Hasanuddin
Economics and Business Review
VOL. 9 NO. 2, 2025
Publisher:
Faculty of Economics and Business Hasanuddin University
H.E.B.R
P-ISSN: 2549-3221
E-ISSN: 2549-323X

Determinants of Payment Processing Inefficiencies: Qualitative Study of Accounts Payable Aging in Indonesia

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Abstract

This study diagnoses the drivers of accounts payable delays in a multinational manufacturer in Indonesia using a single case design that integrates quantitative Pareto analysis with qualitative Fishbone investigation. We analyse forty-two supplier invoices aged beyond ninety days and conduct six interviews across finance, logistics, and procurement to prioritise causes and explain their mechanisms within legacy ERP conditions, bonded-warehouse logistics, and import-quota controls. Four categories, namely receipt data errors, items still being searched, missing items, and unposted receipts, account for approximately eighty-three per cent of delays and indicate concentrated leverage for improvement. Recommended interventions include competency building and workload balancing, the separation of workflows for goods and service invoices, automated three-way match validations, real-time SLA dashboards, and supply planning that reflects bonded-warehouse constraints. These actions are expected to cut average cycle time by twenty to thirty per cent and raise first-pass match rates to about eighty-five per cent. The study advances evidence-based operations governance for emerging-market manufacturing and informs procurement policy alignment with customs regulation. This manuscript fits the aim and scope of HEBR by translating rigorous analysis into policy-relevant and managerial implications that enhance sustainable business processes in the Asian context.

Keywords: Accounts Payable; Fishbone Diagram; Governance; Pareto Analysis; Procurement Policy

INTRODUCTION

Timely processing of supplier invoices is fundamental to maintaining cash-flow reliability, working-capital efficiency, and sustainable relationships with suppliers. When invoices extend beyond contractual terms, organisations face penalties, increased dispute-resolution costs, and deteriorating collaboration with vendors. In such cases, operational coordination across purchasing, receiving, and accounting becomes impaired (Bragg, 2004; Rogowski, 2019). Within the manufacturing sector, the Accounts Payable (AP) function is typically governed by a three-way matching procedure that reconciles the purchase order (PO), goods receipt (GR), and supplier invoice prior to payment. While

Received 12 August 2025; Received in revised form 13 September 2025; Accepted 29 October 2025; Available Online 31 October 2025

conceptually straightforward, this process is socio-technical in nature because it depends on competent personnel, standardised procedures, and well-integrated enterprise systems. Legacy Enterprise Resource Planning (ERP) systems with limited automation and outdated interfaces tend to increase cognitive load and susceptibility to error, particularly where field validations, scan-based receiving, and exception routing are insufficient (Van Gurp et al., 2005; Salam & Taufik, 2020). From the supply perspective, partial shipments, stock shortages at affiliated entities, and upstream variability further complicate receipt posting and matching (Christopher, 2022; Syaifuddin, 2018). Consequently, invoice delays often emerge as cross-functional coordination failures rather than isolated administrative lapses.

In the context of Indonesia, the Accounts Payable process is further shaped by regulatory frameworks such as bonded-warehouse schemes and import-quota mechanisms under the Ministry of Trade Regulation No. 36 of 2023. These institutional features influence the timeliness of goods receipts and consequently the posting of invoices within the ERP system. PT XYZ Indonesia, a multinational manufacturing firm, has experienced persistent delays in AP invoice processing, with a substantial number of invoices aged beyond 90 days. Internal reviews have identified recurring issues, including mismatched receipt data, missing or untraceable items, and invoices pending because receipts were not recorded in the system. However, the relative magnitude of these factors, the mechanisms through which they occur across departments, and the most effective remedies remain uncertain. Without a structured and prioritised diagnosis, improvement initiatives risk being fragmented, technology-driven, or overly focused on surface-level symptoms rather than systemic causes.

