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Integrating DEMATEL and ANP to Prioritize RPA Success Determinants in Small and Medium-Sized Accounting Practices

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Abstract

This study investigates the critical success factors (CSFs) that shape the adoption of Robotic Process Automation (RPA) in the digital transformation of small and medium-sized accounting service firms in Taiwan. As the accounting sector faces labor shortages, increasing process complexity, and growing demands for accuracy and efficiency, RPA has emerged as a strategic enabler of operational upgrading. Drawing on a comprehensive literature review and expert insights, this study integrates the Decision Making Trial and Evaluation Laboratory (DEMATEL) and Analytic Network Process (ANP) to construct a multi-criteria decision-making (MCDM) framework for evaluating key determinants of RPA implementation. The DEMATEL results reveal that process reengineering and digital transformation maturity serve as major causal drivers influencing system readiness, human resources, and external environmental factors. Subsequent ANP analysis prioritizes information security, degree of digital transformation, process optimization, and process standardization as the most influential CSFs. The findings underscore that successful RPA adoption requires not only technological investment but also organizational restructuring, workforce capability enhancement, and systematic governance. This study provides accounting SMEs with an evidence-based decision framework for allocating resources, mitigating implementation risks, and formulating effective digital transformation strategies aligned with long-term competitiveness.

JEL classification numbers: M15, M41, O33.
Keywords: Robotic Process Automation (RPA), Digital Transformation, Multi-Criteria Decision Making (MCDM), SME Accounting Firms.

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1. Introduction

1.1 Background

The small and medium-sized accounting services industry primarily comprises three major categories of operations: consulting services, accounting services, and business agency services. Among these, providing bookkeeping and tax-filing assistance to small and medium-sized enterprises (SMEs) constitutes the main revenue source for most firms in this sector. Since accounting and tax declaration services are essential obligations for all business entities—regardless of economic conditions—this form of publicly funded income has long been a stable and important revenue stream for SME-focused accounting service providers (Olena et al., 2023).

Digital transformation offers significant benefits, including enhanced communication within organizations, greater client autonomy, access to high-quality data, and more cost-effective accounting and tax services (Ren et al., 2024). To unlock new competitive advantages, SME accounting firms must move beyond traditional mindsets and avoid viewing digital transformation as a burden. Instead, digitalization should be leveraged to connect organizational resources through large-scale data integration, enabling the reuse and optimization of information and fostering an operational ecosystem centered on "tax management." This represents the fundamental objective of digital operations in the accounting services sector.

However, the industry faces critical challenges. Taiwan's rapidly declining birth rate has intensified labor shortages across the job market, and the accounting services field - long overlooked and characterized by relatively low wages - struggles to attract new talent. Achieving digital transformation, therefore, requires the establishment of networked and distributed knowledge systems, processes, and mechanisms. By harnessing information technologies to drive intelligent innovation, accounting service firms can upgrade traditional business models, develop new service offerings, strengthen their core competitiveness, and elevate the overall development of the industry.

In the digitalization era, innovative technologies in science and technology fundamentally serve as tools designed to assist humans. Although these technologies can replicate certain forms of human labor, they cannot completely replace human capabilities. The key lies in humans learning how to apply, manage, and adapt to these tools effectively. In today's fast-paced business environment, organizations and individuals increasingly pursue speed, cost-efficiency, and high productivity - without compromising quality. Under these expectations, artificial intelligence (AI) has continued to evolve, with its learning curve advancing rapidly to meet human needs.

Yet, the same progress has fueled concerns that machines may eventually replace human jobs. To avoid technological displacement and potential unemployment, individuals must continually learn, upskill, and adapt. From early electronic computers to the widespread adoption of advanced machinery, big data, and intelligent systems, AI development has undergone a profound transformation.

Today, AI is capable of acquiring sophisticated human knowledge and performing complex tasks, suggesting that not only blue-collar labor but also certain white-collar functions may be gradually automated. This trend reflects a broader global movement toward technology-driven restructuring of work.

The rise and application of AI are reshaping industries and everyday life. Tasks once considered time-consuming or low-skilled are rapidly being automated, while new products, business models, and lifestyles continue to emerge. Examples include the proliferation of unmanned retail stores and the integration of smart home technologies that enhance convenience and transform living patterns (Woods, 2021).

In the past, small and medium-sized accounting service firms relied heavily on training large numbers of professional accountants and depended on a "visual recognition + manual operation" approach to complete the electronic input of original vouchers and source documents. Accountants would then classify, code, and record the data according to accounting standards and reporting requirements. This process required substantial manpower and time to complete tasks such as data entry, reconciliation, verification, and the preparation of financial statements, which ultimately serve as critical inputs for managerial and investment decision-making.

Looking forward, the adoption of artificial intelligence (AI) and process automation has become an inevitable trend. With the rapid development of advanced technologies, robotic process automation (RPA) has emerged as a key enabler helping accounting firms achieve intelligent and comprehensive digital transformation. At the strategic level, firms must cultivate innovative thinking and proactively incorporate AI-driven tools - such as RPA and intelligent RPA (iRPA) - into their workflows to enhance efficiency, reduce human error, and accelerate reporting cycles. Organizationally, the industry must recruit and develop talent with dual competencies in accounting and information technology. Only by shifting mindsets, overcoming traditional limitations, and embracing technology-driven approaches can the accounting service industry remain aligned with contemporary trends and achieve long-term sustainable development (De Villiers, 2021).

1.2 Research Motivation

In recent years, small and medium-sized accounting firms in Taiwan have increasingly integrated digital technologies and information systems into their accounting operations and financial analysis activities. These advancements significantly reduce manual data entry time, lower error rates, and enhance the accuracy of tasks such as general ledger management, financial reporting, and analytical procedures. Moreover, cost accounting, tax filing, and even certain audit functions can now be supported by shared digital accounting systems, enabling quicker and more reliable completion of critical processes. By leveraging the consistency and traceability of digital data, firms can verify transactions and examine historical records more efficiently, thereby improving the transparency and reliability of financial information.

Digital transformation also removes traditional constraints of time and geographic boundaries, allowing accounting service providers to deliver more flexible, convenient, and accessible services to their clients. For small and medium-sized accounting firms to remain competitive in an increasingly technology-driven environment, adopting a strategic approach to digital transformation has become essential rather than optional.

The introduction of robotic process automation (RPA) further accelerates this shift toward intelligent operations. To maximize its benefits, firms must first redesign and optimize their workflows to ensure alignment with automation technologies. When effectively implemented, RPA can reduce labor requirements, save substantial time, support the upskilling of employees, and open new "blue ocean" opportunities in value-added and knowledge-intensive accounting services. Continuous evaluation of RPA adoption outcomes allows firms to refine their competitive strategies while fostering a strong organizational culture grounded in shared values, innovation, and adaptability. This evolutionary process positions accounting firms to further expand the application of artificial intelligence, ultimately paving the way toward more intelligent, adaptive, and client-centric accounting services.

1.3 Research Purpose

The small and medium-sized accounting services sector in Taiwan is currently confronted with three major structural challenges: labor shortages caused by the country's declining birthrate, which have significantly reduced the available workforce; working environments characterized by heavy workloads and limited operational efficiency, leading to the overextension of human resources; and difficulties in demonstrating the true value of accounting services, resulting in limited service differentiation and weakened competitive advantage.

In response to these conditions, the primary objective of this study is to identify and analyze the critical success factors (CSFs) that influence the adoption of robotic process automation (RPA) in the digital transformation of small and medium-sized accounting practices (SMPs). By systematically examining these factors, this study aims to generate actionable insights to help SMPs enhance the likelihood of successful digital transformation, strengthen operational resilience, and mitigate common risks associated with failed or incomplete technology adoption.

