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RESEARCH ARTICLE

Enhancing supply chain transparency through a QR-Based monitoring dashboard: Governance and integrity implications for food manufacturing SMEs

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Abstract - Supply chain transparency has emerged as a critical governance and integrity imperative, particularly within food manufacturing where product failures can compromise public safety and undermine stakeholder trust. This study examines how a QR-based monitoring dashboard functions as an embedded governance mechanism to enhance transparency, accountability, and ethical oversight within a small and medium-sized enterprise (SME) in the food manufacturing sector. Using a quantitative, system-based case study approach, the study gathered operational traceability data across key supply chain stages of a Malaysian food manufacturer through a QR-enabled dashboard system. The findings show that digital traceability significantly reduces information asymmetry, strengthens internal controls, and enables proactive, ethical decision-making by promptly detecting quality deviations. This study contributes to the governance and integrity literature by conceptualising digital traceability systems not merely as operational tools, but as vital governance infrastructures that reinforce integrity, regulatory compliance, and stakeholder confidence in SMEs.

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1. Introduction

Governance and integrity are increasingly recognised as fundamental dimensions of supply chain management, particularly in the food manufacturing sector, where failures in quality monitoring can directly affect consumer safety and organisational legitimacy. Regulatory pressure, heightened consumer awareness, and reputational vulnerability have shifted supply chain transparency from an operational concern to a governance imperative (Lai et al., 2025). Cao et al. (2026) argue that effective governance in food and agricultural supply chains requires mechanisms that ensure transparency, accountability, and ethical oversight across multiple stages, emphasising that strengthened food safety supervision and traceability systems are essential to ensure that rapid industrial expansion is matched by enforceable governance capacity. Previous studies have examined how the food industry has responded through transparency and traceability systems (Anastasiadis et al., 2025). For instance, many researchers have focused on tools and frameworks for assessing traceability by leveraging technology, introducing blockchain as a standard tool for verifying supply chain integrity and ensuring that products meet ethical and environmental standards (Niranjan et al., 2025; Vasileiou et al., 2026) Equivalently, blockchain is expected not only to enhance traceability in the food supply chain but also to strengthen supply chain governance, particularly in multi-tier supply chains.

Despite these expectations, many small and medium-sized enterprises continue to rely on manual inspection processes and fragmented documentation systems (Gupta & Jagtap, 2024). Common issues often stem from a lack of expertise and staff readiness (Hansen et al., 2025). Consequently, these practices weaken internal controls, delay the detection of quality defects, and increase information asymmetry across the supply chain. As a result, quality issues are often detected only after products reach consumers, raising ethical concerns related to accountability and corporate responsibility. Unlike prior QR-based traceability studies that primarily focus on operational efficiency or product tracking, this study conceptualises digital traceability as an embedded governance mechanism that enhances transparency, accountability, and ethical oversight within SME supply chains. By examining operational traceability data rather than perception-based survey responses, this research provides empirical insight into how digital monitoring infrastructures reshape governance practices in resource-constrained organisations. Accordingly, this study examines how a QR-based digital traceability system enhances governance transparency, accountability, and integrity within a food manufacturing SME. Specifically, the study investigates the role of real-time traceability in reducing information asymmetry, strengthening internal controls, and supporting ethical decision-making across supply chain stages.

2. Literature Review

2.1 Supply Chain Transparency and Governance

Transparency refers to the extent to which stakeholders can access reliable, timely, and verifiable information across the supply chain, from upstream production to downstream consumption. Supply chain transparency has appeared as an important capability in contemporary supply chain management, enabling organisations to monitor compliance, enforce accountability, and reduce governance risk (Charlebois et al., 2024). Prior studies highlight that transparent information flows enhance managerial oversight and reduce opportunistic behaviour, particularly in complex and multi-stage supply chains (Petrillo et al., 2025; Z. Wang et al., 2025). Meanwhile, Li et al. (2026) described supply chain transparency as the continuous disclosure of product-related information for stakeholder access. In the context of food manufacturing,

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transparency is closely linked to food safety governance, regulatory compliance, and theevelopment of stakeholder trust (Krisnanmoorthy & Fernando, 2025). However, despite its recognised importance, inadequate or fragmented traceability systems may undermine transparency by constraining managerial oversight across supply chain activities, delaying corrective actions, and thereby elevating governance risk. Despite growing scholarly attention to transparency, limited research has systematically examined the role of traceability-enabled transparency as a governance mechanism within food manufacturing supply chains.

