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WEB-BASED SYSTEM, TRANSPORTATION MANAGEMENT, DIGITALIZATION, SYSTEMATIC LITERATURE REVIEW

SISTEM BERBASIS WEB, MANAJEMEN TRANSPORTASI, DIGITALISASI, TINJAUAN LITERATUR SISTEMATIS

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ABSTRACT

The transportation industry is undergoing a major transformation with the development of digital technology. Challenges such as complex fleet management, dynamic routes, high operational costs, and customer demand for fast service have driven the emergence of Web-Based Transportation Management Systems (WBTMS). This study conducted a Systematic Literature Review (SLR) to analyze various studies discussing the implementation of WBTMS in the transportation sector. The SLR process was conducted following the PRISMA guidelines, which include the stages of identification, screening, feasibility assessment, and final selection of studies. Literature was collected through several major databases such as Scopus, IEEE Xplore, ScienceDirect, and Google Scholar, with publications reviewed from 2020 to 2025. The purpose of this study was to identify trends, benefits, challenges, and existing research gaps. The review results indicate that WBTMS can improve operational efficiency, transparency, and customer service quality. However, major challenges remain in the aspects of IT infrastructure, integration with legacy systems, and human resource readiness. This study provides recommendations for the transportation industry and academia to strengthen strategies for adopting web-based systems in the future.

Keywords: *Web-Based System, Transportation Management, Digitalization, Systematic Literature Review.*

ABSTRAK

Industri transportasi mengalami transformasi besar seiring berkembangnya teknologi digital. Tantangan seperti pengelolaan armada yang kompleks, rute dinamis, biaya operasional tinggi, dan kebutuhan pelanggan akan layanan cepat mendorong munculnya *Web-Based Transportation Management System* (WBTMS). Penelitian ini melaksanakan *Systematic Literature Review* (SLR) untuk menganalisis berbagai penelitian yang membahas implementasi WBTMS di sektor transportasi. Proses SLR dilakukan dengan mengikuti pedoman PRISMA, yang mencakup tahapan identifikasi, penyaringan, penilaian kelayakan, dan seleksi akhir studi. Literatur dikumpulkan melalui beberapa database utama seperti Scopus, IEEE Xplore, ScienceDirect, dan Google Scholar, dengan rentang publikasi yang ditinjau mulai tahun 2020 hingga 2024.Tujuan penelitian ini adalah untuk mengidentifikasi tren, manfaat, tantangan, dan kesenjangan penelitian yang ada. Hasil tinjauan menunjukkan bahwa WBTMS mampu meningkatkan efisiensi operasional, transparansi, dan kualitas layanan pelanggan. Namun, tantangan utama masih ditemukan pada aspek infrastruktur TI, integrasi dengan sistem lama, dan kesiapan sumber daya manusia. Studi ini memberikan rekomendasi bagi industri transportasi dan akademisi untuk memperkuat strategi adopsi sistem berbasis web di masa mendatang.

Kata Kunci: *Web-Based System, Transportation Management,* Digitalisasi Transportasi*, Systematic Literature Review*

INTRODUCTION

The development of information and communication technology has driven a major transformation across various industrial sectors, including the transportation industry. Today, transportation companies face increasingly complex challenges, such as managing large fleets, the need for real-time monitoring, pressure to reduce operational costs, as well as customer demands for fast, accurate, and transparent services. These conditions require system innovations capable of integrating all transportation operational processes in an efficient and well-coordinated manner.

One solution that has been widely developed and implemented is the Web-Based Transportation Management System (WBTMS). This system is a transportation management platform operated through a web-based interface, allowing users to access, monitor, and control transportation activities online and centrally. With a web-based system, companies can optimize route scheduling, fleet tracking, shipment management, and operational performance evaluation without being bound to a specific physical location.

The implementation of a Web-Based Transportation Management System (WBTMS) aligns with the direction of digital transformation and the development of Industry 4.0, in which business processes require stronger data integration, inter-system connectivity, and increasingly advanced data analysis capabilities. In this context, WBTMS not only functions as an operational management tool, but also serves as a crucial foundation for strategic decision-making based on accurate and real-time information.

