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INTEGRATED BUSINESS IMPROVEMENT STRATEGIES ON DRIVERS' ATTITUDES AND THE HAWK-I CLOUD LOGISTIC SERVICE PLATFORM TO ENHANCE OPERATIONAL PERFORMANCE IN SARAWAK READY-MIXED CONCRETE (RMC) FACTORY

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Abstract:
The rapid expansion of the Pan Borneo Highway has increased the demand for Ready-Mixed Concrete (RMC) in Sarawak, Malaysia, placing greater emphasis on efficient logistics and operational management. This study investigates how integrated business improvement strategies enhance operational performance in selected RMC manufacturing companies. A qualitative case study approach was employed, involving semi-structured interviews with senior operational personnel from five Ready-Mixed Concrete manufacturing companies in Sarawak, complemented by site observations and document analysis. Thematic analysis identified recurring operational challenges, including poor driver attitudes, inefficient delivery coordination, excessive vehicle idling, and fuel misuse. The findings indicate that integrating drivers' performance management with the Hawk-i Cloud Logistic Service Platform, incorporating GPS-based vehicle monitoring, significantly improved fleet utilization, delivery reliability, operational control, and cost efficiency. The study contributes to the limited qualitative literature on operational improvement in Malaysia's RMC industry and offers practical guidance for logistics and manufacturing managers undertaking large-scale infrastructure projects.

JEL: L23; L62; M11; R41

Keywords: Ready-Mixed Concrete (RMC); integrated business improvement strategies; drivers' attitudes; Hawk-i Cloud Logistic Service Platform; operational performance; logistics efficiency

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1. Introduction

The construction industry is a major contributor to economic development and infrastructure expansion, particularly in emerging economies experiencing rapid urbanization. In Malaysia, the Pan Borneo Highway project has significantly increased the demand for construction materials, especially Ready-Mixed Concrete (RMC), which is widely recognized for its consistent quality, controlled production process, and construction efficiency compared with conventional site-mixed concrete (Neville, 2012; Kosmatka & Wilson, 2016). However, RMC possesses a limited workable life of approximately 60 to 90 minutes after batching, requiring precise production scheduling, efficient transportation, and effective logistics coordination to maintain product quality and meet construction deadlines (Slack *et al.*, 2024). The growing scale of infrastructure development has placed considerable operational pressure on RMC manufacturers to improve delivery reliability, reduce operational costs, and enhance customer satisfaction. Effective logistics management has therefore become a critical determinant of operational performance within delivery-intensive industries (Christopher, 2016; Bowersox *et al.*, 2019). Some studies further demonstrate that driver behaviour, route management, and fleet monitoring significantly influence transportation efficiency, service reliability, and operational productivity (Ashkrof *et al.*, 2020; Dalla Chiara *et al.*, 2021). Operational inefficiencies arising from poor driver attitudes, excessive vehicle idling, unauthorized stops, fuel misuse, and inaccurate overtime claims may adversely affect fleet utilization and organizational performance (Robbins & Judge, 2024). To address these challenges, organizations are increasingly adopting digital logistics technologies that integrate Global Positioning System (GPS) tracking, cloud-based fleet management, and real-time operational monitoring to improve transportation visibility and managerial decision-making (Rushton *et al.*, 2022; Aldhahri *et al.*, 2025). This study does not examine the engineering-related section of ready-mixed concrete. Instead, it investigates how integrated business improvement strategies, combining workforce management and digital logistics technologies, can enhance operational performance in selected Ready-Mixed Concrete manufacturing companies in Sarawak. The findings are expected to contribute to the literature on operations management while providing practical guidance for logistics managers and manufacturing organizations involved in large-scale infrastructure projects.

