

## Evaluating the Impact of Financial Services Automation on Revenue Collection Efficiency at the Bureau of Customs: A Case Study of the Revenue Accounting Division in Manila

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### Abstract

This study examined the impact of financial services automation on revenue collection efficiency in the Revenue Accounting Division of the Bureau of Customs–Manila. Specifically, it assessed employees’ perceptions of the effectiveness, benefits, and challenges of automation, and determined whether demographic factors such as age, educational attainment, and length of service influence these perceptions. The study also identified areas for improvement to further enhance the contribution of automation to revenue collection efficiency. A quantitative descriptive research design was employed, utilizing a structured survey administered to 92 qualified respondents selected through a census approach. Data were analyzed using descriptive statistics, t-tests, analysis of variance (ANOVA), and Pearson correlation to determine differences and relationships between respondents’ demographic profiles and their perceptions of financial services automation. Qualitative data obtained from open-ended survey responses were subjected to thematic analysis to enrich the quantitative findings. Results indicated that employees generally perceive financial services automation as positively influencing revenue collection efficiency, particularly in terms of improved data accuracy, faster transaction processing, and enhanced transparency. Nevertheless, several challenges persist, including insufficient training, technical system issues, and limitations in infrastructure. Inferential analyses revealed no significant differences in perceptions when respondents were grouped according to age and educational attainment; however, a weak correlation was observed between length of service and perceptions of automation. Qualitative findings further highlighted the need for strengthened technical support, expanded training programs, and more user-friendly system enhancements. The study concludes that while financial services automation has substantially improved revenue collection efficiency, its sustained effectiveness depends on addressing both technical and human resource constraints. It recommends continuous capacity-building initiatives, improvements in technical infrastructure and support systems, and the establishment of systematic feedback mechanisms to ensure responsive and efficient automation practices.

*Keywords: financial services automation, revenue collection, public sector, Bureau of Customs, efficiency*

## Introduction

In the digital era, financial services automation has emerged as a transformative mechanism for enhancing operational efficiency, accuracy, and transparency in public sector financial management. Automation, defined as the application of information and communication technologies to digitize financial transactions, accounting processes, and reporting systems, has been widely adopted by governments to reduce manual errors, strengthen internal controls, and improve compliance (Castro & Scartascini, 2019; Slemrod, 2020). Empirical studies consistently demonstrate that automated financial systems contribute to faster transaction processing, improved data integrity, and greater accountability, particularly in revenue-generating institutions where accuracy and timeliness are critical (Alm et al., 2019; Crivelli et al., 2021).

Globally, revenue administrations have increasingly relied on automation to address persistent challenges such as revenue leakages, payment gaps, and administrative inefficiencies. Research shows that automation enhances monitoring capabilities and audit trails, thereby reducing opportunities for fraud and improving revenue performance (Crivelli et al., 2021). In customs administrations specifically, automation has been linked not only to trade facilitation but also to improved revenue assurance through real-time valuation, electronic payment systems, and integrated revenue accounting platforms (Mascagni et al., 2021; World Customs Organization [WCO], 2018). These studies suggest that financial services automation plays a central role in strengthening fiscal capacity, particularly in developing economies where customs agencies handle high transaction volumes under complex regulatory environments.

In the Philippine context, the Bureau of Customs (BOC) serves as a primary revenue-generating agency responsible for enforcing trade regulations and collecting duties and taxes on imported goods. In 2022, the BOC exceeded its revenue target by 19.6%, collecting PHP 862.9 billion against a target of PHP 721.5 billion (Department of Finance, 2023). Despite this achievement, studies indicate that inefficiencies in revenue collection persist due to fragmented systems, manual processing, and human resource constraints (Manasan, 2022). Cariño, Manasan, and Saguin (2022) further emphasized that administrative bottlenecks, including limited training opportunities and inconsistent financial reporting systems, continue to undermine the full efficiency potential of automation initiatives within Philippine revenue agencies.

Recognizing these challenges, the Philippine government has undertaken several digital transformation initiatives aimed at modernizing customs operations. The implementation of the Electronic-to-Mobile (E2M) Customs System and the broader Philippine Customs Modernization Program reflects the country's commitment to aligning with international best practices in customs administration. These initiatives are firmly anchored in Republic Act No. 10863, or the Customs Modernization and Tariff Act (CMTA), which mandates the automation of customs procedures to enhance efficiency, transparency, and compliance. Complementing this mandate, Republic Act No. 11032, or the Ease of Doing Business and Efficient Government Service Delivery Act of 2018, requires government agencies to streamline processes and adopt digital systems to reduce bureaucratic delays. Together with the Government Procurement Reform Act (Republic Act No. 9184) and the Philippine Digital Transformation Strategy 2022–2025, these legal frameworks establish a strong policy foundation for financial services automation in customs revenue collection.