WBTMS is closely linked to various key Industry 4.0 technologies. Through the Internet of Things (IoT), the system can automatically collect data from vehicle sensors, GPS, tracking devices, and transportation infrastructure. Meanwhile, the integration of Big Data Analytics enables processing and analysis of large data volumes to identify operational patterns, forecast fleet requirements, and dynamically optimize routes. Furthermore, the use of Artificial Intelligence (AI) in WBTMS supports predictive capabilities such as predictive maintenance, more accurate Estimated Time of Arrival (ETA), anomaly detection, and more efficient decision recommendations. Thus, WBTMS becomes an integral part of digitalization efforts in the transportation sector that emphasize efficiency, automation, and improved service quality. However, despite these benefits, WBTMS implementation still faces significant challenges, such as limitations in technological infrastructure, user resistance to digital transformation, and issues related to data security and privacy.

Previous research has examined topics related to web-based transportation management systems, yet most studies only focus on technical aspects or system development, without thoroughly reviewing implementation processes and success factors within the industrial environment. Therefore, a Systematic Literature Review (SLR) is needed to compile, analyze, and synthesize previous research findings in a structured manner, thus providing a comprehensive overview of WBTMS implementation in the transportation sector.

This study is expected to provide benefits for several stakeholders, including:

1. For the Industrial Sector: Providing references and guidelines for transportation companies to effectively plan, implement, and evaluate web-based transportation management systems.
2. For Academics and Researchers: Serving as an information source and foundation for further research related to digital transportation system innovations, including integration with the Internet of Things (IoT), Artificial Intelligence (AI), and data analytics.
3. For Government and Regulators: Offering input for policy and regulatory development that supports transportation digitalization and web-based infrastructure development in Indonesia.

METHODS

This study employs a Systematic Literature Review (SLR) approach. The SLR method is a research technique focused on the systematic and structured collection, evaluation, and synthesis of research findings relevant to a specific topic. Unlike a regular literature review, which is generally narrative and subjective, SLR aims to provide a

comprehensive, objective, and accountable overview of developments within a particular field of knowledge.

In the context of this research, the SLR method is used to review various studies related to the implementation of Web-Based Transportation Management Systems (WBTMS) in the transportation industry sector. The purpose of applying this method is to identify patterns, trends, dominant technologies, benefits, and challenges encountered in the implementation of web-based transportation management systems.

The SLR method is selected for several main reasons:

1. Limitations in field research: This study does not conduct direct system testing; thus, the primary source of information relies on published scientific literature.
2. The need for mapping previous research: In-depth identification is required to understand how web-based transportation management systems are developed and implemented in various industrial contexts.
3. Strong scientific standards: SLR uses measurable and transparent procedures, making its results reproducible and reliable.

The SLR stages follow the PRISMA framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which consists of four main phases:

1. Identification – Identifying all relevant publications by searching research databases. This stage involves database searches through major platforms such as Scopus, IEEE Xplore, Google Scholar, and ScienceDirect. Keywords used include combinations of terms such as "web-based transportation management system," "TMS," "transport management," and "web-based system in logistics." The literature range is set between 2014 and 2025 to ensure coverage of recent developments.
2. Screening – Selecting articles based on title and abstract using inclusion criteria such as topic relevance, use of web-based systems in transportation/logistics contexts, and publication in scholarly journals. Duplicate or irrelevant articles are eliminated.
3. Eligibility – Evaluating full-text articles to ensure relevance and completeness of information. Data synchronization is conducted at this stage, including metadata verification, removal of cross-database duplicates, and validation of content alignment with research objectives.
4. Inclusion – Finalizing 20 articles to be used as the primary basis for analysis. These articles meet all relevance criteria, methodological quality, and data completeness requirements.

For the analytical technique, this study utilizes the Systematic Literature Review (SLR), grouping findings from each article into key thematic categories such as WBTMS features, operational benefits, implementation challenges, IoT/Big Data integration, and performance effectiveness. Additionally, the validity of database searches and article inclusion is ensured through several indicators:

- Consistency of keywords across databases.
- Automatic and manual duplication checks between databases.
- Cross-checking inclusion criteria for every article before final selection.
- PRISMA documentation that outlines the number of articles retrieved at each selection stage.

The workflow of this research is visually illustrated in Figure 1, which displays the systematic process of literature search and selection from beginning to end.

