

Robotic process automation: implementation in a multi-municipal water supply and sanitation company

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Abstract

Purpose – This study aims to analyze the implementation process of Project Sophia, a robotic process automation (RPA) initiative at Águas do Norte S.A., a Portuguese multi-municipal water supply and sanitation company.

Design/methodology/approach – Adopting institutional theory and recent trends in public sector accounting, this qualitative and interpretive case study is based on semi-structured interviews with key Project Sophia actors, internal and external and documentary analysis. Interviews involve those implementing or using the new tech-related practices.

Findings – The results demonstrated a strong external influence on the decision to adopt the technology, with evidence of isomorphic mechanisms. Also emphasized is the role of institutional actors in shaping the pace of RPA development and implementation within a public sector organization.

Originality/value – This study contributes to an in-depth knowledge of RPA projects, providing evidence on technology implementation's best practices and benefits. It highlights institutional theory's relevance in exploring macro- and micro-level institutional dynamics, capturing how internal activities of individual actors within public sector organizations are interconnected with broader institutional forces.

Keywords Robotic process automation, Case study, Institutional theory, Public service, Utilities, Efficiency

Paper type Research article

1. Introduction

Today's world is increasingly competitive, technological, and digital, creating high pressure on organizations to be efficient and deliver quality service (Argento *et al.*, 2025; Garlatti *et al.*, 2025; Kedziora *et al.*, 2021; Matthies, 2020). These institutional pressures are particularly

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acute in the public sector – especially in public utilities – where balancing efficiency and service quality is essential (Agostino *et al.*, 2022a; Martins *et al.*, 2025). As digitization, digitalization and digital transformation (DT) continues to reshape organizational fields, public administration is entering a challenging phase of “digital government,” which promises more integrated, agile, and holistic institutions (Carlsson-Wall *et al.*, 2022; see also Gil-Garcia *et al.*, 2018; Moll and Yigitbasioglu, 2019). Within this context, Robotic process automation (RPA) has emerged as a promising tool to enhance financial and operational performance, aligning with New Public Management (NPM) principles by improving efficiency and service delivery (Eriksson and Andersson, 2023).

As awareness grows that holistic organizational change is crucial to fully benefit from DT, research is emerging on how accountants and other organizational members offer overt/covert resistance, accommodate, or leverage DT in the public sector (e.g. Carlsson-Wall *et al.*, 2022; Lino *et al.*, 2022). Although the terms *digitization*, *digitalization*, and *DT* are often used interchangeably in the literature, Mergel *et al.* (2019) propose a more nuanced distinction between them. [1] DT may be defined as an “organizational change that is triggered and shaped by the widespread diffusion of digital technologies” (Hanelt *et al.*, 2020, p. 1160; see also Papenfuß and Wagner-Krechlok, 2025). Implementing information technologies (IT) involves redesigning data flows, developing new competencies, adopting a proactive mindset for digital innovations, updating accounting practices, and rethinking professional roles and identities (Agostino *et al.*, 2022a; Lino *et al.*, 2022). Among the digital technologies enabling DT, RPA stands out as a relatively new and rapidly growing trend, offering cutting-edge capabilities expected to automate a large share of human–system interactions (Fernandez *et al.*, 2023; Kokina *et al.*, 2021). Despite much discussion about the potential benefits and costs of RPA, research remains limited. Most existing studies focus on private sector organizations – particularly in accounting, and especially within auditing and accounting firms (Cooper *et al.*, 2019; Zhang *et al.*, 2023), reflecting the prominence of accounting domain as one of the most common applications of RPA (Kokina and Blanchette, 2019). Yet public sector organizations face unique challenges that shape RPA implementation, including complex IT infrastructures, rigid hierarchies, and departmental silos – conditions that require careful consideration of changes in roles, responsibilities, processes, and social arrangements prior to RPA adoption (Lindgren *et al.*, 2024; Vollenberg *et al.*, 2024).

