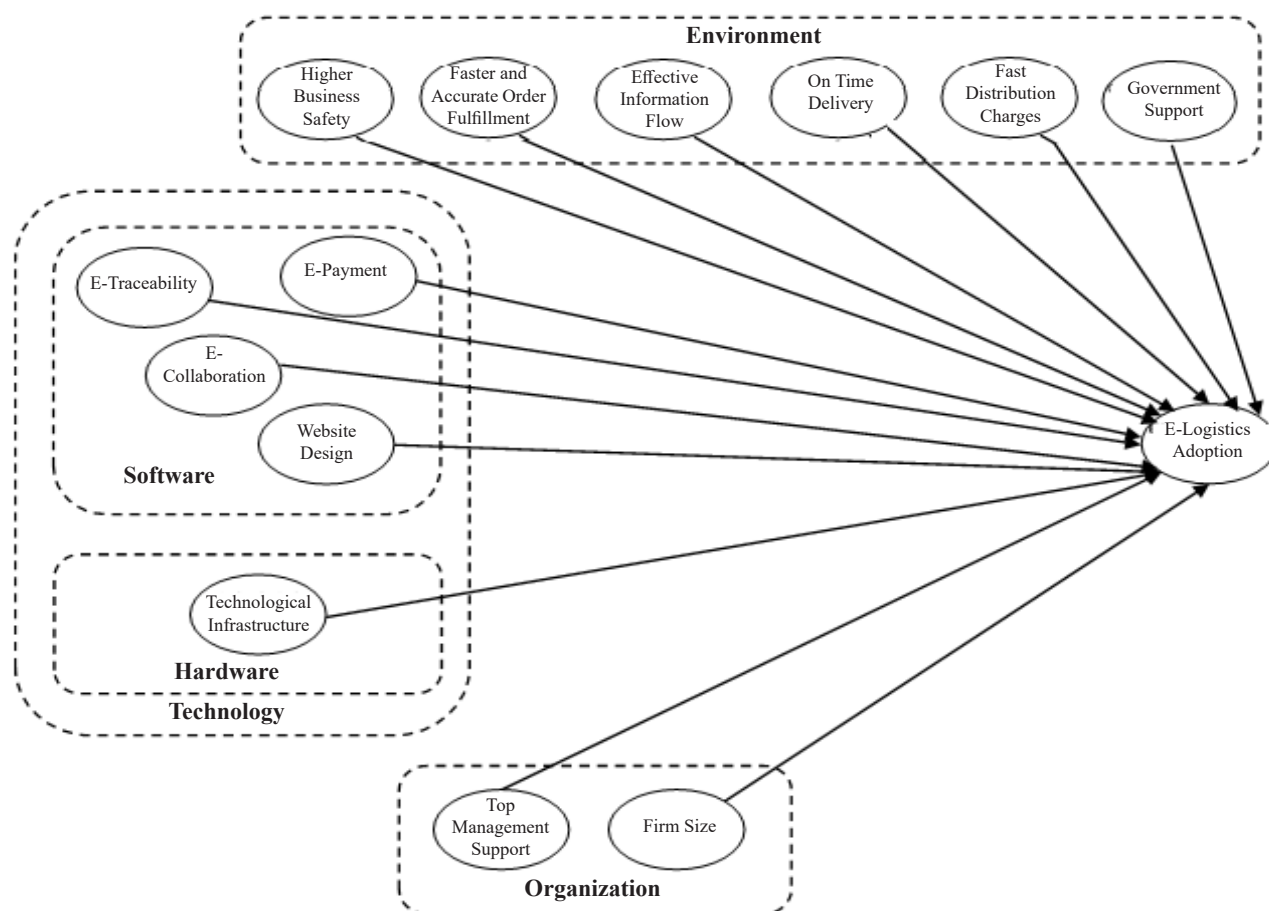
Figure 4. Updated model based on expert judgment

Quantitative Analysis For E-Logistic Success Model

The model that has been validated by experts will be quantitatively validated to see the relationship between all factors and the adoption of E-Logistics. The hypothesis of this research is generated based on the success model of E-Logistics that has been validated by experts' judgment which can be seen in Table 4. The model is analyzed quantitatively by distributing questionnaires. Questionnaires were distributed to 200 respondents spread throughout Indonesia. Furthermore, the calculation of Spearman's rank correlation test is performed to see the relationship between each factor on the success of e-logistics adoption.