This research also seeks to highlight practical constraints - such as financial limitations, time pressures, and shortages of qualified personnel - that frequently hinder the effective implementation of RPA. These barriers often result in underutilization of key success factors or imbalances between technological investment and organizational outcomes. By addressing these challenges, this study intends to support decision-makers in allocating resources more strategically, selecting cost-efficient automation solutions, and developing structured implementation roadmaps. Ultimately, the findings of this research are expected to help Taiwan's SMPs optimize their digital transformation initiatives, enhance operational efficiency, and improve long-term sustainability in an increasingly competitive and technology-driven environment (Herrmann, 2023).

2. Literature Review

2.1 Definition of Robotic Process Automation

Robotic Process Automation (RPA) is a software-based automation technology—rather than a physical robot—that replicates human actions to execute predefined, rules-based, and standardized tasks across one or multiple software systems (Haklay et al., 2021). By mimicking human behavior in digital environments, RPA can autonomously perform repetitive, logic-driven, and labor-intensive processes. This not only frees professionals from routine manual work but also reduces error rates, enhances processing accuracy, and improves overall operational efficiency.

According to Smeets et al. (2021), RPA can operate in desktop, web-based, or enterprise-level environments and can interact seamlessly with a wide range of information systems. Its core functionality involves simulating human interactions—receiving inputs, validating and processing data, and generating outputs—while integrating with other applications to streamline end-to-end workflows. In the accounting services industry, such capabilities substantially reduce the burden of manual data entry and accelerate financial processes, thereby improving both the speed and reliability of accounting operations.

2.2 Benefits and Advantages of RPA

The adoption of RPA has emerged as a cornerstone of enterprise digital transformation due to its substantial operational and strategic advantages. By automating high-volume, rules-based tasks, RPA significantly enhances processing speed and accuracy, thereby improving the reliability of financial records and reporting outputs. At the same time, automation reduces dependence on manual labor and enables firms to reallocate human resources toward higher-value, knowledge-intensive activities, resulting in considerable cost savings. RPA also contributes to the advancement of artificial intelligence, as its ability to consistently generate, structure, and transmit large volumes of data provides a strong foundation for AI training and optimization (Afrin et al., 2024). Furthermore, automation improves service scalability by allowing organizations to manage increasing workloads without proportionally expanding their workforce. Collectively, these benefits underscore why RPA has become a strategic enabler of digital transformation, particularly in sectors such as accounting, where efficiency, accuracy, and data-intensive processes are central to competitive performance.

2.3 Limitations and Disadvantages of RPA

Despite its significant advantages, RPA also presents important limitations that organizations must address to ensure sustainable adoption. Without proper governance, ongoing monitoring, and continuous maintenance, RPA implementations can quickly shift from being valuable assets to operational liabilities (Räty, 2022). When firms rely excessively on automation without redesigning or optimizing the underlying business processes, inefficiencies may persist, and system failures can occur, undermining the intended benefits. As Li

(2024) emphasizes, the effectiveness of RPA hinges not only on its technical capabilities but also on the careful evaluation of application scenarios, organizational readiness, and risk mitigation strategies. Enterprises must therefore develop a well-structured implementation roadmap that clarifies objectives, eliminates redundant steps, and prevents unnecessary expenditures. Although these challenges highlight the need for thoughtful planning and management, the growing adoption of RPA across various industries indicates that it will continue to expand and evolve as a core enabler of digital transformation.

2.4 Integration of AI and RPA

The integration of artificial intelligence (AI) with RPA has significantly broadened the scope and sophistication of automation by enabling systems to perform tasks that require reasoning, judgment, pattern recognition, or predictive analysis—capabilities that traditional rule-based automation cannot achieve. Modern automation platforms such as UiPath and Microsoft Power Automate increasingly embed AI-driven components, including machine learning algorithms, natural language processing, and intelligent document processing, to enhance decision-making within automated workflows and adapt to dynamic business environments (Premavathi et al., 2024). Through these AI-enhanced features, RPA systems are no longer limited to repetitive, deterministic operations; instead, they can classify unstructured data, interpret contextual information, learn from human inputs, and continuously improve task execution.

Moreover, cross-platform integration has become a critical development in the evolution of RPA. Contemporary RPA solutions are designed to operate seamlessly across multiple operating systems—including Windows, macOS, and Linux—while interfacing with enterprise applications, cloud platforms, and web-based systems. This interoperability allows organizations to automate end-to-end processes that span diverse technological environments, thereby reducing the fragmentation of workflows and improving overall process continuity. As businesses increasingly rely on hybrid IT infrastructures, the ability of RPA to integrate with ERP systems, CRM platforms, and third-party cloud services further enhances its strategic value.

In addition, the convergence of RPA with the Internet of Things (IoT) represents another frontier in intelligent automation. By connecting IoT devices with automated workflows, organizations can trigger RPA actions based on real-time data from physical environments—for example, initiating automated maintenance reports, inventory updates, or compliance checks. This fusion of digital and physical data flows not only improves operational responsiveness but also elevates user experience through more proactive and adaptive services. As AI, IoT, and RPA continue to co-evolve, their combined applications are expected to create more autonomous, scalable, and context-aware systems capable of transforming business operations across industries.

2.5 Critical Success Factors for RPA Implementation

Successful RPA adoption requires far more than the installation of new technologies; it depends fundamentally on organizational alignment, stakeholder engagement, and human–technology collaboration. As Lacity et al. (2021) emphasize, seamless cooperation among key stakeholders—including process operators, IT personnel, managers, and end-users—is essential for realizing the full benefits of automation. Without organizational buy-in, effective communication, and a willingness to adapt existing routines, RPA initiatives are prone to resistance, suboptimal usage, or early abandonment, ultimately compromising their long-term value.

Beyond immediate operational improvements, RPA also serves as a strategic catalyst for broader digital transformation efforts. By standardizing processes and generating structured, high-quality data, RPA creates the foundation for advanced analytics, big data integration, and future AI-driven innovation. For organizations to fully capture these opportunities, they must approach RPA adoption with a clear understanding of their digital transformation objectives and ensure that managerial attitudes and decision-making philosophies are aligned with these goals. A structured, phased approach—combining technical readiness, process reengineering, talent development, and cultural adaptation—is crucial for transitioning into a digitally mature enterprise. Through this holistic strategy, organizations can establish a resilient foundation for ongoing technological advancement and position themselves to capitalize on future waves of intelligent automation.

2.6 RPA Adoption Goals and Trends in Taiwan's SME Accounting Sector

The adoption of Robotic Process Automation (RPA) in Taiwan's small and medium-sized accounting service industry reflects a broader shift toward digital transformation driven by competitive pressures, regulatory requirements, and evolving client expectations. As traditional manual workflows become increasingly unsustainable in terms of cost, efficiency, and accuracy, RPA offers firms an opportunity to redesign core processes, enhance service quality, and strengthen operational resilience. Beyond simply automating routine tasks, RPA supports the industry's transition toward data-driven decision-making and intelligent services powered by cloud computing, AI, and big data analytics. Figure 1 summarizes the major goals and strategic directions guiding RPA adoption within Taiwan's SME accounting sector, highlighting how digital transformation supports long-term sustainability and competitiveness. For small and medium-sized accounting service firms in Taiwan, digital transformation has shifted from an optional enhancement to a strategic imperative for maintaining competitiveness. Through the adoption of cloud platforms, data analytics, and robotic process automation (RPA), firms are transitioning from labor-intensive procedures to streamlined, intelligent workflows. This shift not only improves efficiency but also lays a critical foundation for integrating advanced technologies such as artificial intelligence (AI) and machine learning into routine accounting and advisory services.