Given the limited research on RPA adoption in public sector organizations, particularly in public sector accounting, the main objective of this study is to analyze the implementation process of Project Sophia, an RPA initiative at *Águas do Norte S.A.* (AdN), a Portuguese multi-municipal water supply and sanitation company. Accordingly, the research questions are: (1) Why did a public sector entity decide to implement an RPA project across various processes in distinct areas of the organization, including accounting-related processes?; and (2) How was the implementing process of the new tech-related practices carried out, and what role did internal and external actors/pressures play? This investigation adopts an interpretive methodological approach based on a case study. Our argument is built on a theoretical framework derived from institutional theory and its recent trends (DiMaggio and Powell, 1983; Leca and Laguecir, 2023; Modell, 2022; Powell and DiMaggio, 2012; Smets *et al.*, 2017). This framework highlights how and why public organizations in the utilities sector respond to institutional pressures driving changes in technology-related practices. The study highlights external influences on adopting new technology, including coercive, normative and mimetic isomorphism. It also emphasizes the role of institutional actors in setting the pace for developing and implementing new technology-related practices in a public sector context. The analysis is informed by the literature on the changes that NPM has brought to the public sector, focusing on outcomes and accountability, particularly in areas such as DT (Hyndman and Lapsley, 2016; Lapsley, 2008; Martins *et al.*, 2025). The minimal definition of NPM, as most scholars agree, is the “attempt to implement management ideas from business and private sector into the public services” to address the challenge of making the public sector more economical, efficient, and effective (Haynes, 2003, p. 9; Lapuente and Van de Walle, 2020, p. 463).

This study contributes to the literature in several ways. First, while previous research has primarily focused on private organizations, this study addresses the limited exploration of technology-driven changes in accounting and management practices and accountability within public service organizations (e.g. [Agostino et al., 2022a, b](#); [Argento et al., 2025](#); [Broccardo et al., 2023](#); [Carlsson-Wall et al., 2025](#); [Cooper et al., 2019](#); [Zhang et al., 2023](#)). Specifically, it furthers understanding of the process and factors influencing RPA implementation in the under-explored public utilities sector. While prior studies have focused on municipalities' RPA implementation for administrative tasks, the present research focuses on a public utility company with distinct characteristics. Second, this research adds to public-sector accounting literature (e.g. [Agostino et al., 2022a](#); [Chua et al., 2022](#); [Lino et al., 2022](#); [Heiling, 2025](#); [Martins et al., 2025](#)). While only a few studies have analyzed the adoption of RPA in the public sector ([Lindgren et al., 2024](#); [Vollenberg et al., 2024](#)), the focus has not been on accounting-related processes. Finally, this study applies an institutional theory perspective to DT, accountability, and accounting practices in public services, in contrast to previous research that has favored frameworks centered on DT and technology concepts (e.g. [Carlsson-Wall et al., 2022](#); [Martins et al., 2025](#)). While we analyze organizational responses to institutional pressures or complex demands ([DiMaggio and Powell, 1983](#); [Oliver, 1991](#)), this study goes further in the analysis and answers to the call to explain why specific organizations respond in particular ways to broader phenomena and how these responses are reflected and addressed by individual practitioners.

The rest of this article is structured as follows. The second section presents the literature review on RPA and the theoretical framework. The next section describes the empirical setting and the research method. Section four presents and discusses the findings. The final section outlines the main conclusions and implications for future research.

2. Literature review

2.1 Robotic process automation

RPA technologies intersect with repetitive task automation and digital task performance, enabling automation of rules-based business processes through software bots ([Aguirre and Rodriguez, 2017](#); [Kokina and Blanchette, 2019](#)). Given that numerous accounting-related tasks involve interacting with multiple systems, high transaction processing and minimal decision-making, RPA has a significant potential in this field ([Cooper et al., 2019](#); [Harrast, 2020](#); [Jackson and Allen, 2024](#); [Kokina and Blanchette, 2019](#); [Kokina et al., 2021](#); [Zhang et al., 2023](#)). DT is accelerating across both private and public sectors ([Carlsson-Wall et al., 2022](#); [Lacity et al., 2015](#); [Matthies, 2020](#); [Moll and Yigitbasioglu, 2019](#)), with the public sector adopting private sector innovations, especially in the early stages of digitization ([Wilson and Mergel, 2022](#)). This shift supports the emerging “digital government” paradigm, aiming for more integrated, agile, and holistic public sector organizations ([Carlsson-Wall et al., 2022](#)).

