

An E-Governance based National Defense Budget Decision Practice: Trend Prediction, Strategy Planning, and Performance Evaluation

數位治理基礎之國防預算決策實踐：趨勢預測、策略規劃與績效評估

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Abstract 摘要

E-Government is a digital conception policy to serve as the government's emerging instrument of Information and Communication Technology (ICT) combined with operational processes of government to provide the best public service. E-governance includes monitoring and controlling mechanisms, with the principles of transparency, accountability, and collaboration. Effective E-governance

contributes to E-government policy implementation. In order to achieve the objectives of national defense financial resource sustainability, budget trend prediction, strategy planning and performance evaluation are the challenges that need to be overcome. This study incorporates a lifecycle concept into a national defense budget decision practice cycle to aid the national defense budget decision process. The main suggestions are as follows:

I. Combining Historic Budgets and Text Mining Techniques into Precision Budgeting Trend Prediction.

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II.Utilizing the Public-Private Partnership Innovation Model to Promote National Budget Effectiveness.

III.Applying the Cost-Benefit Analysis into Performance Evaluation to Promote Budget Quality.

IV.Establishment of a National Defense Financial Open Data Platform to enhance National Defense Financial Information Value.

V.Performance Audit-oriented Rolling Correction Process for National Defense Financial Performance Evaluation.

數位政府政策為政府利用資通訊科技技術結合作業流程提供最佳公眾服務。數位治理乃監督與控制機制並具備透明、課責及合作之特性，有效的數位治理將有助於數位政府政策之推動。為達成國防財務資源永續之目標，預算趨勢預測、策略規劃及績效評估為重大挑戰，本研究將生命週期概念導入國防預算決策實踐循環，以優化國防預算決策流程。本概念架構主要建議：

- [1]結合歷史預算與文字探勘技術，達成精準預算趨勢預測。
- [2]善用公私協力創新模式，增進國防財務資源效能。
- [3]強化成本效益分析，提升預算績效評估品質。
- [4]建立國防財務資源開放資料平台，促進主財資訊價值。
- [5]落實績效審計機制，建立預算績效關鍵指標滾動修正模型。

Keywords: E-Governance; Precision Budgeting Trend Predictive; Public-Private Partnership; National Defense Financial Open Data Platform; Performance Audit

關鍵詞：數位治理；精準預算趨勢預測；公私

協力模式；國防財務資；料開放平台；績效審計

1. Introduction

E-Government is a digital conception policy to serve as the government's emerging instrument of Information and Communication Technology (ICT) combined with organizational change, in seeking to improve the operational processes of government and provide the best public service quality (Field, Muller, Lau, Gadriot-Renard & Vergez, 2003). E-governance provides a basis for accessing the government use of web-based technologies applications and evaluating the delivery quality of governmental services and information to citizens, business, and government departments (Layne & Lee, 2001).

To overcome the global security environment challenges, Taiwan has emphasized the strategic advantages of geographic location and core technology to promote national defense capacity development. The Ministry of National Defense (MND) also offers digital service for military operations. Especially, the National Defense Comptroller Cloud Information System (NDCCIS) was established to plan for satisfying weapon needs and to assist defense financial and budget spending activities. Meanwhile, in addition, the transparency and openness of national defense's financial open data platform helps to ensure that the budget review mechanism will avoid improper budget allocation, and promote proper budget performance audits.

The advent of the e-governance initiative may contribute to monitoring national defense financial resource sustainability. This study incorporates the lifecycle concept into the national defense budget

dividing trends into prediction, strategic planning, and performance evaluation phases. First, the predictive trend for the national defense budget focuses on precision budgeting planning and text mining technology. Data analytics not only can help decision makers to discern future trends and make predictions, but it can also assist them in making policy as well as facilitating the circulation of scarce resources. In order to provide much more comprehensive and overarching information for decision makers to form their decisions, this study intends to provide an advanced analytics method that can be used to allocate resources to suitable places and shorten the decision-making process under anticipated resource level restrictions. Previous research indicated that the data can be roughly divided into two different types: numerical information and textual information. Numerical information accounts for 10 to 15% of all data, the rest are textual information. However, most studies make a final decision relying heavily on numerical information. Merely utilizing 10 to 15% of data to form a final decision is not trustworthy and reliable. Shirata et al. (2011) also indicate that numerical-based information represents the past performance of the entity, while textual-based information contains information related to its future development. Henry (2008) concluded that textual-based information provides decision makers with valuable supplementary information that exceeds what numerical-based information offers. In order to provide a more comprehensive decision-making process for management, the text mining technique was implemented to extract the inherent knowledge from textual-based documents, as well as increase the accurateness of decision outcomes. Second, the

