The Effect of Competence and Information System Quality on the Smooth Distribution of Traffic Control Devices at the Transportation Office of North Sumatra Province

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Abstract

This paper examines how employee competence and information system quality shape the smooth distribution of traffic control devices at the Transportation Office of North Sumatra Province. The study is presented in conference proceedings format based on the completed research narrative contained in the source manuscript. Competence is treated as the first independent variable, information system quality as the second independent variable, and distribution smoothness as the dependent variable. The field findings indicate that distribution performance is still constrained by delays, document inaccuracy, and mismatch between requested and delivered items. Competence problems appear in weak mastery of standard procedures, limited cross-unit coordination, and insufficient ability to use digital tracking tools. Information system quality problems are reflected in weak real-time stock visibility, slow access, and low report accuracy. The analysis shows that the two variables operate as mutually reinforcing factors in public-sector logistics. Stronger employee capability supports planning accuracy and execution discipline, while better information system quality increases visibility, monitoring, and decision speed. Therefore, the smooth distribution of traffic control devices requires simultaneous improvement in human competence and system reliability so that public service delivery can become more timely, accurate, and accountable.

Keywords: Competence, Information System Quality, Distribution Smoothness, Traffic Control Devices, Public Logistics.

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Introduction

The provision of traffic control devices such as traffic signs, road markings, and traffic signal equipment is a strategic part of public transportation governance. These devices are not merely physical assets installed on roads; they are operational instruments that regulate movement, reduce conflict among road users, and contribute to traffic safety. In provincial government practice, the value of these devices is determined not only by their technical specification but also by the effectiveness of the distribution process that places them in the right location at the right time.

At the Transportation Office of North Sumatra Province, the distribution of traffic control devices requires coordination among planning staff, warehouse officers, administrative personnel, technical units, and receiving field teams. The work includes demand identification, stock recording, item preparation, transportation arrangement, documentation, handover, and post-delivery monitoring. If one link in this chain fails, the disruption can affect installation schedules, maintenance work, and service continuity in districts and municipalities that depend on provincial support.

The present study focuses on two internal determinants that often explain whether distribution activities can run smoothly. The first determinant is competence. Competence reflects the extent to which employees possess the knowledge, skills, work attitudes, and operational judgment needed to complete distribution tasks consistently. In the public logistics setting, competence involves understanding technical specifications, mastering standard operating procedures, preparing documents accurately, communicating across units, and handling field constraints without creating new delays.

The second determinant is information system quality. Contemporary logistics operations rely on information systems to record stock movement, support planning, trace shipment status, and generate managerial reports. If a system is slow, unreliable, difficult to access, or inconsistent with actual stock conditions, distribution decisions will be weakened. Conversely, when the system provides accurate and timely information, employees can work more quickly, documents become more consistent, and field coordination becomes easier to monitor.

The source manuscript for this paper reports field evidence showing that the distribution of traffic control devices still encounters practical obstacles. On-time delivery is not yet consistent, supporting documents are not always complete and accurate, and receiving units still report mismatch problems related to item type or quantity. These operational symptoms suggest that distribution smoothness cannot be understood as a simple transportation issue. Instead, it is closely tied to organizational capability and information quality.

This article therefore reformulates the Rano Sidi manuscript into a proceedings-style research paper with a fuller discussion structure. The goal is to explain the conceptual relationship between competence and information system quality, to present the available field findings narratively rather than through preliminary tables, and to discuss how both variables influence public-sector distribution performance at the Transportation Office of North Sumatra Province.

The study is important for at least three reasons. First, traffic control devices are directly related to public safety and orderly road operation. Second, provincial logistics performance depends on administrative accuracy as much as on physical distribution. Third, digitalization efforts in public institutions often fail to create operational benefit when they are not matched by employee capability. For these reasons, the research contributes both practically and academically to the discussion of logistics performance in public administration.

Literature Review

2.1 Distribution Smoothness

Distribution smoothness in this study refers to the degree to which traffic control devices can be delivered according to schedule, in the correct quantity and item type, with complete documentation, and with clear follow-up when problems occur in the field. This understanding

is consistent with logistics management literature that treats distribution performance as an indicator of service reliability and execution discipline. In the public sector, distribution smoothness also reflects the ability of an agency to translate plans and procurement outcomes into usable infrastructure support for the community.