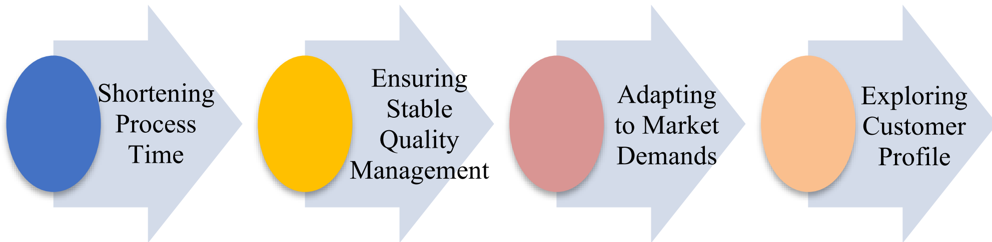

Figure 1: The Major Goals and Strategic Directions Guiding RPA Adoption

(1) Shortening Process Time

Technological advancements have markedly accelerated operational workflows within the accounting sector. According to Article 34 of the Commercial Accounting Law, accounting events must be recorded daily or within two months; however, RPA enables near-instant processing of tasks such as document scanning, recognition, classification, and data extraction. Previously, paper-based procedures—such as signing purchase orders or invoices—can now be completed electronically, reducing administrative burdens and improving both accuracy and processing speed. AI-enabled tax filing and real-time tracking systems further strengthen service timeliness.

(2) Ensuring Stable Quality Management

Manual operations are inherently vulnerable to human error, often leading to inconsistencies in bookkeeping accuracy, tax filings, and compliance tasks. Digital transformation supports the establishment of standardized operating procedures (SOPs) and automated workflows, reducing variability and ensuring more consistent quality across accounting services. This improved stability enhances operational efficiency while reinforcing client trust and regulatory confidence through higher accuracy and reliability.

(3) Adapting to Market Demands

Rapid technological advancement and shifting client expectations have rendered traditional accounting business models increasingly unsustainable. As the saying goes, “the back wave pushes the front wave”—firms that fail to innovate risk being overtaken by competitors. The rise of digital-native service providers, coupled with evolving expectations from clients, tax authorities, and financial institutions, requires firms to maintain agility. By embracing digital transformation and RPA, accounting firms can strengthen their relevance, competitiveness, and capacity to seize new opportunities in an ever-changing market environment (Fiolleau et al., 2024).

(4) Exploring Customer Profile

One of the most valuable outcomes of digital transformation is the ability to generate, collect, and analyze large volumes of data. Each digital transaction creates data traces that can be transformed into actionable insights. By systematically organizing and analyzing these data points, firms can develop detailed customer profiles, better understand emerging client needs, and tailor services to increase satisfaction. This data-driven approach not only deepens customer relationships but also enhances market competitiveness, allows firms to expand service offerings, and supports sustainable business growth by reducing the risk of market displacement.

2.7 Digital Transformation Applications in SME Accounting Firms

Digital transformation within small and medium-sized accounting service firms can be conceptualized as a three-stage developmental progression, with each stage reflecting a deeper level of technological integration and organizational sophistication (Paramesha et al., 2024). Rather than occurring as a single, linear shift, digital transformation unfolds through incremental advancements in digital capability, process redesign, and cultural adaptation. At the foundational level, firms begin by digitizing manual processes to enhance basic operational efficiency. As transformation progresses, organizations adopt more advanced technologies—such as cloud systems, data analytics, and robotic process automation (RPA)—to optimize workflows and enable more intelligent service delivery. Ultimately, mature firms reach a strategic stage in which digital tools are fully embedded into decision-making, value creation, and client engagement, allowing the organization to leverage artificial intelligence, big data, and automation in a holistic and proactive manner. Understanding these stages provides a clear framework for evaluating how accounting service firms evolve technologically and how they can better position themselves for sustainable competitiveness in a rapidly changing environment. Figure 2 displays the digital transformation applications in small and medium-sized accounting services.

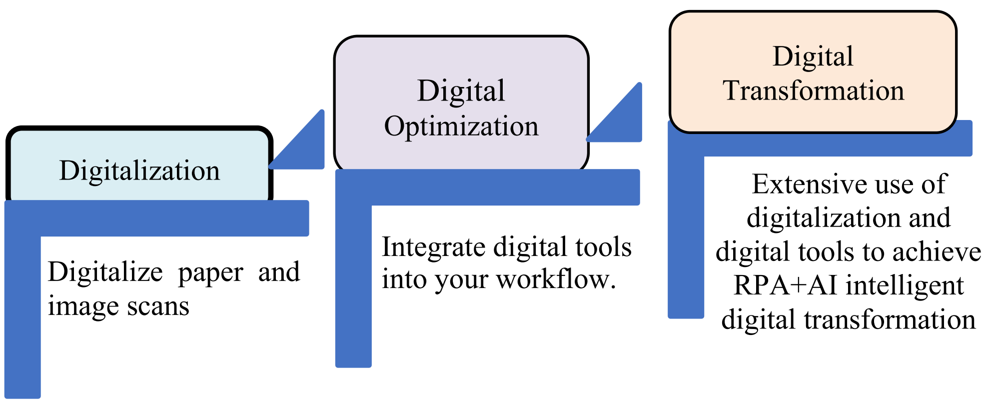

Figure 2: Application of Digital Transformation in SME Accounting Services

(1) Digitalization (Information Digitization)

The first stage, digitalization, involves the initial introduction of computer-based information systems to convert physical accounting records and documents into digital formats. This transformation reduces the manual labor associated with traditional tasks such as scanning, printing, sorting, and data entry. By digitizing core operational data, accounting firms can lower operating costs, enhance data accuracy, and establish a foundational digital infrastructure. As Vrana & Singh (2021) note, this stage reflects the earliest step toward technological adoption, where digital tools are primarily used to sharpen operational efficiency and save time and manpower.

(2) Digital Optimization (Process Integration)

The second stage, digital optimization, builds upon the digital foundation by integrating recognition systems, workflow automation tools, and RPA-enhanced AI services into existing business processes. The purpose of this stage is to strengthen internal operational efficiency and enhance the customer experience while enabling smoother interactions with clients, banks, tax authorities, and government agencies (Weigel & Hiebl, 2023). For instance, implementing paperless payment and collection mechanisms allows clients to choose from multiple payment channels while simultaneously streamlining account settlement processes within the firm. Digital optimization represents a refinement phase in which technology begins to directly elevate service quality, reduce process bottlenecks, and improve the speed and reliability of accounting tasks.

(3) Digital Transformation (Integrated RPA Systems)

The third stage, digital transformation, encompasses the comprehensive and strategic application of digital technologies across all functional areas of the accounting service firm. This includes not only accounting and tax operations but also talent recruitment, client acquisition, internal management, and long-term business strategy. At this advanced stage, firms leverage accumulated digital assets to develop AI-enabled systems capable of reusing and analyzing accounting data, uncovering new business opportunities, and automating repetitive tasks to enhance value creation (Rajagopal et al., 2022). Digital transformation fundamentally reshapes the business model: it shifts the organizational focus toward customer-centric and data-driven decision-making, integrates RPA and intelligent tools into end-to-end workflows, and cultivates a culture of continuous innovation and process improvement. This stage represents the culmination of digital evolution, positioning accounting firms to fully harness technological capabilities for sustained competitive advantage.

2.8 Five Steps to Digital Transformation

Digital transformation in the small and medium-sized accounting service industry is a systematic and staged process that requires strategic foresight, coordinated resource integration, and continuous refinement. Drawing on relevant literature and practical industry experiences, this study delineates five essential steps for achieving effective digital transformation (Song & Wen, 2023). Figure 3 illustrates the five essential steps involved in achieving digital transformation.