strategic planning for the national defense budget refers to reasonable allocation and public-private partnership. Maran, Bracci and Inglis (2018) argue that the entire management's main focus was on the financial budget and the specific budget allocation they were entitled to manage. Therefore, determining how to reasonably allocate resources is an important challenge. According to the military operational requirements, incorporating the priority budget program into the budget allocation decision process may enhance budget utilization effectiveness and performance. In addition exploring the resources of the national budget, implementing the annual budget under law, applying the public-private partnership (PPP) mechanism to proactively seek cooperation with industry and funding significant military operation programs can promote budget allocation flexibility. Third, the performance evaluation for the national defense budget mainly contains the cost-benefit analysis and performance audit. Volden (2019) presented that cost-benefit analyses are a crucial part of the evaluation process for public investment projects. The cost-benefit analysis also concerns the relationship between the resources invested and the benefits that can be achieved. Generally, developing the performance audit concept and tools used in performance evaluation consideration could optimize the operation process and lower the risk of fraud.

Above all, an E-governance-based national defense budget decision practice cycle is important not only because the decision makers have more insights into the budgeting process, but also because it can promote the effective use of resources in the national defense budget. Through the collaboration of NDCCIS and the national defense financial open data platform, it is possible to reduce the

differences between the expected benefits of military programs with the actual outcomes of military missions. This study focuses on presenting the conceptual framework of an E-governance-based national defense budget decision practice cycle. Simultaneously, applying a comprehensive evaluation infrastructure of key performance indicators strengthens performance audits. The remainder of this study is organized into four sections. Section 2 reviews the literature on national defense budget decision practice cycle dimensions. In section 3, the conceptual framework is presented. Lastly, the main conclusions and management implications are discussed.

2.Literature Review

This section discusses recent literature on the E-governance-based national defense budget decision practice cycle, presenting an integrated model that incorporates trend prediction, strategic planning and performance evaluation. E-governance includes monitoring and controlling mechanisms under the simultaneous principles of transparency, accountability, and collaboration; it contains the interactive relationships between government and citizens through information technology in decision-making and problem-solving processes (Lee-Geiller & Lee, 2019).

This study presents a schematic of an E-governance-based national defense budget decision practice cycle to stratify the national defense financial resource sustainability. The National defense budget involves numerous essential issues, such as intensive training, military technology, soldier care, talent cultivation, and construction equipment. Determining how to

appropriately allocate the resources for each issue is an urgently required task. The public sector not only considers short-term and long-term goals under an anticipated budget, but also takes public opinion into consideration. However, most of the information related to public opinion has been non-structured textual-based information. Determining how to handle and extract the inherent information is an essential task in today's big data environment. Huang et al. (2014) point out that textual-based information can yield more information beyond numerical information by providing detailed illustrations of numerous facets of a project. However, compared with well-examined studies, such as financial crisis prediction, and pattern recognition, the work on the national defense budget that has implemented the textual-based content of documents or social media blogs is quite rare. Hence, this study suggests that decision-makers must take textual- and numerical-based information into the decision architecture for the national defense budget planning to achieve precision budgeting targets.

The main concerns of national defense financial resource optimization are active acquisition, reasonable allocation and effective utilization of the national defense financial resources. Strategy planning, which indicates reasonable budget allocation through priority evaluation, also considers a public-private partnership mechanism for exploring financial resource sources. Yang and Lee (2018) indicate that Goal programming (GP) methodology provides a simultaneous solution for several objectives and optimal decision selection. Based on relevance performance criteria to achieve strategy targets, the national defense budget needs to be allocated for building the programming model for

months or years to come. Combining the financial resources of national defense and private sector capabilities includes sharing resources, allocating risks and management responsibilities (Bayliss & Van Waeyenberge, 2018). Roehrich, Lewis & George (2014) define public-private partnership (PPP) as comprising a cooperation protocol of relationships between the public and private sectors to execute services and projects, such as operation activity services and defense military investment projects. Clearly, the allocation, transfer, and management of risk impact constitute an important problem (Burke & Demirag, 2017); this complex interplay between public and private partners is also a key characteristic of military PPP projects.