1.1 Rational for the Study

The construction of the Pan Borneo Highway has significantly increased the demand for Ready-Mixed Concrete (RMC) in Sarawak, creating greater operational demands on manufacturers to strengthen logistics coordination, workforce management, and overall operational performance. Since RMC has a limited workable life of only 60 to 90 minutes after batching, any delay during transportation or delivery may affect concrete quality, disrupt construction schedules, and increase operational costs. Consequently, operational performance in the RMC industry depends heavily on effective logistics coordination, disciplined workforce management, and reliable delivery systems. Despite advancements in production technology, operational challenges remain prevalent within RMC manufacturing companies. Findings from the selected company indicate that driver-related issues are the primary contributors to operational inefficiencies. These include unauthorized diversion of concrete and fuel for personal gain, excessive vehicle idling, unscheduled stops, inaccurate overtime claims, and non-compliance with delivery schedules. Such practices have resulted in increased fuel consumption, higher labour costs, reduced fleet utilization, delayed deliveries, and declining customer satisfaction, ultimately affecting the company's overall operational performance and competitiveness. To improve operational control, the company implemented the Hawk-i Cloud Logistic Service Platform, incorporating Global Positioning System (GPS) technology to monitor vehicle movement, delivery routes, stoppage duration, and fuel usage in real time. While this technological intervention has enhanced monitoring capabilities, its effectiveness depends on drivers' attitudes and management's ability to integrate technology with appropriate supervision and performance management practices. However, limited empirical research has examined the combined influence of behavioural and technological improvement strategies on operational performance in the Malaysian RMC industry. Therefore, this study investigates how integrated business improvement strategies focusing on drivers' attitudes and the Hawk-i Cloud Logistic Service Platform can enhance operational performance in a ready-mixed concrete manufacturing factory in Sarawak.

2. Literature Review

2.1 Ready-Mixed Concrete Industry and Operational Challenges

Ready-Mixed Concrete (RMC) has become an indispensable construction material for infrastructure and building projects due to its consistent quality, efficient production process, and reduced on-site labour requirements. Unlike conventional concrete, RMC is manufactured in a centralized batching plant and delivered directly to construction sites under controlled conditions. However, its limited workable life of approximately 60 to 90 minutes after mixing presents significant operational challenges, requiring precise production planning, efficient transportation, and effective delivery scheduling. Delays caused by traffic congestion, poor fleet coordination, or inefficient logistics may compromise concrete quality, increase operational costs, and disrupt construction schedules. Large-scale infrastructure developments, such as the Pan Borneo Highway in Sarawak, have intensified these challenges by increasing demand for timely deliveries and reliable logistics management (Neville, 2012; Kosmatka & Wilson, 2016).

2.2 Business Improvement Strategies

Business improvement strategies refer to systematic managerial initiatives aimed at enhancing organizational efficiency, reducing operational waste, and improving service quality through continuous improvement and process optimization (Tortorella &

Fogliatto (2017). Modern organizations increasingly adopt integrated approaches that combine human resource management, technological innovation, and operational control to improve business performance. Continuous improvement philosophies, including Lean Management and Total Quality Management (TQM), emphasize eliminating inefficiencies while promoting employee accountability and customer satisfaction (Slack *et al.*, 2022). In logistics-intensive industries, business improvement strategies involve integrating operational procedures, workforce management, and digital technologies to ensure sustainable operational excellence and organizational competitiveness (Dubey *et al.*, 2019).

2.3 Drivers' Attitudes and Operational Performance

Human factors remain a critical determinant of operational success in logistics and transportation industries. Drivers are directly responsible for delivering products safely and punctually while maintaining customer relationships (Zhang *et al.,* 2023). Positive work attitudes, discipline, accountability, and ethical behaviour contribute significantly to delivery reliability and organizational performance (Ashkrof *et al.*, 2020). Conversely, negative attitudes, including unauthorized stoppages, excessive idling, fuel misuse, inaccurate overtime claims, and poor adherence to operational procedures, may increase operating costs, reduce productivity, and negatively affect customer satisfaction (Dalla Chiara *et al.*, 2021). Organizational behaviour literature suggests that employee attitudes strongly influence service quality, operational efficiency, and organizational reputation (Robbins & Judge, 2023). Therefore, improving drivers' attitudes represents a strategic component of business improvement initiatives within ready-mixed concrete operations.

