

THE INFLUENCE OF E-SERVICE QUALITY ON DATA-DRIVEN CULTURE MODERATED BY BI ADOPTION & AI READINESS IN INDONESIAN TRANSPORTATION SUPPORT SERVICES PROVIDER

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Abstract:

Background: This study examines e-service quality, BI, and AI in the digital food ordering services of a state-owned transportation company.

Purpose: This study aims to examine the direct effect of e-service quality on data-driven culture and the moderating roles of business intelligence (BI) implementation and artificial intelligence (AI) readiness.

Design/Methodology/Approach: This study used a descriptive quantitative method. The sample was selected using purposive sampling method. A total of 63 respondents were involved in the study. The sample size is acceptable as PLS-SEM is robust with small samples and meets the 10-times rule. Primary and secondary data were used. The researcher obtained primary data using questionnaires. Secondary data were obtained from the company's internal information system. Data were collected through a literature review and questionnaires. The data were analyzed using the PLS-SEM method.

Findings/Results: This study found that service quality positively affects a company's data-driven culture. Based on respondents' perceptions, AI readiness, and BI implementation, the correlation between electronic service quality and data-driven culture is supported. However, BI implementation has a more decisive influence than AI readiness. This condition is likely due to earlier implementation, stronger integration, and greater organizational readiness.

Conclusions: Theoretically, this study extends technology adoption and service quality theories by demonstrating that improving e-service quality, combined with BI and AI readiness, enhances a data-driven decision-making culture in the public sector. Practically, this study recommends improving system availability and responsiveness, optimizing BI for real-time analytics, and accelerating AI implementation, such as chatbots and predictive analytics, to increase customer satisfaction and operational efficiency.

Keywords: business intelligence, artificial intelligence, e-service quality, data-driven culture, transportation services

How to Cite:

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INTRODUCTION

The object of this study is a state-owned transportation holding company that has introduced various innovations to improve its service quality and expand its operational reach. One of these innovations is food service during travel, which is managed by a subsidiary company. In line with the development of digital technology, the subsidiary introduced an online food ordering system accessible via websites and mobile applications to enhance passenger comfort (Almaqtari & Abdullah, 2024). Keeping up with developments in digital technology, this subsidiary introduced an online food ordering system. The system can be accessed via a website or mobile application. This service aims to improve passenger comfort. Passengers can easily obtain various types of food and drinks during their journey. Food can be ordered before or during transit. (Almaqtari et al. 2024). This subsidiary has implemented electronic service quality in its online food ordering service.

Although online transactions increased from 5.44% in 2023 to 7.95% by October 2024, the contribution remains relatively small compared to total sales (Almazmomi et al. 2022). Although online transactions increased from 5.44% in 2023 to 7.95% by October 2024, the contribution remains relatively small compared to total sales (Alsaad et al. 2022). There were 58% of questions and complaints related to food and beverage delivery, 17% to general questions, and 16% to ordering procedures and other issues from January to July 2024. Delays in food delivery negatively affect customer satisfaction. Therefore, effective logistics management is critical, particularly in digital services. Companies hope to provide reliable and fast services (Frank, 2024). A technology-based approach is essential for addressing these challenges. BI can analyze complaint patterns, whereas AI can improve handling efficiency and responsiveness (Hair et al. 2018).

This booking service app has received low ratings from the Google Play Store and Apple App Store users. This indicates that the quality of digital services, particularly those related to system response speed, ease of navigation, and mobile application reliability, must be evaluated (Hassan et al. 2024).

The company's internal information system uses tools such as PHP and Grafana dashboards. However, its use has not been optimal in management. Instead of using dashboards, management prefers to use reports in PDF or PPT formats during the holiday season. Data are increasingly complex, and decisions must be made faster. Thus, there is an excellent opportunity to maximize BI use.

The BI variable acts as a moderating variable. Many previous studies have generally positioned BI as an independent variable that directly influences the dependent variable, especially during the COVID-19 pandemic, when data analysis and digitalization have become increasingly important (Nguyen et al. 2022). The novelty of this study is the use of BI as a moderating variable that strengthens the relationship between Electronic service quality (ESQ) and data-based culture.

AI is discussed in this study because of its increasing relevance in recent years, especially after the Covid-19 pandemic (Vatolkina et al. 2020). In this study, AI was used as a moderating variable. AI is expected that AI can strengthen the relationship between variables. Primarily, it supports organizations in using a data-driven decision-making culture through more sophisticated automation and analytical capabilities (Chaudhuri et al. 2024). This study discusses data-driven culture to understand how companies can utilize big data effectively. According to Lin & Chen (2021), companies that start using big data face challenges. This study was conducted to learn how to build and improve a data-driven decision-making culture in organizations (Issa et al. 2021). In addition, to strengthen this culture, this study also identifies the important roles of AI and BI.

This study shows a significant contribution by combining these variables in the context of a data-driven culture and digital transformation. No previous research has explicitly investigated the effect of ESQ on a data-driven culture with the moderating roles of BI and AI. Most prior studies have positioned BI as an independent variable rather than a moderator. This study provides a new scientific contribution by examining BI and AI as moderating variables that strengthen the ESQ-DDC relationship, while also extending the application of the Resource-Based View (RBV) in the context of digital transformation in the transportation sector.

Based on the literature review conducted, most studies on e-service quality (ESQ) have focused on its impact on customer satisfaction and loyalty (e.g., Bitner, 2000; Stamenkov & Dika, 2015; Chaudhuri et al. 2024) and have not examined its relationship with organizational data-driven culture. No meta-analysis or systematic literature review has been found that explicitly links ESQ to the development of a data-driven organizational culture. Therefore, this study provides novelty by positioning ESQ as a trigger for a data-driven culture moderated by BI adoption and AI readiness, extending prior research from a customer-level focus to an organizational-level perspective.

This study discusses the main theories of the resource-based view (RBV). It asserts that an organization's competitive advantage depends on valuable, rare, inimitable, and irreplaceable (VRIN) resources (Barney, 2000). Technology and data increase the organization's competitiveness. Data-driven supply chain capabilities have a positive effect on financial performance (Yu et al. 2018). This supports the RBV principle that data-driven capabilities improve efficiency and decision-making.