2.2 Digital Traceability as an Integrity Mechanism

(Krisnanmoorthy & Fernando, 2025). However, despite its recognised importance, inadequate or fragmented traceability systems may undermine transparency by constraining managerial oversight across supply chain activities, delaying corrective actions, and thereby elevating governance risk. Despite growing scholarly attention to transparency, limited research has systematically examined the role of traceability-enabled transparency as a governance mechanism within food manufacturing supply chains.

2.2 Digital Traceability as an Integrity Mechanism

Digital traceability systems extend supply chain transparency by enabling the organised tracking, recording, and authentication of product-related information across organisational frontiers (Li et al., 2026; Ablegue et al., 2026). Within the governance and integrity vein, traceability is increasingly viewed not solely as a technical or operational instrument but also as an institutional instrument that supports accountability, auditability, and regulatory enforcement. By recording transactions, material flows, and process histories, traceability systems transform operational activities into verifiable, auditable data, strengthening integrity by reducing information manipulation and documentation gaps, lessening information asymmetry, and boosting managerial control across dispersed supply chain networks (Ahmed & MacCarthy, 2023; J. Wang et al., 2026). Previous studies indicate that efficient traceability systems reinforce accountability by visibly distributing responsibility for compliance failures and quality breaches. In food manufacturing supply chains, traceability plays a critical role in food safety governance, particularly by supporting product recalls, conformity reporting, and regulatory inspections. The availability of verifiable traceability data enables organisations to demonstrate due diligence, respond quickly to governance breakdowns, and preserve authenticity in the eyes of regulators and shareholders.

However, the effectiveness of traceability system governance varies across organisations. Existing literature suggests that fragmented data architectures, limited inter-organisational data sharing, and inconsistent governance standards among supply chain actors often hamper the application of traceability. These limitations may weaken accountability mechanisms and reduce traceability systems' capacity to function as effective governance instruments. As a result, traceability may exist in form without fully achieving its intended governance outcomes. Recent governance-oriented studies increasingly argue that traceability should be identified as part of a broader governance frame that incorporates transparency, accountability, and monitoring mechanisms (Lai et al., 2025; Zhou et al., 2023) . Nevertheless, empirical insights remain limited regarding how traceability systems interact with organisational governance structures and managerial practices to mitigate governance risk in complex food manufacturing supply chains. Digital dashboards and QR-based traceability systems, for instance, provide real-time visibility, enabling managerial actors to identify abnormalities promptly and implement timely corrective actions (Ausawanetmanee et al., 2024) . For small and medium-sized enterprises (SMEs), in particular, digital traceability may serve as a compensatory governance mechanism, mitigating limitations in formal control structures and enhancing integrity through data-driven oversight. Nevertheless, empirical evidence remains limited regarding how digital traceability systems interact with organisational governance structures and managerial practices to mitigate governance risk in complex food manufacturing supply chains.

2.3 Theoretical Foundations of Digital Governance

From a theoretical perspective, this study draws on Information Asymmetry Theory, Agency Theory, and Stakeholder Theory. Information asymmetry theory suggests that fragmented and delayed information flows weaken governance effectiveness by limiting managerial oversight and increasing operational risk (Duong et al., 2024). In food supply chains, manual documentation systems intensify asymmetry by inhibiting real-time visibility of product conditions. Agency theory explains how digital traceability serves as a monitoring mechanism that aligns operational behaviour with organisational objectives. By embedding accountability into daily activities through time-stamped and traceable records, QR-based systems reduce opportunistic behaviour and strengthen internal controls (Fernando et al., 2026).