The indicators of distribution smoothness commonly include timeliness, quantity accuracy, item suitability, document completeness, and responsiveness to urgent requests. Timeliness measures whether distribution activities can be completed according to approved schedules. Quantity and item suitability assess whether what is delivered matches operational needs. Document completeness is necessary because public distribution activities must be auditable, traceable, and supported by formal administrative evidence. Responsiveness shows whether the organization can react quickly to sudden maintenance requests or field disturbances.

A smooth distribution process is therefore not simply the absence of delay. It is the presence of coordination, information visibility, and procedural compliance across the whole chain of preparation, dispatch, delivery, and monitoring. In this sense, distribution smoothness becomes an operational performance construct that is directly relevant to logistics-based public service.

2.2 Competence

Competence is commonly defined as an underlying characteristic that causally relates to effective or superior performance. Spencer and Spencer emphasize that competence includes visible and less visible dimensions such as knowledge, skills, self-concept, traits, and motives. In organizational practice, competence is reflected in the ability of employees to complete work according to standards, solve problems, coordinate with others, and adapt to changing conditions.

For distribution work, competence is not limited to technical understanding of goods movement. It also includes the ability to read and follow procedures, prepare administrative documents, communicate with internal and external units, operate simple digital tools, and maintain service discipline under time pressure. A warehouse officer who understands item specifications but cannot coordinate with requesting units, for example, still faces competence limitations because operational work requires integrated capability rather than isolated technical knowledge.

The present research operationalizes competence through five dimensions: knowledge of regulations and procedures, distribution planning skill, inventory handling skill, coordination and communication ability, and operational problem-solving capability. These dimensions are suitable for the context of traffic control device distribution because the work demands both administrative precision and situational judgment.

Human capital theory also supports the view that competence matters for operational outcomes. When an institution invests in employee capability through training, supervision, and practical learning, employees can reduce avoidable error, respond more confidently to task variation, and contribute to more stable service delivery. In short, competence is an enabling condition for smooth distribution.

2.3 Information System Quality

Information system quality is another major factor in logistics execution. DeLone and McLean place system quality at the core of information system success because system quality affects user behavior, satisfaction, and organizational benefit. ISO/IEC 25010 further clarifies that quality is reflected in functional suitability, reliability, performance efficiency, usability, security, and compatibility. A system that is technically present but weak in these dimensions will not create real operational value.

In the distribution of traffic control devices, information system quality determines whether staff can access accurate stock records, know the movement status of goods, verify

documents, and follow item history efficiently. Functional suitability matters because a system must support actual logistics work rather than merely collect data. Reliability matters because interruptions during work hours can slow coordination. Performance efficiency matters because slow processing increases waiting time. Usability matters because employees should be able to use the system without excessive dependency on technical assistance.

Security and compatibility are also important. Public distribution data involve accountability and traceability. Therefore, access rights should match work roles, and the system should reduce the risk of unauthorized change or data loss. Compatibility is equally crucial because distribution work often depends on data exchange among warehouse records, administrative units, and monitoring reports. If the system cannot support this integration, the organization returns to manual coordination, which often generates duplication and inconsistency.

From the task-technology fit perspective, system quality influences performance when technology characteristics align with work needs. For logistics activities that require speed, accuracy, and monitoring, weak system quality directly harms operational smoothness. Thus, information system quality is expected to influence the distribution of traffic control devices positively.

2.4 Previous Research and Analytical Position

Previous studies generally support the importance of human competence and system quality in logistics performance. Research on supply chain and distribution settings repeatedly shows that human capability improves planning discipline, reduces error, and strengthens coordination. Studies on information systems similarly demonstrate that reliable and easy-to-use systems improve visibility, decision speed, and monitoring quality. Several Indonesian studies also indicate that competence and information system quality can jointly explain distribution effectiveness in both private and public organizations.

What distinguishes the present study is its context. The Transportation Office of North Sumatra Province operates within a public-service environment where distribution smoothness is closely linked to infrastructure readiness and traffic management. Unlike commercial logistics, the success criterion here is not only cost efficiency but also administrative accountability, field responsiveness, and service continuity. Therefore, the paper extends previous literature by interpreting competence and information system quality through the operational logic of public-sector traffic device distribution.

