Inventory Management Challenges and Improvement Strategies at TESDA Pangasinan School of Arts and Trades: A Mixed-Methods Case Study

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ABSTRACT

Efficient inventory management is essential for effective utilization of institutional resources, operational efficiency, and accountability in technical-vocational education institutions. This study examined inventory-management challenges and improvement opportunities at TESDA Pangasinan School of Arts and Trades (TESDA-PSAT). A mixed-methods case study design was employed using a structured survey, semi-structured interviews, observations, and document analysis. Fifty respondents composed of administrators, supply officers, property custodians, accounting personnel, and trainers participated in the study. Quantitative data were analyzed using frequency, percentage, weighted mean, standard deviation, and correlation analysis, while qualitative data were analyzed thematically. The results showed an overall inventory-management mean of 3.50, interpreted as moderately effective. Inventory recording (3.28) and monitoring and control (3.19) were the lowest-rated dimensions, while receiving procedures (3.75) and issuance and distribution (3.71) were among the highest. Recurring challenges included procurement delays, manual recording, inconsistent updating of records, difficulty tracking tools and equipment, limited training on digital inventory systems, and insufficient interdepartmental coordination. Correlation analysis indicated a moderate positive relationship between inventory-management practices and operational efficiency. Qualitative findings reinforced the need for digital inventory systems, accurate documentation, timely procurement, capacity building, and standardized procedures. Based on the integrated findings, a Strategic Inventory Management Improvement Framework was developed. The study contributes to social innovation and institutional empowerment by positioning inventory management as a participatory capability that supports responsible resource stewardship, continuity of training, accountability, and sustainable public-service delivery.

Keywords: inventory management, operational efficiency, resource utilization, TESDA, mixed-methods, case study, social innovation, institutional empowerment

INTRODUCTION

Inventory management plays a significant role in ensuring the efficient operation of organizations by maintaining the availability, accountability, and optimal utilization of resources. In technical-vocational education institutions, inventory systems support competency-based training through the effective management of tools, equipment, laboratory resources, instructional materials, and consumable supplies. Efficient inventory management minimizes operational disruptions, reduces unnecessary expenditures, and promotes transparency in the use of public resources.

TESDA Pangasinan School of Arts and Trades (TESDA-PSAT) operates technical training programs requiring specialized facilities and equipment. As programs respond to evolving industry standards, inventory management becomes increasingly complex. Delayed procurement, inaccurate records, inadequate monitoring, and equipment underutilization may affect operational efficiency and training delivery.

Although inventory management has been extensively studied in manufacturing, retail, healthcare, and logistics, fewer studies have focused on public technical-vocational education institutions in the Philippines using a mixed-methods approach. The distinct contribution of this study is therefore contextual and integrative rather

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than a claim that inventory-management principles themselves are new. It combines measurable inventory practices with the experiences of personnel responsible for inventory operations and translates the integrated evidence into a framework tailored to a public technical-vocational institution.

The study also contributes to social innovation by treating inventory improvement as institutional capability building. Digitalization, standardized procedures, staff development, cross-unit coordination, and participatory monitoring can empower personnel to make evidence-informed decisions and improve stewardship of public resources. These improvements can support quality education and training, responsible resource use, resilient institutional operations, and accountable public-service delivery.

The study aimed to assess inventory-management practices and challenges at TESDA-PSAT and develop evidence-based improvement strategies. Specifically, it sought to determine the effectiveness of major inventory-management processes, identify recurring challenges, examine the relationship between inventory management and operational efficiency, explain quantitative findings through qualitative evidence, and develop a Strategic Inventory Management Improvement Framework.

METHODS

Research Design

The study employed a mixed-methods case study design. The quantitative component assessed inventory-management practices and operational efficiency, while the qualitative component used interviews, observations, and document analysis to explain the conditions underlying the quantitative results.

Research Site

The study was conducted at TESDA Pangasinan School of Arts and Trades in Lingayen, Pangasinan. The institution manages training tools, equipment, consumable materials, and office resources that support competency-based education.

Participants and Sampling

Criterion-based purposive sampling was used to select personnel with direct knowledge of inventory-related processes. Participants included administrators, supply officers, property custodians, accounting personnel, and trainers involved in inventory planning, procurement, storage, monitoring, issuance, property accountability, or utilization of training resources. Fifty eligible respondents participated in the quantitative component.