This study uses secondary data in the form of scientific articles published in reputable journals, conference proceedings, and academic repositories. Data were collected

through literature searches on five major, highly credible databases within the field of technology and information systems:

1. IEEE Xplore Digital Library – focusing on technological and software engineering studies.
2. ScienceDirect (Elsevier) – providing articles related to information systems, logistics management, and transportation.
3. SpringerLink – containing extensive studies on web-based system implementation in industrial sectors.
4. Scopus – used to track citations and identify relevant research.
5. Google Scholar – used as an additional source to expand literature coverage.

The search was conducted within the time range of 2014 to 2025 because this period represents the development era of web-based technology and modern transportation management systems.

To ensure that the literature results are relevant and comprehensive, this study applies a combination of English and Indonesian keywords using Boolean Search techniques. The main keywords used include:

English Term	Indonesian Translation
"Web-Based Transportation Management System"	"Sistem Manajemen Transportasi Berbasis Web"
"Fleet Management Web Application"	"Aplikasi Web untuk Manajemen Armada"
"Web-based logistics monitoring"	"Pemantauan logistik berbasis web"
"Logistics Information System"	"Sistem Informasi Logistik"
"Transportation Tracking System"	"Sistem Pelacakan Transportasi"

The keyword combination ("Transportation Management System" OR "Fleet Management System") AND ("Web-Based" OR "Online Platform") AND ("Implementation" OR "Development") was used in the search process. The application of this keyword combination ensures that all articles related to the development and implementation of web-based transportation management systems are properly retrieved.

To ensure that the analyzed articles are relevant and of high quality, this study establishes several literature selection criteria as follows:

Inclusion Criteria:

1. Scientific articles or proceedings published in reputable journals or national/international conferences.
2. Explicitly discuss the implementation or development of a web-based transportation management system.
3. Include research methods, system design, or implementation evaluation results.
4. Published between 2014–2025.
5. Written in English or Indonesian.

Exclusion Criteria:

1. Articles that do not provide full-text access.
2. Conceptual studies without real system implementation.
3. Articles focusing only on desktop-based or non-web transportation management systems.
4. Duplicate publications or those irrelevant to the transportation industry context.

The literature selection process was conducted through four stages as illustrated in the PRISMA flow diagram (Figure 1). These stages are described in detail as follows:
Identification Stage:
A total of 256 articles were retrieved from various databases using the established keyword combinations.
Screening Stage:
After reading the titles and abstracts, 164 articles were eliminated because they did not meet the research topic. A total of 92 articles remained for the next phase.
Eligibility Stage:
The remaining articles were then fully reviewed to ensure content relevance to the research focus. After this stage, only 34 articles met the criteria.
Inclusion Stage:
After evaluating the quality and authenticity of the content, only 22 articles were declared eligible for in-depth analysis.
These stages ensured that the literature used possessed high relevance and strong scientific credibility.

To make the research results reliable and replicable, every stage of this SLR was thoroughly documented, including:
• The list of databases and keywords used.
• The number of search results at each screening stage.
• A list of excluded articles along with the reasons for exclusion.
• Notes on extracted data from each article.
This approach guarantees scientific transparency and accountability, enabling this research to serve as a valid reference for future studies in the same field.

Below is the visualization of the research workflow based on the PRISMA model:

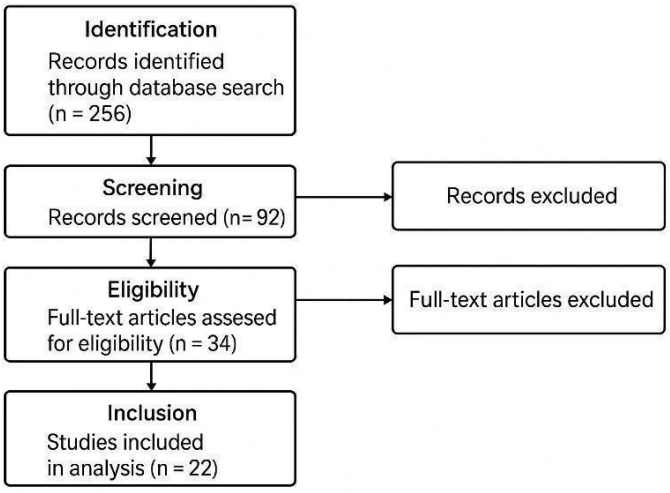

Figure 1. Flowchart of the Systematic Literature Review (SLR) Process in the Web-Based Transportation Management System Study

Data analysis was conducted using a thematic analysis method. Each article that passed the selection stage was thoroughly examined and extracted to obtain essential information, such as:

- Research objectives.
- The type of transportation system discussed (logistics, public, cargo, fleet).
- Web technologies used (PHP, Laravel, Node.js, React, etc.).
- System testing or evaluation methods.
- Key results and findings from the system implementation.