2.5 Conceptual Framework and Hypotheses

The conceptual model positions competence (X1) and information system quality (X2) as independent variables that affect distribution smoothness (Y). The model reflects the argument that human capability and information visibility work together to determine whether distribution can be implemented accurately and responsively in a public-service environment.

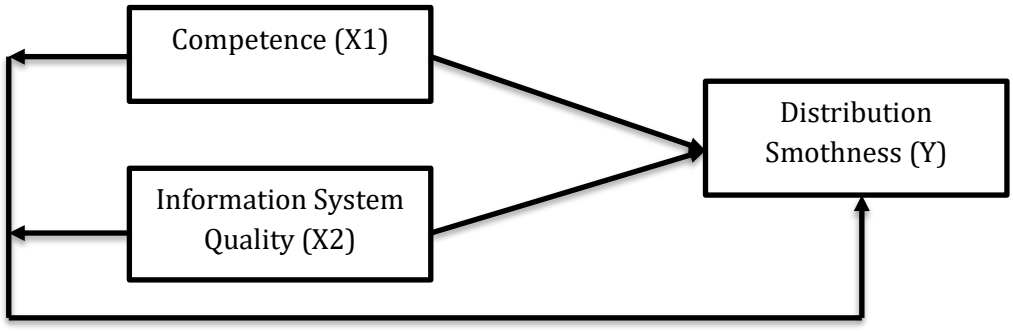

Figure 1. *Conceptual framework of the study*

The hypotheses derived from the framework are as follows: H1, competence has a positive effect on the smooth distribution of traffic control devices; H2, information system quality has a positive effect on the smooth distribution of traffic control devices; and H3, competence and information system quality simultaneously influence the smooth distribution of traffic control devices.

Research Methodology

This research uses a quantitative explanatory design. The purpose of the design is to examine the effect of competence and information system quality on the smooth distribution of traffic control devices. The study is located at the Transportation Office of North Sumatra Province in Medan, particularly in work units that are directly involved in planning demand, recording stock, managing warehouses, preparing delivery documents, and coordinating field distribution.

The population stated in the source manuscript consists of employees who are directly connected to the management and distribution of traffic control devices. The study uses a saturated or census approach because the target population is relatively limited and all relevant employees are considered important for capturing the organizational condition. In the full research design, data are collected through a structured questionnaire using a five-point Likert scale ranging from strong disagreement to strong agreement.

The independent variables are competence (X1) and information system quality (X2), while the dependent variable is distribution smoothness (Y). Competence is measured through employee understanding of procedures, planning ability, inventory handling, coordination, and problem-solving. Information system quality is measured through functional suitability, reliability, speed, ease of use, data accuracy, security, and compatibility. Distribution smoothness is measured through timeliness, item accuracy, document completeness, process speed, and monitoring visibility.

The source manuscript explains that the planned analysis includes validity testing, reliability testing, and inferential processing with SPSS. For the purposes of this proceedings article, the analysis is developed from the field findings available in the manuscript and is presented as a structured narrative of operational results and discussion. This means that the article emphasizes empirical interpretation of the available survey-based findings rather than reproducing full statistical output that is not included in the uploaded source file.

To maintain analytical consistency, the variables are interpreted in direct relation to the actual work process of the Transportation Office rather than as abstract organizational concepts. This operational orientation is important because the smooth distribution of traffic control devices depends on how employees perform real tasks such as checking stock, validating forms, communicating schedules, and following up on complaints from the field. Therefore, the study treats the questionnaire indicators as representations of daily logistics practice.

Results

4.1 Distribution Performance Findings

Chapter IV presents the research findings in narrative form. The source manuscript contains field responses from employees involved in inventory, warehouse, and distribution work. When these responses are reorganized analytically, they reveal a consistent operational pattern: the distribution process is slowed not by a single isolated weakness, but by the interaction of human competence gaps and weaknesses in the information system used to support daily work.