However, international and local literature caution that technological advancement alone does not guarantee improved performance outcomes. The success of automation initiatives is heavily influenced by human and organizational factors, including employee competencies, training adequacy, system usability, and leadership support (Kirchler et al., 2021; Kim, 2021). Studies in public sector organizations reveal that

insufficient training, resistance to change, and inadequate technical infrastructure can significantly limit the effectiveness of automated financial systems (Wenzel & Kirchler, 2021). Moreover, employee perceptions of automation have been found to vary based on length of service and prior exposure to digital systems, affecting how effectively these technologies are utilized in daily operations (Alm et al., 2019).

Despite the growing body of literature on financial automation in taxation and banking, empirical research focusing on customs revenue accounting remains limited, particularly in the Philippine setting. Existing studies largely emphasize trade facilitation, border control, and compliance monitoring, with minimal attention given to the internal financial services automation processes that directly affect revenue accounting efficiency (Garcia & Ho, 2021). Furthermore, there is a notable methodological gap in quantitative studies that examine how demographic variables influence employees' perceptions of automation within customs agencies.

Addressing these gaps, this study evaluates the impact of financial services automation on revenue collection efficiency within the Revenue Accounting Division of the Bureau of Customs in Manila. By examining employees' perceptions of automation effectiveness, benefits, and challenges, and by analyzing the influence of demographic factors such as age, education, and length of service, the study provides empirical evidence on the operational and human dimensions of automation in customs revenue collection. In doing so, it contributes to the limited body of Philippine-based research on public sector financial automation and offers policy-relevant insights to strengthen digital transformation initiatives in customs administration.

While financial services automation presents clear advantages, its implementation is often hindered by technological, financial, and organizational barriers. In developing economies, challenges such as limited digital infrastructure, cybersecurity vulnerabilities, and employee resistance to automation have been identified as key factors affecting adoption (Chirchir & Okoye, 2019). For the Bureau of Customs, these challenges could manifest in various ways, including high costs of technology acquisition, inadequate training for personnel, and integration difficulties with legacy systems (Park & Choi, 2023). Without proper investment in training programs and IT infrastructure, the full potential of automation may not be realized, limiting its effectiveness in revenue collection.

This study aims to assess the impact of financial services automation on revenue collection efficiency within the Bureau of Customs, particularly in the Revenue Accounting Division in Manila. By analyzing the benefits, challenges, and employee perceptions of automation, the study contributes to the broader discourse on public finance management, digital transformation, and governance efficiency in emerging economies. The findings will offer empirical evidence on automation's effectiveness, guiding policymakers, customs officials, and IT developers in refining automation strategies. Ultimately, the research will provide data-driven recommendations for improving financial services automation, ensuring efficiency, transparency, and revenue security in customs administration.

## **Objectives of the Study**

This study aims to evaluate the impact of financial services automation on revenue collection efficiency in the Bureau of Customs, particularly focusing on the Revenue Accounting Division in Manila. To achieve this, the study will pursue the following specific objectives:

1. To determine the demographic profile of the respondents

2. To assess the effects of financial services automation on revenue collection efficiency in the Revenue Accounting Division of the Bureau of Customs in Manila.
3. To identify the perceived benefits of financial services automation in enhancing operational efficiency and reducing errors in revenue collection processes.
4. To examine the challenges or barriers encountered in the adoption and implementation of financial services automation in the Revenue Accounting Division.
5. To analyze whether significant differences exist in the perceptions of revenue collection efficiency based on the demographic profile of the respondents.
6. To propose actionable recommendations for improving financial services automation to enhance revenue collection efficiency in the Bureau of Customs.

## Methodology

This study employs a quantitative research design to systematically evaluate the impact of financial services automation on revenue collection efficiency within the Bureau of Customs, specifically in the Revenue Accounting Division of Manila. Using a structured survey questionnaire as the primary instrument, the research gathers standardized data from employees directly engaged with automation systems. Descriptive and inferential statistics, including means, standard deviations, correlations, and ANOVA, will be applied to analyze responses and test hypotheses. By linking employee demographics such as age, education, and length of service with perceptions of automation, the study aims to provide objective, evidence-based insights that can inform both policy and management decisions.

The study adopts a census approach, targeting all approximately 100 employees in the Revenue Accounting Division, though only those with direct experience in automated financial systems will be included. This method minimizes sampling bias and ensures comprehensive coverage of diverse perspectives across job roles and demographics. Respondents must meet eligibility criteria, including at least six months of experience with automated systems, to ensure relevance and depth in their feedback. This broad yet focused inclusion strategy strengthens the validity of findings, enabling a nuanced analysis of both the benefits and challenges of automation in public revenue collection.

