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# Relationship Between the Implementation of the Inventory Control System and Operational Efficiency Within Borongan Water District

**Kim B. Afable[1], Alyssa May C. Agus[1], Ma. Zosima L. Tejero, PhD[2]**
*[1]Masterand, Master of Arts in Teaching Vocational Education, Specialization in Information and Communication Technology, Graduate School, Eastern Samar State University, Borongan City, Eastern Samar, Philippines*
*[2]Program Head, Master of Arts in Teaching Vocational Education, Specialization in Information and Communication Technology, Graduate School, Eastern Samar State University, Borongan City, Eastern Samar, Philippines*

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Email of Corresponding Author: kimbernasafable@gmail.com

## Abstract

This study examined the relationship between Inventory Control System (ICS) implementation and operational efficiency in Borongan Water District (BWD). Anchored on the principle that effective inventory control contributes to improved operational performance, the study assessed ICS implementation in terms of system accuracy, accessibility, automation level, and user competency, while operational efficiency was evaluated through timeliness of operations, cost-effectiveness, resource utilization, and service delivery. A quantitative-correlational research design was employed, utilizing a structured and validated survey questionnaire administered to employees directly involved in inventory management and operational activities. Purposive sampling was used to select respondents from inventory-related personnel within the organization. Data were analyzed using weighted mean, Pearson's correlation coefficient (r), and a t-test for significance. Findings revealed that the overall level of ICS implementation was high (mean = 4.28), with system accessibility and system accuracy obtaining the highest ratings, while user competency received the lowest, though still within the high category. Operational efficiency was rated very high (mean = 4.29), with service delivery and resource utilization receiving the highest ratings, while timeliness of operation obtained the lowest score. Correlation analysis revealed a strong positive and statistically significant relationship between ICS implementation and operational efficiency (r = 0.81), leading to the rejection of the null hypothesis. The results indicate that effective inventory control contributes substantially to improved organizational performance, resource utilization, and service delivery. The study concludes that the Inventory Control System serves as a strategic operational tool that enhances organizational efficiency in Borongan Water District. It recommends continuous employee training, workflow optimization, strengthened system support, and greater utilization of inventory data for forecasting, budgeting, and resource allocation. The study supports Sustainable Development Goal (SDG) 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) by promoting efficient resource management, operational productivity, and institutional innovation in water utility services. Its sustainability impact lies in strengthening organizational resilience, improving public service delivery, reducing resource wastage, and supporting the long-term sustainability of water service operations.

**Keywords:** Accessibility; Automation Level; Inventory Control System; Operational Efficiency; Resource Utilization; Service Delivery; System Accuracy; Timeliness of Operation; User Competency

## 1. Introduction

Inventory control systems are essential for maintaining an appropriate balance between supply and demand within organizations. In public utility institutions such as Borongan Water District (BWD), effective inventory management ensures the availability of materials, tools, and equipment necessary for uninterrupted operations, maintenance activities, and service delivery. The implementation of an Inventory Control System (ICS) supports operational processes by improving inventory monitoring, reducing manual errors, enhancing tracking accuracy, and facilitating informed decision-making. This study examines the effect of Inventory Control System implementation on the operational efficiency of Borongan Water District.

### 1.1 Inventory Control System Implementation in Borongan Water District

An Inventory Control System (ICS) is a systematic approach used to manage, monitor, and control inventory resources. In Borongan Water District, effective inventory management is necessary to ensure the continuous availability of supplies while avoiding excessive inventory costs. Through automation and accurate monitoring, inventory systems contribute to

improved operational performance and resource utilization. Despite the benefits of inventory systems, public utility organizations often encounter challenges such as limited technical expertise, inadequate user training, and resistance to technological adoption. Evaluating the implementation of an Inventory Control System is therefore important in determining its contribution to operational efficiency and identifying opportunities for improvement. Agu, Agu Okoro et. Al. (2016) emphasized that inventory control affects the productivity of selected manufacturing firms, customer satisfaction through demand management, and organizational growth through Just-in-Time practices. Furthermore, effective inventory systems are characterized by simplicity of implementation, service quality, and cost-effectiveness, with cost-effectiveness being one of the most important criteria according to Davood Mohammaditabar et. al. (2012).

