

## The Use of Intelligent Decision Support System in Traveloka Company's Decision-Making Process

Dea Aprizanti<sup>1</sup>, Norbaida<sup>2</sup>, Siti Arini<sup>3</sup>, Titin Sumarni<sup>4</sup>.

<sup>1,2,3</sup>.Bengkalis State Islamic College

Email: [deaaprizanti14@gmail.com](mailto:deaaprizanti14@gmail.com)<sup>1</sup>, [idanor121203@gmail.com](mailto:idanor121203@gmail.com)<sup>2</sup>, [sitiarini17042020@gmail.com](mailto:sitiarini17042020@gmail.com)<sup>3</sup>, [titinijal@gmail.com](mailto:titinijal@gmail.com)<sup>4</sup>

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### ABSTRACT

The aviation industry is currently growing rapidly thanks to the advancement of information technology, which has changed the way consumers search for information and book tickets online. Traveloka, founded in March 2012, is one of the companies that has successfully utilized this technology optimally. With intelligent algorithms, Traveloka can analyze user preferences and provide suitable recommendations, although the effectiveness of its intelligent support system still needs further research to improve user satisfaction and operational efficiency. This study aims to evaluate the effectiveness of the intelligent support system in Traveloka's decision-making process, using a qualitative method and literature study approach. The development model proposed by Peter Fenrich is used to ensure that the built system can effectively and efficiently meet user needs. The results show that the intelligent support system in Traveloka is very helpful in providing accurate recommendations, improving user satisfaction and operational efficiency, and providing a competitive advantage in the e-commerce market. Overall, the use of information technology and intelligent support systems in Traveloka contributes significantly to the advancement of the aviation industry, simplifying the ticket booking process, and enhancing the company's competitiveness. Further research is needed to continuously improve the effectiveness and efficiency of this system, so that it can provide greater benefits for consumers and companies.

**Keywords:** Intelligent Decision Support System, Traveloka, Decision-Making Process

### INTRODUCTION

Currently, the aviation industry is growing rapidly. This can be seen from the increasing number of domestic and international airlines, which has led to increased competition. This development is supported by the advancement of information technology, which influences consumer behavior and their desire for quick and accurate information. The internet, as a user-friendly and widely accessible service, has become one of the main drivers of this development.<sup>1</sup>

The internet has now become a powerful tool for businesses to win in the competitive market, as the increasing number of internet users worldwide has made marketing and business development easier. Consumers can choose desired products or services without time and distance limitations, thus saving time and costs.

The advancements made possible by information technology in aviation offer many benefits. Airplanes are a primary means of transportation for modern society to travel long distances in a short amount of time, saving time and energy. People need a medium that provides sufficient information to choose the right airline when making ticket purchase decisions.<sup>2</sup>

<sup>1</sup> Sastika W, "Analisis Pengaruh Kualitas Website (WebQual 4.0) Terhadap Keputusan Pembelian Pada Website E-Commerce Traveloka. Sentika," , " *Refleksi Pembelajaran Inovatif* 1, no. 1 (2016): 19.

<sup>2</sup> Ibid.



Previously, the price of airline tickets was only known by the airlines and travel agencies, but now ticket prices are open to the public. People no longer need to go to travel agents or airports to buy tickets, as many airlines offer online ticket services. Online flight ticket booking is becoming increasingly popular in Indonesia, especially in big cities. Interest continues to grow due to the quality of websites, which include user-friendliness, clear information, and secure and private communication. Many websites compete with attractive designs and accurate information, thus increasing customer satisfaction and encouraging them to return to the site. Traveloka.com is here to meet the needs of the public in searching for fares and buying tickets online from various airlines, providing integrated services for consumers without the need to check fares separately.

Traveloka.com, founded by Ferry Unardi in March 2012 along with Derianto Kusuma and Albert, is an online flight ticket booking service company. Traveloka uses intelligent algorithms to analyze user preferences and search history to provide suitable flight, hotel, and vacation recommendations.<sup>3</sup>

Intelligent support systems help in decision-making by providing alternative options. Although this system has been adopted by many companies, its effectiveness in the context of Traveloka still needs to be studied to improve user satisfaction and operational efficiency, which ultimately can enhance Traveloka's competitiveness in the market.

This research aims to analyze the effectiveness of using intelligent support systems in Traveloka's decision-making process, as well as how this system analyzes user preferences to provide optimal recommendations. The research is conducted using a qualitative method and a literature review approach, using thematic analysis to identify patterns and main themes from the collected data.