From a stakeholder theory perspective, transparency and integrity are essential for maintaining trust with consumers, regulators, and supply chain partners (Tran et al., 2025). Digital traceability enhances stakeholder confidence by providing verifiable evidence of ethical practices, regulatory compliance, and product safety (Pan et al., 2025). Together, these theoretical perspectives position digital traceability as an embedded governance mechanism that reinforces accountability, integrity, and ethical decision-making. Despite growing research on digital traceability technologies such as blockchain, IoT, and QR-based monitoring systems, existing studies predominantly focus on technological adoption, operational efficiency, or food safety compliance . Limited empirical research has examined how traceability systems function as governance infrastructures that shape transparency, accountability, and ethical control within supply chain organisations. This gap is particularly evident in SME contexts where formal governance mechanisms are often limited. Therefore, this study addresses this gap by investigating how a QR-based monitoring dashboard embeds governance capabilities into operational supply chain activities.

3. Methodology

3.1 Research Design

This study adopts a single-case study research design to examine how digital traceability functions as a governance and integrity mechanism within a real organisational context, focusing on operational traceability data rather than perception-based surveys. This approach enhances the relevance of governance by analysing actual monitoring and control practices within the organisation. Case study research is particularly suitable for investigating contemporary phenomena in real-life contexts, where the boundaries between the phenomenon and its context are unclear (Yin, 2018).

3.2 Case Selection and Context

The selected case organisation is a Malaysian food manufacturing SME operating a farm-to-fork supply chain encompassing raw material handling, processing, packaging, cold storage, and distribution. The firm was selected based on three criteria:

i) Governance relevance – the organisation operates in the food sector, where transparency and traceability are directly linked to public safety and regulatory compliance.
ii) Observed governance challenge – recurring late detection of product defects and limited traceability under manual inspection systems.
iii) Digital intervention – recent implementation of a QR-based traceability dashboard across supply chain stages.

Prior Prior to system implementation, quality assurance relied on manual inspections and paper-based documentation maintained separately by production, storage, and logistics units. This resulted in fragmented information flows, delayed defect detection, and weak accountability conditions that are theoretically associated with high information asymmetry and governance risk.

3.3 Unit of analysis and System Boundary

This study uses the batch-level product flow across supply chain stages as its unit of analysis. Each production batch represents a discrete governance object through which transparency, accountability, and integrity can be observed. The system boundary includes post-packaging inspection, cold storage handling, distribution dispatch and delivery stages. These stages were selected because they represent critical control points where product quality deterioration had previously been observed and where governance oversight was weakest under manual systems.

3.4 Data Collection Procedure

Data were collected through direct operational traceability records generated by the QR-based monitoring dashboard. Operational personnel assigned each batch a unique QR code and scanned it at predefined checkpoints. At each scan point, personnel recorded the following data: packaging condition, seal integrity, handling quality, and stage-specific damage indicators. All records were automatically time-stamped and stored in a centralised digital dashboard, ensuring data consistency, traceability, and auditability. This method reduces reliance on recall- or perception-based data and strengthens internal validity by capturing actual governance practices as they are enacted.

3.5 Data Analysis Procedure

Data analysis was conducted in three stages. First, operational traceability records were compiled and organised by supply chain stage. Second, descriptive statistical summaries were generated to identify patterns in product condition outcomes and defect occurrence. Third, dashboard-based pattern analysis identified recurring governance risk points and accountability gaps across operational stages.

3.6 Governance Indicators and Analytical Strategy

In line with governance and integrity research, analysis focused on process-oriented governance indicators rather than financial or perceptual metrics. The following indicators were examined: transparency (visibility of product condition across supply chain stages); accountability (clarity of responsibility for quality deviations by stage); integrity (consistency, completeness, and non-manipulability of records); and timeliness (the point at which defects were detected within the supply chain). Data analysis was conducted using descriptive statistics and dashboard-based pattern analysis to identify recurring defect locations, accountability gaps, and governance risk concentration points. The analytical approach emphasised explanation-building, linking observed operational patterns to governance outcomes such as improved oversight and ethical control.