Electronic service quality plays an important role in enhancing customer experience and satisfaction according to Bitner (2000). ESQ is influenced by the accessibility, reliability, and responsiveness of digital services (Dika & Stamenkov, 2015). Previous studies have linked ESQ with customer satisfaction and loyalty (Chaudhuri et al. 2024), but very few have examined its relationship with data-driven culture (DDC). Moreover, the implementation of Business Intelligence (BI) and Artificial Intelligence (AI) has been proven to improve operational efficiency and support data-driven decision-making (Gupta et al. 2022; Chen et al. 2024).

In decision-making and data analysis, BI plays an important role. According to Qatawneh (2024), BI can provide visual insights that support more effective business planning. Gupta et al. (2022) explain that AI can improve operational efficiency. It can be done through fraud detection, business trend prediction, and customer service automation. According to Chen et al. (2024) AI can accelerate customer response and strengthen a data-driven culture.

According to Yu et al. (2021), a data-driven culture (DDC) enables organizations to maximize data utilization through Big Data Analytics Capability

(BDAC) and encourages evidence-based decision-making (Barbala et al. 2024).

DDC has a role in shaping a data-based work culture. ESQ is a trigger, and AI and BI are moderator variables that strengthen the relationship. This study uses the RBV framework to examine the influence of ESQ on data-based culture. It will present a new perspective on digital service transformation. It confirms that data, the use of AI and BI, and improving digital services are important in the hospitality and transportation sectors.

The purpose of this study is to explore how BI systems can be improved through deep analytics integration for example, predictive analytics or AI (Qatawneh, 2024; Gupta et al. 2022). This approach enables BI platforms, including Grafana, to support more strategic data-driven decision-making.

Electronic service quality (ESQ) is important. (Sahoo et al. 2024). Oftentimes, digital interactions become a connecting medium between companies and their customers (Paul & Kalia, 2021). Various factors influence the quality of digital services, including ease of access, reliability, and speed (Keller & Kotler, 2019). The quality of e-services also depends on the company's speed in responding to consumer needs through digital platforms (Ellis-Chadwick & Chaffey, 2012). Readiness to implement AI and BI can moderate the correlation between e-service quality and data-driven culture. According to Siwarit & Cattapan (2022) implementing this technology can facilitate rapid response and increase operational efficiency and customer experience.

Chaudhuri et al. (2024) explained that ESQ is generally associated with customer satisfaction and loyalty. This study links ESQ to the formation of a data-based organizational culture (Wamba et al. 2024). This is something new because no previous research discusses the correlation between ESQ and data-based organizational culture (Cheng et al. 2023), this study provides a new perspective. It aligns with this company's growing trend of service digitalization.

METHODS

This study uses a quantitative descriptive method, which is suitable for answering problems related to the impact of ESQ on data-based culture and the role of AI and BI in moderation. The study was conducted at a transportation

support service provider company in Indonesia, a subsidiary of the Indonesian National Transportation Holding Company.

This study used both primary and secondary data. The primary data collected by the researchers was obtained from the questionnaires. These data were tested for validity and reliability. Management can use this data to explore information about ESQ, AI readiness, BI adoption and data-driven culture. Meanwhile, the secondary data was obtained from observations and the company's internal information system. Both data types allow researchers to validate their findings and provide in-depth analysis (Creswell & Creswell, 2018).

Data were collected by conducting observations, literature studies, documentation, and distributing questionnaires. Sampling was carried out by applying purposive sampling. Of the 141 employees, 63 respondents were selected. Although this study involved only 63 respondents, the sample size is acceptable for PLS-SEM analysis because the method is robust with small samples, particularly in exploratory research with moderating variables (Sugiyono, 2022). Additionally, the sample fulfills the "10-times rule," as it exceeds ten times the largest number of structural paths directed to a single construct. A post-hoc power analysis also indicates that this sample size is sufficient to detect medium effect sizes with a statistical power of 0.80 at a 5% significance level. The population consists of employees in managerial positions, assistant managers, and specialists. Respondents were selected based on their position and involvement with the company's online ordering system. Data were collected through questionnaires from January 13, 2025, to February 7, 2025. Distribution was carried out through instant messaging platforms.

Data analysis using the PLS-SEM method. This method allows the use of smaller samples. It is explained by Chin (2000). He stated that 30 to 100 respondents are sufficient for analysis with this method. The recommended sample size is at least 10 times the number of latent variables (Hair et al. 2021). In this study, the latent variables have five indicators. So, the minimum sample size is 50 respondents (5 indicators x 10). That way, 63 respondents can be accepted according to these guidelines. Researchers can get respondents' contact data from the company's internal information system.

Figure 1 shows that the framework illustrates how E-Service Quality (ESQ) influences the development of a Data-Driven Culture (DDC), with the moderating roles of Business Intelligence (BI) Adoption and Artificial Intelligence (AI) Readiness. ESQ, covering efficiency, system availability, responsiveness, contact and privacy, directly supports the integration of data into organizational practices. BI strengthen this relationship by providing actionable insights and easy-to-consume reports for decision-making, while AI readiness enhances it through predictive and automation capabilities. Together, these factors demonstrate that high-quality digital services, supported by BI and AI, foster a stronger and more sustainable data-driven culture.

The hypotheses in this study include:

H1: The quality of e-services influences data-based culture. H1 proposed because this study examines electronic service quality (ESQ) from an organizational perspective, particularly from managers' viewpoints. While prior research has mostly focused on ESQ's impact on customer satisfaction, this study extends the discussion by positioning ESQ within the organizational context (Stamenkov & Dika, 2015).

H2: Implementing business intelligence supports the correlation between the quality of e-services and data-driven culture. H2 proposed because Business Intelligence (BI) adoption has been shown to improve organizational decision-making performance and efficiency, especially during digital transformation. Prior studies highlight that BI enables managers to process complex data into actionable insights, thereby strengthening the relationship shown in TOE's framework to organizational outcomes (Qataweh, 2024).

H3: The readiness of artificial intelligence supports the correlation between the quality of e-services and data-driven culture. H3 proposed because AI readiness reflects relative advantage, technological competence, and organizational support that enable effective adoption (Gupta et al. 2022). In this research context by enhancing AI readiness from TOE's framework is expected to strengthen the relationship between e-service quality and organizational environment, such as data-driven culture.