## **METHOD**

This research will follow the development model proposed by Peter Fenrich. This model includes several systematic stages: analysis, planning, design, development, and implementation. Each stage plays a crucial role in ensuring that the built system can effectively and efficiently meet user needs. By following Peter Fenrich's development model, this research is expected to produce an effective and efficient intelligent support system, improve user satisfaction, and provide a competitive advantage for Traveloka in the e-commerce market.<sup>4</sup>

Each stage of this model will be executed carefully to ensure that all aspects of system development are considered and implemented properly. This research will also use qualitative methods with a literature study approach and thematic analysis to identify patterns and main themes from the collected data, ensuring that the obtained results truly meet the needs and expectations of users.

## **RESULTS AND DISCUSSION**

### **1. Theoretical Foundation**

Decision Support System (DSS) is an information system that aims to accelerate and improve the accuracy of decision-making processes regarding a problem (Widaningsih, 2019). DSS methods help simplify decision model creation and

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<sup>3</sup> Sri Kusuma Dewi, "Memahami Sistem Cerdas Dan Pendukung Keputusan Menggunakan Model 'Problem Based Learning,'" *Refleksi Pembelajaran Inovatif* 2 1 (2020): 262.

<sup>4</sup> Amalia Zati Atsari, Dewi Putrie Lestari, and Ilmiyati Sari, "Aplikasi Sistem Pendukung Keputusan Pemilihan Hotel Menggunakan Metode Analytic Network Process," *Jurnal Ilmiah Teknologi dan Rekayasa* 25, no. 3 (2020): 174–186.

database usage by providing alternative systems that function as analysis tools for existing models.<sup>5</sup>

Understanding artificial intelligence in the context of intelligent decision-making continues to evolve. The effectiveness, productivity, and success of a system or organization are greatly influenced by timely and wise assessments in complex and dynamic environments. To achieve this, an effective and efficient decision-making process is required.<sup>6</sup>

Intelligent systems are systems built using artificial intelligence technology. Therefore, intelligent systems have three main components: a database, an inference engine, and a user interface. The first two components are inherent AI components, while the user interface is a mandatory component in any computer system. Some examples of smart system applications are:<sup>7</sup>

a. *Advanced Driver Assistance Systems (ADAS)*

This system informs the driver about potentially dangerous situations so that the driver can take action to address them, consisting of several features, namely:

- 1) Notifying the driver when they are veering off the lane;
- 2) Showing the relative situation to the vehicle in front, such as the possibility of a collision, so that the driver needs to apply the brakes;
- 3) Automatic emergency braking that can identify an impending collision and apply the brakes without driver intervention;
- 4) Adjusting the vehicle's speed from a predetermined value in the case of a slower vehicle in its lane;
- 5) Automatically keeping the vehicle within the lane boundaries.

b. Audi Automatic Driving Parking.

This car uses 8 integrated ultrasonic sensors on the car bumper. The car moves and searches for empty parking spaces on its own. When the car starts entering the parking lane, 10 active ultrasonic sensors search for empty spaces.

c. VIZ.AI

This system is used to catalyze therapy after a patient suffers a stroke. This system helps doctors detect abnormalities in brain scans using machine learning. Deep learning is used to inform stroke patients directly to specialist doctors who can intervene, treat, and identify suspected blood vessel blockages that prevent strokes using CT scans and inform stroke specialist teams as soon as possible.

d. Chris, AI co-driver

Chris, AI Assistant Manager This application is developed by German Autolabs. It is digitally connected directly to your smartphone. This application allows you to view incoming messages, answer and end calls, play music, and even follow navigation instructions.

## 2. Discussion of Research Results

One thing that makes Traveloka better than other online travel agents is that Traveloka was founded at the right time, one year before Indonesia experienced a tourism business boom in 2013. Phocuswright research shows that in this year, the

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<sup>5</sup> Fahrul Nurzaman and Alviani Permata Putri, "Sistem Pendukung Keputusan Pengambilan Mata Kuliah Peminatan Prodi Informatika UPI Y.A.I Menggunakan Metode Simple Additive Weighting (SAW)," *Ikraith-Informatika* 7, no. 1 (2022): 67–75.