Prior studies have addressed payment delays primarily in descriptive or prescriptive terms, citing financial constraints, administrative inefficiencies, and internal control weaknesses (Bragg, 2004; Rogowski, 2019; Kurniawan et al., 2025). Research on warehouse operations and manpower management links data inconsistencies to process inefficiencies and staffing imbalances (Tsou & Hsu, 2022; Brian Pratama et al., 2022), while digital operations scholarship emphasises the potential of automation, particularly ERP-based validation and RFID-enabled receiving, to improve data accuracy and reduce cycle time (Unhelkar et al., 2022; Bisetty et al., 2024). Despite these advances, two research gaps persist. First, there is a scarcity of empirical evidence quantifying which delay categories dominate within live manufacturing environments and explaining how human, procedural, technological, and material factors interact to produce invoice aging. Second, few studies have integrated quantitative prioritisation tools such as Pareto analysis with qualitative diagnostic frameworks such as the Fishbone (Ishikawa) diagram to translate diagnostic insights into actionable redesign of the AP process.

To address these gaps, this study adopts a socio-technical and information-processing perspective to examine the mechanisms underlying AP delays in PT XYZ Indonesia. It combines quantitative evidence from ERP and document analysis with qualitative insights from staff interviews to provide both prioritised and explanatory findings. Specifically, it quantifies the main drivers of invoice aging using Pareto analysis and then explains their causal mechanisms through a Fishbone model structured across six dimensions: People, Methods, Machines (ERP/IT), Materials (Supply Chain),

Measurement (Key Performance Indicators and Controls), and Environment (Regulatory and Logistics Conditions). This approach enables a comprehensive understanding of how interrelated factors create AP inefficiencies and how targeted improvements can mitigate them.

This study investigates delays in Accounts Payable (AP) invoice processing at PT XYZ Indonesia by first identifying the dominant contributing factors and then unpacking the socio-technical mechanisms through which people, processes, systems, and materials interact to produce those delays. In doing so, it examines how operational routines, data quality, system configurations, and coordination practices jointly shape AP cycle times, and it evaluates targeted interventions capable of mitigating these bottlenecks and improving end-to-end processing performance.

The scope of this study is confined to a single-firm case within the manufacturing sector, operating under a legacy ERP system in Indonesia between 2021 and 2024. The findings are therefore interpreted within these boundary conditions, particularly concerning the firm's organisational structure, its ERP environment, and its reliance on bonded-warehouse logistics and import-based supply chains. Within this context, the study contributes empirically grounded and practically relevant insights into the management of Accounts Payable efficiency in emerging-market manufacturing settings.

LITERATURE REVIEW

Accounts Payable Controls and Three-Way Matching

The Accounts Payable (AP) function represents a critical internal control mechanism that ensures payment accuracy and liquidity reliability within organisations. Classical accounting literature defines AP as a control-intensive process that relies on the three-way matching principle, which reconciles the purchase order (PO), goods receipt (GR), and supplier invoice before authorising payment (Bragg, 2004). This procedure is designed to safeguard organisational funds, maintain compliance, and prevent fraud by ensuring consistency across transactional documents. However, while these texts provide prescriptive guidance, they rarely demonstrate which categories of delay dominate in real-world contexts or how the interactions between departments such as procurement, logistics, and finance contribute to invoice aging.

Descriptive works on payment delays typically attribute inefficiencies to financial constraints, disputes, or administrative lapses (Rogowski, 2019). Introductory accounting sources similarly codify document flows and recordkeeping requirements but fall short of explaining causal mechanisms at the process level (Mursyidi, 2010; Sodikin & Riyono, 2014). Consequently, much of the extant literature is normative rather than diagnostic. The present study builds upon these foundational discussions by adopting a mechanism-based analytical stance to uncover how specific operational failures generate invoice delays in practice.