3.7 Methodology Rigour and Trustworthiness

To enhance rigour, the study triangulated data across multiple supply chain stages, used process tracing to establish logical links between digital traceability and governance outcomes, and ensured auditability through time-stamped, immutable digital records. Although limited to a single case, the study prioritises analytical generalisation rather than statistical generalisation, contributing theoretically to governance scholarship on digital traceability in SMEs.

4. Results and Discussion

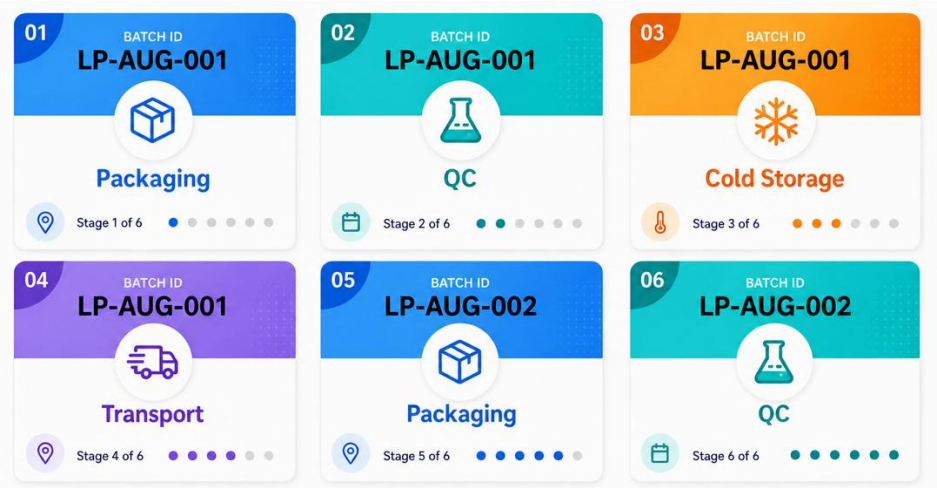
4.1 Transparency and Governance Oversight

Implementing the QR-based monitoring dashboard substantially enhanced transparency across supply chain stages. Information once split across departments became centrally available, enabling continuous oversight and reducing blind spots in quality monitoring. Before implementation, quality checking at company XYZ relied heavily on manual inspection and paper-based records, which production, storage, and logistics units maintained separately. As a result, information about product condition was fragmented, delayed, and frequently unavailable to management in real time, restricting effective governance oversight. A practical example of this improvement is the ability to monitor packaging integrity across operational stages. Before the digital system was established, packaging deficiencies, including seal leaks or physical damage, were often detected only when products reached sellers or customers. At that stage, management struggled to determine whether the damage occurred during packaging, cold storage, or transportation, as inspection records were incomplete and not time-synchronised. This lack of transparency undermined accountability and delayed restorative action.

With the introduction of the QR-based dashboard, each production lot was assigned a unique QR code that was scanned at predefined control points, including post-packaging, cold storage entry, and distribution dispatch. At each stage, operators recorded packaging condition and handling status, which were immediately stored in a centralised dashboard. For example, when the dashboard detected an increase in minor seal defects at the cold storage stage across several batches, management could identify a pattern indicating improper stacking practices during storage. This concern had earlier been overlooked due to a lack of records. From a governance perspective, this real-time visibility strengthened control by enabling management to identify variations early, trace them to specific stages, and initiate corrective measures quickly. Rather than responding to customer complaints, the organisation intervened internally by correcting storage and handling processes and strengthening compliance with standard operating procedures. This shows how transparency allowed by digital traceability supports proactive governance, reduces information asymmetry, and enhances managerial control over operational risks. Overall, the example shows that transparency through QR-based monitoring is not merely informational but also a governance enabler. By transforming operational activities into visible, auditable data, the system enhances oversight capability, supports timely decision-making, and reinforces organisational integrity within the food supply chain. As shown in Figure 1, the batch-level dashboard provides continuous visibility across packaging, quality control, cold storage, and transport stages, displaying batch-level traceability records through the sequential supply chain. Each batch ID (e.g., LP-AUG-001) is recorded multiple times as it progresses through these stages, providing continuous, structured visibility into product handling activities. This interface allows managers to retrieve traceability records instantly by batch ID, eliminating reliance on fragmented, department-specific documentation.