<sup>6</sup> Dwi Putra Espy Bendanu et al., "Penerapan Teknik Forward Chaining Untuk Pengambilan Keputusan Cerdas: Literatur Review," *AI dan SPK: Jurnal Artificial Intelligent dan Sistem Penunjang Keputusan* 1, no. 1 (2023): 126–134.

<sup>7</sup> Ulva Hasdiana, *Sistem Cerdas Dan Pendukung Keputusan (Decision Support and Intelligent System)*, *Analytical Biochemistry*, vol. 11, 2018

revenue collected from Indonesia's tourism industry reached 10.5 billion dollars or Rp136 trillion. This means that national revenue could reach 1 trillion US dollars with an annual growth rate of six percent. Combined with the right strategy, this condition will drive the development of Traveloka into a leading startup in the travel industry. This achievement did not escape the attention of foreign investors.<sup>8</sup>

Although this online flight ticket booking site is very attractive, it will not be of much benefit or consumer interest if it is not communicated well. In previous years, consumers were only informed about this site through social networks, namely the website and Twitter. The results of this communication were considered less than optimal, even though the number of visitors to this website was quite high. However, PT. Traveloka Indonesia itself still feels that communication in this way is still not optimal. According to PT. Traveloka Indonesia, there is still a lot of untapped potential because people do not know about this site due to a lack of information.<sup>9</sup>

#### a. Data Transformation

Data is transformed into numbers by assigning weights to words using the expression of inverse document frequency (TF-IDF), where each word is transformed into a vector representation. In this study, we use the TfidfVectorizer function from the scikit-learn library to calculate TF-IDF. The calculation of TF-IDF is as follows:

$$idf(t) = \ln \frac{1+n}{1+idf(t)} + 1 \quad (1)$$

$$tf-idf(t, d) = tf(t, d) \times idf(t) \quad (2)$$

$$v_{norm} = \frac{v}{\|v\|_2} = \frac{v}{\sqrt{v_1^2 + v_2^2 + \dots + v_n^2}} \quad (3)$$

#### b. Text Mining

In this step, data division is done first. In this study, a comparison of training data: test data ratios of 80:20, 70:30, and 60:40 is conducted to obtain the best results. Then, unbalanced data is processed using the Synthetic Minority Oversampling Technique (SMOTE) algorithm. The accuracy results are obtained from the classification using support vector machine (SVM) with a linear kernel.

**Table 1 Data Distribution**

Dataset	Rasio	Jumlah Data Train				Jumlah Data Test	
		Sebelum SMOTE		Setelah SMOTE		Positif	Negatif
		Positif	Negatif	Positif	Negatif		
Harga Tiket.com	80:20	164	58	164	164	40	16
	70:30	145	49	145	145	59	25
	60:40	126	40	126	126	78	34
Harga Traveloka	80:20	3854	114	3854	3854	967	26
	70:30	3370	102	3370	3370	1451	38
	60:40	2890	86	2890	2890	1931	54
Layanan Tiket.com	80:20	119	138	138	138	32	33
	70:30	103	122	122	122	48	49
	60:40	84	109	109	109	67	62
Layanan Traveloka	80:20	114	294	294	294	26	76
	70:30	99	258	258	258	41	112
	60:40	83	223	223	223	57	147

<sup>8</sup> Hamdani Amos Marthen, "Aplikasi Sistem Pendukung Keputusan Untuk Penentuan Tujuan Wisata Hotel Dan Alam Di Indonesia" *Jurnal Informatika Mulawarman Edisi Februari* 8, no. 1 (2013): 13–16.

<sup>9</sup> Miftahul Farochah, Rike Silvia, and Siti Nur 'aini, "Efektivitas Sistem Informasi Manajemen Pada Aplikasi Traveloka," *Jurnal Penelitian Rumpun Ilmu Teknik* 1, no. 4 (2022): 78–92.

c. Evaluation

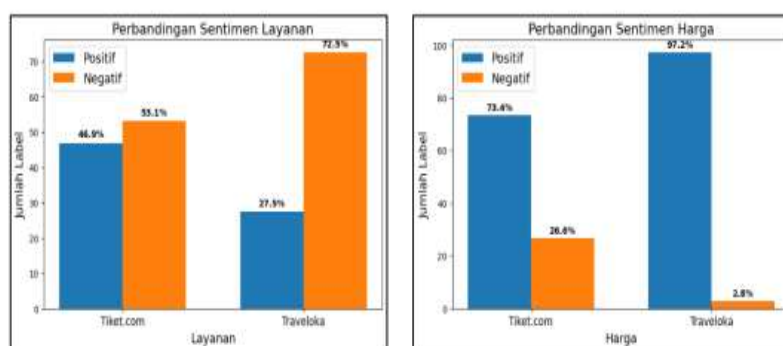
K-fold cross-validation and confusion matrix are used as evaluation methods in this study.<sup>10</sup>