Accounts Payable Controls and Three-Way Matching

Research within operations and supply-chain management links invoicing delays to structural and procedural inefficiencies. Studies demonstrate that inconsistencies in data entry and receipting are frequently associated with warehouse management practices, manpower allocation, and overlapping roles between divisions (Tsou & Hsu, 2022; Brian Pratama et al., 2022). In manufacturing contexts, these inefficiencies propagate from upstream logistics to financial reconciliation, resulting in discrepancies between physical flows and accounting records.

Furthermore, supply-chain scholarship highlights the complexity of multi-tier sourcing arrangements, partial shipments, and inter-affiliate dependencies that hinder timely invoice posting (Christopher, 2022). In emerging markets such as Indonesia, import dependency and bonded-warehouse regulation exacerbate these challenges. Variability in delivery timing and product quality increases the likelihood of mismatches between GR and invoice entries within the ERP system (Selepe & Makinde, 2024). While these studies offer valuable insights, they often remain fragmented across functional silos and do not quantify the proportional contribution of each causal factor. This research addresses that gap by systematically identifying and prioritising these categories through the Pareto method before explaining their interconnections using a structured Fishbone framework.

Digitalization, Legacy ERP Constraints, and User Capabilities

Digital transformation literature consistently emphasises automation as a key enabler of operational efficiency in invoice verification and payment processes. Studies demonstrate that technologies such as barcode scanning, Radio Frequency Identification (RFID), and integrated validation systems can reduce manual keying errors and shorten cycle times (Unhelkar et al., 2022). However, many of these studies approach automation as a purely technical upgrade, without sufficient consideration of changes in user roles, process ownership, or measurement systems (Bisetty et al., 2024).

Legacy ERP environments, such as Baan, remain prevalent in many multinational subsidiaries. These systems, although stable, often lack flexibility, user-friendly interfaces, and real-time validation features, which heighten the risk of data-entry errors and exception backlogs (Van Gurp et al., 2005). Moreover, the success of ERP adoption depends not only on system design but also on user competence and management support (Sudarmo et al., 2024). The intersection of these issues demonstrates that AP efficiency is not solely a technological problem but a socio-technical one, requiring simultaneous redesign of people, processes, and digital infrastructure. The current study adopts this socio-technical stance to interpret the underlying mechanisms of AP delays within PT XYZ Indonesia.

Root-Cause Frameworks in Operations Diagnosis

Root-cause analysis tools such as Pareto charts and Fishbone (Ishikawa) diagrams are widely used in manufacturing and quality-management programmes to identify the “vital few” contributors to operational inefficiencies (Aqilah et al., 2025; Tsou & Hsu, 2022). The Pareto principle helps prioritise improvement efforts by focusing on the small

number of causes that account for the majority of problems, whereas the Fishbone framework provides a structured taxonomy that categorises potential causes under six dimensions: People, Methods, Machines, Materials, Measurement, and Environment.

Despite their widespread application, published research on AP performance rarely integrates these two tools within a single analytical design. Prior studies tend to rely on qualitative narratives or descriptive statistics, leading to generic recommendations for stricter procedures or greater automation. This research advances the methodological frontier by combining Pareto analysis for quantitative prioritisation with Fishbone mapping for qualitative explanation. This integration not only strengthens causal inference but also provides a replicable framework for diagnosing socio-technical inefficiencies in other financial processes.

Theoretical Framework

This study is grounded in Socio-Technical Systems Theory (STST) as its primary theoretical lens and complemented by the Information-Processing View (IPV) as a supporting perspective. The socio-technical approach posits that organisational performance emerges from the joint optimisation of social subsystems (people, roles, and culture) and technical subsystems (technology, processes, and tools). Misalignment between these subsystems manifests as coordination failures, which in the AP context appear as low first-pass match rates, unposted receipts, or prolonged exception-handling loops (Bragg, 2004; Van Gurp et al., 2005).