**1.2 Themes and Insights on Inventory Control Systems and Operational Efficiency**

Existing literature highlights the importance of inventory control in enhancing organizational productivity, operational performance, and customer service. Effective inventory management supports efficient resource allocation and reduces unnecessary costs while ensuring the availability of essential materials. According to Thomas C. Harrington et al. (1990), inventory control problems often result in discrepancies between inventory records and physical counts, leading to excessive inventory levels. Accurate inventory records, however, support forecasting, ordering, tracking, vendor evaluation, and dead-stock management. Similarly, Rashmi Ranjan Panigrahi et al. (2024) emphasized the value of integrating traditional and modern inventory management technologies to improve inventory control practices. These studies collectively suggest that inventory systems contribute to organizational efficiency through accurate record-keeping, effective resource management, and technological integration.

**1.3 Local, National, and Global Context of Inventory Control Systems in Public Utilities**

Inventory control has become increasingly important across organizations worldwide as institutions seek to improve operational efficiency and service quality through digital systems. Public utility providers require effective inventory management to maintain service continuity and ensure the availability of critical resources. At the local level, Borongan Water District relies on efficient inventory practices to support water production, distribution, maintenance, and quality control operations. Assessing the implementation of its Inventory Control System provides insights into how inventory management influences operational efficiency within a government-owned public utility setting.

**1.4 Conceptual Basis of Inventory Control System Implementation and Operational Efficiency**

The study is anchored on the principle that effective inventory control contributes to improved operational efficiency. Inventory system implementation is assessed through system accuracy, accessibility, automation level, and user competency. Operational efficiency is evaluated in terms of timeliness of operations, cost-effectiveness, resource utilization, and service delivery. The conceptual assumption is that higher levels of Inventory Control System implementation lead to better operational outcomes by improving inventory visibility, reducing delays, optimizing resource allocation, and supporting service continuity.

**1.5 Research Gaps on Inventory Control System Implementation and Operational Efficiency in Public Water Utilities**

Although previous studies have established the importance of inventory control in improving productivity, customer satisfaction, and organizational performance, limited research has focused on the relationship between Inventory Control System implementation and operational efficiency within public water utility organizations. Existing studies largely emphasize manufacturing environments, while less attention has been given to government-owned and controlled corporations involved in water service delivery. This study addresses this gap by examining the level of Inventory Control System implementation and its relationship with operational efficiency in Borongan Water District. The findings may provide evidence-based recommendations for strengthening inventory management practices and improving operational performance.

**1.6 Alignment of Inventory Control System Implementation with Relevant Sustainable Development Goals (SDGs)**

This study aligns with: SDG 6 – Clean Water and Sanitation, as improved inventory management supports the continuous operation, maintenance, and delivery of water services. SDG 8 – Decent Work and Economic Growth, as efficient inventory systems enhance productivity, optimize resource utilization, and improve organizational performance. SDG 9 – Industry, Innovation and Infrastructure, as the implementation of inventory control technologies promotes operational innovation and strengthens institutional systems and infrastructure.

**1.7 Importance of Inventory Control System Implementation to Multidisciplinary Sustainability**

The study contributes primarily to socio-economic sustainability by improving organizational efficiency, reducing resource wastage, and supporting effective service delivery. It also supports institutional sustainability through enhanced inventory governance, planning, and decision-making processes. Furthermore, the study contributes to technological sustainability by promoting the effective use of automated inventory systems and encouraging technology adoption within public utility

operations. Improved inventory management can strengthen organizational resilience, ensure the availability of essential resources, and support the long-term sustainability of water service delivery in Borongan Water District.

## 2. Material and methods

### 2.1 Research Design

The study employed a quantitative-correlational research design to examine the relationship between Inventory Control System (ICS) implementation and operational efficiency in Borongan Water District. This design enabled the researcher to measure and analyze the association between the variables without manipulating existing organizational conditions. Data were collected through structured survey questionnaires distributed to selected employees. Statistical techniques, including correlation and regression analyses, were utilized to determine the existence, strength, and direction of the relationship between ICS implementation and operational efficiency. The correlational approach was deemed appropriate because it facilitated an objective assessment of naturally occurring conditions within the organization and provided insights into the effectiveness of the current inventory system.

### 2.2 Locale of the Study

The study was conducted at Borongan Water District (BWD) in Borongan City, Eastern Samar. As a government-owned and controlled corporation, BWD is responsible for providing potable water services and managing the infrastructure, equipment, and materials necessary for water distribution and maintenance operations. The organization maintains an inventory of materials, tools, and spare parts required for the continuous operation of its water supply system. The research focused on the administrative and operational units involved in inventory management and procurement processes, as these departments play a significant role in monitoring inventory levels, acquiring supplies, and supporting operational requirements.