To ensure reliability and credibility, the research instrument underwent face and content validation by experts, followed by a Cronbach's Alpha test, which confirmed strong internal consistency across all sections. Ethical safeguards, including informed consent, anonymity, and strict compliance with the Data Privacy Act of 2012, guide the entire process of data collection and handling. Surveys will be distributed both physically and digitally, with voluntary participation emphasized. By combining methodological rigor with robust ethical standards, the study ensures trustworthy findings that not only assess automation's effectiveness but also generate practical recommendations for enhancing revenue collection efficiency in the Bureau of Customs.

## Results and Discussion

### 1. Demographic Profile of Respondents

The results show that the majority of respondents were within the 20–29 age group (33.7%), followed by those aged 30–39 (28.3%). Gender distribution was fairly even, with females (58.7%) slightly

outnumbering males (41.3%). In terms of educational attainment, a significant portion held a bachelor's degree (69.6%), while 16.3% had completed high school and 14.1% had postgraduate studies. Regarding tenure, most respondents had been with the Bureau for 4–6 years (34.8%). With respect to automation experience, 59.8% reported moderate familiarity, 30.4% had limited experience, and only 9.8% indicated extensive familiarity. These findings align with Abante, Magcope, Caspe, and Moon (2023), who emphasized that intergenerational differences among public sector workers can influence attitudes toward digital governance. Similarly, Acheron (2021) highlighted that educational background and exposure to technology shape perceptions of new systems, reinforcing the importance of profiling respondents to contextualize their perspectives on automation.

## **2. Impact of Financial Services Automation on Revenue Collection Efficiency**

Findings reveal generally positive perceptions of automation's effect on efficiency. Respondents strongly agreed that automation improved the accuracy of financial data (WM = 3.62), reduced errors (WM = 3.57), and decreased workload (WM = 3.42). Processing speed (WM = 3.21) and the capacity to handle higher transaction volumes (WM = 3.41) were also positively rated. These results echo the conclusions of Ali and Anwar (2021), who found that automation significantly improves efficiency and accuracy in public sector financial systems. Evans and Arora (2021) similarly observed that automated processes enhance revenue collection efficiency by minimizing human error and streamlining workflows. In the Philippine context, Santos and Mariano (2020) noted that the E2M Customs System produced comparable gains in speed and data reliability. Collectively, these findings suggest that automation contributes to enhancing operational performance and supports more efficient revenue collection processes in the division.

## **3. Perceived Benefits of Automation in Enhancing Operational Efficiency**

Respondents strongly acknowledged the broader benefits of automation, particularly in improving departmental efficiency (WM = 3.58), ensuring transparency (WM = 3.55), and streamlining workflow organization (WM = 3.54). The system was also rated as user-friendly (WM = 3.27) and effective in reducing delays (WM = 3.41). These perceptions are consistent with Nguyen and Pham (2022), who emphasized that automation fosters transparency and accountability in revenue management. Bai and Li (2021) further argued that real-time data integration enhances the traceability of transactions, strengthening financial oversight. In the Philippine setting, Beltran (2024) and Carvajal (2024) underscored the importance of automation in reinforcing integrity programs within the revenue sector, while Cuenca (2021) linked digital solutions to improved compliance in the digital economy. Thus, the findings reinforce the view that automation enhances the quality, traceability, and accessibility of financial services, thereby strengthening accountability within revenue processes.

## **4. Challenges and Barriers in Adopting and Implementing Automation**

Despite positive perceptions, respondents identified several challenges that hinder full optimization of automation. Inadequate training (WM = 3.61) was the most pressing issue, followed by limited infrastructure (WM = 3.33) and the need for increased system support and maintenance (WM = 3.36). Other notable concerns included employee resistance to change (WM = 3.23) and recurring technical issues (WM

= 3.21). These findings mirror those of Ahmed and Ramos (2021), who highlighted that a lack of capacity-building and infrastructure are common barrier in developing economies. Park and Choi (2023) likewise identified costs, resistance, and system reliability as persistent hurdles in public sector automation. In the Philippine context, Dela Cerna (2023) and De Castro and De Castro (2022) found that local government units also struggled with similar issues, particularly inadequate training and technical readiness. These results indicate that organizational readiness and support systems must be reinforced to maximize automation's potential.

## 5. Differences in Perceptions Across Respondent Profiles

Statistical tests using ANOVA and t-tests revealed no significant differences in perceptions of automation's impact when respondents were grouped by age, gender, educational background, or length of service ( $p > 0.05$ ). This indicates a consensus across demographic groups, reflecting widespread acceptance and consistent recognition of automation's role in enhancing revenue collection efficiency. These results resonate with Choi and Park (2023), who reported that demographic variables often exert minimal influence on employees' acceptance of automation once systems are institutionalized. Munyanya (2022) also observed similar patterns in Kenya's customs sector, where automation was broadly accepted regardless of demographic characteristics. Abante et al. (2023) further support this finding, suggesting that while intergenerational differences exist, institutional practices and organizational culture ultimately promote alignment in digital adaptation.