- 1) K-fold cross-validation is a validation method that checks for overfitting in the context of classification modeling, where the existing data set is randomly divided into testing data and training data in K equal parts.
- 2) The confusion matrix shows the comparison of predicted and actual classifications, as well as the number of correctly and incorrectly classified test data. The best accuracy is for Tiket.com prices with a data division ratio of 60:40, for Traveloka prices with a ratio of 60:40, for Tiket.com services with a ratio of 80:20, and for Traveloka services with a ratio of 70:30.

**Table 2 Confusion Matrix**

Dataset	TP	TN	FN	FP
Harga Tiket.com	68	8	10	26
Harga Traveloka	1916	19	15	35
Layanan Tiket.com	27	33	5	0
Layanan Traveloka	34	102	7	10

To see a comparison of Traveloka and Tiket.com in the distribution of positive and negative labels in the price and service sections, as follows:<sup>11</sup>



**Figure 1 Price and Service Comparison.1**

Volume data of Traveloka's service data usually has more data compared to Tiket.com's service data. Tiket.com has a positive rate of 46.89% with a total of 151 data, while Traveloka has a positive rate of 27.45% with a total of 140 data. Traveloka has a negative rate of 72.55% with a total of 370 data, while Tiket.com has a rate of 53.11%, totaling 171 data. The volume of Traveloka's price database data is usually larger than Tiket.com's service. From the positive data, the percentage of positive data from Traveloka is 97.18% with a total of 4821 data, while Tiket.com is 73.38% with a total of 204 data. From the negative data, Tiket.com has a higher percentage of

<sup>10</sup> Ibid.

<sup>11</sup> Putri Utami Rukmana, Oktariani Nurul Pratiwi, and Hanif Fakhurroja, "Perbandingan Analisis Sentimen Aplikasi Traveloka Dan Tiket.Com Pada Twitter Dengan Metode Support Vector Machine," *Jurnal Sistem Cerdas* 6, no. 3 (2023): 241–250.

26.62% with a total of 741 data, while Traveloka only has 2.82% with a total of 140 data.<sup>12</sup>

## CONCLUSION

Currently, the aviation industry is rapidly developing, driven by advances in information technology. The internet has become the main tool that allows consumers to obtain information quickly and accurately, as well as facilitating the process of booking flights online. Traveloka, as one of the providers of online flight ticket booking services, has utilized this technology very well.

Established in March 2012, Traveloka.com has successfully used advanced technology to provide services that make it easy for consumers to choose and purchase flight tickets. With intelligent algorithms, Traveloka is able to analyze user preferences and provide optimal recommendations. However, the effectiveness of the intelligent support system at Traveloka still requires further research to improve user satisfaction and operational efficiency.

This study aims to evaluate the effectiveness of using the intelligent support system at Traveloka in the decision-making process. The study was conducted using a qualitative method and a literature study approach, using thematic analysis to identify patterns and main themes from the collected data. The development model proposed by Peter Fenrich is used to ensure that the built system can effectively and efficiently meet user needs.

The results of the study show that the intelligent support system at Traveloka is very helpful in the decision-making process, especially in providing accurate recommendations to users. Improving user satisfaction and operational efficiency at Traveloka can provide a competitive advantage in the e-commerce market. In addition, a comparison analysis between Traveloka and Tiket.com reveals that Traveloka has more positive service and price data, indicating an advantage in the quality of service and price offered.

Overall, the implementation of information technology and intelligent support systems has made a significant contribution to the advancement of the aviation industry, making it easier for consumers to book tickets, and enhancing the competitiveness of companies like Traveloka in the market. Further research is needed to continuously improve the effectiveness and efficiency of these systems, so that they can provide greater benefits to consumers and companies.

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<sup>12</sup> Darvian Dio Prakoso, "Analisis Efektivitas Iklan Pt. Traveloka Indonesia Di Televisi (Studi Pada Mahasiswa Fakultas Ekonomi Dan Bisnis Universitas Brawijaya Malang)," *Journal of Chemical Information and Modeling* 53, no. 9 (2019): 1689–1699.

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