Figure 1

Batch-level traceability dashboard enabling governance transparency across supply chain stages



4.2 Empirical Evidence from Traceability Data

To support the governance outcomes discussed above, we analysed operational traceability records captured through the QR-based monitoring dashboard. The dataset consisted of batch-level monitoring data collected across multiple supply chain checkpoints, including packaging inspection, cold storage handling, distribution dispatch, and delivery verification. Table 1 summarises the distribution of product condition outcomes across these stages. The QR-based monitoring dashboard tracked 120 production batches across four key supply chain checkpoints. Table 1 summarises the traceability records collected from packaging, cold storage, distribution dispatch, and delivery stages. The results indicate that most batches remained in normal condition throughout the supply chain; however, minor defects were progressively detected at later stages. The highest proportion of defects occurred during distribution and transport, suggesting that handling practices during loading and transportation are the most significant governance risk point. These findings demonstrate how real-time traceability enables early detection of quality deviations and supports stage-level accountability across the supply chain. To further illustrate how digital traceability enables stage-level accountability, Table 2 presents selected

batch-level traceability records captured through the monitoring dashboard. These records show how the QR-based system enables managers to identify the specific supply-chain stage where product deviations first occurred. The batch-level records presented in Table 2 demonstrate the digital traceability system's ability to attribute quality deviations to specific operational stages. For example, while several batches were recorded as compliant during packaging and cold storage stages, minor dents or cracks were later detected during distribution and delivery checkpoints. This sequential visibility strengthens accountability by enabling management to identify the operational unit responsible for the deviation and implement targeted corrective actions.

Table 1
Summary of batch-level traceability records across supply chain stages

Supply chain stage	Number of batches monitored	Normal condition (%)	Minor defect (%)	Major defect (%)	Example of detected issue
Packaging inspection	120	117 (97.5%)	3 (2.5%)	0 (0%)	Incomplete seal or slight packaging misalignment
Cold storage handling	120	112 (93.3%)	7 (5.8%)	1 (0.9%)	Minor dent due to stacking pressure
Distribution dispatch	120	109 (90.8%)	9 (7.5%)	2 (1.7%)	Packaging deformation during loading
Delivery checkpoint	120	107 (89.2%)	10 (8.3%)	3 (2.5%)	Crack detected during transport vibration

Table 2
Stage-level detection of quality deviations

Batch ID	Packaging	Cold storage	Distribution	Delivery	Stage where defect first detected
LP-AUG-001	Normal	Normal	Minor Dent	Minor Dent	Distribution
LP-AUG-002	Normal	Minor Dent	Minor Dent	Minor Dent	Cold Storage
LP-AUG-003	Normal	Normal	Normal	Crack	Delivery
LP-AUG-004	Minor Seal	Minor Seal	Minor Seal	Minor Seal	Packaging

4.3 Accountability, Integrity, and Ethical Control

Implementing the QR-based monitoring dashboard improved accountability and data reliability by creating time-stamped records that clearly linked quality results to specific stages of the supply chain. Before implementation, responsibility for product defects at XYZ was often unclear because documentation was fragmented, making it difficult to determine whether problems originated in production, storage, or distribution. A practical example can be seen in cases of packaging deformation detected during distribution. Before digital traceability, such incidents were usually detected only after delivery, and accountability was often challenged because departmental records were incompatible. Through the QR-based system, the company recorded batch conditions at post-packaging, cold storage, and dispatch. When deformation was discovered at delivery, dashboard records confirmed that upstream packaging integrity was compliant, enabling management to attribute the issue to transportation handling practices accurately. This evidence-based attribution strengthened accountability by directing corrective actions to the appropriate operational unit rather than relying on assumptions. From an integrity perspective, verifiable records reduced opportunities for data manipulation and encouraged accurate reporting by operational staff (Krstić et al., 2023). Management decisions regarding process improvements and compliance were therefore based on objective evidence, supporting ethical control and fair governance practices.