However, the literature primarily examines RPA implementation in private organizations, focusing on accounting/auditing firms, assurance and tax services, and the automation of accounting processes and accountant's skills ([Cooper et al., 2019](#); [Eulerich et al., 2022](#); [Huang and Vasarhelyi, 2019](#); [Kokina et al., 2021](#); [Matthies, 2020](#); [Moffitt et al., 2018](#); [Zhang et al., 2023](#)). The literature on RPA implementation in the public sector is scant ([Lindgren et al., 2024](#); [Vollenberg et al., 2024](#)), with limited knowledge of the drivers, motivations, challenges, and limitations. [Lindgren et al. \(2024\)](#) analyzed the motivation, intended uses, and challenges of implementing RPA in Swedish municipalities. They highlight that RPA should be viewed as a tool rather than an end in itself and that its implementation is not solely about technology, but also about developing employees' abilities and knowledge to navigate the challenges and opportunities it presents. The study emphasizes that Swedish policymakers identified RPA as the “preferred automation technology for the municipalities” ([Lindgren et al., 2024](#), p. 435). Regarding organizational conditions for RPA implementation, the findings stress the need for

a shared vision, allocated resources, collaboration across administrative, operational, and professional boundaries, and the consideration of different voices in the development process.

Vollenberg *et al.* (2024) examined the drivers of RPA acceptance and usage behavior in public sector institutions. The authors highlight possible factors influencing RPA adoption in the public sector, such as workload reduction, focus on higher-value tasks, time and cost efficiencies, and reduced error rates. They also highlight the importance of supporting employees and improving work conditions. Nevertheless, the introduction of new technologies in accounting, such as RPA, in both the private and public sectors, is not a neutral process (Broccardo *et al.*, 2023; Carlsson-Wall *et al.*, 2022). Integrating RPA into workflows requires human cognitive skills, and deploying multiple bots can be costly and complex (Jackson and Allen, 2024).

Technology adoption is shaped by the perceptions, meanings, and ideologies of those involved (Carlsson-Wall *et al.*, 2022; Haug *et al.*, 2024). In the case of RPA, Eulerich *et al.* (2022) note that the lack of adequate guidance in selecting tasks for automation can result in implementation failures and unmet expectations, mainly when individuals are not RPA experts. As Haug *et al.* (2024) highlight, employees and leaders are crucial to digital change processes and play key roles through initial support, such as innovators driving the process and promoting and legitimizing the change.

The reasons for implementing RPA are also key to its success or failure. On one hand, public sector organizations face challenges such as increased societal demands for modern communication channels; economic fulfillment of public duties under budget constraints; public employees' poor working conditions; lack of technological requirements; and legal restrictions (Matthies, 2020; Vollenberg *et al.*, 2024). On the other hand, RPA can contribute to the public sector in different ways: automation of repetitive tasks; improved efficiency; reduced operational costs; enhanced process accuracy and consistency to minimize errors and ensure compliance with regulations, enabling employees to focus on more complex and high-value tasks, and promoting transparency and accountability (Vollenberg *et al.*, 2024).

By focusing on a Portuguese public utility company, this study contributes to an understanding of the process and factors influencing the implementation of RPA in an under-researched sector. While previous accounting and management studies have focused on private sector organizations or municipalities, this study focuses on a multi-municipal water supply and sanitation company, a regulated customer-centric sector and environmentally sensitive, that provides essential services for the daily needs of citizens, and its accounting-related processes.

2.2 Institutional theory

In a global, digital technology-driven environment permeating all types of organizations and their processes, it is crucial to examine the connections between what goes on deep inside organizations and broader phenomena occurring in the broader contextual domain (Leca and Laguecir, 2023; Smets *et al.*, 2017). However, this represents a shift from earlier work in institutional theory, which focused on broader social norms and prescriptions, often neglecting the activities that sustain them (Modell, 2022; Smets *et al.*, 2017). This was particularly evident in institutional theory's assumption that organizations must conform to social expectations to gain/maintain legitimacy, leading to the homogenization of practices (DiMaggio and Powell, 1983). This conceptualization led to the extensive use of the concept of isomorphism, including in accounting research, while neglecting the mechanisms of agency and change (Leca and Laguecir, 2023; Modell, 2022; Smets *et al.*, 2017). Isomorphism is defined as "a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (DiMaggio and Powell, 1983, p. 149). Positioning the analysis at the organizational field or sector, DiMaggio and Powell (1983) identified three key forms of institutional isomorphism: coercive, mimetic, and normative isomorphism. Coercive