Participants were included if they were currently assigned to TESDA-PSAT, had direct involvement in or sufficient knowledge of inventory-related activities, and consented to participate. Personnel without substantive involvement in inventory functions were excluded. Interview participants were purposively selected to represent different functions and levels of responsibility within inventory operations.

Research Instruments

Four sources of evidence were used: a structured survey questionnaire, a semi-structured interview guide, an observation checklist, and authorized inventory-related documents and reports. The questionnaire covered inventory planning, procurement, receiving, storage and warehousing, inventory recording, monitoring and control, issuance and distribution, and disposal procedures, together with indicators of operational efficiency and resource utilization.

The interview guide explored recurring challenges, documentation, digital systems, procurement, personnel capability, coordination, and improvement strategies. Observation and document analysis were used to corroborate reported practices.

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Instrument Validation and Reliability

The research instruments underwent expert review before administration to establish relevance, clarity, and appropriateness to the study objectives. The questionnaire was refined before full administration and pilot-tested.

Qualitative credibility was strengthened through triangulation of interview responses, observations, and available inventory documents, together with systematic coding and comparison of themes across sources.

Data Collection Procedure

Approval was obtained from the appropriate TESDA authorities before data collection. The finalized survey was administered to selected participants. Interviews, observations, and authorized document reviews were conducted to supplement and explain the quantitative findings. Participants were informed of the study purpose, voluntary participation, confidentiality, and their right to decline participation.

Data Analysis and Inferential Tests

Quantitative data were analyzed using frequency, percentage, weighted mean, and standard deviation. Correlation analysis was used to examine the relationship between inventory-management practices and operational efficiency. The study results indicate a moderate positive relationship.

Qualitative data were coded, categorized, and analyzed through thematic analysis. Interview evidence was compared with observation and documentary evidence to strengthen interpretation.

Integration of Quantitative and Qualitative Findings

Integration occurred during interpretation by comparing quantitative patterns with qualitative explanations. Areas of convergence were used to strengthen conclusions, while complementary or divergent evidence was examined to identify contextual factors. For example, the lower ratings for inventory recording and monitoring were explained by qualitative accounts concerning manual processes, recording errors, difficulty tracking tools and equipment, and inconsistent updating. Procurement concerns identified quantitatively were further explained by reports that delays could postpone laboratory activities when required materials or equipment were unavailable. The integrated evidence was used to formulate the improvement framework.

RESULTS

Respondent Profile

A total of 50 respondents participated in the study, consisting of administrators, supply officers, property custodians, accounting personnel, and trainers. Most respondents had more than five years of service and were directly involved in inventory-related functions, making them appropriate sources of information regarding inventory-management practices.

Inventory Management Practices

Dimension	Mean	Interpretation
Inventory Planning	3.68	Effective
Procurement	3.42	Moderately Effective
Receiving Procedures	3.75	Effective
Storage and Warehousing	3.61	Effective

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Inventory Recording	3.28	Moderately Effective
Monitoring and Control	3.19	Moderately Effective
Issuance and Distribution	3.71	Effective
Disposal Procedures	3.33	Moderately Effective
Overall	3.50	Moderately Effective

The overall mean of 3.50 indicates that inventory-management practices were moderately effective. Receiving procedures had the highest mean (3.75), followed by issuance and distribution (3.71), inventory planning (3.68), and storage and warehousing (3.61). Monitoring and control (3.19) and inventory recording (3.28) received the lowest ratings and therefore represent priority areas for improvement.

Inventory Management Challenges

• Delays in procurement and delivery of supplies.

• Manual recording of inventory transactions.

• Inconsistent updating of inventory records.

• Difficulty tracking the movement of tools and equipment.

• Limited training on digital inventory systems.

• Insufficient coordination among departments.

Operational Efficiency and Resource Utilization

Respondents generally perceived operational efficiency as satisfactory but identified procurement delays and record-updating delays as factors that occasionally affected the availability of instructional materials and equipment.

Relationship Between Inventory Management and Operational Efficiency

Correlation analysis suggested a moderate positive relationship between inventory-management practices and operational efficiency. This indicates that better inventory planning, monitoring, and documentation tend to be associated with improved organizational performance and more efficient resource utilization.