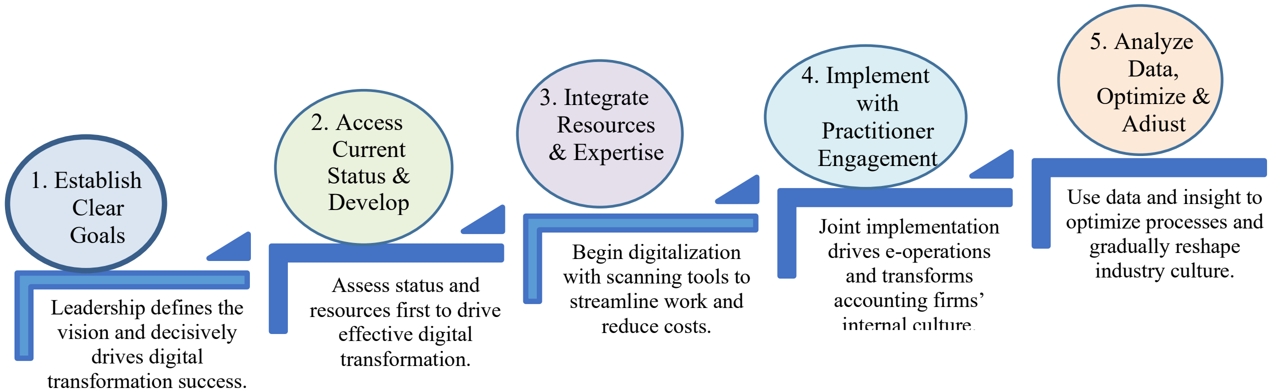

Figure 3: Five steps to digital transformation for small and medium-sized accounting services

Step 1: Establish Clear Goals

Leadership plays a pivotal role in driving digital transformation. Leaders must articulate a clear vision and strategic blueprint for the firm's future, defining what the accounting services industry aims to achieve and the direction it should pursue. Such clarity enables effective organizational guidance, aligns internal and external stakeholders, and fosters commitment and cohesion across all levels.

Step 2: Assess Current Status and Develop Plan

Before implementing any digital initiative, firms must conduct a comprehensive assessment of their existing resources, operational processes, and technological maturity. A clear understanding of both internal capabilities and external environmental conditions enables the development of a realistic, data-driven transformation plan that aligns with market needs. Digital transformation resembles a strategic battle against market forces; without thorough situational awareness, firms risk inefficiencies, misaligned investments, and costly strategic errors.

Step 3: Integrate Resources and Expertise

Before implementing any digital initiative, firms must undertake a comprehensive assessment of their existing resources, operational workflows, and technological maturity. Gaining a clear understanding of internal capabilities and the external environment provides the foundation for formulating a feasible, data-driven transformation plan that aligns with evolving market demands. Digital transformation is analogous to a strategic confrontation with market forces; without sufficient situational awareness, firms risk inefficiencies, misallocated investments, and costly strategic misjudgments.

Step 4: Implement with Practitioner Engagement

Successful digital transformation requires the active participation of both employees and clients. Mobilizing practitioners ensures effective adoption of digital tools and supports the parallel evolution of organizational culture. Strong engagement at this stage fosters collaboration, enhances learning, and reduces resistance to change, thereby creating a supportive environment for sustained transformation.

Step 5: Analyze Data, Optimize, and Adjust

Digital transformation is an iterative process that depends on continuous feedback, evaluation, and improvement. Firms should routinely collect and analyze operational data to identify inefficiencies, refine workflows, and guide organizational adjustments. These data-driven insights not only enhance operational performance but also gradually shape cultural and behavioral norms, ensuring that transformation becomes embedded in daily practice. To operationalize digital transformation, small and medium-sized accounting service firms must first assess their internal and external environment to determine their digital maturity, then formulate a clear digital vision and transformation strategy, followed by the development of a detailed action plan with measurable implementation outcomes. In practical applications such as tax reporting, transformation commonly progresses through three maturity stages: the starting stage, which emphasizes division of labor and basic process efficiency; the development stage, which focuses on upgrading rapid-result tax declaration systems; and the breakthrough stage, which integrates innovative information models and advanced AI-enabled processes (Song & Wen, 2023).

Historical evidence further underscores three critical factors for transformation success: a comprehensive digital roadmap, strong cross-departmental collaboration, and an operational model capable of reliably supporting digitalized processes. To reduce risk and strengthen long-term planning, organizations are encouraged to begin with small-scale pilot projects before expanding to wider implementation (Krishnasamy & Gopalakrishnan, 2023).

2.9 Strengthening Accounting Competitiveness through Digital Transformation

Digital transformation is increasingly recognized as a strategic lever for enhancing the competitiveness of the accounting services industry. By integrating advanced technologies and intelligent systems, firms can not only improve operational efficiency and reduce costs but also create additional value for clients and stakeholders (Zhai et al., 2022). Strengthening competitiveness requires the development of a comprehensive digital roadmap that aligns organizational vision with long-term objectives, specifies strategic priorities, and outlines measurable implementation milestones. Equally important is the promotion of cross-departmental cooperation, as effective communication and coordinated workflows ensure consistent technological adoption and optimized knowledge sharing across the organization. In addition, establishing a robust operational model that integrates technology, people, and processes is essential to sustaining digital initiatives and ensuring that digital operations remain efficient, scalable, and aligned with strategic goals. By embracing these integrated strategies, the accounting services industry can enhance data analytics capabilities, deliver value-added services, respond more rapidly to market demands, and differentiate itself in an increasingly competitive environment. Advanced digital tools such as RPA, AI-driven analytics, and cloud-based accounting platforms further support this transformation, enabling firms to improve client satisfaction and achieve sustainable long-term growth (Javaid et al., 2022).

2.10 RPA and the Shift to Intelligent Automation

Robotic Process Automation (RPA) has emerged as a critical driver of digital transformation in small and medium-sized accounting service firms. Once viewed as a tool limited to IT departments, RPA has become increasingly accessible to non-technical users, enabling broader adoption across organizational functions (Kedziora et al., 2021). As digital transformation becomes a core strategy for sustaining competitive advantage, RPA stands out for its rapid deployment, measurable efficiency improvements, and significant impact on digital productivity. By examining internal workflows, standardizing processes, and introducing process robots, firms have achieved notable gains in operational speed and quality. However, the scope of RPA is expanding, as organizations now seek solutions capable of managing complex, dynamic tasks, shifting the focus of digital transformation toward intelligent automation (Hsiung & Wang, 2022).

This evolution moves RPA beyond repetitive, rule-based tasks toward integrated automation systems that combine robotics with cognitive technologies such as artificial intelligence, machine learning, and natural language processing. Intelligent automation enables firms to process both structured and unstructured data, incorporate image recognition and speech perception, and execute sophisticated data-conversion tasks that were previously difficult to automate (Jha et al., 2021). This transition enhances traditional RPA benefits by reducing operational costs, improving accuracy and timeliness, and freeing human resources to engage in higher-value activities such as financial analysis, advisory work, and strategic planning. As a result, intelligent automation strengthens service quality, operational stability, and client satisfaction in accounting firms (Fouad, 2024).

Despite these advantages, implementing intelligent automation presents several challenges. Designing automation for complex processes requires consideration of cross-departmental collaboration, diverse workflows, and multiple data sources. Strategic misalignment remains a risk when automation initiatives lack a clear blueprint that supports the firm's long-term goals. Furthermore, many accounting practitioners face a skills gap, limiting their ability to effectively implement and utilize advanced automation technologies. Overcoming these barriers requires firms to redefine work models, optimize labor structures, and cultivate strategic thinking around automation. Encouraging creativity, adaptability, and continuous learning helps establish a collaborative human–robot framework that enables firms to respond more effectively to digital transformation challenges (Gonçalves et al., 2022).

