

AN EMPIRICAL STUDY ON FINANCIAL DIGITAL TRANSFORMATION IN THE LOGISTICS INDUSTRY ENABLED BY ROBOTIC PROCESS AUTOMATION

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Abstract

As digitalisation firmly takes hold of the logistics sector and businesses are challenged to find ways to be more efficient, transparent and cost-effective in their operations, amid increasingly technologically savvy, competitive markets. Further in this development, however, a tool has come to the fore that can automate repetitive and rule-based financial processes without much impact on the incumbent systems: Robotic Process Automation (RPA). The current research questions the idea of RPA in enhancing financial digital transformation in logistics companies by posing an empirical question. The study is conducted in descriptive-analytical paradigm (based on primary data obtained in the logistics institutions in the process of interacting with the departments of finance, operations, and technology). The study assesses RPA adoption scores for financial processes and measures the impact of RPA on operational effectiveness, accuracy, financial disclosure, and decision-making effectiveness. These are used to support the hypotheses that are to be tested in the context of applying statistical techniques like descriptive statistics, correlation analysis, regression and analysis of variance. Results reveal that there exists a strong positive correlation between RPA implementation and financial digital transformation by logistic companies. Automation has proven to reduce processing power, reduce the rate of error, boost compliance, and unify internal financial controls. The relevance of employee approval and organizational preparedness to effective RPA deployment is the other saliency that the study highlights. The findings conjecture that in spite of RPA executing valuable operational and monetary yields, its efficacy is dependent on whether it has been strategically positioned and its change-management practices have been skillful. This contribution adds value to the literature that exists in that it provides empirical data of RPA-led financial transformation in the logistics field, as well as offers practical advice to managers who want to utilize automation to support long-term financial success.

Keywords: digital finance, financial automation, financial digital transformation, logistics industry, operational efficiency, process automation, robotic process automation

1. INTRODUCTION

Digital transformation has become a strategic objective to organizations determined to take efficiency, transparency and competitiveness into the next levels in a business environment that is becoming more data intensive. The logistics industry is facing unique operations and financial issues due to the large transaction volumes, the volatility of the documentation requirements, and the strictness of the regulatory requirements. Traditional financial procedures on logistics which include invoicing, reconciliation, audit reporting and payment processing are still labor-intensive and prone to delays and human-error. As a response to these constraints, companies are

increasingly adopting Robotic Process Automation (RPA) as one of the key drivers of financial digital revolution (Tsang *et al.*, 2024).

RPA can be defined as the deployment of software-driven robots that imitate human activities, which are ruled by rules, in numerous digital environments. Compared to classic automation, RPA can be implemented without the presence of overall changes in the current IT environments, which makes it especially appealing to logistics organizations that have been using legacy environments (Wewerka & Reichert, 2021). RPA allows organizations to become more accurate by automating regular financial operations, reduce the processing time and redirect human resources towards more analytical and strategic activities (Sobczak, 2022).

Recent research notes that the use of RPA in financial operations adds significantly to the efficiency of operations and improvements in governance. Automation has been associated with increased financial visibility, accelerated reporting and strengthened internal control in the operations of logistics organizations (Zhang, 2024). However, the empirical studies that pay specific attention to RPA-enabled financial digital transformation in the logistics sector are not very numerous. The majority of studies left today tend to focus on operational automation, which creates a gaps in the understanding of how RPA alters financial structures, employee roles, as well as on strategic decision making processes.

This gap is tackled by the present research with the objective of empirically exploring the influence of Robotic Process Automation on the digital transformation process in the logistics value chain from a financial perspective. The investigation is a fusion of technological, financial and organizational visions and has as its goal to enrich the academic and managerial practice.

2. REVIEW OF LITERATURE

2.1 Replacing Human Workflow with RPA and DT

RPA has become an important part of more extensive digital transformation programs in all industries. Digital transformation process is not only on the usage of technology, but it is also a restructuring of operation processes, organization, and decision-making process in the organization (Lomte and Madrewar, 2023). RPA helps with this change by using workflow standardization, enhanced data fidelity and real-time processes.