2.4 Hawk-i Cloud Logistic Service Platform

Advances in digital logistics have transformed fleet management through cloud-based technologies, Global Positioning System (GPS) tracking, Internet of Things (IoT) applications, and real-time vehicle monitoring (Aldhahri *et al.*, 2025). The Hawk-i Cloud Logistic Service Platform integrates these technologies to provide continuous monitoring of vehicle movement, delivery routes, stopping duration, fuel consumption, and driver behaviour. Such systems enhance managerial visibility, improve operational control, facilitate preventive decision-making, and strengthen accountability across logistics operations (Sojipun *et al.,* 2024). Previous studies have demonstrated that GPS-enabled fleet management systems improve delivery reliability, optimize routing, reduce fuel consumption, and enhance overall logistics efficiency (Christopher, 2016; Bowersox *et al.*, 2020). Consequently, integrating digital monitoring technologies has become an essential business improvement strategy for transportation-intensive industries (Ivanov *et al.*, 2019).

2.5 Operational Performance

Operational performance reflects an organization's ability to achieve efficiency, productivity, quality, and customer satisfaction while minimizing operational costs

(Prajogo & Olhager, 2012). In the ready-mixed concrete industry, operational performance is commonly assessed through delivery punctuality, fleet utilization, fuel efficiency, production continuity, and customer service quality (Gunasekaran *et al.*, 2004). Effective coordination between employees, operational processes, and technological systems enables organizations to improve resource utilization and maintain competitive advantage (Flynn *et al.*, 2010). According to Slack *et al.* (2022), organizations that successfully integrate people, technology, and operational processes are more likely to achieve sustainable operational performance and long-term organizational success.

2.6 Theoretical Underpinning

This study is underpinned by Socio-Technical Systems (STS) Theory**,** which posits that organizational performance is optimized when social systems (employees, leadership, and organizational culture) are effectively integrated with technical systems (technology, equipment, and operational processes) (Trist & Bamforth, 1951). The theory emphasizes that organizational effectiveness depends on jointly optimising human and technological elements rather than treating them as independent components (Mumford, 2006). More recent applications of STS Theory further highlight its relevance in guiding organizations to integrate digital technologies with workforce capabilities to improve operational performance, innovation, and organisational resilience (Pasmore *et al.*, 2019). In the context of this study, drivers' attitudes represent the social subsystem, while the Hawk-i Cloud Logistic Service Platform constitutes the technical subsystem. Their integration through business improvement strategies is expected to enhance operational performance by improving accountability, operational control, and logistics efficiency.

2.7 Conceptual Framework

The conceptual framework proposes that Integrated Business Improvement Strategies enhance Operational Performance through the integration of two key dimensions: drivers' attitudes and the Hawk-i Cloud Logistic Service Platform**.** Drivers' attitudes represent the human dimension, encompassing work discipline, accountability, compliance with delivery schedules, ethical behaviour, and adherence to standard operating procedures. Positive behavioural practices improve delivery reliability, minimize operational delays, and strengthen customer service. The technological dimension is represented by the Hawk-i Cloud Logistic Service Platform, which integrates GPS vehicle tracking, route monitoring, fuel consumption monitoring, and delivery status monitoring to provide real-time operational visibility and strengthen fleet coordination. The interaction between these behavioural and technological dimensions supports continuous operational monitoring, improves managerial decision-making, and enhances logistics efficiency. This framework is underpinned by Socio-Technical Systems (STS) Theory, which posits that sustainable organizational performance is achieved through the effective integration of social and technical systems, ultimately leading to improved operational performance in the selected Ready-Mixed Concrete manufacturing company.