### 2.3 Respondents of the Study

The respondents consisted of employees and staff members of Borongan Water District who were directly involved in inventory management, supply handling, and operational activities. These included personnel from the administrative and technical sections, such as inventory managers, procurement officers, field technicians, and operations coordinators. Their participation was considered essential because of their direct experience in inventory monitoring, stock management, system utilization, and operational processes. Their knowledge and experiences provided valuable information regarding the effectiveness of the Inventory Control System and its impact on operational efficiency.

### 2.4 Sample and Sampling Procedure

The study utilized purposive sampling to select respondents with relevant knowledge and experience related to inventory management and operational procedures. From the identified population of 32 employees involved in inventory-related processes, approximately 70% to 100% were considered for participation based on their availability and willingness to respond. The sample included property custodians and employees directly involved in inventory control and material requisition. This approach ensured the collection of comprehensive information from individuals who regularly interact with the inventory system and contribute to operational activities within the organization.

### 2.5 Research Instrument

The primary data-gathering instrument was a structured questionnaire designed to collect quantitative information regarding Inventory Control System implementation and operational efficiency. The instrument was developed based on relevant literature, previous studies, and the objectives of the research. Prior to administration, it underwent expert validation and pilot testing to ensure clarity, relevance, reliability, and consistency. The questionnaire consisted of four sections. The first section gathered respondents' demographic information, including age, gender, position, years of service, department or division, educational attainment, designation, and civil status. The second section assessed the level of Inventory Control System implementation in terms of system accuracy, accessibility, automation level, and user competency. The third section measured operational efficiency based on timeliness of operations, cost-effectiveness, resource utilization, and service delivery. The fourth section solicited suggestions and recommendations for improving the Inventory Control System and enhancing organizational service delivery. Responses regarding system implementation and operational efficiency were measured using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). The instrument was validated by three research experts, and a pilot test was conducted to establish reliability. Cronbach's Alpha was computed to determine the internal consistency of the questionnaire. The study was guided by the null hypothesis that there is no significant relationship between Inventory Control System implementation and operational efficiency within Borongan Water District, and the alternative hypothesis that a significant relationship exists between these variables.

### 2.6 Data Gathering Procedure

The researcher secured formal permission from the General Manager of Borongan Water District before conducting the study. Upon approval, survey questionnaires were personally distributed to the identified respondents. Prior to participation, respondents were informed about the purpose, scope, and significance of the research and were encouraged to provide honest responses. They were assured that all information would be treated confidentially and that their identities would remain anonymous. Respondents were given sufficient time to complete the questionnaire. After completion, the questionnaires were personally retrieved by the researcher to ensure completeness and accuracy of responses. The collected data were subsequently organized, tabulated, summarized, and prepared for statistical analysis to facilitate interpretation and conclusion drawing.

### 2.7 Data Analysis Techniques

The collected data were analyzed using appropriate statistical tools. Weighted Mean was used to determine the level of Inventory Control System implementation and operational efficiency. Pearson's r (Correlation Coefficient) was employed to determine the relationship between Inventory Control System implementation and operational efficiency. A t-test for significance was used to test the hypothesis and determine whether the observed relationship was statistically significant at the 0.05 level of significance. The weighted mean results were interpreted using verbal descriptions ranging from Very Low/Strongly Disagree to Very High/Strongly Agree, corresponding to the appropriate numerical scale ranges.

### 2.8 Ethical Considerations

The study adhered to established ethical principles throughout the research process. Respondents were informed about the purpose, scope, and voluntary nature of their participation before data collection. Confidentiality was maintained by ensuring that personal identifiers were not disclosed and that all information was treated with strict confidentiality. Participation was entirely voluntary, and respondents had the right to withdraw at any stage without penalty. The researcher also upheld integrity and transparency by collecting, analyzing, and reporting data honestly and objectively without fabrication, manipulation, or misrepresentation.

## 3. Results and Discussion

### 3.1 Inventory Control System Implementation

#### 3.1.1 System Accessibility, System Accuracy, Automation Level, and User Competency

The findings revealed that the overall level of Inventory Control System implementation was high, with an overall mean of 4.28. System Accessibility and System Accuracy obtained the highest mean scores of 4.45, followed by Automation Level with a mean of 4.33. User Competency recorded the lowest mean score of 3.88, although it remained within the high category. These results indicate that employees generally perceive the inventory control system as accessible, accurate, automated, and effectively implemented. The high ratings for accessibility and accuracy suggest that inventory information is readily available and dependable for operational use. This finding supports the assertion that accurate inventory records are essential for effective forecasting, ordering, tracking, and inventory management processes (Harrington et al., 1990). The strong performance of the automation component further indicates the system's ability to reduce manual errors and improve operational processes. However, the relatively lower score for user competency suggests that differences in employees' knowledge and system utilization still exist, highlighting the need for continuous training to maximize the benefits of the inventory control system.