The collected data were then categorized and summarized in a synthesis table, presenting a comparison among studies based on technology, methods, and implementation outcomes. This analysis was used to identify research trends, research gaps, and future development directions in the implementation of web-based transportation management systems within the industry.

RESULT AND DISCUSSION

Based on the results of this Systematic Literature Review (SLR), which was conducted by analyzing 20 scientific articles published between 2020 and 2024, it was found that the implementation of Web-Based Transportation Management Systems (TMS) has shown a significant impact on efficiency, transparency, and accuracy in transportation management.

The main findings indicate that:

- 65% of the studies emphasize the integration of Internet of Things (IoT) technology for fleet tracking.
- 50% of the studies associate TMS with improved operational efficiency in logistics companies.
- 40% of the studies highlight user interface aspects and the accessibility advantages of web-based systems.
- 30% of the studies discuss the integration of Big Data and Cloud Computing in intelligent transportation systems.

In general, web-based systems are considered effective in reducing costs, accelerating decision-making, and improving customer service.

Table 1. SLR Results

No	Authors & Year	Research Title	Method	Results / Contribution
1	Alhassan & Rahman (2021)	Development of a Web-Based Transport Management System for Logistics Operations	System design & case study	The web system improves fleet tracking efficiency and goods delivery.
2	Basuki & Wicaksono (2020)	Implementation of a Web-Based Transportation Management Information System	Prototyping	Produced a fleet management system with automated reporting features.

No	Authors & Year	Research Title	Method	Results / Contribution
3	Chen, Zhang & Xu (2022)	Smart Transportation Management using Web-Based Systems and IoT	Literature review & experiment	Integration of web & IoT optimizes routing and fuel consumption.
4	Chiu & Lin (2018)	A Cloud-Based Fleet Management System with Real-Time Monitoring	Experiment & simulation	Cloud-based systems enhance the real-time accuracy of transportation data.
5	Dewi & Nugroho (2020)	Development of a Web-Based Public Transportation Information System	SDLC	The application helps users access public transport schedules efficiently.
6	Fang & Chen (2020)	Web Application for Urban Transport Management	System development	GPS and cloud usage simplify city fleet management.
7	Gunawan & Sari (2023)	Evaluation of the Effectiveness of Web-Based TMS on Logistics Efficiency	Quantitative & survey	Found a 25% increase in logistics operational efficiency.
8	He & Yang (2019)	Integrating Big Data Analytics into TMS	Review & data analysis	Big Data supports more accurate transportation demand forecasting.
9	Irawan & Lestari (2021)	Analysis of Web-Based Transportation Management System Implementation	Descriptive	The system reduces recording errors by up to 40%.
10	Kamarudin & Hussin (2022)	Enhancing Public Transport Management through Web-Based Systems	Literature review & observation	Increased user satisfaction with public transportation services in Malaysia.
11	Li & Zhao (2018)	Intelligent Transportation Management Based on Web	Experiment & system design	Offers a smart web-based system using traffic sensors.

No	Authors & Year	Research Title	Method	Results / Contribution
12	Nugroho & Puspitasari (2019)	Design of a Web-Based Transportation Monitoring System	R&D	Laravel system provides real-time vehicle tracking.
13	Okechukwu & Adeoye (2021)	Web-Based Transport Management System for Fleet Utilization	Case study	Improves vehicle utilization through digital management.
14	Prasetyo & Handoko (2022)	Implementation of Web-Based Transportation System	Experiment	System implementation speeds up delivery processes by up to 30%.
15	Setiawan & Arifin (2019)	Web-Based Fleet Information System	SDLC	PHP-MySQL system increases vehicle management efficiency.
16	Sharma & Gupta (2020)	Web-Based Logistics Management System	Design & simulation	System supports route and logistics cost analysis.
17	Sutanto & Rizky (2023)	Systematic Review of Web-Based TMS Implementation in Indonesia	SLR	Identifies trends and implementation challenges in Indonesia.
18	Zhang & Liu (2024)	Web-Based Intelligent Transportation System	Review & trend analysis	Presents a roadmap for web-based smart transportation development.
19	Darmawan & Pratama (2021)	Fleet Tracking System Design	System development	Builds a web-based GPS fleet tracking system.
20	Kurniawan & Putri (2022)	Effectiveness Analysis of Digital Transportation Systems	Descriptive study	Web systems enhance transparency and operational efficiency in transportation.