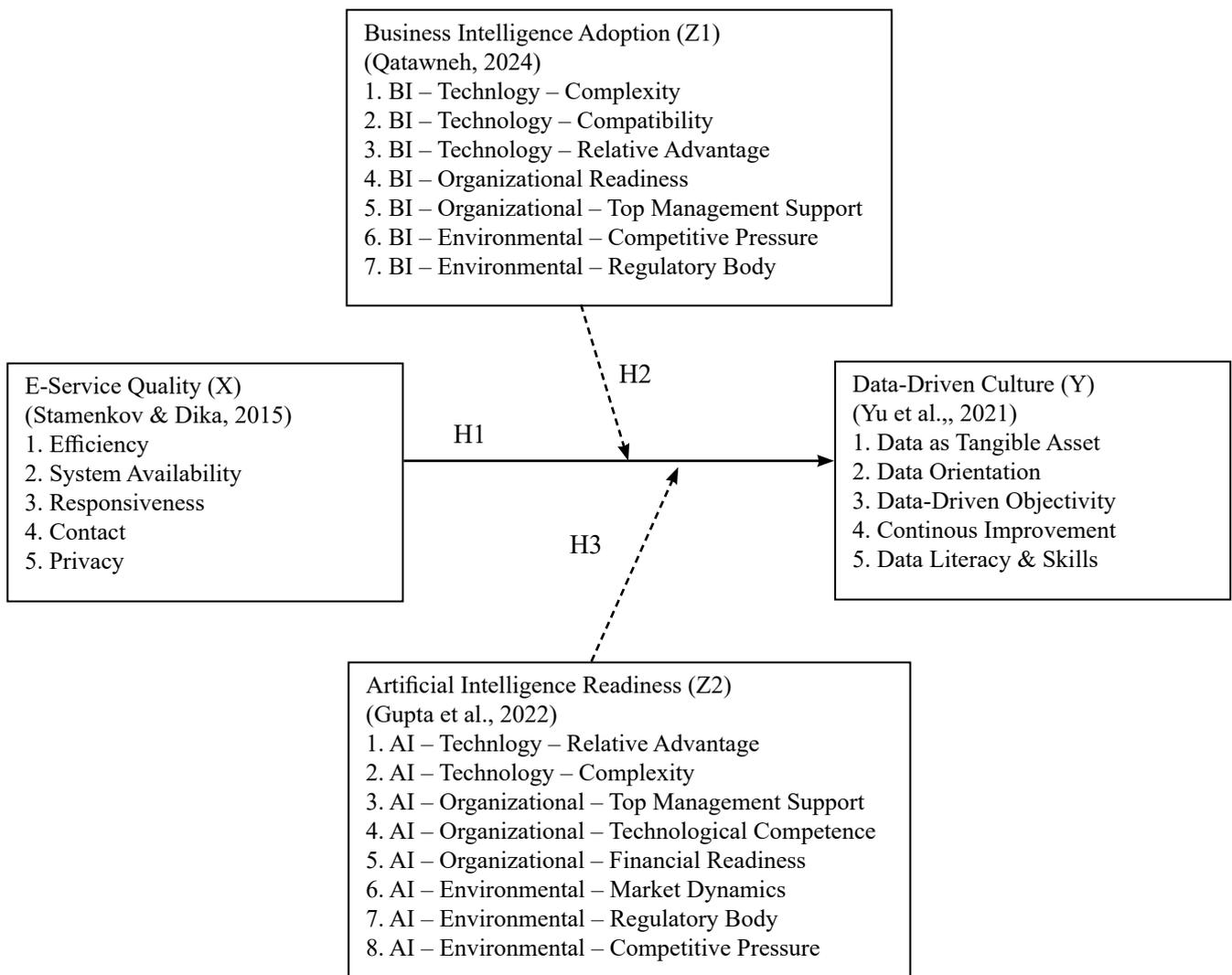


Figure 1. Research thinking frameworks

RESULTS

Researchers obtained primary data through questionnaires. The sample was 63 respondents. The internal model was tested by evaluating the outer and inner model measurements against the results of hypothesis testing. Outer model measurements include reliability tests, validity tests, Fornell-Larcker criteria, respondent response scores, and heterotrait-monotrait ratios. Meanwhile, inner model measurements consist of VIF values, f^2 size effect values, Q^2 prediction, and R-square values.

As shown in Table 1, the results indicate that all questionnaire items used in this study are valid. This is evidenced by the calculated r-values for each questionnaire item of each variable being greater than r-table value (0.3). This means that all variable question items have a satisfactory level of validity, which indicates that they can measure the variables being studied.

Table 2 shows that each variable's reliability value is higher than the critical value of 0.7. Based on Cronbach's Alpha results, each variable shows acceptable reliability. This emphasizes that the measuring instrument provides consistent results.

Table 3 shows that the average score for all variables falls within the good category. However, ESQ received the lowest score compared to the others. This lower ESQ score is primarily due to the dimensions of system availability and responsiveness. Respondents have high expectations regarding BI adoption and AI readiness. Although AI is still in the process of being implemented, respondents appeared to be well-informed.

Figure 2 shows that the path coefficient value from the calculation of the effect of ESQ on data-based culture is 0.581. When moderated by BI adoption, the interaction effect of ESQ and BI on data-driven culture is 0.209. Similarly, when moderated by AI readiness,

the interaction effect of ESQ and AI on data-driven culture 0.143. For the data-based cultural model, the R-squared value is 0.596. The error term is 0.404 (1 - 0.596). The structural model for the correlation is:

$$DDC = 0.581 \text{ E-SQ} + 0.209 (\text{ABI} \times \text{ESQ}) + 0.143 (\text{AAI} \times \text{ESQ}) + 0.404 \quad (1)$$

Where: DDC (Data-Driven Culture); ESQ (E-Service Quality); ABI x ESQ (Interaction between ESQ and BI Adoption); AAI x ESQ (Interaction between ESQ and AI Readiness)

Table 4 shows that a comparison of correlation values between constructs and the square root of the average

variance extracted (AVE), represented on the diagonal of the matrix, shows that the square root of AVE for each variable is greater than the correlation values between the construct of the research variables. These indicate that the discriminant validity of each latent variable is high and that all constructs exhibit good consistency.

Table 5 shows that discriminant validity is assessed by the HTMT ratio. HTMT values below 0.8 or between 0.8 and 1 indicate that the research variable has good discriminant validity. That is, it is acceptable (Ketchen, 2013). The results of the R-square value for the research model calculated using SmartPLS 4 Software in Figure 3.