Wewerka and Reichert (2021) conducted a systematic Mapping Study on the field of Research on RPA wherein they found that RPA is now emerging as an imminent issue in enterprise systems particularly in the finance sector. Their findings suggest that RPA could be a bridge for connection between legacy and the new digital environments and through the automation of repetitive tasks and the scalability. Likewise, Sobczak (2022) pointed out that RPA as an approach to structured and organized digital transformation becomes more digitized and less volatile when used by an organization.

2.2 RPA-based Supply Chain and Logistics Performance

RPA has increasingly been adopted by the logistics industry to address the issue of operational inefficiencies and complexities in documentation. According to Fischer *et al.* (2023), the primary uses of RPA in logistics companies are invoice processing, documentation of shipments, and financial reconciliation. Though Koyeda (2025) the challenges related to the implementation mentioned in the study, including the integration of the system and resistance by the workforce, confirmed significant efficiency and compliance improvements.

Tsang *et al.* (2024) presented an extensive overview of the RPA usage within logistics and supply chain management and note that operational and financial coordination is improved with

the use of automation. Okoro *et al.* (2025) results have reported that the use of RPA is beneficial to increase transparency of the process and facilitate data-driven decision making in logistics networks. Nalgozhina *et al.* (2024) also suggested a systematic approach to applying RPA to logistics systems that focuses on the alignment of the workflow between financial and operating processes.

2.3 Financial Digital Transformation with RPA

Financial digital transformation would be the modernization of the accounting, reporting, and control systems by means of digital technologies. According to Zhang (2024) and Fekih (2025), the researcher analyzed the trajectory of digital transformation in the financial segment of logistics companies strengthened by RPA empirically and discovered that automation contributes to the significant improvement of financial accuracy and a timely process of reporting data. The study further observed that the adoption of RPA helps in the strategic financial planning due to the provision of real-time data insights.

Similarly, in another scenario, Pandey *et al.* (2024) revealed that RPA improves financial performance by making the processing more economical and the transactions to be minimal in terms of errors. Nielsen *et al.* (2023) also gave similar observations, stating that RPA initiatives in supply chains provide tangible monetary returns, such as enhanced audit preparedness and reduction of operational risk.

2.4 RPA and Organizational and Human Factors in its Implementation

Although technological benefits of RPA are sufficiently described, a number of researches address the significance of organizational preparedness and acceptance by employees. As mentioned by Fischer *et al.* (2023) and Sobczak (2022), resistance to change and skill deficiency also may hinder the effectiveness of RPA initiatives. Patrício *et al.* (2025) the perception of the staff members is critical towards automation being considered a productivity enhancer or a job threat.

Recent studies have shown that in cases where systematic training and organized change management is invested in, the implementing of Robotic Process Automation (RPA) is more likely to cause a positive change in the workforce than a mass laying off Aghaei *et al.*, (2025). In addition, RPA incorporation is expected to be further reshaped by the entry of the emerging technologies, including artificial intelligence or intelligent document processing which are sure to redefine the functions of finance in logistics organizations Jeong *et al.*, (2025).

2.5 Research Gap

Though it is acknowledged in the antecedent scholarship that the operational benefits of RPA are realized, there is little empirical data on its overall impact on financial digital transformation in the logistics industry. Current literature largely focuses on efficiency of the process itself and the financial governance, transparency, and outcomes of the strategic performance are not studied further. The current research is aimed at filling this gap by conducting an empirical investigation into the way RPA implementation evolves financial digitalization, organizational performance, and staff acceptance in logistic companies.