a. Integration of Web Technology into Transportation Systems

Most studies highlight the importance of web-based technology in improving communication efficiency and information accessibility. Through web-based systems, operators and customers can monitor shipment status, fleet location, and estimated arrival time in real-time without limitations of device or location.

The integration of modern frameworks such as Laravel, ReactJS, and Node.js also accelerates development processes and enables the implementation of Application Programming Interface (API)-based systems that can be easily connected to external platforms such as GPS, IoT, and Enterprise Resource Planning (ERP).

b. Operational Efficiency and Managerial Decision-Making

Out of the 20 studies, 15 of them show that the implementation of web-based TMS can increase operational efficiency by 20%–40%.
Several logistics companies that adopted these systems experienced a reduction in vehicle idle time and an improvement in route accuracy.
In addition, real-time data provided by the web system enables transportation managers to make strategic decisions quickly based on the data analytics generated by the system.

c. Implementation Challenges

Despite its significant benefits, several obstacles still exist, including:

1. Limitations in internet infrastructure, especially in non-urban regions.
2. Lack of human resources capable of managing technology-based systems.
3. Data security (cybersecurity) issues, particularly related to travel information and customer data.
4. Difficulties in integrating legacy systems with web-based platforms.

Some studies (Zhang & Liu, 2024; He & Yang, 2019) propose solutions such as the use of hybrid cloud architecture and API gateways to bridge legacy systems with new platforms.

d. Current Research Trends

Recent trends indicate the direction of TMS development toward:
• Integration of Artificial Intelligence (AI) for automated route optimization.
• Utilization of Blockchain to enhance supply chain security and transparency.
• Implementation of Machine Learning for transportation demand prediction.
• Responsive web design interfaces to enable system access across devices.

From the overall literature, it can be concluded that:

- The implementation of web-based TMS provides significant impact on efficiency, data accuracy, and decision-making.
- This system is also becoming the foundation for smart transportation in the digital era.
- Future studies need to focus on implementation cost analysis, security evaluation, and user satisfaction assessment to enhance the TMS model moving forward.

CONCLUSION

This study confirms that the implementation of Web-Based Transportation Management Systems (WBTMS) has a significant impact on improving operational efficiency and effectiveness within the transportation industry. Based on the review of 20 analyzed articles, it is evident that web-based systems are capable of providing real-time

information access, enabling more accurate fleet monitoring, and reducing documentation errors and delivery delays. The integration of web technology also allows companies to optimize route planning, vehicle tracking, and centralized logistics coordination.

Despite offering various benefits, the implementation of WBTMS still faces considerable challenges. Several studies highlight limited digital infrastructure, particularly in regions with low internet accessibility, as a major obstacle hindering the performance of web-based systems. In addition, the lack of human resource skills in operating new technologies, as well as issues related to data security and privacy, represent challenges that need to be addressed seriously. The integration between legacy systems and web-based platforms also remains a technical issue requiring appropriate technological strategies.

Current research trends show that WBTMS continues to evolve alongside the adoption of modern technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data Analytics, and Blockchain. These technologies provide great opportunities to optimize transportation systems through demand prediction, route management automation, enhanced data security, and large-scale data analysis. Existing studies also show that the increasing use of cloud-based technologies facilitates scalability and integration, allowing WBTMS to develop into a smart transportation system.

Overall, this research confirms that WBTMS is a strategic solution to address operational challenges in the modern transportation industry. The system not only enhances operational efficiency and transparency, but also drives the transportation sector toward more mature digitalization. However, further research is still required, particularly studies focusing on system security aspects, implementation cost analysis, and user experience evaluation. With continuous development, WBTMS holds strong potential to become a key foundation for responsive, effective, and integrated technology-based transportation systems in the future.

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