

Applying Robotic Process Automation (RPA) in National Defense Comptroller Service innovation 機器人流程自動化應用於 國軍主財業務創新之研究

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Abstract 摘 要

Robotic Process Automation (RPA) is an emerging information technology that automates standard operating processes. In order to accelerate digital service transformation, planning towards the implementation of financial management process automation and the evolution of the National Defense Comptroller Cloud Information System (NDCCIS) is important. This study aims to identify the main process framework for implementing the RPA concept in national defense financial

management practices and to conduct an analysis of RPA integration in the NDCCIS, which can be evaluated by decision-makers based on strengths, weaknesses, opportunities, and threats, respectively.

The main suggestions are as follows:

- I. Achieve national defense financial management readiness and improve decision-making quality.
- II. Utilize Business Process Management (BPM) and digital technology tools to improve the National Defense Financial Management operation process.
- III. Emphasize digital training programs to promote employee intelligent analytics capacity.
- IV. Establish an NDCCIS data warehouse and apply

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Big Data Analysis to track national defense budgeting information.

V. Establish an RPA platform for the National Defense Comptroller innovation service model.

機器人流程自動化（RPA）為新興資訊技術，主要提供標準營運流程自動化。為加速數位服務轉型，導入國軍主財業務流程自動化與國軍主財雲端資訊系統持續優化為主要規畫之願景。本研究提出國軍主財業務導入RPA之主要流程架構，並進一步探討RPA導入之優勢、劣勢、機會及威脅之不同角度分析架構。本概念架構主要建議：

- [1]達成國防財務管理完備品質，有效改善主財決策品質。
- [2]運用企業流程再造（BPM）與數位技術工具，有要改善國軍主財營運流程。
- [3]強化國軍主財軍官數位教育訓練，有效提升智能分析能力。
- [4]建立國軍主財雲端資訊系統之資料倉儲，應用大數據分析觀察與評估國防預算資訊內容。
- [5]建立RPA機器人服務平台，提升國軍主財創新服務新價值。

Keywords: Robotic Process Automation (RPA); Business Process Management (BPM); National Defense Financial Data Warehouse; RPA robot platform

關鍵詞： 流程機器人自動化(RPA)；企業流程再造(BPM)；國防財務管理資料倉儲；機器人服務平台

1. Introduction

In recent years, the Comptroller Bureau of the Ministry of National Defense has dedicated itself to

incorporating innovative planning, improving service efficiency, and promoting financial management service quality. To accelerate advancement and fulfill government digitalization goals, planning towards the implementation of financial management process automation and the evolution of the National Defense Comptroller Cloud Information System (NDCCIS) is important. The government needs to think ahead regarding digital technology trends that can benefit current operational processes and promote new service values. Yang, Lee, and Lin (2019) reported that the national defense financial management process includes budget planning, programming, execution, internal audit, and performance evaluation within the Ministry of National Defense. These standard operational activities are necessary for satisfying defense needs and to assure a system of internal control. Therefore, it is important for both military practitioners and national defense financial management trainers to evaluate the benefits as well as potential challenges of automation technology implementation.

Robotic Process Automation (RPA) is an emerging information technology that automates standard operating processes. Ernst and Young (2017) reported that RPA implementation has been proven to save time and cost compared to existing manual data processing, give businesses increased efficiencies, and improve data quality. Deloitte (2017) described RPA as a methodology for integrating routine business processes by automating manual activities through simple rules that make (metaphorical) robots operate. The business processing features the machines perform are repetitive, structured, and labor-intensive (Syed et al., 2020).

With the goal of sustainable national defense financial resources, this study proposes a five-step model for incorporating RPA into the national defense comptroller sector. There are, however, many barriers to consider; this study further assesses strategic planning for RPA using SWOT analysis. Santos, Pereira, and Vasconcelos (2019) indicated that organizations with successful RPA adoption accompany business process management effectively have a significant impact on its strategic goals. For this reason, decision-makers should be proactive in rethinking operation processes in terms of automation and taking advantage of data analytic capacity to support service innovation.

This study aims to identify the main process framework for implementing the RPA concept in national defense financial management practices and to conduct an analysis of RPA integration in the NDCCIS, which can be evaluated by decision-makers based on strengths, weaknesses, opportunities, and threats. Above all, applying Robotic Process Automation to National Defense Comptroller service innovation is important not only because the RPA can reduce system costs for decision information analysis, but also because it can promote labour productivity.

This study is structured as follows. The next section is a literature review on service innovation and RPA. Section 3 is a description of the relevant conceptual framework. The last section provides the main conclusion and management implications.