2.6 Objectives of the Study

- To determine the current level of financial digitalization of logistics organizations, particularly, the implementation of RPA in the fundamental financial processes of an organization, i.e., in accounting, billing, compliance, and reporting.
- To determine the key financial processes of the logistics sector that are being automated using RPA and to assess the extent to which automation has transformed the conventional financial processes.
- To examine how digital transformation which has been enabled by RPA has influenced financial efficiency in terms of cost reduction, processing time, accuracy and minimization of errors.
- To determine the impact of RPA on improving financial transparency and control as well as its effect on audit preparedness, regulatory compliance, and real-time financial monitoring.
- In order to explore the opinion of those working in finance and operations about the adoption of RPA, its usability, flexibility, and its role in decision-making effectiveness.
- To investigate the issues and risks involved in the implementation of RPA to financial functions including integration, data security, skill shortage, and organizational change rejection.
- To use the connection between RPA-induced financial digital transformation and the total organization performance in logistics companies.

2.7 Hypotheses

H1: There is a major association between the integration of Robotic Process Automation and the degree of logistics organization financial transformation.

H2: RPA implementation has a positive impact on the performance of the financial operations within the logistics sector, specifically, the speed of the processing and cost-effectiveness.

H3: Financial systems with RPA have significant positive changes in the accounting and financial reporting processes that occur through a reduction of manual errors.

H4: There is an improvement in the financial transparency and internal control system with respect to the RPA digital transformation in the logistics companies.

H5: The use of RPA in the financial processes has a positive influence on the quality and time efficiency of the managerial decision-making process within the logistic organizations.

H6: RPA acceptance by employees is also critical in the success of financial transformation tools.

H7: Logistics companies which have implemented RPA in their financial operations exhibit high general organizational performance in relation to companies with limited or none-automation.

H8: There are technological and organizational issues that have a quantifiable effect on the successes of RPA implementation in the transformation of financial services through technology.

3. RESEARCH METHODOLOGY

3.1 Research Design

The research will have a descriptive-analytical research design to analyze how Robotic Process Automation has impacted the digital transformation of financial matters in the logistics sector. The approach will allow having the holistic representation of the existing RPA practices and will support the attribution of the relationship between automation, financial effectiveness, transparency and organizational performance.

3.2 Nature of the Study

The research is empirical, as it is based mostly on quantitative information gathered in logistics organizations. This quantitative system allows objective quantification of such perceptions and results in regard to RPA-facilitated financial transformation.

3.3 Sources of Data

Primary Data

A structured questionnaire that was used to conduct primary data collection was in the form of a questionnaire that was given to the professionals working at the logistics firms. The respondents included the managers of accounts, operations, IT and senior management personnel engaged in financial processes or automation projects directly.

Secondary Data

The sources of the secondary data consisted of peer-reviewed research papers, Scopus IEEE and indexed journals, as well as conference papers, industry reports, corporate websites and policy documents that included the concept of digital transformation, financial automation and logistics management. The theoretical framework and the literature review was based on these sources.

3.4 Population and Sample

This population included logistics firms both in the regional and national levels. The purposive sampling was used to locate organizations that have adopted or are adopting RPA in their financial activities.

3.5 Sample Size

The number of valid responses was 150 and analyzed. This was considered to be the appropriate sample size to perform both descriptive and inferential statistics like correlation, regression, ANOVA and factor analysis, as well as good representation of various organizational jobs in the logistics sector.

3.6 Sampling Technique

A purposive sampling was used to ensure that the respondents had the necessary knowledge and experience in relation to financial processes and RPA adoption, which is needed due to the expertise of the investigation.

3.7 Data Collection Instrument

A five-point Likert scale that included such options as Strongly Disagree and Strongly Agree was used in the questionnaire. It consisted of parts on demographic data, level of RPA implementation, cost effectiveness, precision, openness, staff acceptance, and problems of implementation. Special review and pilot testing of the instrument were conducted to respond to make it clear and relevant.