For small and medium-sized accounting firms, RPA and intelligent automation offer broad applicability across digitization, process optimization, and full-scale digital transformation. Time efficiency, a critical value driver in accounting services, can be significantly enhanced through RPA-enabled process improvements. Maximizing these benefits requires identifying key success factors—including strong leadership commitment, systematic process redesign, workforce upskilling, and continuous performance evaluation—that support sustainable adoption and long-term competitiveness. By focusing on these elements, Taiwanese accounting service firms can effectively integrate RPA into their digital transformation journey and strengthen their position in a rapidly evolving professional landscape.

2.11 Key RPA Success Factors for SME Accounting Digital Transformation

The existing literature provides strong evidence of RPA's pivotal role in advancing digital transformation within small and medium-sized accounting firms (SMEs). Yet a critical question remains: which factors most substantially influence the successful adoption of RPA and its effective integration into broader digital transformation efforts? Identifying these determinants enables Taiwanese SMEs to reinforce key success factors, anticipate implementation challenges, mitigate risks, and enhance long-term competitiveness and sustainability (Jiang et al., 2025). With the rise of big data, accounting and audit SMEs can increasingly leverage advanced information technologies to process and analyze vast and complex datasets. RPA supports this shift by automating repetitive and rule-based tasks, thereby improving operational efficiency, accuracy, and flexibility. By reducing manual burdens, RPA allows professionals to redirect their efforts toward higher-value functions such as creative problem-solving, risk assessment, internal control enhancement, and compliance with evolving international tax regulations (Zaqeeba et al., 2025).

Although RPA performs exceptionally well in executing structured, rule-based tasks, its effectiveness diminishes when processes are irregular or highly complex. Integrating RPA with artificial intelligence enables process robots to manage these scenarios by applying cognitive technologies that enhance judgment, adaptability, and decision-making. This synergy accelerates the development of AI capabilities while extending automation beyond routine operations. In this broader context, RPA not only streamlines repetitive workflows but also establishes the foundation for process standardization, big data analytics, and AI-driven intelligent automation. Together, these advancements strengthen the long-term digitalization and strategic transformation goals of accounting firms (Cardinali et al., 2023).

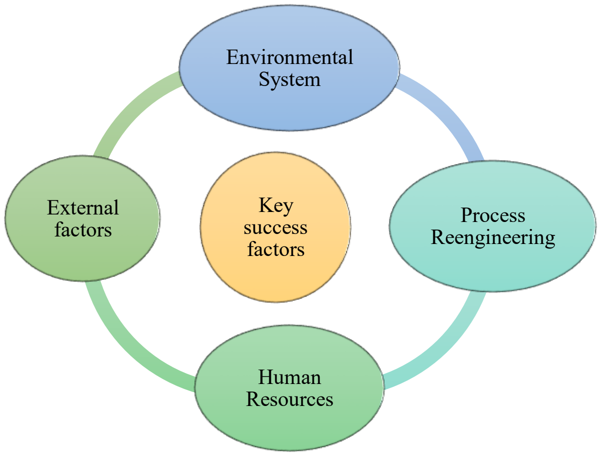

Figure 4: Key RPA Success Factors for SME Accounting Firms

This study identifies four major dimensions of critical success factors for RPA adoption in small and medium-sized accounting firms, as shown in Figure 4. The environmental system dimension encompasses data governance, information security, and digital infrastructure, all of which ensure that automation operates reliably and securely. The human resources dimension addresses staff competencies, technical expertise, and user perceptions - particularly perceived usefulness and ease of use - which influence the acceptance and effective utilization of digital tools. Process reengineering focuses on standardizing, optimizing, and redesigning workflows to maximize automation efficiency. Finally, external factors, including market pressures, regulatory requirements, and evolving client expectations, shape the readiness and motivation of firms to adopt RPA. Together, these four dimensions incorporate twelve specific criteria that collectively determine the success of RPA implementation in enhancing operational performance, competitiveness, and regulatory compliance (Shapovalova et al., 2023; Jahandarlashaki et al., 2024).

In practice, the implementation of RPA in SMEs is often constrained by limited financial resources, time, and workforce capacity. As a result, firms must strategically prioritize the most influential success factors to ensure that limited resources are allocated effectively and that the foundational elements of automation are strengthened before and during implementation. By concentrating on these key dimensions, accounting SMEs can optimize their digital transformation trajectory, achieve strategic goals, and generate practical insights that support informed decision-making (Kedziora et al., 2021).

3. Research Methods and Empirical Results

3.1 Decision-Making Experimental Analysis Method

In practice, decision-making processes often involve multiple interrelated criteria, requiring decision-makers to navigate trade-offs among competing objectives. Multi-criteria decision-making (MCDM) methods are therefore essential for identifying, analyzing, and balancing these conflicts to support rational and effective decisions. Among these methods, the Decision Making Trial and Evaluation Laboratory (DEMATEL) approach is particularly valuable for analyzing complex systems because it identifies correlations among problems, distinguishes primary from secondary factors, and clarifies the cause–effect relationships among criteria. By incorporating expert judgments, DEMATEL determines the relative importance and interdependencies of decision variables, enabling decision-makers to understand which criteria exert the greatest influence and how these factors interact within the system. According to Fontela & Gabus (1976), the DEMATEL process involves constructing an initial direct-relation matrix, normalizing the data, calculating the total-relation matrix, and then determining the prominence and relation values to reveal the influence and dependence of each criterion. The results are typically visualized through a causal digraph that highlights key driving and dependent factors. This systematic approach is particularly useful for examining the complex interdependencies among the key success factors of RPA adoption in the digital transformation of small and medium-sized accounting firms, offering a robust foundation for strategic prioritization and intervention planning.

3.2 Analytic Network Process

The Analytic Network Process (ANP), developed by Saaty (1977), is an advanced extension of the Analytic Hierarchy Process (AHP) and is widely regarded as a powerful multi-criteria decision-making (MCDM) method. Unlike AHP, which is based on the assumption that decision criteria are independent and arranged in a rigid hierarchical structure, ANP accommodates interdependencies and feedback relationships among decision elements, making it particularly suitable for complex, real-world decision problems. The fundamental distinction between the two approaches lies in their treatment of interactions among criteria: AHP calculates overall weights through the multiplication of interaction weights within a fixed hierarchy, whereas ANP replaces this hierarchical structure with a more flexible network model that incorporates interdependent relationships and circular causality. This network-based perspective better reflects human reasoning by capturing the intricate, reciprocal influences that characterize many decision environments - similar to exploring the logic behind "which came first, the chicken or the egg."

Through its ability to represent both direct and indirect relationships, ANP enables researchers to systematically analyze complex problems by decomposing them into individual elements and examining their interconnections, assessing feedback effects within and across clusters of criteria, and addressing nonlinear decision-making under uncertainty with multiple interrelated factors. In the context of this study, ANP provides a rigorous analytical framework for quantifying and prioritizing the key success factors influencing RPA adoption in the digital transformation of small and medium-sized accounting firms. By modeling the interdependencies among these factors, ANP offers a more comprehensive and realistic understanding of the decision-making landscape, enhancing the robustness and relevance of the evaluation results.

3.3 Evaluation Research Framework

Drawing on the preceding literature review and relevant industry materials, this study develops an evaluation framework to assess the influence of RPA on the key success factors for digital transformation in Taiwan's small and medium-sized accounting service firms. The framework is tailored to the unique operational characteristics of the industry, including centralized data storage, broad participation in governance and workflow processes, desktop-based data management, and the use of advanced data analytics tools. These capabilities enhance information processing, improve productivity, strengthen internal tax technologies, reduce manual errors, standardize operations, and ultimately elevate efficiency and core competitiveness.