### 3.2 Operational Efficiency

#### 3.2.1 Service Delivery, Resource Utilization, Cost-Effectiveness, and Timeliness of Operation

The results showed that the overall level of Operational Efficiency was very high, with a mean score of 4.29. Service Delivery achieved the highest mean of 4.45, closely followed by Resource Utilization at 4.43. Cost-Effectiveness obtained a mean score of 4.29, while Timeliness of Operation recorded the lowest score of 4.00, although it remained within the high category. These findings indicate that employees perceive the organization as highly efficient in delivering services and utilizing resources. The very high ratings for service delivery and resource utilization demonstrate the effectiveness of the inventory control system in ensuring the availability of materials required for maintenance and operational activities. Efficient resource utilization is particularly important in a government-owned and controlled corporation because it reflects responsible use of public resources. Likewise, the high level of cost-effectiveness supports the view that effective inventory management minimizes wastage and unnecessary expenditures, which aligns with the findings of Mohammaditabar et al. (2012) that cost-effectiveness is a key characteristic of effective inventory systems. Although timeliness of operation was positively rated, its comparatively lower score suggests the presence of minor delays in material processing or handling procedures that could still be improved to further enhance organizational efficiency.

### 3.3 Relationship Between Inventory Control System Implementation and Operational Efficiency

#### 3.3.1 Correlation Between Inventory Control System Implementation and Operational Efficiency

The analysis revealed a Pearson's r correlation coefficient of 0.81 between Inventory Control System implementation and Operational Efficiency. This value indicates a high positive correlation, leading to the rejection of the null hypothesis and confirming a statistically significant relationship between the two variables. The result demonstrates that higher levels of Inventory Control System implementation are associated with higher levels of operational efficiency within Borongan Water District. The strong positive relationship confirms that effective inventory management contributes substantially to organizational performance. This finding is consistent with Agu et al. (2016), who emphasized that inventory control directly influences productivity, and supports the conclusions of Panigrahi et al. (2024) regarding the positive impact of effective inventory management on organizational outcomes. The results suggest that strong system accuracy, accessibility, and automation contribute directly to efficient resource utilization and improved service delivery. Furthermore, the findings indicate that the inventory control system functions as a strategic operational tool rather than merely a record-keeping mechanism. The comparatively lower ratings in user competency and timeliness of operation suggest areas where targeted interventions, particularly employee training and process improvement initiatives, may further strengthen operational efficiency and enhance the overall effectiveness of the inventory control system.

## 4. Conclusion & Recommendations

The study found that the Inventory Control System (ICS) of Borongan Water District is effectively implemented, particularly in terms of system accuracy, accessibility, and automation, resulting in a high level of operational performance. Operational Efficiency was rated very high, especially in service delivery and resource utilization, indicating that the system supports the district's mandate of providing reliable and efficient public service. The findings also revealed that user competency and timeliness of operation were the lowest-rated dimensions, suggesting opportunities for further improvement. Moreover, the strong positive correlation between ICS implementation and Operational Efficiency confirmed that improvements in inventory system implementation are associated with corresponding increases in operational performance.

Borongan Water District should continue strengthening its Inventory Control System through sustained support for system infrastructure and personnel development. Priority should be given to enhancing user competency through continuous training programs and improving operational timeliness through workflow optimization between administrative and technical units. The organization should also maximize the use of inventory data for forecasting, budgeting, and resource allocation to further improve cost-effectiveness, service delivery, and operational performance. Future researchers may build upon this study by examining employee competency development and investigating factors affecting operational timeliness.

The study was limited to the assessment of Inventory Control System implementation and Operational Efficiency within Borongan Water District and focused on employees directly involved in inventory management and operational processes. The findings were based on respondents' perceptions and measured only the dimensions included in the study, namely system accuracy, accessibility, automation level, user competency, timeliness of operation, cost-effectiveness, resource utilization, and service delivery. Consequently, the results may not fully capture other organizational, financial, or external factors that could influence operational efficiency.

## Compliance with ethical standards

This study adhered to established ethical principles throughout the research process. The authors ensured that all respondents were informed of the purpose, scope, and voluntary nature of their participation prior to data collection. Confidentiality was maintained by ensuring that personal identifiers were not disclosed and that all information provided was treated with strict confidentiality. The authors upheld integrity and transparency by collecting, analyzing, and reporting data honestly and objectively without fabrication, manipulation, or misrepresentation.

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