The time-stamped records presented in Figure 2 enable stage-level attribution of quality deviations, strengthening accountability and data integrity. Each record contains time-stamped operational attributes such as packaging condition, seal status, temperature, stacking level, transport vibration, and inspector identification. This structured representation of operational data provides granular visibility into product handling conditions as batches move through the supply chain. Figure 2 directly supports the transparency findings discussed by demonstrating how real-time, stage-specific data eliminate information gaps that previously existed under manual documentation systems. For example, the records show that certain batches were marked as “Normal” during packaging and quality control but later exhibited defects such as “Minor Dent” or “Crack Detected” during cold storage or transport. This sequential visibility enables management to pinpoint the exact stage at which deviations occurred, rather than relying on retrospective inference.

Figure 2
Time-stamped traceability records supporting accountability and data integrity across operational stages

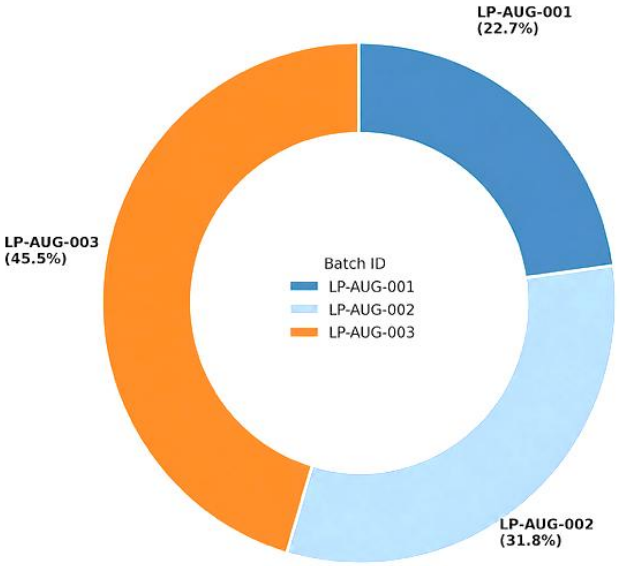
TRACEABILITY RECORDS

Batch ID	Stage	Date	Time	Packaging Condition	Seal Status	Temperature (°C)	Stack Level	Transport Vibration	Inspector ID
LP-AUG-001	Packaging	8/4/2025	10:15 AM	Normal	Pass	28	–	–	OP01
LP-AUG-001	QC	8/4/2025	10:35 AM	Normal	Pass	28	–	–	QC03
LP-AUG-001	Cold Storage	8/4/2025	12:00 PM	Minor Dent	Pass	4	3	–	WH02
LP-AUG-001	Transport	8/5/2025	7:30 AM	Crack Detected	Fail	6	–	High	LG01
LP-AUG-002	Packaging	8/11/2025	11:00 AM	Normal	Pass	29	–	–	OP02
LP-AUG-002	QC	8/11/2025	11:20 AM	Loose Lid	Fail	29	–	–	QC01
LP-AUG-002	Cold Storage	8/11/2025	1:00 PM	Normal	Pass	4	2	–	WH01
LP-AUG-002	Transport	8/12/2025	8:00 AM	Normal	Pass	5	–	Low	LG02
LP-AUG-003	Packaging	8/18/2025	9:40 AM	Crack Detected	Fail	30	–	–	OP03
LP-AUG-003	QC	8/18/2025	10:00 AM	Crack Detected	Fail	30	–	–	QC02
LP-AUG-003	Cold Storage	8/18/2025	12:30 PM	Normal	Pass	5	3	–	WH03
LP-AUG-003	Transport	8/19/2025	7:50 AM	Normal	Pass	6	–	Medium	LG01