The first set of findings concerns distribution smoothness itself. The manuscript reports that only a minority of respondents agreed that deliveries could be completed according to schedule, that distribution documents were consistently complete and accurate, and that complaints related to mismatch of item type or quantity were rare. In practical terms, this means that the Transportation Office still experiences instability in three core performance indicators

at once: timeliness, administrative accuracy, and delivery accuracy. Because these three indicators are interdependent, a problem in one area quickly spreads to the others. When preparation is delayed, documents are rushed. When documents are rushed, verification becomes weaker. When verification is weaker, mismatch risk rises.

More specifically, the source document notes that only 30 percent of respondents believed that the delivery schedule could be met consistently, 35 percent believed that shipment documents were always complete and accurate, and only 25 percent stated that field complaints related to wrong item type or quantity were rare. These item-level responses show that the operational challenge is not abstract. It is visible in everyday distribution practice, where scheduling discipline, paperwork quality, and verification quality still need strengthening.

4.2 Competence Findings

The second set of findings concerns competence. Employee responses show that procedural mastery is not yet evenly distributed across the responsible units. Some staff understand the standard operating procedures and technical requirements well, but the overall response pattern indicates that this knowledge has not been institutionalized consistently. More importantly, coordination capability is weaker than procedural recognition. This suggests that employees may know what should be done in principle but face difficulty when they must coordinate work across inventory, administration, transport preparation, and receiving units. In operational settings, this gap is crucial because distribution depends on synchronized action rather than individual task completion alone.

The competence findings also point to limited ability in the use of technology for distribution tracking. The manuscript reports that 40 percent of respondents felt they mastered distribution procedures adequately, 30 percent believed they could coordinate effectively across units, and only 25 percent considered themselves skilled in using technology for tracking and monitoring. This is a meaningful result because digital competence has become an operational requirement rather than an optional skill. Staff who cannot use inventory or tracking functions confidently are more likely to rely on manual confirmation, repeated checking, and informal communication. These workarounds consume time, increase the probability of inconsistent records, and reduce the speed of response when field units request urgent support.

4.3 Information System Quality Findings

The third set of findings concerns information system quality. The manuscript indicates that real-time stock information remains weak, access is not always easy and fast, and system-generated reports are not yet fully trusted for operational decisions. This variable also shows the lowest overall level of positive response among the three major constructs examined in the study. The implication is that the system is not functioning fully as an end-to-end visibility tool. Instead of shortening decision time, the current system still leaves room for uncertainty. This is particularly problematic in public distribution because every delivery decision requires confidence in stock availability, document status, and the traceability of previous movements.

The item-level responses reinforce this interpretation. Only 20 percent of respondents stated that the existing system provided real-time stock data, 35 percent considered access to be easy and fast, and 25 percent felt that the reports produced by the system were sufficiently accurate for decision making. These numbers reveal that the system still does not offer the operational transparency expected from a distribution support platform. In practice, this forces employees to verify data through alternative channels, thereby slowing the entire process.

A detailed reading of the field evidence shows that the most serious weakness lies in stock visibility. When employees cannot rely on real-time data, they must confirm availability manually through repeated communication with warehouse staff or through later adjustments in administrative records. Such manual dependency slows work, increases the possibility of discrepancy between physical stock and recorded stock, and creates hesitation in scheduling

delivery. Even when employees are willing to respond quickly, the absence of dependable information reduces their ability to do so.

The next issue concerns accessibility and usability. A system may exist formally but still fail operationally if users encounter difficulty in navigating menus, locating records, or generating reports quickly. The source manuscript suggests that the system is not yet sufficiently easy and fast for all relevant users. This result supports the idea that system quality is experienced through daily work practice, not only through technical specification. For the user, a high-quality system is one that reduces friction and helps tasks flow smoothly. In the present case, the reported experience suggests that the system still creates friction.

4.4 Integrated Analytical Discussion

When the competence and information system findings are read together, an important pattern emerges. The organization is facing a dual bottleneck. On the one hand, competence limitations weaken execution discipline, problem-solving ability, and coordination quality. On the other hand, information system limitations weaken visibility, accuracy, and response speed. Distribution smoothness declines because these two weaknesses do not operate independently. Low competence makes it harder for staff to compensate for weak system performance, while low system quality makes it harder for competent staff to maintain consistent output across repeated transactions.