Table 1. Validity Test Results

Variable	Critical Value	Conclusion
E-Service Quality	0.3	Valid
Data-Driven Culture	0.3	Valid
Business Intelligence Adoption	0.3	Valid
Artificial Intelligence Readiness	0.3	Valid

Table 2. Reliability Test Results

Variable	Number of Items	Reliability Coefficient (Cronbach's Alpha)	Critical Value	Conclusion
E-Service Quality	5	0.878	0.7	Reliable
Data-Driven Culture	5	0.802	0.7	Reliable
Business Intelligence Adoption	9	0.860	0.7	Reliable
Artificial Intelligence Readiness	10	0.826	0.7	Reliable

Table 3. Respondent Response Scores

Variable	Total Score	Average	Category
E-Service Quality	1334	4.23	Good
Data-Driven Culture	1389	4.41	Good
Business Intelligence Adoption	608	4.83	Good
Artificial Intelligence Readiness	581	4.61	Good

Table 4. Discriminant Validity Assessment with Fornell-Larcker Criteria

	Artificial Intelligence Readiness	Business Intelligence Adoption	Data-Driven Culture	E-Service Quality
Artificial Intelligence Readiness	0.887			
Business Intelligence Adoption	0.360	0.902		
Data-Driven Culture	0.123	0.321	0.749	
E-Service Quality	0.097	0.295	0.711	0.822

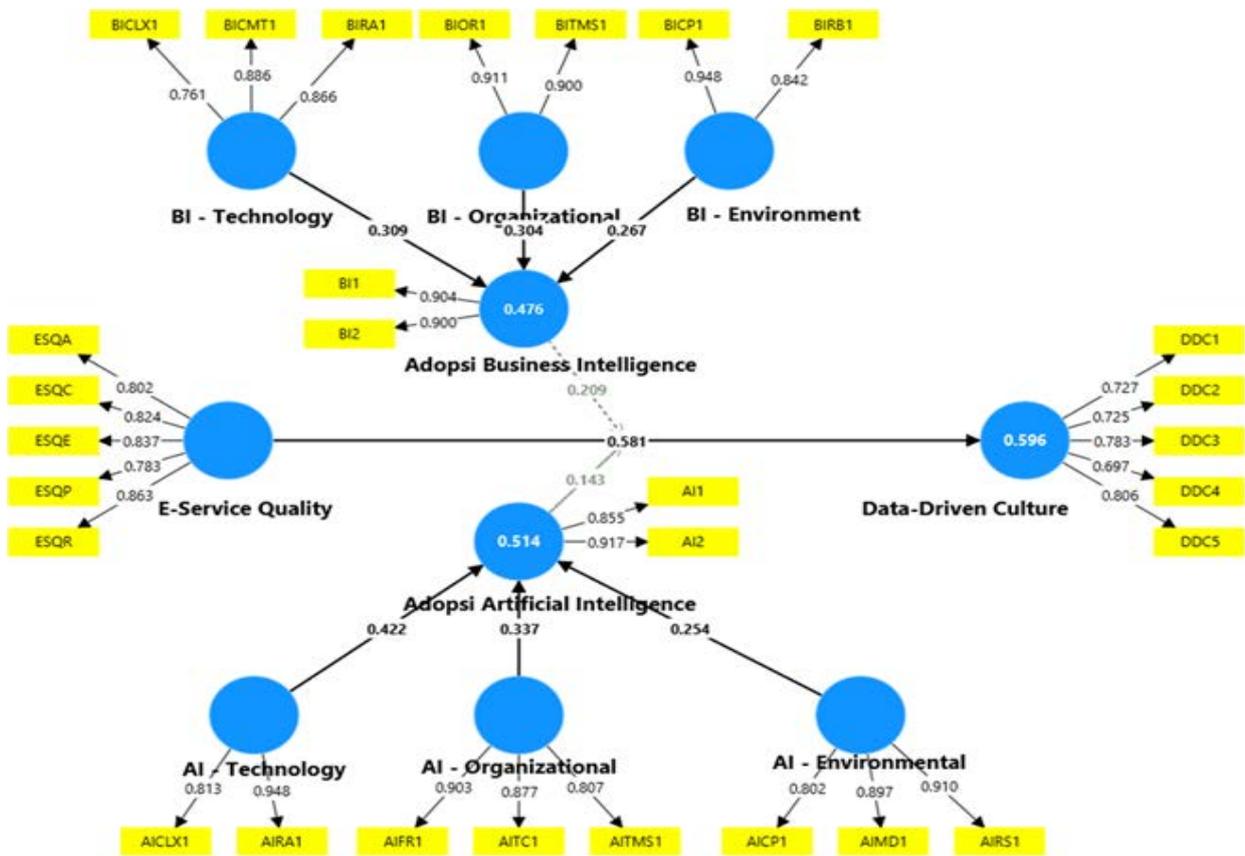


Figure 2. Path Diagram of SEM Model using Partial Least Square (PLS) Approach

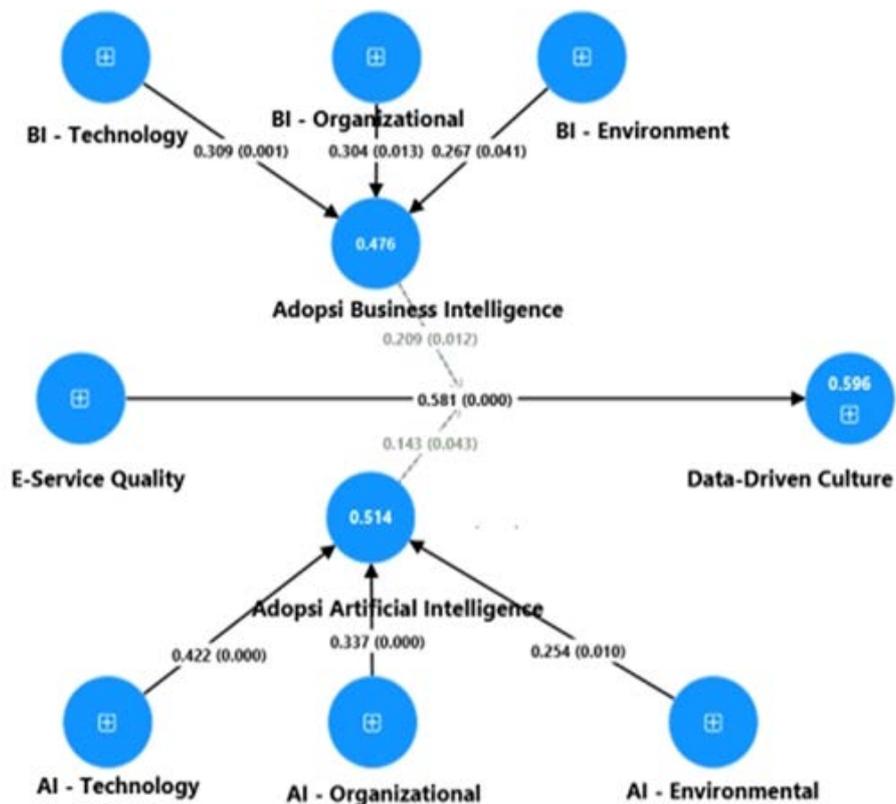


Figure 3. Structural model results

Table 6 shows that the R-square value for the data-driven culture variable was 0.596. An R^2 value between 0.5 and 0.75 indicates that the accuracy of the model's predictions has a moderate effect. ESQ can explain 59.6% of the variation in a data-driven culture, with BI adoption as the moderating variable. The results of the calculation of the effect of the contribution value of each exogenous construct size f^2 are presented in the following Table 7.