From the information-processing perspective, the three-way matching process can be viewed as a coordination problem that requires balancing information load and processing capacity across multiple departments. Delays occur when standard operating procedures, role clarity, or system affordances are insufficient to handle variability from inbound logistics or purchasing activities. Measurement mechanisms such as Key Performance Indicators (KPIs), including first-pass match rate and receiving-SLA compliance, act as feedback loops that either mitigate or amplify these coordination challenges (Christopher, 2022; Selepe & Makinde, 2024).

By combining these theoretical lenses, the study formulates a conceptual framework that links the six Fishbone dimensions (People, Methods, Machines, Materials, Measurement, and Environment) to socio-technical coordination mechanisms. The resulting model suggests that systemic redesign through competency development, workload balancing, procedural standardisation, and digital validation serves as the causal pathway through which organisations can translate diagnostic insight into sustained improvement in AP performance (Unhelkar et al., 2022; Bisetty et al., 2024; Sudarmo et al., 2024).

METHODOLOGY

This research adopts a qualitative case study design supported by descriptive quantitative analysis. The study was conducted within PT XYZ Indonesia, a multinational manufacturing firm that operates as a subsidiary of a global parent company. The single-

firm case study approach was selected to enable an in-depth examination of Accounts Payable (AP) invoice delays within their real organisational and socio-technical context. This design allows the integration of quantitative data, which captures delay frequencies and patterns, with qualitative insights from interviews and document analysis that reveal underlying mechanisms and contextual influences. Such a mixed-methods posture strengthens both the internal validity and practical relevance of the findings by linking numerical prioritisation with interpretive explanation.

The study focuses on the Accounts Payable function, which involves coordination between the Finance and Accounting departments and the Logistics division. The Finance and Accounting departments are responsible for recording and processing supplier invoices, while the Logistics division manages the receipt and verification of goods data. These divisions collectively ensure the accuracy of three-way matching among purchase orders, goods receipts, and supplier invoices. The research participants comprised staff directly involved in the invoice management process, including six key personnel from the finance, logistics, and procurement functions. Their roles encompassed invoice verification, goods receipt posting, and documentation management, thereby providing comprehensive perspectives on workflow bottlenecks and coordination issues.

Data collection combined three complementary sources: enterprise records, internal documents, and semi-structured interviews. Documentary data were drawn from 42 invoices that experienced processing delays exceeding 90 days. Supporting records included purchase order files, goods receipt logs, air way bills from affiliates, and transaction reports extracted from the Enterprise Resource Planning (ERP) system. These documents provided empirical evidence on the nature, timing, and categorisation of delay occurrences. In parallel, semi-structured interviews were conducted to elicit detailed explanations of how such delays occurred and to capture employees' perceptions of procedural weaknesses and system limitations. Each interview lasted approximately 45 to 60 minutes and followed an open-ended guide that focused on five areas: document flow, coordination mechanisms, system usage, problem escalation, and perceived causes of delay. All interviews were recorded with prior consent and transcribed verbatim for analysis.

The data analysis proceeded in two stages. In the first stage, Pareto analysis was applied to identify the most dominant causes of delay based on the 80/20 principle. Each of the 42 delayed invoices was categorised according to the primary cause of the delay. The frequency and percentage of each category were calculated using the formula:

$$\text{Delayed Invoice Factors} = \left(\frac{\text{Invoices with a Given Delay Factor}}{\text{Total Number of Delayed Invoices}}\right) \times 100\% \quad (1)$$

this quantitative step enabled the researcher to determine the vital few categories that contributed most significantly to the overall delay problem. The results guided the focus of subsequent qualitative inquiry

In the second stage, the Fishbone (Ishikawa) method was employed to trace the root causes of these dominant delay factors. The analysis began by defining the central problem, namely "delays in AP invoice processing," and mapping contributing factors under six causal dimensions consistent with the Fishbone framework: People, Methods,

Machines, Materials, Measurement, and Environment. Qualitative data from interview transcripts and internal reports were coded according to these categories. Thematic coding was performed manually by two independent coders to enhance analytical reliability, followed by an inter-coder agreement test that achieved an acceptable level of consistency. Discrepancies were discussed until consensus was reached. Triangulation was performed by comparing evidence across multiple data sources, including ERP transaction data, interview statements, and internal audit documents. This process ensured that interpretations were grounded in convergent findings rather than single-source perceptions.