isomorphism results mainly from formal and informal pressures exerted on organizations by other organizations upon which they are dependent, as well as societal cultural expectations, stemming from political influence and the need for legitimacy. Mimetic isomorphism emerges under uncertainty as a powerful force that encourages imitation. Normative isomorphism is rooted in professionalization, mainly through formal education and professional networks, which facilitate the rapid diffusion of new models and practices.

Although isomorphism is a relevant concept and our study analyses isomorphic pressures in the adoption and implementation of RPA in AdN, we follow recent trends and developments in institutional theory, such as [Smets et al. \(2017\)](#), articulated in accounting research by [Modell \(2022\)](#) and [Leca and Laguecir \(2023\)](#). New developments in institutional theory call for the need to avoid “the separation or juxtaposition of ‘micro’ and ‘macro’ and takes ‘work’ literally to explore the recursive influence through which institutional dynamics are constituted in the everyday work of practitioners on the ground – and vice versa” ([Smets et al., 2017](#), p. 372; see also [Modell, 2022](#)). Therefore, it is important to consider “individuals” and “activity” in the contexts they participate in, without separating them ([Smets et al., 2017](#)). While institutional work has introduced a more nuanced perspective on agency ([Hampel et al., 2017](#)), early developments focused on macro-level phenomena shaping individual practitioners’ practices ([Lawrence and Suddaby, 2006](#); [Smets et al., 2017](#)). However, there is still a need to focus on the technical environment of organizations ([Modell, 2022](#)) and the “mundane praxis of practitioners”, rather than limiting the analysis to practices at the organizational or field level ([Smets et al., 2017](#), p. 377).

[Modell \(2009\)](#) advised a bottom-up analysis process, emphasizing the need to analyze not only the institutional effects on specific organizational practices but also how these practices can drive change and contribute to the creation of different institutional realities within organizations and at higher levels of institutional fields ([Modell, 2022](#), p. 356). As highlighted by [Smets et al. \(2017\)](#), people often do not intentionally try to influence the institutional arrangement around them; instead, they typically aim to address the practical demands of their situation. Everyday work may be repetitive and not exciting; the fact is that it may be entirely trivial, but it is nonetheless highly consequential ([Bjerregaard and Jonasson, 2014](#)).

[Leca and Laguecir \(2023, p. 609\)](#) combine two streams of institutional theory: (1) inhabited institutionalism, which highlights the recursive relationships between the cultural ideals of the institutional environment and the interactions through which individuals, both within and across organizations, respond to these cultural pressures, and shape them at the same time; (2) institutional work, which studies how actors develop purposive activities aiming to create, maintain and disrupt institutions. By combining these two streams, the authors renew the notion of decoupling, focusing on various organizational responses to a new policy, conceptualizing new forms of decoupling, and introducing political aspects ([Leca and Laguecir, 2023](#)). This approach calls for a new perspective on agency, given the enduring complex coexistence of social structures and individual agency, and the need to move from powerful actors/institutional entrepreneurs to individual practitioners ([Leca and Laguecir, 2023, p. 610](#); [Smets et al., 2017](#)).

In complex situations, it is important to understand when, where and how “things get done”, that is, how agency is exercised by individual practitioners ([Smets et al., 2017](#)). Relevant to our study is the acknowledgment that most individuals are not grand entrepreneurs but rather people simply trying to do their practical work ([Smets and Jarzabkowski, 2013](#); see also [Leca and Laguecir, 2023](#); [Smets et al., 2017](#)). While this is relevant, attention must also be paid to the intentionality behind that practical work. Focusing on everyday work may give the impression that the goal is not to create, maintain, or disrupt institutions ([Lawrence and Suddaby, 2006](#)). Yet, as [Smets et al. \(2017, p. 378\)](#) argue, these practices are not unintentional—they aim to accomplish practical work and motivate change. The role of individual practitioners is relevant, as it may reveal new mechanisms for managing complexity and uncover previously overlooked instances of complexity ([Smets et al., 2017](#)).