Validity And Reliability Test

All questions in the questionnaire are considered valid. This is because based on the calculation results using SPSS software, the value of r count ≥ r table (sig. 0.05 two tails, N = 100). Where, the r table value based on the r product moment table with a significance of 0.05 and a sample of 100 is 0.195. The results of the reliability test can be seen in Table 5. Based on the results of the reliability test on 13 factors, all of the factors had a Cronbach's Alpha value ≥ 0.7 and it can be said that the questions on the questionnaire are reliable.

Hypothesis Test Result

After the questionnaire is considered reliable, a questionnaire is distributed to a minimum of 200 respondents. The data was collected and data processing was carried out using the Spearman rank correlation test method. A correlation test is used to determine the relationship between each factor on the success of E-Logistics adoption. The data used is the average value of each question. Below are the results of the Spearman test of 13 factors of the E-Logistics Success Model that can be seen in Table 6.

Tabel 4. Research Hypothesis

Hypothesis	Hypothesis description
H1	Higher Business Safety (HBS) has an impact on the successful adoption of E-Logistic
H2	Faster and Accurate Order Fulfillment (FAO) has an impact on the successful adoption of E-Logistic
H3	Effective Information Flow (EIF) has an impact on the successful adoption of E-Logistic
H4	On Time Delivery (OTD) has an impact on the successful adoption of E-Logistic
H5	Fair Distribution Charges (FDC) have an impact on the successful adoption of E-Logistic
H6	Government Support (GVS) has an impact on the successful adoption of E-Logistics
H7	E-Payment (EPM) has an impact on the successful adoption of E-Logistics
H8	E-Traceability (ETC) has an impact on the successful adoption of E-Logistics
H9	E-Collaboration (ECB) has an impact on the successful adoption of E-Logistics
H10	Website Design (WDS) has an impact on the successful adoption of E-Logistics
H11	Technological Infrastructure (TIS) has an impact on the successful adoption of E-Logistics
H12	Top Management Support (TMS) has an impact on the successful adoption of E-Logistics
H13	Firm Size (FIS) has an impact on the successful adoption of E-Logistics

Tabel 5. Reliability test results

Factors	Cronbach's Alpha	Factors	Cronbach's Alpha
Higher Business Safety (HBS)	0.867	E-Traceability (ETC)	0.907
Faster and Accurate Order Fulfillment (FAO)	0.832	E-Collaboration (ECB)	0.873
Effective Information Flow (EIF)	0.905	Website Design (WDS)	0.900
On Time Delivery (OTD)	0.886	Technological Infrastructure (TIS)	0.852
Fair Distribution Charges (FDC)	0.868	Top Management Support (TMS)	0.922
Government Support (GVS)	0.889	Firm Size (FIS)	0.852
E-Payment (EPM)	0.912		

All factors have a positive relationship to success in adopting E-Logistics. The HBS factor has a value of +0.458, the FAO factor has a value of +0.481, the EIF factor has a value of +0.548, the OTD factor has a value of +0.499, the FDC factor has a value of +0.640, the GVS factor has a value of +0.598, the EPM factor has a value of +0.764, the ETC has a value of +0.601, the ECB factor has a value of +0.651, the WDS factor has a value of +0.844, the TIS factor has a value of +0.771, the TMS factor has a value of +0.590, and the FIS factor has a value of +0.498 on the success of E-Logistics adoption.

All of the factors are considered strong for ten factors (HBS, FAO, EIF, OTD, FDC, GVS, ETC, ECB, TMS, and FIS) and very strong for three factors (EPM, WDS, and TIS). Based on the correlation value and the strength of correlation, all hypotheses in this research are considered accepted. The final E-Logistics Success Model can be seen in Figure 5 and further analysis about The final E-Logistics Success Model can be seen in Table 7.