This interaction can be explained through the logic of task-technology fit and human capital perspectives. Competence provides the human side of operational capability. System quality provides the informational side. If one side is weak, the other side is forced to carry a disproportionate burden. For example, a competent warehouse officer may still fail to dispatch correctly if the recorded stock position is inaccurate. Likewise, a reliable system may still fail to create good distribution performance if users do not understand how to interpret data, communicate changes, or solve exceptions. Therefore, the findings of this study support the view that distribution smoothness is created by the alignment of competent employees and reliable information systems.

The field findings also illuminate the administrative nature of public logistics. In the private sector, distribution failure is often discussed in terms of cost, speed, or customer dissatisfaction. In the public sector, however, document completeness and accountability are equally central. The source manuscript shows that documentation is one of the weak points in current practice. This matters because public agencies are expected to demonstrate not only that goods are moved, but also that every movement is formally traceable and compliant. Consequently, competence and system quality both influence not just physical delivery but also governance quality.

From a managerial standpoint, the results indicate that employee development programs should be linked directly to distribution tasks. Training is needed on three fronts: procedural mastery, cross-unit coordination, and digital tool use. Procedural mastery ensures that each employee understands the correct flow of work. Coordination training helps different units operate with a shared timeline and shared responsibility. Digital tool training reduces manual dependency and allows the information system to function as an operational support mechanism rather than as a passive archive.

System improvement is equally necessary. First, the organization needs stronger real-time stock visibility so that decisions can be made without repeated manual confirmation. Second, access speed and system stability must improve to reduce operational waiting time. Third, report outputs must be accurate, easy to understand, and aligned with the information actually needed by operational staff. Fourth, the monitoring function should allow clearer tracing of status from item preparation to delivery and receipt. These improvements would not only reduce delay but also strengthen accountability in distribution activities.

The findings also imply that coordination should be formalized more clearly. When competence and system quality are both incomplete, organizations often rely on informal

communication to bridge the gap. While informal coordination can help in the short term, it is unreliable as a permanent mechanism. The Transportation Office would benefit from standard escalation paths, clearer handover points, and defined verification responsibilities for each stage of distribution. Such structural clarity can reduce the extent to which outcomes depend on individual initiative alone.

4.5 Additional Analytical Interpretation

The overall discussion leads to a central interpretation: the smooth distribution of traffic control devices is a combined outcome of employee readiness and information readiness. Competence improves the quality of human action, while information system quality improves the quality of operational visibility. The source manuscript demonstrates that both are still below the level required for consistently reliable public distribution. Therefore, improvements in one area without improvements in the other are unlikely to create substantial performance change.

Although the article is built from the available field findings rather than from a complete inferential output table, the narrative evidence is sufficiently strong to show the direction of the problem. The reported percentages for key items repeatedly point to weaknesses in procedure mastery, coordination, system access, reporting accuracy, and delivery accuracy. Because these patterns are internally consistent across variables, they provide a credible basis for concluding that competence and information system quality are strategic determinants of distribution smoothness within the Transportation Office of North Sumatra Province.

Another important observation concerns operational dependency on informal communication. The source manuscript implies that staff frequently rely on verbal confirmation, repeated messaging, or direct personal contact to ensure that item availability and delivery status are understood correctly. Although such practices may temporarily solve immediate problems, they are inefficient as a routine mechanism because they bypass system discipline and make audit trails weaker. In an organization that handles public assets, informal communication should complement formal records, not replace them.

The findings also suggest that urgency management remains vulnerable. Traffic control devices are sometimes required for maintenance work, replacement of damaged equipment, or responses to field complaints that cannot wait for lengthy administrative clarification. When competence is uneven and system data are uncertain, urgent requests become harder to process because staff must first verify information that should already be visible. This condition increases the risk that urgent public needs are handled more slowly than expected.

A further implication appears in the area of accountability. Every distribution activity in a public agency should be explainable through document completeness, traceable item records, and responsible authorization. The narrative results indicate that current weakness in document accuracy and monitoring visibility can affect more than operational speed; it can also weaken institutional accountability. For this reason, competence development and system improvement should be treated as governance priorities rather than merely technical improvements.

The field findings are also relevant for the broader agenda of digital transformation in government. Many public institutions invest in digital applications with the expectation that systems will automatically improve service delivery. The present study shows that technology alone is insufficient. Digital transformation creates operational benefit only when the system supports actual task requirements and when employees possess the competence needed to use that system consistently. This insight is particularly valuable for distribution management because logistics work depends on both data discipline and execution discipline.