The methodological integration of Pareto and Fishbone analysis serves a complementary function. Pareto analysis provided a quantitative prioritisation of delay categories, while the Fishbone framework offered a qualitative exploration of underlying mechanisms. Together, these methods generated a comprehensive and actionable understanding of how human, procedural, technological, and environmental factors interact to produce AP inefficiencies. The analysis was further supported by Business Intelligence (BI) tools available within the organisation, which facilitated the identification of recurring patterns and time-based trends in invoice processing.

Ethical considerations were addressed throughout the study. Participation in interviews was voluntary, and informed consent was obtained from all respondents prior to data collection. Confidentiality was strictly maintained by anonymising names, positions, and departmental identifiers in the reporting of results. Organisational approval was granted by PT XYZ Indonesia's finance directorate, and all data handling procedures complied with the institution's confidentiality and information-security policies. The research design thus ensured that participant rights and corporate data integrity were fully protected while maintaining transparency and accountability in the research process.

RESULTS

Based on the integrated analysis of ERP transaction data, internal documentation, and interviews with staff from finance, logistics, and operations divisions, a total of forty-two invoices were identified with processing delays exceeding ninety days as of 31 December 2024. Each invoice was classified according to the primary factor responsible for its delay. The quantitative results are summarised in Table 1, while Figure 1 presents the Pareto chart illustrating the relative and cumulative contribution of each category to overall delay frequency.

Table 1. Factor Frequency Table

Category	Frequency	Cumulative Frequency	Cumulative Percentage (%)

Data errors on receipt	14	14	33%
Item still being searched	9	23	55%
Missing items	7	30	71%
Not receipted into the system	5	35	83%
Claim not filed by the parts team	4	39	93%
Partial product shipments	2	41	98%
Re-exportation	1	42	100%

Source: Process Researcher (2025)

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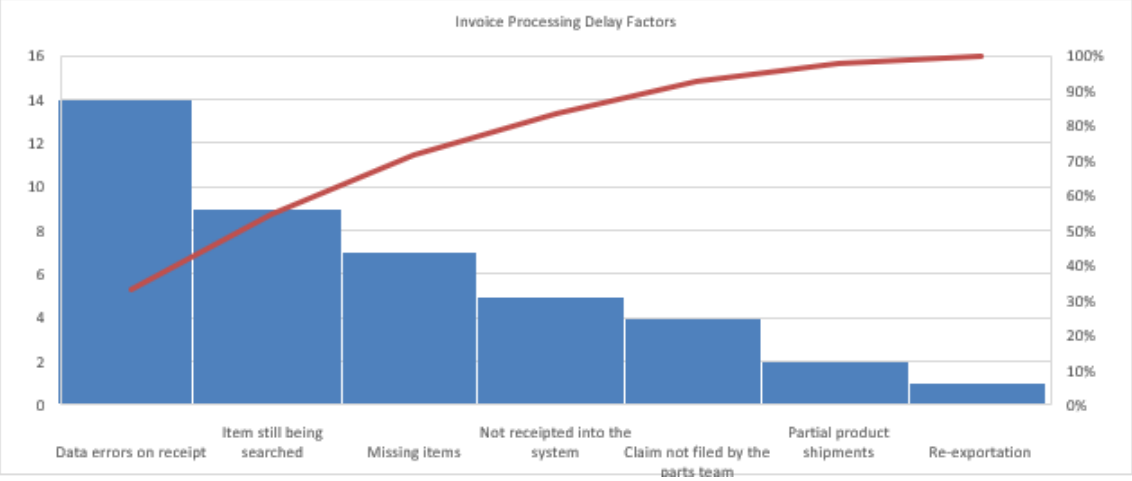
Figure 1. Pareto Graph of Delay Factors