This directs the focus to internal organizational complexity, as different entities within organizations, either public or private, might react differently to the same institutional pressures (Leca and Laguecir, 2023). This suggests that how organizations decouple their practices from formal policies can be determined by who the organizational actor is. Accounting research identified other forms of decoupling (Bromley and Powell, 2012). One form is policy-practice decoupling, which is the original definition of decoupling, meaning “a disconnection between a policy set up to comply with external pressures and an internal practice that remains unchanged” (Leca and Laguecir, 2023, p. 614). Another form is means-ends decoupling, which is closely linked to the complexities of internal organizational processes.

3. Empirical setting and research method

3.1 The case study—Águas do Norte, S.A

This paper presents a qualitative and interpretive case study on AdN, a subsidiary of the corporate group *Águas de Portugal* (AdP). AdN operates under a state-granted exclusive concession to manage northern Portugal’s multi-municipal water supply and sanitation system. Formed in 2015 as part of a government-led sector reorganization to achieve tariff balance and sustainability, AdN consolidates upstream (provided to municipalities) and downstream systems (serving end users, the citizens) under one entity. Following the financial crisis and the intervention of the International Monetary Fund and the European Commission in Portugal, the merger of existing multi-municipal systems into new, larger ones was intended to promote economies of scale that would guarantee the economic, social and environmental sustainability of services, while preserving their public nature (Decree-Law No. 93/2015, of 29 May).

AdN faces pressure from customers and politicians to provide an efficient and quality service at reduced costs (Castro, 2020). In 2011, the Portuguese water sector announced plans for privatization. Though it never materialized, the proposal highlights the ongoing debate on how best to provide this service.

3.2 A brief overview of Project Sophia

Over the past five years, AdN has invested significantly in information systems to leverage digitization and meet regulatory and customer demands (AdN, 2020; AdN, 2021a, b). Efforts in operational technologies have focused on integrating new infrastructures (AdN, 2020). AdN has increasingly digitized administrative processes, eliminating paper circuits and automating operations. Project Sophia stands out for applying RPA technology across various areas within AdN. Launched in 2019, it won the “100% Innovation Prize” that same year at the 10th edition of the AdP Group Engineering Days.

Between 2019 and 2024, Project Sophia generated 26 sub-projects (identified by *p#*): 25 in administrative and financial areas (planning and management control [PMC], accounting, treasury, and administrative) and one in IT (P26). Appendix 1 summarizes their objectives, automation timelines, and status as of March 2024. Of these, 12 (46%) have been successfully automated, seven (27%) require modifications, six (23%) remain under analysis, and one (4%) is yet to enter development. Of the 12 automated processes, five (42%) were launched with Project Sophia in 2019. The remaining seven were automated gradually between 2020 and 2024.

Project Sophia includes seven accounting-related projects (P3, P4, P5, P6, P7, P8, and P27) summarized in Table 1. As of March 2024, only three (P6, P8 and P27) were fully operational.

Table 2 summarizes Project Sophia’s total external supplier invoicing of 186,505.97€ (excluding VAT) from 2018 to 2023. The project began with a Proof of Concept (PoC) in 2018, followed by normalization of the project volume over the next three years. In 2022, post-Covid, tasks from the implementation stages, delayed due to resource shortages, were completed. By 2023, AdN’s need to automate processes decreased.