2. Robotic Process Automation (RPA)

RPA is preconfigured software that simultaneously executes a combination of processes, activities, transactions, and tasks related to business operation; it is the automation of processes, mimicking human interaction, to reduce manual operational frequency (IEEE CAG 2017). RPA has evolved from being centered on desktop automation and using structured data sources; it can now interact with the information system interface to perform automatic tasks (Ernst & Young, 2017).

Studying the application of RPA in international military practices, Gex and Minor (2019) described how the United States Army invests in RPA to assist military activities, reduce information technology system costs, achieve audit readiness, and provide additional capacity to both financial management professionals and commanders. The RPA tool employed by the U.S. Army financial management sector automates their manual processes in running military activities and establishes standard processes for regular military financial operation tasks. RPA can be seen as a collection of digital workers, where machines perform as many as business processes within twenty-four hours and real employees can focus on value-added work (Winkler, 2018).

The RPA software product landscape is dominated by three companies: UiPath, Blue Prism, and Automation Anywhere. Some organizations build RPA programs in-house. Generally, RPA products comprise three main components: a graphical modeling tool, an orchestrator that manages execution, and the bots themselves, which cover the development, testing, staging and production lifecycle phases (Syed et al., 2020). For

example, UiPath uses flowchart actions to create a process by recording on-screen actions. Even though RPA has received a lot of attention in the business field, little is known about RPA planning analysis surrounding RPA implementation for national defense comptroller practices in Taiwan. This includes implementation and an analysis of the strengths, weaknesses, opportunities, and threats regarding RPA implementation in the national defense sector.

3. Conceptual Framework and SWOT analysis

To promote effectiveness and efficiency in future RPA implementation, this study illustrates a five-step model for RPA integration with a cloud information environment, followed by a detailed description of each step. Furthermore, this study applies SWOT analysis to RPA technology in the national defense financial management operation process to fill the gap between academic research and national defense practitioners.

3.1 The 5-step Model of RPA implementation

Considering information technology innovation and NDCCIS development, this study designs a five-step model for RPA implementation in the national defense sector. Figure 1 illustrates the model framework: project evaluation, initial planning, robots implementation, performance evaluation, and robots platform. What follows is further description of each implementation step.

Step I: Project Evaluation

RPA project evaluation mainly ensures that requirements of cost, scope, time, and other resources are met in project implementation. More importantly, the goal of the RPA project is to satisfy the development trend for the national defense comptroller bureau.

Step II: Initial Planning

Lacity and Willcocks (2016) argued that automation procedures must meet the conditions of well-defined, highly repetitive, and mature processes. Therefore, when initially planning for the RPA project, the project team should understand data compatibility (file name, data characteristics, and data relationships), process and task suitability (interdependence and standardization), and external software applications (information system and office software).

Step III: Robots Implementation

Kokina and Blanchette (2019) suggested that improving the process before automation is a key factor. Furthermore, an evaluation of risk and controlled environment is required in the initial RPA implementation. In addition, for the national defense sector, those incorporating RPA into the financial management process should pay attention to training programs, testing and assessment, and in-house programming capacity. Simultaneously, when onboarding, an effective governance mechanism will maximize the bot team's productivity.

Step IV: Performance Evaluation

Specifically speaking, the project team should define expected goals and compare the outcomes of manual activities and automation by RPA. Huang and Vasarhelyi (2019) indicated that performance evaluation is necessary; it should include implementation procedure monitoring and adjustment, assessment of the metric design, and continuous maintenance to assure an effective automation process. If the results from evaluation reveal that the RPA project needs modification, the project needs to return the step of initial planning in order to strengthen project structure and operation success.

Step V: Robot Platform

Value-driven RPA is part of the process-led digital transformation management discipline (Kirchmer & Franz, 2019). In the national defense sector, the robots platform should be an optimal development vision, combining RPA technology with the NDCCIS and supporting national financial management service innovation and sustainability. Additionally, the data warehouse must be established and classified according to national defense financial management topics (budget, internal auditing, fund, finance, and accounting activities).