The proposed research framework is organized into four dimensions:

(1) Environmental System, which includes data control, information security, and the degree of digital transformation;

(2) Human Resources, encompassing perceived usefulness, perceived ease of use, and the technical professionalism of personnel;

(3) Process Reengineering, which focuses on process standardization and workflow optimization; and

(4) External Factors, such as market competitiveness, taxation guidance, and performance requirements. Across these four dimensions, twelve evaluation criteria are incorporated to form a comprehensive multi-criteria decision-making (MCDM) model. This model provides a robust analytical foundation for experimental decision analysis aimed at identifying the critical factors that influence successful RPA adoption within the context of digital transformation.

Table 1: Key Factors of Decision-Making Experimental Analysis

	Environmental System	**Process Reengineering**	**Human Resources**	**External factors**
Environmental System	0.000	3.111	2.444	2.556
Process Reengineering	3.222	0.000	3.111	2.778
Human Resources	2.778	3.000	0.000	2.778
External factors	2.667	2.889	2.556	0.000

The values in Table 1 indicate the degree of direct influence each dimension has on the others within the decision-making system. Higher numerical values represent stronger influence, meaning that improvements or changes in that dimension will significantly affect the corresponding target dimension, while a value of 0.000 indicates no direct impact. For instance, Process Reengineering exerts a strong influence on the Environmental System (3.222), demonstrating its central role in shaping system readiness. Similarly, the Environmental System moderately affects Human Resources (2.444), reflecting how technological infrastructure shapes personnel capabilities. These interaction values clarify how the four dimensions collectively drive successful RPA adoption and digital transformation.

Table 2 presents the initial direct-relationship matrix, in which each numerical value reflects the strength and direction of influence that one evaluation criterion exerts on another. These values, derived from expert judgments, quantify the extent to which changes in a given factor are expected to impact others within the RPA adoption environment. Higher numerical values represent stronger direct influence, indicating that improvements in that criterion will substantially affect the target criterion. Conversely, lower values denote weaker influence, while a value of **0** indicates no direct relationship. For instance, Process Standardization exerts a strong influence on Data Control (3.444), suggesting that clearly defined and standardized procedures significantly enhance the reliability and integrity of data management in accounting firms. Similarly, the Degree of Digital Transformation strongly affects System Compatibility (3.444), highlighting the need for technological alignment as firms progress toward digital maturity. Other notable relationships include strong mutual influences between Human Resource–related criteria such as Perceived Usefulness and Perceived Ease of Use, demonstrating how staff perceptions shape digital tool adoption. These detailed influence values reveal the complex interdependencies among the twelve criteria and provide the analytical basis for subsequent DEMATEL and ANP calculations. By understanding these relationships, decision-makers can identify key leverage points for strengthening RPA adoption and optimizing digital transformation strategies.

Table 2: Initial Direct Relationship Matrix between Criteria (Z)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Data Control (1)	**0**	**3.444**	**3.222**	**2.889**	**2.556**	**2.556**	**2.333**	**2.667**	**3.667**	**2.556**	**2.778**	**2.778**
Information Security (2)	3.222	0	3.111	2.889	2.556	2.444	2.111	2.222	3.000	2.000	1.667	1.667
Degree of Digital Transformation (3)	3.778	3.667	0	3.444	3.111	3.000	2.667	2.556	3.000	3.000	2.333	2.444
System Compatibility (4)	3.111	3.111	2.778	0	3.000	3.111	2.444	2.556	2.889	2.667	2.444	2.333
Process Standardization (5)	3.444*	3.000	3.000	3.000	0	3.222	2.556	3.000	3.000	2.889	2.444	2.667
Process Optimized (6)	2.889	2.667	3.000	2.889	3.000	0	2.778	2.778	2.889	2.444	2.444	2.444
Perceived Usefulness (7)	2.556	2.556	2.667	2.333	2.556	2.444	0	2.333	2.444	2.000	1.889	2.333
Perceived Ease of Use (8)	2.556	2.667	2.778	2.111	2.333	2.222	2.222	0	2.000	2.111	2.000	2.111
Professional Level of Talents (9)	3.444	3.333	2.889	2.556	2.444	2.444	2.556	2.556	0	2.444	2.333	2.111
Competitiveness (10)	2.444	2.556	2.778	2.556	2.556	2.444	1.889	2.222	2.444	0	2.333	2.444
Taxation Guide (11)	2.556	2.333	2.444	2.111	2.333	2.333	2.444	2.556	2.667	2.000	0	2.000
Performance Considerations (12)	2.333	2.111	2.333	2.333	2.667	2.556	2.667	2.667	2.333	2.444	2.111	0

* the maximum values of the elements

3.4 Establish a Standardized Direct Relationship Matrix

After obtaining the two initial direct relationship matrices, the initial direct relationship matrix (Z) is standardized in accordance with Step 3 of the DEMATEL (Decision Making Trial and Evaluation Laboratory) method. This standardization produces the standardized direct relationship matrix (S), ensuring that all elements are comparable in scale. The normalization process is performed by dividing each element of the matrix by the maximum value among all row and column sums, thereby converting the matrix into a unified numerical range suitable for subsequent analysis.

To determine which relationships are meaningful, this study applies the numerical average (AVE) of the total relationship matrix (T) as the cutoff threshold. Any element with a value below this threshold is considered insignificant and omitted from further interpretation. As presented in Table 3, the numerical average of the total relationship matrix at the facet level is 3.528, whereas the corresponding average at the criteria level is 0.563. These thresholds enable the analysis to concentrate on the most influential and substantive relationships, thereby highlighting the critical factors that drive successful RPA adoption in the digital transformation of small and medium-sized accounting service firms. This approach ensures analytical rigor by filtering out weaker, non-essential connections and emphasizing the dominant causal pathways within the system.

Table 3: Threshold Value as the Average of the Total Impact Matrix (S)

AVE	Numeric	Calculate (AVE)
Facets	3.528	Calculate the average of values
Guidelines	0.563	Calculate the average of values

3.5 Analysis of the Total Relationship Matrix (T) for Facets and Criteria

The total relationship matrix (T) provides a quantitative foundation for evaluating the cause-effect relationships among facets and criteria in small and medium-sized accounting services during RPA implementation.

3.5.1 Analysis of Facets

The D–R values indicate whether a dimension belongs to the cause or effect group as shown in Table 4.

1. Positive D–R values indicate a cause, meaning the dimension has a greater influence on other dimensions.
2. Negative D–R values indicate an effect, meaning the dimension is primarily influenced by other dimensions.

For the four facets analyzed:

1. Process Reengineering (0.136), Human Resources (0.415), and External Factors (0.013) are cause dimensions.
2. Environmental System (-0.564) is an effect dimension.

The D+R values represent the correlation strength, reflecting how much a facet influences and is influenced by other facets. Among the four facets, Process Reengineering (29.599) shows the highest correlation strength, followed by Environmental System (28.118).

Table 4: Causal Relationship System of the Facets

Facets	X-axis	Y-axis	
	D+R(Correlation Strength)	D-R(Cause)	Causal properties
Environmental System	28.118	-0.564	effect
Process Reengineering	29.599*	0.136	cause
Human Resources	27.956	0.415	cause
External factors	27.218	0.013	cause

Note: * the maximum value of D + R (correlation strength)

Process Reengineering emerges as the most critical facet, exerting substantial influence on other dimensions—particularly Human Resources and the Environmental System. The high correlation strength (D+R) values show that these facets are not only influential but are also significantly influenced by others, indicating that they represent central components within the RPA adoption system and should be prioritized to enhance implementation effectiveness.
In the cause–and–effect diagram, the horizontal axis (D+R) represents the overall correlation strength, while the vertical axis (D–R) reflects the causal degree. Facets positioned above the X-axis function as causal drivers, whereas those below serve as effect factors. This visualization helps clarify the complex network of interdependencies and further underscores Process Reengineering as a dominant causal driver, reinforcing its pivotal role in supporting successful digital transformation in small and medium-sized accounting firms.