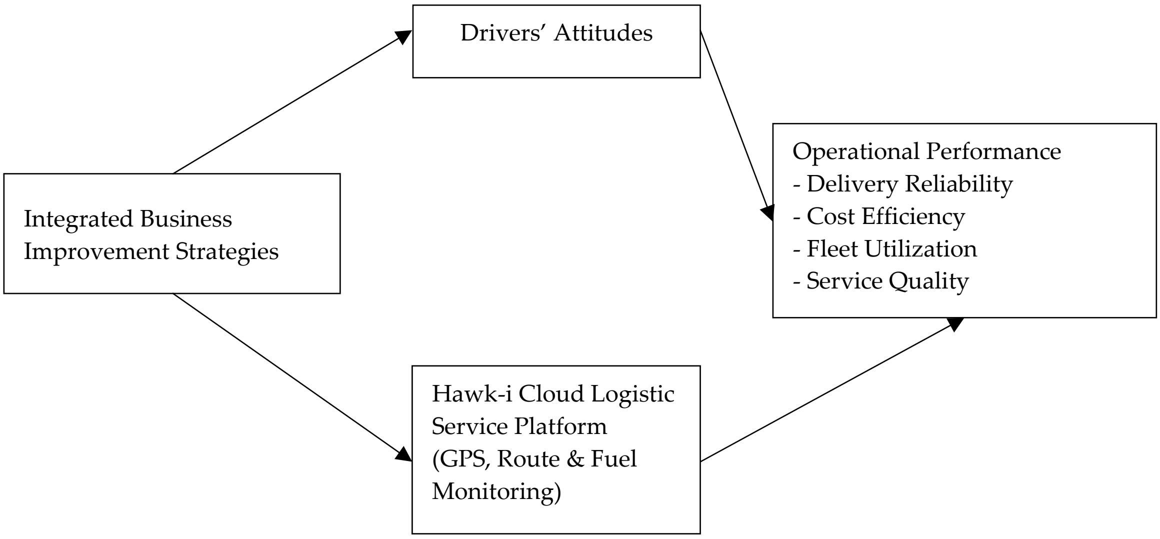

Figure 1: Conceptual Framework

3. Material and Methods

This study adopted a qualitative case study design to explore how integrated business improvement strategies enhance operational performance in the Ready-Mixed Concrete (RMC) industry. A qualitative case study is appropriate for investigating contemporary organizational phenomena within their real-life context and provides an in-depth understanding of complex operational issues (Yin, 2018). Data were collected through semi-structured interviews, site observations, and reviews of company operational documents, which enabled the triangulation of evidence and enhanced the credibility of the findings (Creswell & Poth, 2018). The interview participants comprised five selected Ready-Mixed Concrete (RMC) manufacturing companies in Sarawak, represented by senior personnel responsible for operations, logistics, or management, who possessed extensive knowledge of fleet operations and business improvement initiatives. The interview data were analyzed using thematic analysis, whereby responses were systematically coded, categorized into emerging themes, and interpreted to identify common operational issues, improvement strategies, and best practices that contribute to enhanced operational performance. Thematic analysis provides a flexible and rigorous approach for identifying meaningful patterns within qualitative data and generating rich interpretations of participants' experiences (Braun & Clarke, 2022).

4. Operational Process and Findings

4.1 Current Operational Process

The selected Ready-Mixed Concrete (RMC) manufacturing company operates an integrated production and delivery system designed to ensure that concrete is delivered to construction sites within its limited workable life of approximately 60 to 90 minutes after batching. The operational process begins with customers placing orders specifying the concrete grade, quantity, delivery location, and required delivery schedule. The Sales

Department verifies the order before forwarding it to the Production Department, where batching schedules are prepared according to customer requirements. Upon completion of the batching process, concrete is immediately loaded into transit mixer trucks for delivery to construction sites. Efficient coordination between production scheduling and transportation is essential to maintain concrete quality and minimize delivery delays (Neville, 2012; Kosmatka & Wilson, 2016). The Logistics Department is responsible for assigning vehicles and drivers based on delivery schedules and customer priorities. To improve operational visibility, the company employs the Hawk-i Cloud Logistic Service Platform integrated with Global Positioning System (GPS) technology to monitor vehicle movement, delivery routes, stoppage duration, and fleet utilization in real time. Operational records, including fuel consumption, mileage, and delivery documentation, are also maintained and reviewed by the Cost Analysis Department to evaluate fleet efficiency and support management decisions. This integrated operational process enhances delivery coordination, operational control, and customer service while supporting overall logistics efficiency (Christopher, 2016; Slack *et al.*, 2022).