Effect size values of f^2 of 0.02, 0.15, and 0.35 are interpreted as slight, moderate, and significant effects, respectively. The f^2 value for the effect of ESQ on data-driven culture is 0.682 (> 0.35). It indicates a strong effect. The f^2 value for BI adoption on data-driven culture is 0.074, which falls in the small effect range (0.02 – 0.15). Similarly, the f^2 value for AI readiness on data-driven culture is 0.074, indicating a small effect as well. The Q-square (Q^2) value, which measures predictive relevance, is 0.558 for the data-driven culture variable, as indicated in Table 8.

The value is above 0, which indicates that the model has predictive relevance. The Q^2 predict value is greater than 0.5 ($Q^2 > 0.5$), 0.558, which indicates that the model has high predictive relevance for data-based culture.

Table 9 shows that model's standardized root mean square residual (SRMR) value is 0.110, which indicates that the model has an acceptable fit. Based on cross-loadings, the discriminant analysis results show that the factor loadings (LF) for each indicator of each latent variable are higher than the factor loadings (LF) when connected to other latent variables or dimensions. The bootstrapping analysis was conducted using data from the measurement stage. In bootstrapping, the t-value generated must be greater than the critical t-value of 1.96 for a significance level (α) of 5% or a p-value of less than 0.05.

Table 5. Heterotrait-Monotrait Ratio (HTMT)

	Heterotrait-Monotrait Ratio (HTMT)
E-Service Quality ↔ Data-Driven Culture	0.826
Data-Driven Culture ↔ Artificial Intelligence Readiness	0.219
Data-Driven Culture ↔ Business Intelligence Adoption	0.390
Business Intelligence Adoption ↔ Artificial Intelligence Readiness	0.487

Table 6. R-Square Value

	R-Square	R-Square Adjusted
Data-Driven Culture	0.596	0.561

Table 7. Assessment of Effect Size

	f-square	Category
E-Service Quality → Data-Driven Culture	0.682	Big
Business Intelligence Adoption x E-Service Quality → Data-Driven Culture	0.074	Small
Artificial Intelligence Readiness x E-Service Quality → Data-Driven Culture	0.047	Small

Table 8. Q^2 predict Value

	Q^2 predict
Data-Driven Culture	0.558

Table 10 shows that the relationship between ESQ and data-driven culture is indicated by a path coefficient value of 0.581 with a t-value of 7.258 and a p-value of 0.000. Since the t-statistic value is higher than the critical value of 1.96 and the p-value is below the Alpha value of 0.05, this confirms statistical significance. The null hypothesis (H0) is rejected. Significantly, ESQ influences data-driven culture. The interaction coefficient between ESQ and BI adoption on data-driven culture is 0.209. The t-value is 2.519, and the p-value is 0.012. These results indicate that BI adoption moderates the influence of ESQ on data-driven culture (Wang et al. 2022). The interaction coefficient value between ESQ and AI readiness for data-driven culture is 0.143. The t-value is 2.025, and the p-value is 0.043. The results indicate that AI readiness moderates the influence of ESQ on data-driven culture. Based on a descriptive analysis of ESQ, five main dimensions were evaluated: efficiency, system availability, responsiveness, contact, and privacy. Several relevant indicators are used to evaluate each dimension. It is done to determine respondents' perceptions of the quality of electronic services (Thanabalan et al. 2024).

The total score for ESQ is 1334, and the average score is 4.23. This score falls into the good category. Respondents generally have a positive perception of the company's electronic services. However, there are several dimensions that can be further improved, particularly system availability and responsiveness. This two-dimensional improvement significantly affects the overall user experience. These results provide

important insights for the company to continuously improve its digital services. While efficiency and security are the main strengths of enterprise-level electronic services (Huang et al. 2022), the company needs to pay more attention to the aspects of system availability and responsiveness in resolving customer issues. Companies can improve customer perception of ESQ by improving aspects with lower scores. Customer perception has a positive influence on customer loyalty and trust.

Influence of E-Service Quality on Data-Driven Culture

Based on the test results, ESQ has a significant effect on data-driven culture. The path coefficient value is 0.581, the t-statistic value is 7.258 (greater than 1.96), and the p-value is 0.000 (less than 0.05). These statistical findings reflect the importance of electronic service quality in shaping a data-driven culture at the subsidiary company. The speed, reliability, and accessibility of digital services, such as online ordering through the mobile application and website, directly affect the company's ability to integrate data into decision-making. However, the low percentage of online order transactions (7.95%) indicates that there is a gap between the potential of ESQ and its implementation. To further strengthen the data-driven culture, the subsidiary company should focus on increasing customer acceptance of digital services through education, promotion, and user experience improvement.