Qualitative Findings

Need for Digital Inventory Systems.

Manual inventory processes consumed considerable time and increased the possibility of recording errors.

Importance of Accurate Documentation.

Accurate and updated records were considered essential for accountability, procurement planning, and audit compliance.

Procurement Delays Affect Training.

Delays sometimes postponed laboratory activities because required materials or equipment were unavailable.

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Capacity Building for Inventory Personnel.

Participants recommended continuous training on inventory procedures and digital systems.

Standardization of Inventory Procedures.

Participants expressed the need for standardized practices to ensure consistency, transparency, and accountability.

DISCUSSION

The findings show that inventory management at TESDA-PSAT is functional but has identifiable weaknesses in recording and monitoring. The overall mean of 3.50 indicates moderate effectiveness, while the lower ratings for recording and monitoring point to weaknesses in information visibility and control. In a technical-vocational institution, these weaknesses have implications beyond administrative record keeping because the availability and accountability of tools, equipment, and consumables directly support competency-based training.

The qualitative findings reinforce the quantitative results. Manual processes contribute to time demands and recording errors, while incomplete or outdated documentation can affect accountability and procurement planning. Procurement delays can also affect training continuity when needed materials and equipment are unavailable. The findings therefore support a coordinated response involving digital systems, standardized procedures, staff development, and stronger interdepartmental coordination.

The moderate positive relationship between inventory management and operational efficiency suggests that improvements in planning, monitoring, and documentation may contribute to better resource utilization and fewer operational disruptions.

From a social-innovation perspective, inventory improvement is an institutional capability-building intervention. Digital information, clear procedures, training, and participatory monitoring can empower personnel to identify problems, coordinate solutions, and steward public assets. These changes can support responsible resource use, accountability, continuity of training, and broader sustainable-development outcomes related to quality education and effective institutions.

Strategic Inventory Management Improvement Framework

1. Standardized inventory policies and procedures.

2. Adoption or strengthening of a computerized inventory management system.

3. Regular inventory audits and reconciliation.

4. Clearly defined inventory-management key performance indicators.

5. Continuous training for supply officers, property custodians, and administrative personnel.

6. Improved coordination among procurement, accounting, supply, property, and training units.

7. A monitoring and evaluation mechanism for continuous improvement.

The framework is an evidence-informed institutional improvement mechanism. Its distinct contribution is the integration of established inventory controls with personnel capability, inter-unit coordination, competency-based training needs, and public accountability within a Philippine technical-vocational school.

Conference Contribution and Novelty

The study's novelty is contextual and integrative. It does not claim that digital inventory systems, audits, KPIs, or staff training are individually new. Instead, it develops a framework that combines these established practices in response to empirically identified challenges in a Philippine public technical-vocational institution. The framework connects inventory governance with operational efficiency, resource stewardship, training continuity, and institutional capability.

The social-innovation contribution lies in shifting inventory management from a purely administrative function toward a participatory institutional improvement process. Personnel are empowered through reliable information, standardized responsibilities, shared procedures, and continuous feedback. The resulting improvements can strengthen institutional capacity and support sustainable public-service outcomes.

CONCLUSION

The study found that inventory-management practices at TESDA-PSAT were generally moderately effective, with an overall mean of 3.50. Receiving procedures and issuance and distribution were among the stronger areas, while inventory recording and monitoring and control were the weakest. Procurement delays, manual recording, inconsistent updating, difficulty tracking tools and equipment, limited digital-system training, and insufficient coordination were identified as recurring challenges.

The integrated quantitative and qualitative findings support an improvement strategy centered on digitalization, standardized procedures, accurate documentation, personnel development, coordination, regular reconciliation, performance indicators, and continuous monitoring. The resulting Strategic Inventory Management Improvement Framework provides a practical basis for strengthening operational efficiency, accountability, and resource utilization.

The study's broader contribution is its linkage of inventory management with social innovation and institutional empowerment. Strengthening personnel capacity to manage information, coordinate processes, and steward public resources can support resilient institutional operations and more reliable delivery of technical-vocational training. Application to other TESDA schools should be considered according to their organizational structures, inventory requirements, and institutional policies.

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