To ensure national defense financial performance maximization, building an evaluation mechanism of cost-benefit analysis and audit activity can provide suggestions for future military investment program improvements. Cost-benefit analysis is widely used in the public sector decision process, providing project feasibility assessment of minimizing costs and maximizing performance. Volden (2019) indicates that the cost-benefit analysis should consider the overall national benefit perspective, which is particularly relevant for public projects. Therefore, applying the cost-benefit analysis in the performance evaluation for the national defense budget would strengthen the utilization of the effectiveness criterion. Additionally, under the NDCCIS and national defense financial open data platform, computer auditing techniques can assist the complete internal control policy and readiness of military operation activities. Sledgianowski, Gomaa & Tan (2017) present that the use of data visualization in auditing

is becoming more common as auditors can generate valuable insights by using transaction process data from information systems. Hence, performance audits provide an improvement opportunity for improving the operation process and defining the relevant fraud risk dimension.

3. Conceptual Framework

Based on the E-Governance-based National Defense Budget Decision Practice development, MND is devoted to building a cloud information environment. In order to achieve national defense financial resource sustainability, the financial open data platform provides the interaction of academic research and military operation.

3.1 E-governance-based national defense financial management

Twizeyimana & Andersson (2019) indicate that open government capabilities refer to public engagement, information transparency, the sharing of databases, skills, and resources. Online platforms provide central and transparent access to government open data (Ruijter, Grimmelikhuijsen & Meijer, 2017). Above all, the national defense financial open data platform should link different dimensions by the internal data source from NDCCIS and external data from government-related open data.

Fig. 1 depicts the conceptual framework of an E-governance-based national defense budget decision practice cycle; it incorporates the lifecycle concept into the national defense budget divided into trend prediction, strategic planning, and performance evaluation phase.

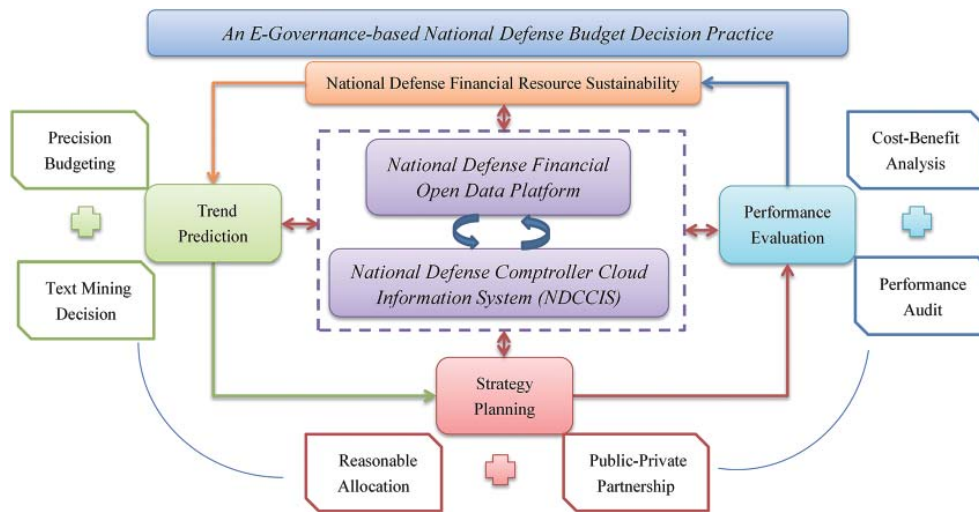


Figure 1. The conceptual framework of an E-governance-based national defense budget decision practice cycle

3.2 Comprehensive evaluation of key performance indicators of National Defense Financial Management with consideration of performance audit

In regard to the national defense financial resource sustainability goal, this study presents a comprehensive evaluation concept model. In the performance evaluation phase, two essential aspects

are the key performance indicators (KPIs) and fraud detection program, such as computer auditing techniques. The focus is on rolling correction processes for the national financial performance evaluation, when fraud is detected from the daily transaction through the computer auditing analysis, the feedback information is provided to the decision-maker to prevent risk and losses, and promotes the internal control instruments quality, as shown in Figure 2.