4.2 Operational Issues and Findings

Despite having a structured operational system supported by digital monitoring technologies, the study identified several operational issues that adversely affected organisational performance. Findings from interviews and site observations as summarized in Table 1 below revealed that the primary operational challenges were associated with drivers' attitudes and behavioural practices rather than production capacity. Management reported incidents involving unauthorized stops, excessive vehicle idling, inaccurate overtime claims, fuel misuse, and the diversion of ready-mixed concrete for personal financial gain. These practices resulted in increased operating costs, delayed deliveries, reduced fleet utilization, and declining customer satisfaction. Since RMC is highly time-sensitive, such delays may also compromise concrete quality and disrupt construction schedules (Neville, 2012).

Although the Hawk-i Cloud Logistic Service Platform enabled management to monitor vehicle movement and driver activities in real time, interview findings indicated that technology alone was insufficient to eliminate operational misconduct. Effective supervision, driver accountability, and consistent enforcement of organizational policies remained essential for improving operational performance. These findings support previous studies which suggest that organizational performance depends on the effective integration of human behaviour and technological systems rather than relying solely on digital solutions (Christopher, 2016; Robbins & Judge, 2023). Consequently, the findings highlight the need for integrated business improvement strategies that combine technological monitoring with behavioural and managerial interventions to achieve sustainable operational performance.

Table 1: Summary of Operational Issues Identified

Operational Issue	Evidence	Operational Impact	Current Control
Fuel misuse	Interview	Increased cost	Fuel records
Unauthorized stops	Interview	Delivery delays	GPS monitoring
Vehicle idling	Observation	Fuel wastage	Hawk-i Platform
Overtime claims	Records	Labour cost	Verification
Route deviation	GPS	Customer complaints	Route monitoring

Source: Developed from interviews, site observations, operational records, and company documents.

4.3 Findings and Discussion

The findings demonstrate that the company's operational challenges are primarily associated with behavioural and managerial factors rather than production capability. Although the Hawk-i Cloud Logistic Service Platform has improved logistics visibility through GPS-enabled vehicle monitoring, recurring issues such as unauthorised concrete diversion, fuel misuse, prolonged idling, inaccurate overtime claims, and non-compliance with delivery schedules continue to affect operational performance. These issues increase operating costs, reduce fleet utilisation, delay deliveries, and adversely affect customer satisfaction. The evidence further suggests that technological monitoring alone is insufficient to eliminate operational misconduct without complementary managerial interventions, including effective supervision, driver accountability, and performance management. Consequently, the findings support the need for an integrated business improvement strategy that combines technological solutions with behavioural and organisational initiatives to achieve sustainable improvements in operational performance.

5. Proposed Integrated Improvement Model

Based on the findings, this study proposes an Integrated Business Improvement Model that combines driver attitude enhancement, digital logistics technology, and continuous operational monitoring to strengthen organizational performance. The model begins with improving drivers' attitudes through clear standard operating procedures (SOPs), performance monitoring, accountability, and disciplinary enforcement. Positive behavioural practices are reinforced through regular supervision, communication, and performance evaluation to encourage compliance with delivery schedules and company policies. The second component integrates the Hawk-i Cloud Logistic Service Platform, including GPS vehicle tracking, route monitoring, delivery verification, vehicle stoppage monitoring, and fuel consumption analysis. The platform provides real-time operational information that enables management to detect operational irregularities, optimize fleet utilization, and improve delivery coordination. Information generated by the system is subsequently analyzed by the Cost Analysis Department to support managerial decision-making and continuous operational improvement. The proposed model emphasizes the integration of people, technology, and management practices to improve operational performance. By combining driver accountability with digital logistics monitoring and systematic performance evaluation, the company is expected to reduce operational inefficiencies, improve delivery reliability, optimize resource utilization, and enhance overall operational performance. The model therefore provides a practical framework for strengthening logistics management within ready-mixed concrete manufacturing companies operating in large-scale infrastructure projects.