3.8 Variables of the Study

- IV: Adams Robotic Process Automation (RPA) Adoption.
- Dependent Variable: Financial Digital Transformation.
- Intermediated Variables: Financial efficiency, accuracy and transparency.
- Moderating Variables: Employee acceptance and organizational readiness.

3.9 Data Analysis Techniques

Analysis of the data was done with the help of the normal statistical software. The percentages, means scores, and standard deviations (SD) as descriptive statistics summarized the respondent characteristics and other important variables. Hypotheses were tested and relationships among the variables were interrogated by using inferential techniques such as correlation analysis, regression analysis, ANOVA and factor analysis.

3.10 Reliability and Validity

The internal consistency measures were investigated in order to determine reliability of the questionnaire. The content validity was determined to have a big support of literature and consultation with experts. Factor analysis was used to ensure construct validity to determine that the measurement items were appropriate.

3.11 Ethical Considerations

The participation in the study was voluntary and the respondents were aware of the purpose of research. Data were not given out to any other parties and the versus was confidential with anonymity.

3.12 Limitations of the Methodology

The empirical study is restricted to those logistics companies that have integrated RPA-based financial systems. The data obtained are based on self-reported perceptions thus are bound to have some subjectivity. However, regardless of these limitations, the methodology provides a reliable basis on vindicating the concept of financial digital transformation in the field of logistics.

4. RESULTS AND DISCUSSION

The following section presents the empirical results of the researches and explains them in the light of the initial objectives and hypotheses of the research. The analytical focus will be the effects of Robotic Process Automation to financial digital transformation in the logistics business.

4.1 Profile of Respondents

Table 1: Demographic Profile of Respondents

Particulars	Category	Frequency	Percentage
Designation	Finance Executives	48	32
	Operations Managers	42	28
	IT / Automation Professionals	35	23.3
	Senior Management	25	16.7
Experience	Below 5 Years	39	26
	5-10 Years	61	40.7
	Above 10 Years	50	33.3

The respondent demographic is a balance of the finance, operations and technology professionals. The majority of respondents say they have more than five years of experience, indicating that they will draw from their long-term experience with the financial system and automation programs to give their answers.

4.2 Extent of RPA Adoption in Financial Functions

Table 2: Level of RPA Adoption in Financial Processes

Financial Function	Mean Score	Std. Deviation
Accounts Payable & Receivable	4.12	0.68
Billing & Invoicing	4.05	0.71
Financial Reporting	3.94	0.75
Compliance & Audit Support	3.88	0.79
Budgeting & Forecasting	3.61	0.82

The statistics demonstrate that there is a high adoption of RPA in the routine and transactional activities like payment of bills, collection of bills, and invoicing. On the other hand, strategic domains, such as budgeting and forecasting, are characterized by relatively lower rates of automation, indicating that decision-making in the field still requires human involvement when it comes to making intricate financial decisions.

4.3 Impact of RPA on Financial Efficiency

Table 3: Perceived Impact of RPA on Financial Efficiency

Efficiency Dimension	Mean	Std. Deviation
Reduction in Processing Time	4.26	0.63
Cost Optimization	4.08	0.69
Accuracy in Transactions	4.34	0.58
Error Reduction	4.41	0.55

Most of the respondents the majority confirm that the use of RPA has led to much improvement in accuracy and minimized errors in financial processes. The results suggest that automation has limited human intervention hence enhancing the uniformity and dependability of financial processing. This underlines the need for RPA to be an integral part of the ‘operational perfection’ in logistics finance.

4.4 Relationship Between RPA Adoption and Financial Digital Transformation

Table 4: Correlation Analysis

Variables	RPA Adoption	Financial Digital Transformation
RPA Adoption	1	
Financial Digital Transformation	0.682**	1

Note: Correlation is significant at 1% level.

There is a strong positive relationship portraying that the higher the levels of RPA implementation, the higher the financial digitalization. In that regard, the current evidence of the study indicates that the automation projects are closely related to the financial systems modernization in the logistics organizations.