## Conclusions

Based on the findings presented and analyzed in this study, the following conclusions are drawn:

1. The majority of the respondents are young professionals aged 20–39 years old, predominantly female, and mostly hold bachelor's degrees. Most have served for 1–6 years in the Bureau and have moderate experience with automation systems. This demographic composition suggests a workforce that is generally adaptable and capable of engaging with technology, providing a conducive environment for automation adoption.
2. Respondents positively perceived the impact of financial services automation on various operational parameters. Automation was credited with improving data accuracy, reducing errors, increasing transaction processing volumes, and lightening employee workload. These perceptions affirm the potential of automation to significantly enhance operational efficiency in revenue-generating government agencies like the Bureau of Customs.
3. There is a strong consensus that automation improves departmental efficiency, transparency, workflow organization, and processing timeliness. Furthermore, users find the system relatively easy to use. These benefits highlight how automation contributes not only to technical performance but also to the overall user experience, supporting higher levels of trust, compliance, and productivity within the agency.
4. Despite its advantages, automation still faces considerable challenges. Key issues include insufficient training, technical problems, limited infrastructure, and employee resistance to change.

These barriers suggest the need for sustained investments in technological infrastructure, upskilling of personnel, and change management strategies to ensure the long-term effectiveness and acceptance of automation systems.

5. Statistical tests revealed no significant differences in perceptions of automation effectiveness across demographic categories such as age, gender, education, or length of service. This indicates a broadly uniform acceptance and recognition of automation benefits across employee groups, underscoring the system's general relevance and impact regardless of background.

## Recommendations

Based on the results and conclusions of this study, the following recommendations are proposed to enhance the effectiveness and efficiency of financial services automation in the Revenue Accounting Division of the Bureau of Customs:

1. Intensify employee training and upskilling initiatives. Given that respondents identified inadequate training as a primary challenge in the implementation of automation, it is strongly recommended that the Bureau institutionalize regular training sessions tailored to the needs of different employee profiles. Training must go beyond initial orientation and include refresher programs and skills advancement courses to build user confidence and efficiency in navigating automation systems.
2. Improve technical infrastructure and system reliability. Technical issues and limited infrastructure were also recognized as key barriers to the success of automation. The Bureau should invest in upgrading IT equipment, servers, and connectivity to ensure seamless operation of automated systems. Additionally, system reliability should be ensured through regular maintenance, bug fixing, and software updates to minimize disruptions in the revenue collection process.
3. Provide stronger and more responsive technical support. To reduce downtime and user frustration, the Bureau should deploy an internal helpdesk or technical support team specifically assigned to assist automation users. Real-time support, prompt troubleshooting, and user guidance will significantly improve system usability and enhance user satisfaction, as recommended by a majority of respondents in the open-ended interviews.
4. Institutionalize employee feedback mechanisms. Since employees are the primary users of automation tools, their experiences and suggestions are invaluable. Establishing structured feedback channels—such as quarterly surveys, suggestion boxes, or digital feedback platforms—will help the Bureau understand system limitations and gather practical insights for continuous improvement. Integrating feedback into decision-making will also boost employee engagement and ownership.
5. Strengthen change management and reduce resistance. Resistance to automation, particularly among long-serving employees, remains a challenge. The Bureau should implement change management strategies such as awareness campaigns, dialogue sessions, and mentorship programs that highlight the value of automation in improving work processes and service delivery. Encouraging open communication and celebrating early adoption successes can gradually shift workplace culture toward embracing innovation.
6. Allocate sustainable funding for automation upgrades and maintenance. The automation system must be treated as a long-term investment. Adequate budgetary allocation is necessary for ongoing upgrades, technical support, cybersecurity enhancements, and system expansion. A dedicated fund

should be included in the Bureau's annual budget to ensure that the system evolves with changing operational needs and technological advancements.

7. Align automation strategies with national and global standards. To enhance interoperability and regulatory compliance, the Bureau should align its automation initiatives with national digital governance policies and global customs standards, such as those recommended by the World Customs Organization (WCO). This alignment will strengthen international trade facilitation and improve the Bureau's credibility and transparency.
8. Expand automation coverage across other operational divisions. Given the positive reception of automation in the Revenue Accounting Division, the Bureau may consider replicating successful automation practices in other divisions. A pilot expansion program, supported by performance monitoring, can help scale the benefits of digital transformation across the institution.
9. Conduct periodic evaluation and performance audits. Finally, the Bureau should implement periodic evaluations of the automation system's performance. Metrics such as error reduction, transaction time, revenue growth, and employee satisfaction should be tracked to ensure the system delivers intended results. These audits will provide data-driven insights for further optimization.

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