3.5.2 Analysis of Criteria

Similarly, the twelve evaluation criteria were analyzed using the D, R, D+R, and D–R indices. Criteria with positive D–R values are classified as **cause factors**, while those with negative D–R values function as **effect factors** within the system. The D+R value represents the overall correlation strength of each criterion and illustrates the extent of its interaction with other criteria. These results are depicted in Figure 5, which visualizes the relative influence and dependence of each criterion on RPA adoption.

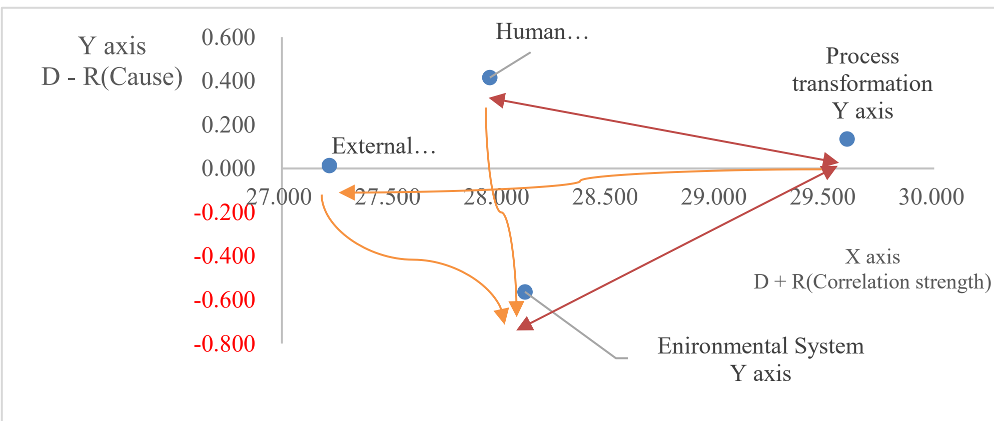

Figure 5: Cause-and-Effect Relationship Diagram between Facets

Notes: Mutual influence (two-way) impact, One-way.

Table 5 presents the overall relationship matrix and the cause–and–effect analysis for the twelve evaluation criteria. Each numerical value in the matrix represents the total influence that one criterion exerts on another, combining both direct and indirect effects. Higher values indicate stronger influence, whereas lower values reflect weaker interactions; a value close to zero suggests minimal impact. The D-value (sum of row values) captures how much influence a criterion exerts on others, while the R-value (sum of column values) reflects how much influence it receives. The D+R value denotes the overall correlation strength, showing the extent to which a criterion is interconnected within the system. Finally, the D–R value distinguishes cause factors (positive values) from effect factors (negative values). This analysis highlights criteria with strong driving power—such as Process Standardization and Degree of Digital Transformation—as key contributors to successful RPA adoption in small and medium-sized accounting firms.

Table 6 presents the causal relationship system of principles, where each criterion is evaluated using two key indicators: D+R (correlation strength) and D–R (causal degree). The D+R value, shown on the X-axis, reflects the overall level of interaction a criterion has with others—higher values indicate that the factor is highly interconnected within the system. The Degree of Digital Transformation records the highest D+R value (15.005), identifying it as the most influential and central criterion in the network. The D–R value, represented on the Y-axis, distinguishes **cause factors** (positive values) from effect factors (negative values). Criteria such as System Compatibility, Process Standardization, and Taxation Guide exhibit positive D–R values, indicating that they act as causal drivers in RPA adoption. Conversely, Data Control, Information Security, and Perceived Ease of Use show negative D–R values and thus function as effect factors. Together, these values clarify the hierarchical influence structure and highlight the criteria that should be prioritized to advance digital transformation in accounting SMEs.

Table 5: Overall Relationship Matrix and Cause–Effect Analysis of Criteria

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	D-Value	D + R	D - R
Data Control (1)	0.607	0.688	0.671	0.631	0.619	0.614	0.570	0.604	0.672	0.575	0.549	0.558	7.357	14.948	-0.234
Information Security (2)	0.621	0.519	0.596	0.563	0.551	0.543	0.501	0.526	0.584	0.498	0.461	0.469	6.431	13.841	-0.978
Degree of Digital Transformation (3)	0.741	0.723	0.612	0.673	0.661	0.652	0.603	0.627	0.684	0.612	0.561	0.573	7.722	15.005	0.439
System Compatibility (4)	0.677	0.663	0.644	0.536	0.616	0.614	0.559	0.587	0.637	0.565	0.528	0.534	7.160	14.045	0.274
Process Standardization (5)	0.717	0.691	0.680	0.647	0.561	0.644	0.588	0.625	0.670	0.597	0.552	0.567	7.538	14.388	0.689
Process Optimized (6)	0.667	0.647	0.646	0.612	0.612	0.524	0.564	0.589	0.633	0.556	0.524	0.533	7.107	13.888	0.326
Perceived Usefulness (7)	0.584	0.572	0.566	0.531	0.534	0.526	0.425	0.513	0.552	0.482	0.452	0.472	6.208	12.510	-0.094
Perceived Ease of Use (8)	0.565	0.557	0.551	0.508	0.511	0.504	0.472	0.430	0.522	0.470	0.440	0.451	5.981	12.602	-0.640
Professional Level of Talents (9)	0.661	0.645	0.624	0.586	0.579	0.574	0.541	0.565	0.534	0.538	0.505	0.508	6.862	14.015	-0.292
Competitiveness (10)	0.591	0.582	0.578	0.546	0.543	0.535	0.488	0.518	0.561	0.433	0.472	0.482	6.329	12.630	0.029
Taxation Guide (11)	0.576	0.558	0.553	0.517	0.521	0.516	0.487	0.511	0.550	0.475	0.391	0.456	6.113	12.009	0.216
Performance Considerations (12)	0.583	0.565	0.563	0.535	0.542	0.534	0.505	0.526	0.554	0.499	0.462	0.410	6.278	12.292	0.264
R-Value	7.591	7.409	7.283	6.885	6.850	6.781	6.302	6.621	7.154	6.300	5.897	6.014			

Note: The Red-Colored elements are above the threshold value (AVE);
D Value = degree of influence; R-Value = degree of influence

Table 6: The Causal Relationship System of Principles

Guidelines	X-axis	Y-axis	
	D + R (Correlation strength)	D – R (Cause)	Causal properties
Data Control	14.948	-0.234	Effect
Information Security	13.841	-0.978	Effect
Degree of digital transformation	**15.005***	0.439	Cause
System compatibility	14.045	0.274	Cause
Process Standardization	14.388	0.689	Cause
The process can be optimized	13.888	0.326	Cause
Perceived usefulness	12.510	-0.094	Effect
Perceived ease of use	12.602	-0.640	Effect
Professional level of talents	14.015	-0.292	Effect
Competitiveness	12.630	0.029	Cause
Taxation Guide	12.009	0.216	Cause
Performance considerations	12.292	0.264	Cause

Note: * indicates the maximum value of D + R (correlation strength)

3.6 Drawing the Network Relations Map (NRM)

The objective of this study is to identify and prioritize the key factors influencing the digital transformation of small and medium-sized accounting service firms, particularly in relation to RPA implementation. By concentrating on the factors with the greatest impact intensity, the study ranks the relative weights among criteria and proposes priority solutions that best support informed decision-making. Based on the results of the DEMATEL analysis, the influence relationships among the twelve criteria are visualized through a Network Relations Map (NRM), which simplifies complex interactions and highlights the degree to which each factor affects or is affected by others. In the NRM, the horizontal axis represents centrality (D+R), indicating the total correlation strength of each criterion, while the vertical axis represents causality (D–R), distinguishing whether a criterion serves primarily as a cause (positive) or an effect (negative). Criteria positioned above the X-axis are interpreted as driving factors, whereas those below function as outcome variables. The arrows displayed in the NRM denote the direction and intensity of influence, with only relationships exceeding the threshold—defined as the average value of the total influence matrix—being represented. Both one-way and reciprocal influences are distinguished to provide a transparent understanding of the dynamics among criteria. Through the NRM, decision-makers can identify the most influential factors, trace cause–effect chains, and determine which criteria should be prioritized to maximize the effectiveness of RPA adoption. Overall, the NRM transforms complex interdependencies into an intuitive visual structure that facilitates strategic prioritization, reduces operational risk, and enhances digital transformation outcomes.