Table 6. Spearman correlation coefficient test results

Factors	Factor Correlation Value Against-ELG	Correlation	Remark
Higher Business Safety (HBS)	0.458	Strong	Accepted H1
Faster and Accurate Order Fulfillment (FAO)	0.481	Strong	Accepted H2
Effective Information Flow (EIF)	0.548	Strong	Accepted H3
On Time Delivery (OTD)	0.499	Strong	Accepted H4
Fair Distribution Charges (FDC)	0.640	Strong	Accepted H5
Government Support (GVS)	0.598	Strong	Accepted H6
E-Payment (EPM)	0.764	Very Strong	Accepted H7
E-Traceability (ETC)	0.601	Strong	Accepted H8
E-Collaboration (ECB)	0.651	Strong	Accepted H9
Website Design (WDS)	0.844	Very Strong	Accepted H10
Technological Infrastructure (TIS)	0.771	Very Strong	Accepted H11
Top Management Support (TMS)	0.590	Strong	Accepted H12
Firm Size (FIS)	0.498	Strong	Accepted H13

Tabel 7. Factor analysis

Factors	Analysis
Higher business safety	Higher Business Safety is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Luhur et al. (2020) which states that Higher Business Safety is a critical factor contributing to E-Logistics. Based on expert review Higher Business Safety is an important factor for the successful adoption of E-Logistics. It is because all of the cargo owners want their cargo to be safely delivered without any damage so high safety in cargo delivery is an important factor.
Faster and accurate order fulfillment	Faster and Accurate Order Fulfillment is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Luhur et al. (2020) and Rahman et al. (2021) which states that Faster and Accurate Order fulfillment is a critical factor contributing to E-Logistic. Based on expert review Faster and Accurate Order Fulfillment is an important factor in the successful adoption of E-Logistic it is because nowadays all cargo owners are demanding not only fast delivery services but also accuracy. It means that cargo owners want the right cargo, at the right time in the right place.
Effective information flow	Effective Information Flow is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Luhur et al. (2020) and Rahman et al. (2021) which states that Effective Information Flow is a critical factor contributing to E-Logistic. Based on expert review Effective Information Flow is an important factor in the successful adoption of E-Logistic. It is because to make a seamless cargo delivery all of the information needs to be integrated from upstream to downstream so that information is complete and rich.

Tabel 7. Factor analysis (continue)