Conclusion

Based on the field findings and analytical discussion, several conclusions can be stated. First, the smooth distribution of traffic control devices at the Transportation Office of North Sumatra Province has not yet reached an optimal level. Distribution activities still face difficulty

in terms of timeliness, administrative completeness, and delivery accuracy. These weaknesses show that operational problems persist across several stages of the distribution process rather than at only one point.

Second, competence is a major explanatory factor. The available findings indicate that employee capability is still uneven, especially in relation to procedural mastery, inter-unit coordination, and digital tracking ability. These competence limitations reduce execution consistency and make distribution activities more dependent on repeated clarification and manual correction.

Third, information system quality is also a central determinant. Weak real-time stock visibility, limited ease of access, and low confidence in report accuracy reduce operational responsiveness and make distribution decisions slower and less precise. The system has not yet functioned fully as a visibility and control mechanism for public distribution operations.

Fourth, competence and information system quality should be understood as complementary variables. Stronger employee capability without better information quality will still leave decision makers with limited visibility. Better systems without capable users will also fail to generate consistent distribution performance. Therefore, the most appropriate improvement path is an integrated strategy that develops both human resources and digital support systems simultaneously.

From a practical perspective, the Transportation Office of North Sumatra Province is advised to strengthen distribution performance through targeted procedural training, coordination-based supervision, and digital capability development. At the same time, the institution should improve system reliability, real-time stock recording, access speed, report accuracy, and monitoring visibility. These steps are expected to improve not only operational speed and accuracy but also public accountability in the management of traffic control devices.

Future research may extend the present study by processing a larger dataset, incorporating full inferential testing, and comparing public distribution units across different provinces or sectors. Such work would provide a broader empirical basis for understanding logistics performance in public institutions.

The present proceedings article is intentionally written in a fuller narrative form so that the research can be read as a completed conference paper rather than as a proposal summary. Even without reproducing unsupported statistical tables, the available field evidence is sufficient to demonstrate the structure of the operational problem and to justify the managerial recommendations proposed in this paper.

5.1 Practical Roadmap for Institutional Improvement

Finally, managerial supervision should adopt a performance-monitoring perspective. Leaders need periodic review of on-time delivery, document completeness, mismatch incidents, and follow-up time for urgent requests. These indicators can become a compact operational dashboard that links competence, system quality, and distribution smoothness in one monitoring view. In this way, the findings of this study can be converted into a practical governance mechanism for strengthening public logistics performance.

System improvement should proceed in parallel. The institution should review whether the current application is aligned with the minimum information needs of warehouse, administrative, and field units. If not, redesign should focus on stock visibility, movement status, user access speed, report reliability, and role-based control. Small but targeted system adjustments are often more effective than broad digital projects that do not address the actual bottlenecks faced by users.

In the medium term, employee competence development should be organized around actual distribution tasks instead of generic administrative training. The priority modules should include standard operating procedure refreshment, cross-unit coordination drills, digital record utilization, exception handling, and field communication. Training effectiveness should then be evaluated not only through attendance but through measurable changes in document accuracy, response speed, and complaint reduction.

To translate the findings into an actionable agenda, the institution needs a phased improvement roadmap. In the short term, the Transportation Office should standardize verification checkpoints for stock data, request forms, and handover documentation. This step is important because many observed weaknesses originate from inconsistent confirmation practices before dispatch. A short-term checklist that must be signed at each stage can reduce avoidable errors while system improvement is still underway.

The institution should also develop a simple learning loop from distribution incidents. Every delayed, mismatched, or undocumented distribution case should be recorded, classified, and reviewed so that the same problem is not repeated in later cycles. By turning incidents into organizational learning material, the Transportation Office can steadily strengthen both competence and system-based control.

An additional operational step concerns inter-unit review meetings. A brief weekly review involving planning, warehouse, administration, and technical representatives can help detect emerging bottlenecks before they become delivery failures. Such meetings do not need to be bureaucratic or lengthy; they need to be structured, data-based, and focused on exceptions, pending requests, and discrepancy resolution.

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