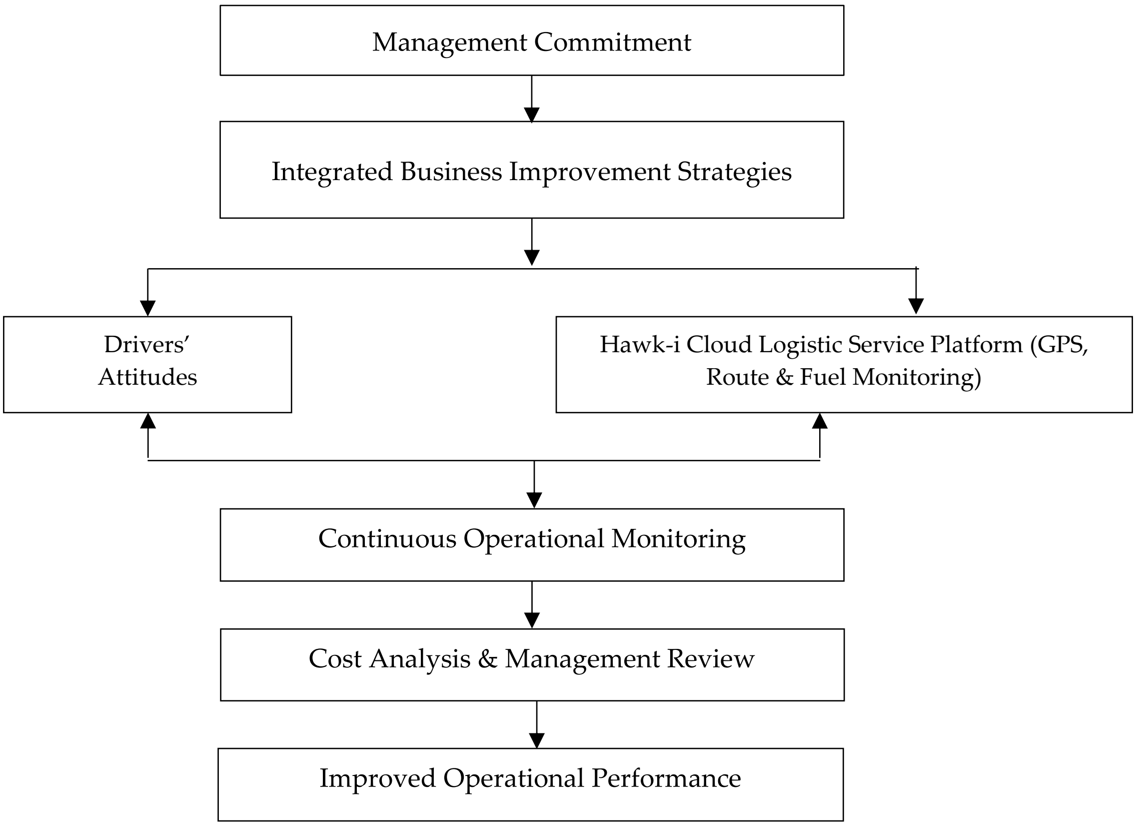

Figure 2: Proposed Integrated Business Improvement Model for enhancing operational performance in the selected Ready-Mixed Concrete manufacturing company. Adapted from the case findings.