| Factors	Analysis
On time delivery	On Time Delivery is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Subramanian et al. (2014), Imran et al. (2019), and Luhur et al. (2020) which states that On Time Delivery is a critical factor contributing to E-Logistic. Based on expert review On Time Delivery is an important factor in the successful adoption of E-Logistic it is because nowadays the need of cargo is considered time-sensitive and Inaccuracy in time will result in increased logistics costs.
Fair distribution charges	Fair Distribution Charges is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Imran et al. (2019) which states that Fair Distribution Charges is a critical factor contributing to E-Logistic. Based on expert review, Fair Distribution Charges is an important factor in the successful adoption of E-Logistic because to create an effective and efficient logistics operation, not with cheap logistics costs, but with logistics costs that meet the needs of consumers.
Government support	Government Support is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Rahman et al. (2021) which states that Government Support is a critical factor contributing to E-Logistic. Based on expert review, Government Support is an important factor in the successful adoption of E-Logistic because support from the government is needed for the smooth flow of cargo information especially when dealing with government related documents.
E-Payment	E-Payment is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Waseem-Ul-Hameed et al. (2018), MahbubulHye et al. (2020), and Miraz et al. (2020) which states that E-Payment is a critical factor contributing to E-Logistic. Based on expert review, E-Payment is an important factor in the successful adoption of E-Logistic. It is because the logistics process is always dealing with a payment process for documents, an electronic payment will make the logistics process easier.
E-Traceability	E-Traceability is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Waseem-Ul-Hameed et al. (2018), MahbubulHye et al. (2020), Miraz et al. (2020), and Cruces-Flores et al. (2019) which states that E-Traceability is a critical factor contributing to E-Logistic. Based on expert review, E-Traceability is an important factor in the successful adoption of E-Logistic because nowadays cargo owners are demanding track and trace of their cargo to anticipate early if there is a problem in the shipment process.
E-Collaboration	E-Collaboration is an important factor that affects E-Logistics Adoption. This result is supported by previous research by MahbubulHye et al. (2020), and Pateman et al. (2016) which states that E-Collaboration is a critical factor contributing to E-Logistic. Based on expert review, E-Collaboration is an important factor in the successful adoption of E-Logistic. It is because many stakeholders are in the logistics process, with E-Collaboration all of the logistics process will be simple and reliable.
Website design	Website Design is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Kidane and Sharma (2016) which states that Website Design is a critical factor contributing to E-Logistic. Based on expert review Website Design is an important factor in the successful adoption of E-Logistic it is because Proper designed websites can increase customer interest and reflect the quality of logistics company information technology capability.
Technological infrastructure	Technological Infrastructure is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Khan et al. (2022) which states that Technological Infrastructure is a critical factor contributing to E-Logistic. Based on expert review Technological Infrastructure is an important factor in the successful adoption of E-Logistic it is because E-Logistic is built based on internet technology that needs a well-managed technology infrastructure.
Top management support	Top Management Support is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Iskandar and Ramantoko (2017) which states that Top Management Support is a critical factor contributing to E-Logistic. Based on expert review Top Management Support is an important factor in the successful adoption of E-Logistic. It is because to implement E-Logistic in a company sometimes a business process reengineering is needed, therefore Top Management Support is very crucial for the success implementation of E-Logistic.
Firm size	Firm Size is an important factor that affects E-Logistics Adoption. This result is supported by previous research by Iskandar and Ramantoko (2017) which states that Firm Size is a critical factor contributing to E-Logistic. Based on expert review Firm Size is an important factor in the successful adoption of E-Logistic it is because the size of the company sometimes determines the level of difficulty of implementing E-Logistics, sometimes large companies tend to be more aware of the importance of E-Logistics.
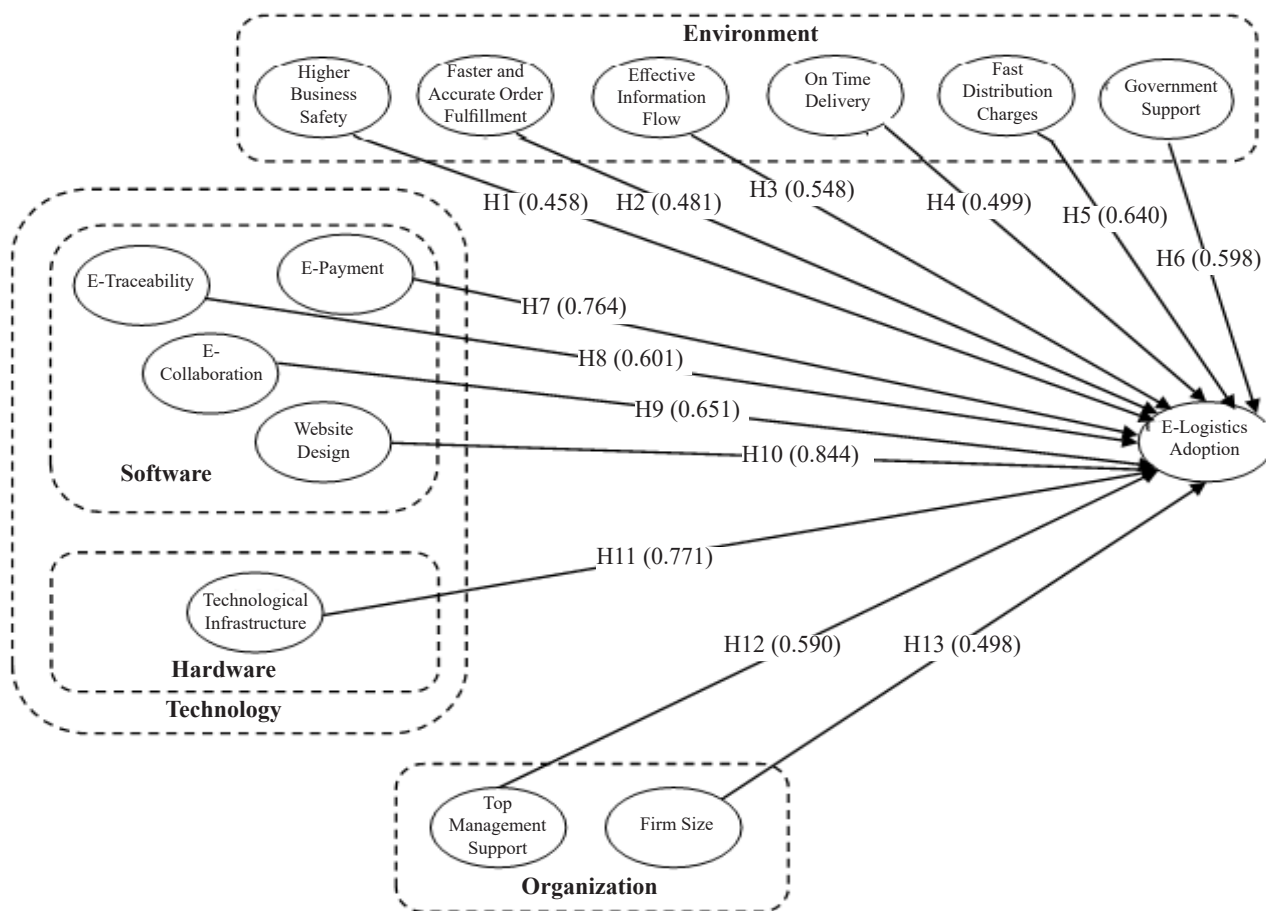
Figure 4. Updated model based on expert judgment