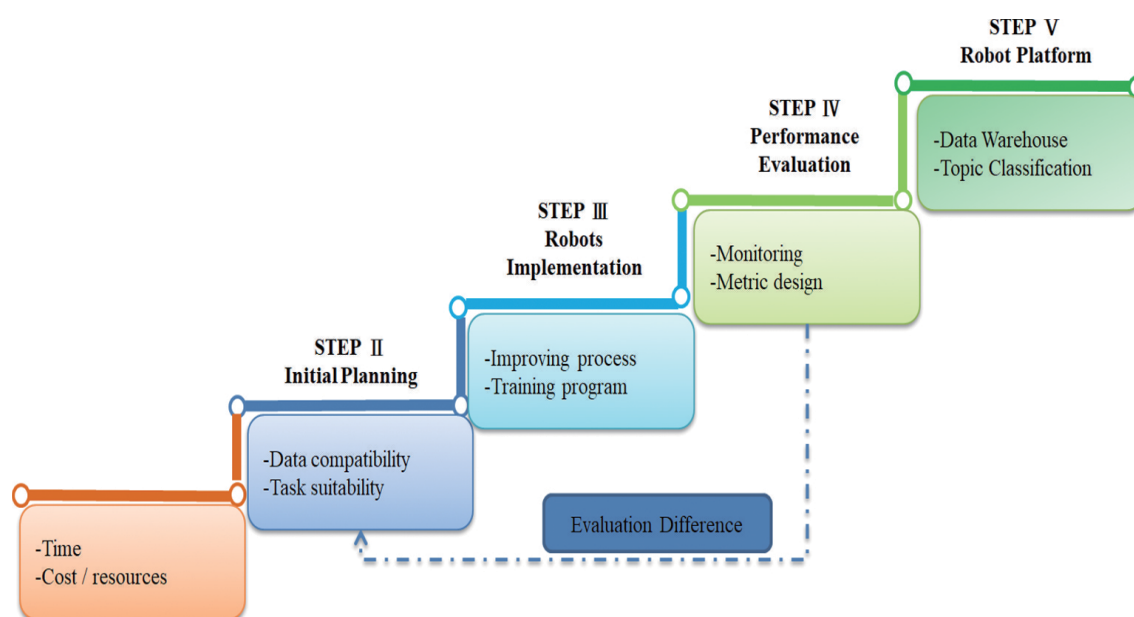


Figure 1 Five-step model of RPA implementation for the national defense sector.

3.2 SWOT analysis for RPA in National Defense Comptroller Service innovation

RPA planning requires digital service policy standard and resource support. Thorough analysis is

a crucial step that must be taken into account before RPA project evaluation in the national defense sector. In order to implement RPA technology, a SWOT analysis is employed to evaluate the external factors (opportunities and threats) and internal factors (strengths and weaknesses) relating to the

national defense comptroller sector.

A SWOT analysis of RPA in the national defense sector can further boost understanding of the organizational environment and contribute to project evaluation and planning. Based on a literature review, the SWOT analysis is depicted in Figure 2 and its description is as follows.

- *Strengths*

Huang and Vasarhelyi (2019) indicated that RPA technology assists businesses in improving the efficiency of processes and the effectiveness of services. In particular, replacing the human workforce reduces the cost and processing time of high-frequency activities. In fact, RPA can help eliminate frequently costly system change requests using a user-friendly system interface. At the same time, data processing automation minimizes human errors as well as promotes employee productivity (Moffitt, Rozario, & Vasarhelyi, 2018). In addition to processes based on the internal information system, RPA also extracts data from the Internet and checks data based on the routine rule.

- *Weaknesses*

Nam (2019) contended that policies should be developed to confront technological changes and further reflect the policy preferences of stakeholders. RPA technology incorporated into the NDCCIS needs regulatory support and monitoring in advance. At the same time, RPA implementation accompanying business process management will result in organizational change (Cooper, Holderness Jr, Sorensen, & Wood, 2019). Especially

in the business processes reengineering, it is a challenge that complexity and time consuming for the military sector, which need the consensus of process automation and innovative services. Huang and Vasarhelyi (2019) described mature procedures as one of the essential conditions of RPA. Although RPA provides an automation process, exceptional events will still require human intervention.

- *Opportunities*

Madakam, Holmukhe, and Jaiswal (2019) indicated that RPA can bring immediate value to core business processes including employee payroll, accounts receivable and payable, invoice processing, inventory management, report creation, and data migration. For the national defense comptroller bureau, employing RPA will contribute critical development opportunities for budgetary, internal auditing, funding, financial, and accounting activities and contribute to NDCCIS upgrade optimization. Moreover, RPA research by Kremer, Villamor, and Aguinis (2019) found that knowledge sharing serves as an antecedent of innovation, leading to creativity and improvement. The same is true regarding RPA implementation: the value of knowledge sharing is a significant development goal.

- *Threats*

Labor being replaced by RPA is one of the threats, but there is significant value in releasing labor to do verification and analysis and to create more valuable tasks. Simultaneously, Gex and Minor (2019)

showed how the United States Army financial management community is leveraging the innovative technology of RPA to accelerate achieving strategic outcomes as well as supporting the commander's field operations. Therefore, military automation is a future trend and emerging service model. Unstructured data

sources in military operation processes are an important threat to RPA implementation. Intelligent automation will become the next step for robot assistants, to help management make more accurate and professional decisions.