5.1 Implementation Strategy

The implementation of the proposed Integrated Business Improvement Model in Figure 2 above requires coordinated efforts involving management, operational departments, and delivery personnel to ensure sustainable improvements in operational performance. Based on the findings, the implementation strategy adopted by the selected Ready-Mixed Concrete (RMC) manufacturing company focused on integrating digital logistics technology with enhanced operational supervision and driver performance management. The implementation commenced with the deployment of the Hawk-i Cloud Logistic Service Platform, incorporating Global Positioning System (GPS) technology to provide real-time monitoring of vehicle locations, delivery routes, stoppage duration, travel time, and fuel utilization. This enabled management to monitor fleet activities continuously and respond promptly to operational irregularities. The second phase emphasized strengthening driver accountability through systematic monitoring of delivery activities and operational records (Mentzer *et al.,* 2001). Information generated by the Hawk-i platform was cross-checked with fuel consumption reports, delivery schedules, mileage records, and overtime claims by the Cost Analysis Department. This verification process enabled management to identify discrepancies in operational activities, improve transparency, and support evidence-based decision-making. Drivers found to have violated company policies were subjected to appropriate disciplinary actions in accordance with organizational procedures, while compliance with delivery schedules and operational standards was continuously reinforced through supervisory monitoring. The final phase involved continuous management review and operational performance evaluation. Operational data collected through the monitoring system were analyzed periodically to assess delivery efficiency, fleet utilization, fuel consumption, and driver performance. The findings were subsequently used to improve delivery scheduling, optimize fleet operations, and strengthen managerial control (Stank *et al.*, 2003). This implementation strategy demonstrates that sustainable operational improvement is achieved through the integration of technological monitoring, effective supervision, and continuous performance evaluation, thereby enabling the company to enhance operational performance, reduce unnecessary operating costs, and provide more reliable customer service.

6. Conclusion and Recommendations

This study examined the implementation of integrated business improvement strategies to enhance operational performance in a Ready-Mixed Concrete (RMC) manufacturing company in Sarawak during the construction of the Pan Borneo Highway. The findings indicate that operational inefficiencies were primarily associated with drivers' attitudes, including unauthorized stops, excessive vehicle idling, fuel misuse, inaccurate overtime claims, and non-compliance with delivery schedules. Although the company had implemented the Hawk-i Cloud Logistic Service Platform with GPS tracking to strengthen logistics monitoring, the study found that technology alone was insufficient to improve operational performance without effective managerial supervision and driver accountability. The integration of digital logistics monitoring, performance evaluation, and behavioural management significantly improved fleet utilization, delivery reliability, operational transparency, and cost control, thereby enhancing overall operational performance. Based on these findings, the study recommends that RMC manufacturers adopt an integrated business improvement approach that combines digital logistics technologies with systematic driver performance management and continuous operational monitoring. Regular training programmes should be conducted to strengthen drivers' awareness of operational procedures, ethical responsibilities, and customer service standards. Organizations should also utilize operational data generated by logistics platforms to support evidence-based decision-making, performance evaluation, and continuous process improvement.

6.1 Future Research Direction

Future research should extend this study by examining a larger sample of Ready-Mixed Concrete (RMC) manufacturing companies across different regions of East Malaysia to improve the generalisability of the findings. While this study adopted a qualitative case study approach, future studies may employ mixed-methods or quantitative research designs to empirically validate the relationships between integrated business improvement strategies and operational performance. Researchers may also investigate additional factors such as leadership effectiveness, organizational culture, employee engagement, digital transformation, and artificial intelligence (AI)-enabled fleet management. Comparative studies involving different construction material manufacturers or infrastructure projects would further enhance understanding of how integrated managerial and technological strategies contribute to sustainable operational excellence and organizational competitiveness in the construction industry.

Conflict of Interest Statement

The author can confidently assure that no conflicts of interest are possibly linked with this research, and there has been no significant financial aid received for this study, authorship and publication that could have influenced the study's outcome. The author affirms that this research is original and has not been published in the past or elsewhere.

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