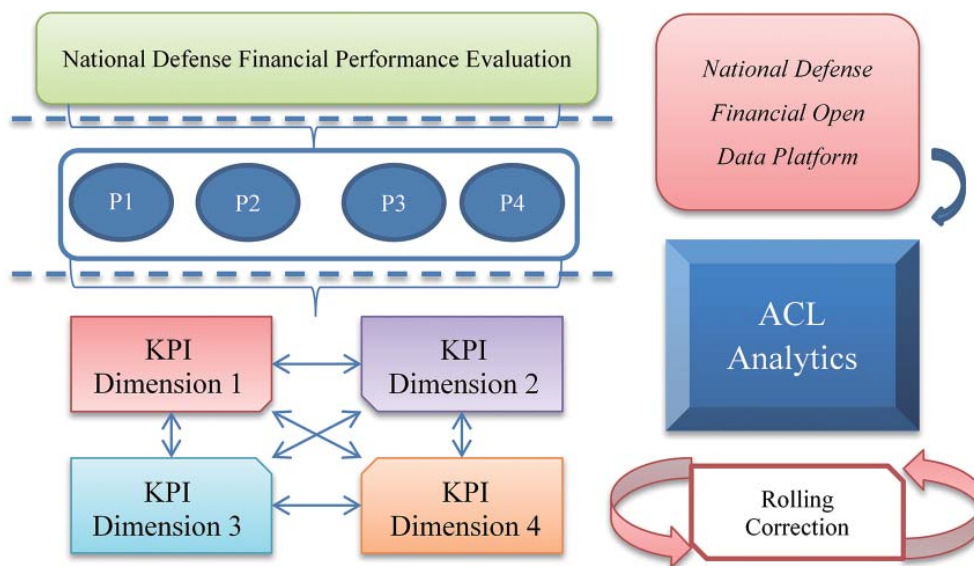


Figure 2. The performance evaluation concept model for defense financial management with performance audit

4. Conclusion and Management implication

This study presents a schematic of an E-governance-based national defense budget decision practice cycle to stratify national defense financial resource sustainability. The contribution aims to aid the national defense budget decision process by incorporating the lifecycle concept, and considers with trend prediction, strategic planning, and performance evaluation phase, respectively. The brief results of the application of the concept model are as follows:

4.1 Combining Historic Budgets and Text Mining Techniques into Precision Budgeting Trend Prediction

Precision budgeting for national defense financial resources is an important issue. Historic budget (numeric) data and social media (text) sources are utilized to obtain precise information for predicting national defense budget planning. Determining how to align different opinions is an essential task. Most people share and discuss information on the internet environment, and the greatest proportion of information is textual-based information. Thus, the text mining technique was performed to identify hot issues or topics from this platform. The public sector can consider the potential implications and align the project with public opinion to reach a win-win situation.

4.2 Utilizing the Public-Private Partnership Innovation Model to Promote National Budget Effectiveness

Public-private partnership (PPP) is comprised of a cooperation protocol of relationships between the public and private sectors to execute services and projects. PPP provides a new innovative way to solve optimal operation and service processes, improve public sector capacities and leverage private sector expertise to achieve the objective of national defense financial resource sustainability. In order to promote the national budget effectiveness, identify the risk of PPP cannot be ignored; management should create a risk management plan to reduce the occurrence of significant risks.

4.3 Integrating the Cost-Benefit Analysis into Performance Evaluation to Promote Budget Quality

In the performance evaluation phase, the cost-benefit analysis is applied to design the assessment process. To ensure national defense financial performance quality and maximization, the emphasis in the program planning should be on the expected benefits, while reinforcing cost data collection and evaluation to provide the reference for budget program forecasting. Especially, cost collection is a challenge for military operation activities; combining the NDCCIS with cost analysis can satisfy optimal national defense financial resources.

4.4 Establishment of a National Defense Financial Open Data Platform to Facilitate Information Value

The national defense financial open data platform should be linked to different dimensions by the internal data source from NDCCIS and external data from government-related open data. Under the e-governance mechanism, the values of open data aid military operation research; the shared value also contributes to internal data collection cost reduction. Information security is important not only because of the need for compliance with the Personal Information Protection Act, but also to pay attention to the secret information shared.

4.5 Performance Audit-oriented Rolling Correction Process for National Defense Financial Performance Evaluation

A performance audit is an assessment concept that includes economic value, efficiency, and effectiveness of evaluation objectives. Generally, performance audits provide positive improvement suggestions. In fact, the national defense program should build key performance indicators to control the implementing process. To extend the computer auditing technique advantages, reliance on auditor expertise and auditing logic to illustrate the fraud detection program and strengthen the rolling correction process for national defense financial performance evaluation is suggested.

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