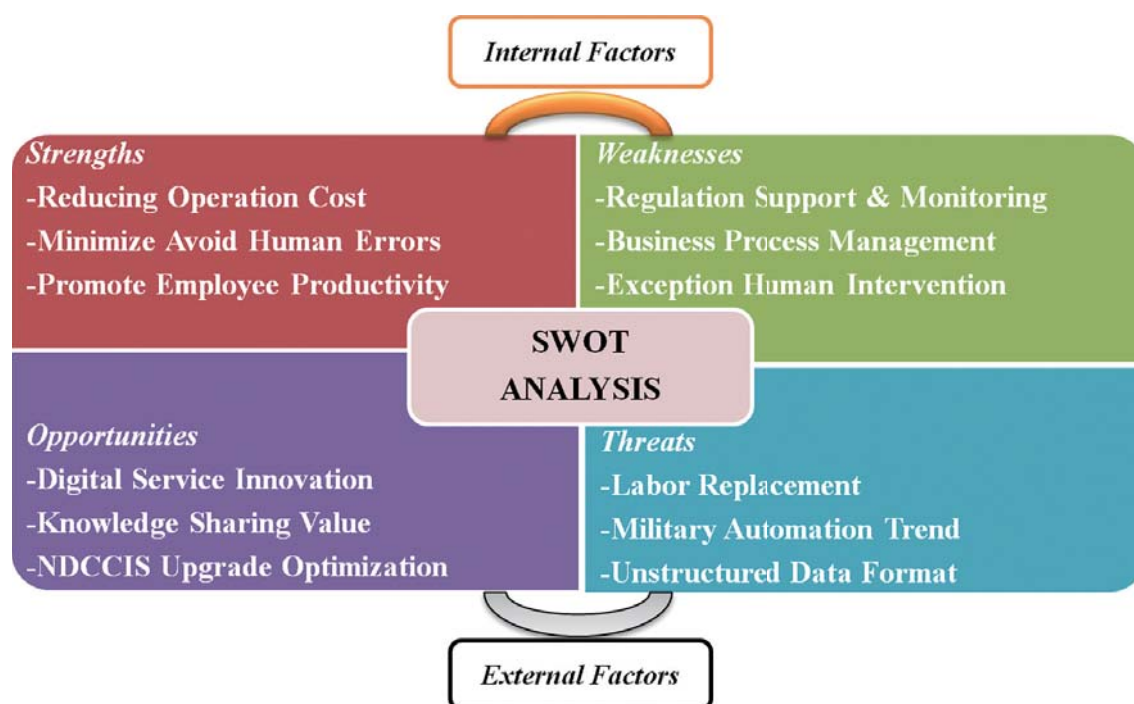


Figure 2 SWOT matrix of RPA implementation in the National Defense Sector

4. Conclusion and Management implication

This study presented a five-step model of RPA implementation and SWOT analysis for RPA implementation in the National Defense Comptroller Service. Its main contribution is to provide a digital automation service concept by incorporating robotics tools and to consider critical factors regarding strengths, weaknesses, opportunities, and

threats, respectively. Based on the research model, brief suggestions for a sustainable national defense financial management policy are as follows.

1. Achieve national defense financial management readiness and improve decision-making quality.

To support annual military financial management activities, the national defense comptroller bureau performs budgeting, internal auditing, and funding tasks. This regularly routine work involves all major military operations and provides information relevant for decision-

making to top management. RPA technology has significant benefits to not only achieve financial management activity readiness but also improve decision quality.

II.Utilize Business Process Management and digital technology tools to improve the National Defense Financial Management operation process.

In contrast to traditional information technology tools, RPA allows organization process management to improve operational efficiency at a lower cost and with lower technical barriers to implementation. The RPA tool is considered an effective business process management strategy that will help improve the competitiveness of the national defense sector.

III.Emphasize digital training programs to promote employee intelligent analytics capacity.

Introducing RPA into the national defense education training program will help ensure that employees are exposed to the latest digital technologies and applications that are employed in military missions. Employees who develop RPA skills will likely have a competitive advantage and intelligent data analytic capacities when adopting to regular military financial management activities.

IV.Establish an NDCCIS data warehouse and apply Big Data Analysis to track national defense budgeting information.

With the implementation of RPA, automation processes perform based on pre-designed routine rules, giving employees more time to execute high-value tasks that require professional judgment and evaluation, such as national defense budgeting

decisions. Appropriate RPA data processes that mimic the way humans perform were chosen for each step. Specifically, establishing an NDCCIS data warehouse will contribute to smooth RPA implementation and the development of further research on current financial management processes.

V.Establishan RPA platform for the National Defense Comptroller innovation service model.

As the national defense comptroller bureau pursues emerging and innovative service models, RPA can potentially make a significant improvement to financial management optimization practices. Currently, the RPA robots platform establishing is a short-term goal of achieving military automation development visions. To further promote the benefits of automation, combining Artificial Intelligence (AI) technology will perform more complex tasks and provide precise decision information.

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