Table 9. Fit Summary

	Saturated Model	Estimated Model
SRMR	0.104	0.110
d_ ULS	4.744	5.300
d_ G	2.215	2.292
Chi-square	689.161	704.848
NFI	0.498	0.487

Table 10. Significance Test Results

Variable Relationship	Original Sample (O)	Sample Mean	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
E-Service Quality → Data-Driven Culture	0.581	0.590	0.080	7.258	0.000
Business Intelligence Adoption x E-Service Quality → Data-Driven Culture	0.209	0.196	0.083	2.519	0.012
Artificial Intelligence Readiness x E-Service Quality → Data-Driven Culture	0.143	0.144	0.071	2.025	0.043

Moderating the Adoption of Business Intelligence on the Influence of E-Service Quality on Data-Driven Culture

The test results showed that implementing BI significantly moderated the correlation between ESQ and data-driven culture. The interaction coefficient value is 0.209, the t-statistic is 2.519, and the p-value is 0.012. The findings indicate that e-service quality (ESQ) significantly influences the development of a data-driven culture (DDC). This relationship can be explained through two main mechanisms. First, Service Quality Theory suggests that fast, reliable, and accessible digital interactions foster customer trust and engagement, leading to the generation of transactional and behavioral data that organizations can leverage (Bitner, 2000; Keller & Kotler, 2019). Improved ESQ encourages customers to use digital services more frequently, which enriches the company's internal data ecosystem. From the Resource-Based View (RBV) perspective, customer data generated from digital service interactions represents a valuable and rare resource. When the company successfully integrates these data into decision-making processes, a data-driven culture naturally emerges. In other words, ESQ acts as a catalyst for DDC because higher service quality enhances the volume, reliability, and timeliness of the data that underpin evidence-based decisions.

The moderating roles of BI and AI further strengthen this relationship by transforming digital service data into actionable insights. BI provides descriptive analytics and visualization to uncover transaction patterns, while AI enables predictive capabilities and automated responses to complaints or demand trends (Chen et al. 2024). The integration of BI and AI accelerates the feedback loop from customer interactions to managerial decision-making, reinforcing a culture that relies on data as a strategic asset.

Business intelligence strengthens the influence of digital services on data-driven culture by providing deeper and integrated operational insights. At the subsidiary company, it can be used to process data from various sources such as online order transactions, customer service through the WhatsApp hotline, and sales through digital platforms, resulting in reports that support data-driven decision-making. BI helps improve operational efficiency and customer service (Chao et al. 2024). With BI, management can monitor the performance of digital services in real-time

(Rajaobelina et al. 2022), such as customer satisfaction with food delivery or order processing speed, and take prompt corrective actions when deviations occur. BI also supports the evaluation of data-driven services (Bohórquez et al. 2024), for example, by analyzing food sales during holidays or identifying trends in the most frequently used services (Fattah, 2024). BI can help reveal customer preferences, such as the most common payment methods used in the mobile application or website, and determine factors influencing customer loyalty to online ordering services.

Moderating the Artificial Intelligence Readiness on the Influence of E-Service Quality on Data-Driven Culture

The test results showed that AI readiness moderated the correlation between ESQ and data-driven culture. The interaction coefficient value is 0.143, the t-statistic is 2.025, and the p-value is 0.043.

The results indicate that BI adoption and AI readiness moderate the relationship between ESQ and data-driven culture (DDC), with BI having a stronger moderating effect than AI. Statistically, this is reflected in the interaction coefficients of $ESQ \times BI$ (0.209; $p < 0.05$) and $ESQ \times AI$ (0.143; $p < 0.05$), which imply that the slope of the ESQ to DDC regression line becomes steeper as BI adoption or AI readiness increases. In other words, higher BI adoption or AI readiness amplifies the impact of e-service quality on the formation of a data-driven culture.

Conceptually, BI and AI serve as enablers that transform digital interaction data into actionable insights. When ESQ is high, customers are more likely to engage with digital services, generating more transaction data. However, without BI and AI, this data may remain underutilized. BI enhances the ESQ effect by providing descriptive analytics and visualization to quickly identify customer behavior patterns, while AI contributes predictive and automation capabilities, such as anticipating demand spikes or addressing complaints in real time.

Thus, the moderating roles of BI and AI are enhancing in nature, as they convert the initial ESQ impact limited to customer experience into an organizational-level data-driven culture. This aligns with the Resource-Based View, which emphasizes that the ability to transform digital service data into strategic insights creates a

competitive advantage that is difficult to imitate.

Compared to the BI effect, the AI moderation effect is lower. AI readiness offers great potential to improve customer experience by leveraging automation and personalization capabilities. At the subsidiary company, AI can help moderate the influence of ESQ on data-driven culture by increasing digital interaction between customers and services (Macías & Borges, 2024). For example, AI-powered chatbots can be integrated into the mobile application or website to handle customer inquiries in real-time. The chatbot can answer questions related to food delivery schedules, order status, or menu recommendations based on customer purchase history. AI can also be used to improve the speed of handling customer complaints (Shao et al. 2022). AI systems can classify and prioritize complaints that come in through the WhatsApp hotline or other platforms, ensuring urgent complaints are handled quickly. This responsiveness has a direct impact on customer satisfaction and reinforces a data-driven culture as decisions are made based on AI analytics (Morsi, 2023). In addition, AI can analyze customer behavior pattern data to provide personalized recommendations (Saleem et al. 2024). For example, when a customer opens the app, they may be presented with menu recommendations that match their preferences, increasing the likelihood of a transaction conversion (Lada et al. 2023). The findings of this study support the Resource-Based View (RBV), which posits that sustainable competitive advantage arises from resources that are valuable, rare, inimitable, and non-substitutable (Barney, 2000). In this context, high e-service quality encourages customers to engage more frequently with digital services, generating rich transactional data. This data represents a strategic resource that is both valuable and rare, and when effectively managed, it can serve as a basis for competitive advantage.

The moderating roles of BI adoption and AI readiness also align with RBV, as they function as organizational capabilities that transform raw data into strategic insights. BI provides real-time visualization and descriptive analytics, while AI adds predictive and automation capabilities to support evidence-based decision-making. Together, these capabilities enhance the utilization of data resources and foster a sustainable data-driven culture. Therefore, the study's findings affirm that improving e-service quality, combined with BI and AI, can create unique organizational capabilities that form the foundation of long-term competitive advantage (Bao et al. 2023).

Managerial Implications

The findings of this study provide several managerial implications for companies in the transportation and digital-services sectors. First, managers should prioritize improving system availability and responsiveness, as these two dimensions of e-service quality were identified as the weakest points but had the most direct impact on customer satisfaction. Second, the adoption of Business Intelligence (BI) should be expanded to enable real-time monitoring of digital transactions, customer feedback, and service performance, while ensuring that BI systems can generate reports that are simple, fast, and easy to interpret for managerial evaluation. Third, readiness for Artificial Intelligence (AI) must be strengthened by integrating AI-based solutions such as chatbots, automated complaint handling, and personalized recommendations, which can enhance customer engagement and loyalty. Fourth, managers should encourage the alignment of BI and AI initiatives with business objectives, ensuring that these technologies provide insights and directly support strategic decision-making. Finally, combining BI and AI adoption with continuous service quality improvements will accelerate digital transformation, foster a sustainable data-driven culture, and provide the company with a competitive advantage that is difficult to replicate.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study concludes that e-service quality (ESQ) significantly strengthens a company's data-driven culture (DDC) by generating reliable customer data that supports evidence-based decision-making. The moderating roles of Business Intelligence (BI) and Artificial Intelligence (AI) amplify this relationship, with BI having a stronger impact owing to its better integration into business processes. These results are consistent with the Resource-Based View (RBV), which posits that data and analytic capabilities are valuable, rare, and difficult-to-imitate resources that drive competitive advantage. They also extend the Service Quality Theory by demonstrating that high-quality digital services not only enhance customer experience but also foster an organizational data-driven culture.