Source: Process Researcher (2025)

The Pareto analysis demonstrates that four primary categories data errors on receipt, items still being searched, missing items, and unrecorded receipts account for approximately eighty-three per cent of total invoice delays. As illustrated in Figure 1, the cumulative percentage curve rises sharply up to these categories before plateauing, confirming the 80/20 principle that a limited number of causes produce the majority of inefficiencies. This finding highlights the need for prioritised interventions focusing on data integrity, item traceability, and system integration.

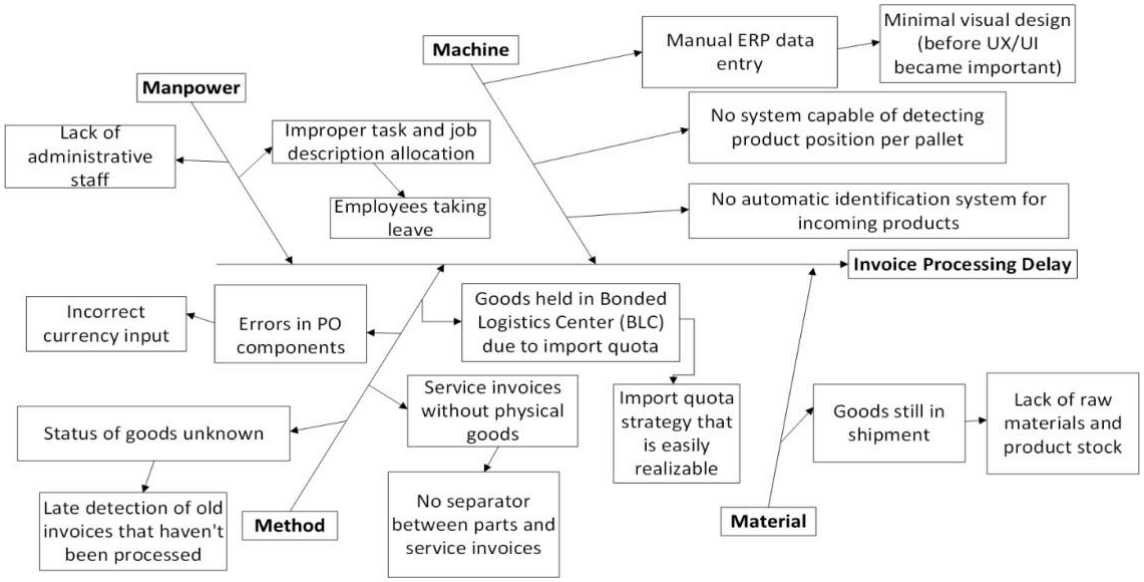
Interviews and document reviews provided qualitative explanations of these dominant categories. Data errors on receipts emerged as the most critical issue, representing thirty-three per cent of total delays. A finance supervisor noted, *"The PO details and the goods receipt often differ; sometimes the item code is outdated or the quantity mismatched, so approval must go through manual correction."* ERP logs confirmed multiple cases of mismatched item identifiers and delayed approval cycles. The second major factor, items still being searched, accounted for twenty-one per cent of delays and was primarily associated with physical verification gaps in the bonded warehouse. As a logistics officer explained, *"When goods cannot be found immediately in the storage area, we cannot close the GR in Baan, and the invoice cannot proceed to*

posting." These two categories reveal that the absence of automation and standardised tracking procedures undermines the accuracy and timeliness of the three-way matching process.