Managerial Implications

Managerial implications can be seen from short-term and long-term implementation. Short-term implementation can be done by forming an e-logistics strategy and framework based on a successful model for implementing e-logistics. This framework can be used as standardization for e-logistics business actors, stakeholders and the government so that the implementation of e-logistics can be better. Meanwhile, strategies can be formed to create steps that will be taken by various parties, including the government to develop the regulations for E-Logistics, especially Information Technology. The long-term implication is if this strategy and standardization is successfully implemented, this can influence e-logistics performance in Indonesia and can increase LPI scores and Indonesia will be able to compete globally.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

To achieve a successful implementation of an e-logistics system, the success factors of e-logistics adoption need to be identified to ensure that the implementation of e-logistics can be effective and efficient. Based on the research results obtained through the factor identification stage and initial model creation which was then validated with expert's judgment and with quantitative analysis using the Spearman rank correlation test to assess the relationship of factors to E-Logistics adoption, it can be found that all factors are Higher Business Safety, Faster and Accurate Order Fulfillment, Effective Information Flow, On Time Delivery, Fair Distribution Charges, Government Support, E-Payment, E-Traceability, E-Collaboration, Website Design, Technological Infrastructure, Top Management Support, Firm Size have a strong relationship with the adoption of E-Logistics.

Website Design (WDS) is the highest factor influencing success in adopting E-Logistics with a value of +0.844. WDS considered the most influencing factors because a properly designed website can increase customer interest and reflect the quality of the logistics company's information technology capabilities. Meanwhile, Higher Business Safety (HBS) has the smallest value of +0.458 but is still considered to have a strong correlation with e-logistic adoption. HBS is also considered important because all cargo owners want their cargo to be sent safely without any damage so high safety in cargo delivery is an important factor.

Recommendations

Recommendations for further research are the model that has been developed in this research can be further developed into an e-logistics framework which ultimately can be used as a basis, guidelines, and standardization in the development of the E-Logistics system. Apart from that, the factors identified in this research can be used as a basis for forming a strategy for a company that wants to implement an E-Logistics system in its company.

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