3.7 Network Level Analysis Results (ANP)

3.7.1 ANP Calculation Process

Based on the research framework and the DEMATEL results presented in the previous section, the study advanced to the second-stage questionnaire to gather expert judgments required for the ANP analysis. This phase was carried out between September and October 2024 and involved nine domain experts. The collected data were processed and analyzed using Excel and the Super Decisions software. As summarized in Table 7, the ANP calculation followed a seven-step procedure designed to identify the key factors that most strongly influence the success of RPA implementation in small and medium-sized accounting firms. Each pairwise comparison matrix was examined for consistency, and all consistency ratios (CR) values were below 0.1, confirming that the expert evaluations were logically coherent and highly reliable.

Table 7: ANP Calculation Steps

Step1	The questionnaire information was transformed into a geometric mean
Step2	Super Decisions software for analysis
Step3	Calculate the eigenvectors and eigenvalues of each matrix
Step4	Obtaining the "unweighted supermatrix"
Step5	Obtaining - "weighted supermatrix" and "maximized supermatrix"
Step6	Sorting - key factors
Step7	Consistency detection

3.7.2 Ranking of Key Factors

Based on the DEMATEL results, several criteria were identified as having minimal influence on the overall system and were therefore excluded from the second-stage ANP questionnaire. Specifically, the criteria Perceived Ease of Use (D+R = 12.602), Taxation Guide (D+R = 12.009), and Performance Considerations (D+R = 12.292) exhibited relatively low correlation strength, indicating limited impact on RPA adoption outcomes. Consequently, these three criteria were removed to ensure that the ANP analysis focused on the most influential factors. The remaining nine key criteria were then evaluated and ranked by experts through the ANP process, resulting in a prioritized list of factors with corresponding weights, as presented in Table 8. This refined selection enhances analytical precision and ensures that the final prioritization reflects the criteria most critical to successful RPA implementation in small and medium-sized accounting firms.

Table 8: Ranking of Key Success Factors for Digital Transformation

Code	Factors	Weight	Sorting
A2	Information Security	0.06549	1
A3	Degree of digital transformation	0.06137	2
B2	Process can be optimized	0.05974	3
B1	Process Standardization	0.05829	4
A1	Data Control	0.05754	5
C3	Professional level of talents	0.05630	6
C1	Perceived usefulness	0.05437	7
A4	System compatibility	0.05210	8
D1	Competitiveness	0.03482	9

These results reveal that information security, the degree of digital transformation, and the extent to which processes can be optimized are the highest-priority factors for achieving successful RPA implementation in small and medium-sized accounting firms. Although factors such as competitiveness and system compatibility rank lower in priority, they still play meaningful supporting roles within the broader digital transformation framework. Together, these insights highlight the areas in which firms should concentrate their resources to maximize RPA effectiveness and sustain long-term digital advancement.

4. Conclusion

4.1 Discussion

This study examined the influence of Robotic Process Automation (RPA) on the digital transformation of small and medium-sized accounting firms in Taiwan by integrating a comprehensive literature review with multi-criteria decision-making (MCDM) techniques, including DEMATEL and ANP. The empirical findings confirm that RPA plays a significant role in enhancing operational efficiency, reducing error rates, and streamlining accounting processes. Nevertheless, successful implementation requires careful attention to cost structures, technological maturity, workforce readiness, and associated risks. These considerations are essential for ensuring that RPA adoption aligns with organizational capacity and long-term strategic objectives.

In an era characterized by rapid technological advancement, digitalization has fundamentally reshaped the operational landscape of the accounting services industry. As the volume and complexity of accounting information continue to expand, firms face increasing pressure to process, interpret, and analyze large datasets with speed and accuracy. Through advanced system analysis, this growing reservoir of data can be transformed into high-value decision-support information, significantly reducing repetitive and routine workloads. Technologies such as RPA further elevate service quality by automating rule-based tasks, minimizing manual intervention, and reducing the likelihood of human error. This automation also helps alleviate labor shortages and enables professionals to focus on higher-value activities such as advisory services, risk assessment, and strategic planning.

As Taiwanese accounting firms accelerate their digital transformation efforts, the integration of cloud technology, intelligent software systems, and automation tools such as RPA enables the reengineering of workflows toward greater speed, lower cost, and improved efficiency. Cloud platforms facilitate real-time data sharing and collaborative work, while advanced analytics tools support real-time monitoring, automated reporting, and enhanced decision-making responsiveness. These capabilities not only reduce operational errors but also strengthen a firm's agility in responding to regulatory changes and market demands. Collectively, the findings underscore that the strategic adoption of RPA—supported by sound governance, resource allocation, and process redesign—can significantly enhance competitiveness and sustain long-term digital transformation in the accounting services industry.

4.2 Suggestions and Limitations

This study makes several important contributions to both academic research and practical application in the field of digital transformation. Academically, it integrates MCDM, DEMATEL, and ANP methodologies to construct a systematic and rigorous analytical framework for evaluating the role of RPA in the digital transformation of small and medium-sized accounting firms. This comprehensive approach enriches the theoretical understanding of RPA adoption by revealing the causal structures, priority factors, and interdependencies that influence implementation success—areas that have been insufficiently addressed in prior literature. Practically, the study proposes actionable and phased strategies for RPA introduction tailored to the operational characteristics of small and medium-sized accounting firms. These strategies help reduce transformation risks, enhance feasibility, and provide firms with a structured roadmap for gradually advancing automation capabilities. In addition, the multi-criteria decision-making model developed in this study offers a valuable reference tool for firm managers, enabling them to evaluate key success factors more accurately and make informed decisions regarding RPA deployment.

Based on the findings, several directions are recommended for future research. Scholars may further explore the long-term impacts of integrating RPA with artificial intelligence and intelligent automation, particularly how these technologies reshape service models, workforce structures, and knowledge requirements in the accounting industry. Future work may also examine variations in RPA adoption between firms of different sizes or levels of technological maturity, as well as investigate the measurable effects of RPA on financial performance, operational quality, and strategic decision-making.

Despite its contributions, this study has several limitations. The sample is limited to small and medium-sized accounting firms in Taiwan and does not include large international firms, which may affect the generalizability of the results. Furthermore, due to the rapid evolution of RPA technologies, the data collected may not fully capture future trends or emerging automation capabilities. Finally, access to detailed RPA implementation cases is constrained by internal confidentiality within firms, limiting the availability of comprehensive empirical data. Future research incorporating longitudinal studies, industry-wide case analyses, and broader sample coverage can help address these limitations and offer a more complete foundation for digital transformation planning in the accounting services sector.

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