Recommendations

Management should prioritize improving system availability and responsiveness to ensure reliable service performance. They are also encouraged to expand business intelligence (BI) utilization, as it provides stronger integration into decision-making processes and accelerates the shift toward a data-driven culture. Enhancing Artificial Intelligence (AI) readiness is equally important because AI adoption supports future scalability and innovation in digital services. From an academic perspective, future studies should explore additional moderating factors, such as organizational culture or leadership style, to provide a deeper understanding of this relationship. Cross-industry and cross-country comparisons are also recommended to capture broader insights into how contextual differences shape the effectiveness of ESQ in fostering a data-driven culture.

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REFERENCES

- Abdullah, A. A. H., & Almaqtari, F. A. (2024). The impact of artificial intelligence and Industry 4.0 on transforming accounting and auditing practices. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1). <https://doi.org/10.1016/j.joitmc.2024.100218>
- Almaqtari, F. A., Farhan, N. H. S., Al-Hattami, H. M., Elsheikh, T., & Al-dalaien, B. O. A. (2024). The impact of artificial intelligence on information audit usage: Evidence from developing countries. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(2). <https://doi.org/10.1016/j.joitmc.2024.100298>
- Almazmomi, N., Ilmudeen, A., & Qaffas, A. A. (2022). The impact of business analytics capability on data-driven culture and exploration: achieving a competitive advantage. *Benchmarking*, 29(4), 1264–1283. <https://doi.org/10.1108/BIJ-01-2021-0021>
- Alsaad, A., Selem, K. M., Alam, M. M., & Melhim, L. K. B. (2022). Linking business intelligence with the performance of new service products: Insight from a dynamic capabilities perspective. *Journal of Innovation and Knowledge*, 7(4). <https://doi.org/10.1016/j.jik.2022.100262>
- Bao, Z. K., Hashim, K. F., Almagrabi, A. O., & Hashim, H. binti. (2023). Business intelligence impact on management accounting development given the role of mediation decision type and environment. *Information Processing and Management*, 60(4). <https://doi.org/10.1016/j.ipm.2023.103380>
- Barbala, A. M., Hanssen, G. K., & Sporse, T. (2024). Towards a common data-driven culture: A longitudinal study of the tensions and emerging solutions involved in becoming data-driven in a large public sector organization. *Journal of Systems and Software*, 218. <https://doi.org/10.1016/j.jss.2024.112185>
- Barney, J. B. (2000). Firm resources and sustained competitive advantage. *Advances in Strategic Management*, 17, 203–227. [https://doi.org/10.1016/S0742-3322\(00\)17018-4](https://doi.org/10.1016/S0742-3322(00)17018-4)
- Bitner, Z. dan. (2000). *Service Marketing 2nd edition : Integrating Customer Focus*. In New York. McGraw-Hill Inc.
- Bohórquez, M. R., Lara-Bocanegra, A., Teva, R., García-Fernández, J., Grimaldi-Puyana, M., & Gálvez-Ruiz, P. (2024). From e-service quality to behavioral intention to use e-fitness services post COVID-19 lockdown: When a crisis changes the social mindset. *Heliyon*, 10(9). <https://doi.org/10.1016/j.heliyon.2024.e30382>
- Cattapan, T., & Siwarit, P. (2022). Enhancing Patronage Intention on Online Fashion Industry in Indonesia: The Role of Value Co-Creation, Brand Image, and E-Service Quality. *Cogent Business and Management*, 9(1).
- Chaffey, D., & Ellis-Chadwick, F. (2012). *Digital marketing: strategy, implementation and practice*. In Pearson.
- Chao, S. L., Yu, M. M., & Wei, S. Y. (2024). Ascertain the impact of e-service quality on e-loyalty for the e-commerce platform of liner shipping companies. *Transportation Research Part E: Logistics and Transportation Review*, 184. <https://doi.org/10.1016/j.tre.2024.103491>
- Chaudhuri, R., Chatterjee, S., Mariani, M. M., & Wamba, S. F. (2024). Assessing the influence of emerging technologies on organizational