4.4 Governance Implications for SMEs

The findings highlight that digital traceability systems can serve as effective governance mechanisms for small and medium-sized enterprises, particularly those operating in regulated and risk-sensitive sectors such as food manufacturing. Unlike large corporations, SMEs often lack formalised governance structures and dedicated compliance units, making real-time operational oversight challenging (Manowanna et al., 2026). The QR-based monitoring dashboard addresses this limitation by embedding governance controls directly into routine operational processes. By integrating transparency and accountability at each stage of the supply chain, the system enables SMEs to strengthen internal controls without imposing excessive administrative or financial burdens. Governance oversight is achieved through structured data capture and centralised visibility rather than hierarchical supervision, which suits resource-constrained organisations. This allows SME managers to monitor compliance, identify risk concentrations, and implement corrective actions promptly. From a regulatory and ethical perspective, digital traceability enhances audit readiness and supports compliance with food safety and quality standards. Verifiable records also improve stakeholder confidence by demonstrating responsible governance practices and a commitment to product integrity. Overall, the findings suggest that QR-based traceability offers SMEs a scalable, practical pathway to strengthen governance effectiveness, integrity, and long-term operational resilience.

Figure 3
Aggregated packaging condition analytics supporting governance oversight in SME's



The aggregated analytics in Figure 3 show how traceability data translate into governance-relevant insights for SME decision-making. It presents an aggregated view of packaging condition outcomes across multiple production batches,

visualised through the QR-Tracer dashboard. Unlike batch-level traceability records, this summary view consolidates operational data into an easily interpretable format, enabling managers to identify packaging-quality patterns without reviewing detailed records. From a governance perspective, this aggregated analytics approach is particularly valuable for small and medium-sized enterprises, where managerial capacity and analytical resources are often limited. The dashboard allows SME managers to rapidly assess the proportion of normal versus defective packaging outcomes across batches, supporting timely identification of systemic issues rather than isolated incidents. For example, a higher concentration of packaging defects in specific batches signals the need for targeted process review or staff retraining, rather than reactive, case-by-case intervention.

4. Conclusion

This study investigated how a QR-based digital traceability system enhances supply chain governance and integrity in a small- and medium-sized food manufacturing enterprise. Drawing on a case study grounded in operational traceability data, the findings demonstrate that digital traceability extends beyond operational monitoring to function as an embedded governance mechanism. The results indicate that real-time, batch-level visibility across key supply chain stages reduces information asymmetry and strengthens governance oversight. By enabling continuous access to product condition data from packaging through distribution, the system supports earlier detection of quality deviations and allows management to intervene proactively rather than reactively. These transparency gains are reinforced by time-stamped and stage-linked records, which enhance accountability and data integrity by enabling clear attribution of responsibility for quality outcomes. As a result, verifiable operational evidence supports managerial decisions on corrective actions and process improvements, reinforcing ethical control. The study further highlights that these governance benefits are particularly relevant for SMEs, which often lack formalised compliance and monitoring structures. The QR-based dashboard translates detailed traceability data into actionable insights, supporting managerial oversight without imposing excessive administrative or analytical burden. While this study provides valuable insights into the governance implications of digital traceability within a food manufacturing SME, several contextual limitations should be acknowledged. The findings come from a single-case study within a specific organisational and regulatory environment, which may limit the generalizability of the observed governance outcomes. Organisational factors such as managerial capability, digital readiness, and resource availability may shape how effectively traceability systems function as governance mechanisms. In addition, regulatory expectations and industry standards may vary across sectors and national contexts, potentially affecting the extent to which digital traceability enhances transparency, accountability, and integrity. Future research should therefore examine multiple organisations across different industries and regulatory environments to understand better how variations in organisational capacity, institutional pressures, and governance structures influence the effectiveness of digital traceability as a governance infrastructure. Such comparative investigations would contribute to a more comprehensive understanding of how digital traceability systems support ethical governance in diverse supply chain settings.

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Declaration of Competing Interest

The author declares no conflicts of interest.

CRediT Authorship Contribution Statement

Amirul Haqimi Muhammad: Methodology; investigation; Writing-original draft; Verification
Azian Ibrahim: Conceptualization; Analysis; Supervision; Writing-revise & review

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Ethics Declarations

This study did not involve human participants or animals. Ethical approval was therefore not required.

Generative Artificial Intelligence Declarations

The authors claim that artificially intelligent-assisted technologies, such as generative AI, were not used to generate content, ideas, or theories. We have just utilised AI to enhance readability and refine the language. This was used with extreme human control and oversight. The authors take full responsibility for reviewing and approving the content.

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