Missing items contributed sixteen per cent of total delays. Internal correspondence indicated that many missing goods were due to partial deliveries or inter-affiliate stock transfers without consistent update of the ERP database. For example, one invoice remained pending for fifty-six days because its receipt documentation was incomplete despite physical arrival being confirmed in an email. The fourth category, not receipted into the system, represented twelve per cent of delays, largely resulting from a backlog of manual data entry. These cases demonstrate the operational and informational gaps that arise when physical verification outpaces digital recording.

To uncover the root mechanisms behind these findings, a Fishbone (Ishikawa) analysis was conducted using the six dimensions of People, Methods, Machines, Materials, Measurement, and Environment. Figure 2 visualises the causal structure developed from combined interview and document evidence.

Figure 2. Fishbone Graph of Invoice Processing Delay Factors



Source: Process Researcher (2025)

The *People* dimension was characterised by inadequate technical competence, improper task allocation, and an imbalance in workload distribution. Several staff members reported multitasking to cover absences, which increased the likelihood of data input errors. One logistics officer recalled, *"When our team member went on maternity leave for four months, the workload doubled, and errors in entry became common."* This observation supports the findings of Tsou and Hsu (2022) and Brian Pratama et al. (2022), who emphasised the influence of manpower shortages on operational data discrepancies.

Under the *Methods* dimension, process fragmentation and lack of standardisation were evident. Service invoices without physical goods were often misclassified, resulting in validation delays. Interviews revealed that unclear procedural boundaries between goods and service invoices forced manual coordination between finance and logistics,

extending the average verification time. Additionally, the company's import quota strategy limiting approved volumes to secure future approvals under Regulation No. 36 of 2023 unintentionally delayed goods clearance in bonded warehouses. This procedural constraint exemplifies what Aqilah et al. (2025) categorised as a method-driven cause of process instability.

The *Machines* dimension pointed to technological obsolescence in the ERP system. PT XYZ Indonesia continues to rely on Baan, an ERP platform introduced in the 1990s, which lacks automation and real-time validation functions. Staff interviews confirmed that data validation and exception handling were entirely manual. As one finance analyst explained, *"The system cannot flag missing fields or inconsistent units automatically, so we have to cross-check everything by hand."* This inefficiency aligns with Van Gurp et al. (2005), who observed that legacy ERP systems impose high cognitive and time burdens in transaction-heavy environments.

The *Materials* dimension revealed structural dependencies on affiliate suppliers for raw materials and spare parts. Partial shipments, often driven by production backlogs or supply constraints at the affiliate level, created ERP discrepancies between ordered and received quantities. Supporting documents showed that these partial deliveries accounted for multiple unclosed purchase orders, preventing corresponding invoices from progressing to approval. Similar to Selepe and Makinde (2024), this case underscores how inter-affiliate supply complexity and import reliance contribute to administrative lag.

The *Measurement* and *Environment* dimensions, though less dominant, still affected the persistence of delays. The absence of measurable performance indicators such as first-pass match rate or receiving-SLA compliance prevented proactive monitoring. Environmental constraints, including customs clearance cycles and bonded-warehouse regulations, further prolonged invoice processing beyond controllable internal factors.

Integrating the Pareto and Fishbone findings reveals that the identified causes are interconnected socio-technical issues rather than isolated procedural weaknesses. Human errors, inefficient methods, and technological limitations interact to produce cumulative process inefficiencies. For instance, outdated ERP design (Machines) magnifies the impact of insufficient training (People) and unclear procedures (Methods). Similarly, supply-chain dependencies (Materials) are aggravated by regulatory constraints (Environment), resulting in cross-functional misalignment.

From a managerial perspective, targeted interventions can address these intertwined causes effectively. Enhancing employee competence through structured ERP training and balanced task allocation can improve data accuracy and reduce human-induced errors. Introducing automated validation modules within the ERP system and segregating workflows for goods and service invoices will improve standardisation and reduce manual handoffs. Upgrading to a modern ERP system equipped with barcode or RFID capabilities can further streamline goods tracking and enhance first-pass match rates (Unhelkar et al., 2022; Bisetty et al., 2024). In parallel, adopting rolling forecasts for import quota planning can synchronise procurement with actual production requirements, mitigating material-related delays (Christopher, 2022).