- data driven culture and innovation capabilities: A sustainability performance perspective. *Technological Forecasting and Social Change*, 200. <https://doi.org/10.1016/j.techfore.2023.123165>
- Chaudhuri, R., Chatterjee, S., Vrontis, D., & Thrassou, A. (2024). Adoption of robust business analytics for product innovation and organizational performance: the mediating role of organizational data-driven culture. *Annals of Operations Research*, 339(3), 1757–1791. <https://doi.org/10.1007/s10479-021-04407-3>
- Chen, Y., & Lin, Z. (2021). Business Intelligence Capabilities and Firm Performance: A Study in China. *International Journal of Information Management*, 57. <https://doi.org/10.1016/j.ijinfomgt.2020.102232>
- Chen, Y., Zhang, L., Chen, M., & Liu, H. (2024). IT–business alignment and business model design: a moderated mediation model of organizational learning and data-driven culture. *Information Technology and People*. <https://doi.org/10.1108/ITP-07-2022-0533>
- Cheng, J., Mahinder Singh, H. S., Zhang, Y. C., & Wang, S. Y. (2023). The impact of business intelligence, big data analytics capability, and green knowledge management on sustainability performance. *Journal of Cleaner Production*, 429. <https://doi.org/10.1016/j.jclepro.2023.139410>
- Creswell W. J. and Creswell J. D. (2018). Qualitative, quantitative, and mixed methods approaches. *Research Design Qualitative Quantitative and Mixed Methods Approaches*. In *Research Design* (Vol. 5, Issue June).
- Fattah, I. A. (2024). The mediating effect of data literacy competence in the relationship between data governance and data-driven culture. *Industrial Management and Data Systems*, 124(5), 1823–1845. <https://doi.org/10.1108/IMDS-11-2023-0812>
- Fosso Wamba, S., Queiroz, M. M., Pappas, I. O., & Sullivan, Y. (2024). Artificial Intelligence Capability and Firm Performance: A Sustainable Development Perspective by the Mediating Role of Data-Driven Culture. *Information Systems Frontiers*. <https://doi.org/10.1007/s10796-023-10460-z>
- Frank, B. (2024). Consumer preferences for artificial intelligence-enhanced products: Differences across consumer segments, product types, and countries. *Technological Forecasting and Social Change*, 209. <https://doi.org/10.1016/j.techfore.2024.123774>
- Gupta, S., Ghardallou, W., Pandey, D. K., & Sahu, G. P. (2022). Artificial intelligence adoption in the insurance industry: Evidence using the technology–organization–environment framework. *Research in International Business and Finance*, 63. <https://doi.org/10.1016/j.ribaf.2022.101757>
- Hair, J. F., Babin, B. J., Anderson, R. E., & Black, W. C. (2018). *Multivariate Data Analysis* (8th ed). In Cengage Learning.
- Hassan, T. H., Al-Hyari, H. S., Helal, M. Y., Elshawarbi, N. N., Mahmoud, H. M. E., Hashish, M. E. S., Anas, A. M., Bilalov, B., Ahmed, I. S., & Moustafa, F. A. (2024). Meeting Online Customers’ Expectations: How Do e-Service Quality and e-Reputation Impact Restaurant e-Customer Satisfaction? *African Journal of Hospitality, Tourism and Leisure*, 13(3), 494–503. <https://doi.org/10.46222/ajhtl.19770720.533>
- Huang, Z. xiong, Savita, K. S., & Zhong-jie, J. (2022). The Business Intelligence impact on the financial performance of start-ups. *Information Processing and Management*, 59(1). <https://doi.org/10.1016/j.ipm.2021.102761>
- issa, helmi, Jabbouri, R., & Palmer, M. (2021). An Artificial Intelligence (Ai)-Readiness and Adoption Framework for Agritech Firms. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3971188>
- Kalia, P., & Paul, J. (2021). E-service quality and e-retailers: Attribute-based multi-dimensional scaling. *Computers in Human Behavior*, 115. <https://doi.org/10.1016/j.chb.2020.106608>
- Macías, J. A., & Borges, C. R. (2024). Monitoring and forecasting usability indicators: A business intelligence approach for leveraging user-centered evaluation data. *Science of Computer Programming*, 234. <https://doi.org/10.1016/j.scico.2023.103077>
- Morsi, S. (2023). Evaluation of E-service Quality and its impact on Customer Satisfaction for Mobile Commerce Applications in Egypt. *Journal of System and Management Sciences*, 13(4), 370–388. <https://doi.org/10.33168/JSMS.2023.0422>
- Nguyen, H. V., Vu, T. D., Nguyen, B. K., Nguyen, T. M. N., Do, B., & Nguyen, N. (2022). Evaluating the Impact of E-Service Quality on Customer

- Intention to Use Video Teller Machine Services. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(3). <https://doi.org/10.3390/joitmc8030167>
- Qatawneh, N. (2024). Empirical insights into business intelligence adoption and decision-making performance during the digital transformation era: Extending the TOE model in the Jordanian banking sector. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(4). <https://doi.org/10.1016/j.joitmc.2024.100401>
- Rajaobelina, L., Brun, I., Kilani, N., & Ricard, L. (2022). Examining emotions linked to live chat services: The role of e-service quality and impact on word of mouth. *Journal of Financial Services Marketing*, 27(3), 232–249. <https://doi.org/10.1057/s41264-021-00119-8>
- Raman, D. A. M., & Khan, M. J. A. (2024). Marketing Management. In *Marketing Management*. <https://doi.org/10.59646/mm/204>
- Sahoo, S., Kumar, S., Donthu, N., & Singh, A. K. (2024). Artificial intelligence capabilities, open innovation, and business performance – Empirical insights from multinational B2B companies. *Industrial Marketing Management*, 117, 28–41. <https://doi.org/10.1016/j.indmarman.2023.12.008>
- Saleem, I., Al-Breiki, N. S. S., & Asad, M. (2024). The nexus of artificial intelligence, frugal innovation and business model innovation to nurture internationalization: A survey of SME's readiness. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(3). <https://doi.org/10.1016/j.joitmc.2024.100326>
- Shao, C., Yang, Y., Juneja, S., & GSeetharam, T. (2022). IoT data visualization for business intelligence in corporate finance. *Information Processing and Management*, 59(1). <https://doi.org/10.1016/j.ipm.2021.102736>
- Stamenkov, G., & Dika, Z. (2015). A sustainable e-service quality model. *Journal of Service Theory and Practice*, 25(4), 414–442. <https://doi.org/10.1108/JSTP-09-2012-0103>
- Sugiyono, P. D. (2022). *Metode Penelitian Kualitatif Dan Kuantitatif*. CV Alfabeta.
- Thanabalan, P., Vafaei-Zadeh, A., Hanifah, H., & Ramayah, T. (2024). Big Data Analytics Adoption in Manufacturing Companies: The Contingent Role of Data-Driven Culture. *Information Systems Frontiers*. <https://doi.org/10.1007/s10796-024-10491-0>
- Vatolkina, N., Gorbashko, E., Kamynina, N., & Fedotkina, O. (2020). E-service quality from attributes to outcomes: The similarity and difference between digital and hybrid services. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 1–21. <https://doi.org/10.3390/joitmc6040143>
- Wang, J., Omar, A. H., Alotaibi, F. M., Daradkeh, Y. I., & Althubiti, S. A. (2022). Business intelligence ability to enhance organizational performance and performance evaluation capabilities by improving data mining systems for competitive advantage. *Information Processing and Management*, 59(6). <https://doi.org/10.1016/j.ipm.2022.103075>
- Yu, W., Chavez, R., Jacobs, M. A., & Feng, M. (2018). Data-driven supply chain capabilities and performance: A resource-based view. *Transportation Research Part E: Logistics and Transportation Review*, 114, 371–385. <https://doi.org/10.1016/j.tre.2017.04.002>
- Yu, W., Wong, C. Y., Chavez, R., & Jacobs, M. A. (2021). Integrating big data analytics into supply chain finance: The roles of information processing and data-driven culture. *International Journal of Production Economics*, 236. <https://doi.org/10.1016/j.ijpe.2021.108135>