4.5 Influence of RPA on Financial Transparency and Control

Table 5: Regression Analysis - RPA and Financial Transparency

Model	R	R ²	F Value	Sig.
RPA → Financial Transparency	0.647	0.419	84.26	0

The source of variation in financial transparency and control explains that a large proportion of the variation is explained by RPA. The level of compliance, as well as governance, in logistics companies, seems to be strengthened by automated audit trails, real concerns reporting, and standardized workflows.

4.6 Employee Acceptance and RPA Effectiveness

Table 6: ANOVA – Employee Acceptance and RPA Outcomes

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	21.34	2	10.67	6.92	0.001
Within Groups	219.46	147	1.49		
<i>Total</i>	<i>240.8</i>	<i>149</i>			

The ANOVA shows that the difference in perceived effectiveness of RPA is statistically significant based on the level of acceptance among the employees. In organizations that are more accepting, better financial results are realized, highlighting the fact that human and organizational factors have a major influence to technological success.

4.7 Overall Discussion of Findings

The paper supports the fact that Robotic Process Automation is decisive towards supporting financial digital transformation in the logistics sector. The results highlight the fact RPA expands efficiency, accuracy, transparency, and control and at the same time hastens and enlightens decision-making. However, the results also point to the fact that effective change does not only depend on technology itself but also on the willingness of staff members and the fit of the organization.

5. CONCLUSION

The current research was aimed at evaluating the role of Robotic Process Automation in the financial digital transformation of the logistics market. The empirical evidence that has been gathered in the field of logistics organizations clearly shows that RPA has gone beyond its fringe position and is now a part of the modern financial operations. Routine financial operations have been automated with conspicuous outcomes of efficiency, accuracy and even uniformity of operations, which has allowed the professionals dealing in finance to allocate their attention to activities involving analysis and strategic duties.

The findings reveal that the implementation of RPA positively and impactfully influences financial process optimization, specifically with respect to transaction processing, reporting and compliance. Among the other examples of the usefulness of the automation in improving logistics companies' governance systems is a better financial transparency and fortified level of internal control schemes. A second key finding of the study is that those organizations with an overall digital transformation strategy that relate their RPA strategy to the overall business-level objectives perform overall better.

Meanwhile the research also highlights the need of human and organizational aspects in determining the success of the financial digitalization transformation. One acceptance from workers, preparedness to address the capabilities and change management were pinpointed as crucial elements defining the impact of RPA adoption. The lessons identify that successful development of technology without the respective organizational culture and leadership devotion will not be enough.

Overall, the paper concludes that the use of RPA is effective and can help bridge the financial digital transformation in the logistics sector, benefiting from both operational and strategic perspectives. If used carefully, RPA can revolutionize financial processes at an organization and will be instrumental in ensuring long-term organizational competitiveness.

5.1 Future Research

On one hand the present research findings are very interesting, but on the other hand this work opens up several possibilities for further research. Future studies may also take into account the intersection of RPA and existing advanced technologies such as Artificial Intelligence, Machine Learning and Blockchain to assess the synergy between these and financial intelligence and financial predictions in logistics.

It could also be asserted that a longitudinal approach of the study will be taken in the future in order to see how the benefits of RPA change over time and how organizations adapt their financial approaches as the automation maturity rises. The cross-industrial comparative research of small medium, and large logistics companies might present a deeper insight into the contextual variables that define the results of digital transformation.

Additionally, qualitative studies that incorporate interviews with top executives in finance and architects in automation schemes may provide more substantial information regarding decision-making strategies, difficulties in implementation, and best practice. Another area of future inquiry could be the idea of workforce transformation, wherein the changes in the financial role, skill needs, and career development will be examined in more automated workplace settings. By covering these segments, the future studies will be able to broaden the area of the current research and help develop a more complicated understanding of the digital transformation of finance in the age of intelligent automation.

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