Quantitatively, the implementation of these interventions is projected to reduce average invoice processing time by twenty to thirty per cent and to raise the first-pass match rate from approximately sixty-five per cent to eighty-five per cent within one year. The introduction of real-time SLA dashboards can further enhance compliance monitoring, enabling management to identify bottlenecks early and respond promptly. These performance metrics provide measurable evidence of process improvement and align with global standards in Accounts Payable governance.

Overall, the integration of Pareto and Fishbone analyses provided a comprehensive diagnostic view of the Accounts Payable delay problem. The combined use of quantitative prioritisation and qualitative causal mapping transformed descriptive delay data into actionable managerial insights. The findings confirm that improving invoice-processing efficiency in multinational manufacturing environments requires concurrent enhancement of human capability, process discipline, and digital infrastructure to achieve sustainable operational performance.

CONCLUSION

This study directly answers the research question concerning the underlying causes of invoice processing delays at PT XYZ. The findings reveal that human resource capability, procedural design, technological obsolescence, and material constraints are the primary contributors to invoice ageing exceeding ninety days. The study highlights that mismatched data entries, unrecorded receipts, and incomplete verification across departments collectively create systematic bottlenecks within the Accounts Payable workflow. The novelty of this research lies in its integrative diagnostic framework that combines Pareto and Fishbone analyses to link descriptive delay data with specific root causes and operational improvement metrics. This approach provides a structured pathway for translating qualitative findings into measurable process performance indicators.

The study identifies several actionable steps for improvement. In the short term, the Finance Department, in collaboration with the Logistics Division, should implement targeted ERP refresher training and enforce a workload redistribution policy to improve first-pass match rates. These actions can be tracked using key performance indicators such as data input accuracy rate and average processing time per invoice, with a goal of achieving an eighty-five per cent first-pass match rate within one fiscal year. Simultaneously, the Information Systems Unit should pilot the integration of automated receipt validation and document tracking within the existing ERP environment. Progress should be measured through monthly Service Level Agreement (SLA) compliance and cycle-time metrics, ensuring that more than ninety per cent of goods receipts are recorded within forty-eight hours of delivery confirmation. As a medium-term initiative, management should prepare a technological roadmap to upgrade the legacy Baan ERP into a modern platform equipped with barcode and RFID integration. The Information Systems Unit should own this programme, monitored by the Operations Steering

Committee, with success measured through reductions in manual entries and real-time tracking coverage.

Beyond internal process enhancement, PT XYZ's import management policy requires strategic recalibration. The Procurement and Trade Compliance Units should adopt a rolling-forecast quota planning model to align import approvals with actual production needs. This adjustment will not only reduce invoice ageing due to goods being held in bonded logistics centres but also improve supply predictability and liquidity planning. The expected outcome is a thirty per cent reduction in average invoice cycle time and a ten per cent improvement in working capital turnover.

The generalisability of these findings extends to organisations operating in similar ERP-based, multi-affiliate supply environments where manual three-way matching and quota-based import constraints exist. However, the scope of this study was limited to a single company over the period 2021–2024, and external variables such as regulatory changes, exchange rate fluctuations, and macroeconomic conditions were not empirically tested. Furthermore, the qualitative approach used here, while effective in identifying causal mechanisms, does not quantify the statistical strength of each factor's impact. To address these limitations, future research should employ a multi-site comparative design across manufacturing subsidiaries to examine cross-organisational variations in invoice-processing efficiency. Alternatively, a longitudinal pre-post evaluation following the implementation of barcode-based goods-receipt systems could empirically measure the extent to which automation improves accuracy and timeliness in invoice processing.

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