Table 1. Accounting and PMC processes

Project number and name	Description	Successfully automated
P3- Information collection for report	Extraction of accounting data (invoices, receipts, customer debt, etc.) from SAP into Excel for generating monthly reports for AdN's group holding	–
P4- Monthly record of impairments in SAP (the ERP system where accounting is performed)	Monthly extraction of large and complex Excel files (about 400,000 rows) from invoicing programs, analyzing relevant columns to calculate client impairment amounts, and inputting the corresponding accounting entries into SAP.	–
P5 – Email sending with report	Each report's area and responsible person are verified on the shared drive, and the corresponding XLSX report is sent	–
P6 - Registration of SAP document numbers in the iPortal (the document management program)	Daily extraction of an Excel file with invoice data from SAP and iPortal enables comparison. If a match is found, the robot inputs the SAP document number into the corresponding iPortal invoice. This centralizes information in iPortal, eliminating the treasury sector's need to verify invoice recordings with accounting	Yes
P7- Preparation of report information for the business areas	Download the previous month's report from SAP, copy the data to the total base file, and generate area-specific report outputs	–
P8- Insertion of the iPortal hyperlink into SAP	The robot adds a hyperlink to the SAP document that directs users to the PDF invoice in iPortal. This further integrates the accounting program with the document management system, working opposite to P6, and eliminates the need to access two platforms for complementary information	Yes
P27- Social Security declarations	One week before the certificate expiration, the robot e-mails the supplier for an update. Upon receipt, it attaches the certificate to the supplier's folder. It notifies the user, ensuring timely and complete compliance with the requirement to maintain an updated non-debt certificate from Social Security in each supplier's folder	Yes
Source(s): The authors, with data provided by AdN		

Table 2. Project Sophia annual budget

Year	Amount
2018	4.700.00€
2019	34.480.00€
2020	37.165.98€
2021	37.677.00€
2022	58.465.01€
2023	14.017.98€
Source(s): The authors, with data provided by AdN	

3.3 Data collection and analysis methods

We draw on longitudinal semi-structured interviews (Mahama and Khalifa, 2017). The first round, in April–May 2022, included six in-person interviews with key actors in Project Sophia: the director of the Department of Information Systems and Technologies (DIS&T); the applications' coordinator of such department (the project manager); three process owners (accounting coordinator, head of PMC, and quality assurance lead for the PoC); and the external development team coordinator. Follow-up Zoom interviews occurred from July 2023 to March 2024, providing further insights into Project Sophia's progress, particularly accounting-related processes and user perspectives from accounting and PMC. This second round permitted the researcher to be in a "position to more objectively observe changes in perspective" (De Villiers *et al.*, 2019, p. 1479). Follow-up contacts via email or meetings clarified any uncertainties, with final meetings held in March 2024. Following De Villiers *et al.* (2019, p. 1463), data collection stopped once "saturation" was reached and no new insights emerged.

In each round, interview questions were developed based on existing literature and theory, and adapted to the interviewees' roles and backgrounds (see the interview guide in Appendix 2). As new insights emerged, questions were refined, and new ones were added, following Mahama and Khalifa (2017). The interviews generated 478 min (nearly 8 h) of data. With participants' consent, all interviews were recorded and transcribed for analysis. Table 3 provides interview details, and excerpts in the results section are identified by interviewee ID and year (e.g. "1_Dir_2022" = IT Director as interviewed in 2022).

Following case-based interpretive research (Lee and Humphrey, 2017), additional documents and data were collected to supplement interview findings. Relevant sources include the AdN website, annual reports, Project Sophia documentation, and personal meeting notes. Project Sophia documentation includes: (1) the Kaizen Portugal 2021 Award application form; (2) internal project presentations; and (3) Process Design Documents (PDD) detailing business processes selected for automation. Data triangulation ensured contextual validity (De Villiers *et al.*, 2019).

In line with prior interpretive qualitative research, we performed a content analysis of the data (Covaleski *et al.*, 2017). The three authors individually carried out the analysis in stages. Theoretical constructs from institutional theory (DiMaggio and Powell, 1983; Leca and Laguecir, 2023; Modell, 2022; Powell and DiMaggio, 2012; Smets *et al.*, 2017) guided the analysis through iterative cycles between theory and data. This approach involved "an interactive and iterative process involving back-and-forth movement between data and theory in order to make sense of and give meaning to the data" (Mahama and Khalifa, 2017, p. 334). In the final stage, a joint analysis was conducted to identify points of contention, with discussions continuing until a consensus was reached.

4. Project Sophia: a case study of RPA adoption

4.1 Institutional pressures for RPA adoption

The evidence suggests that the adoption and implementation of RPA at AdN followed an isomorphic process of change (DiMaggio and Powell, 1983). As a public utility, AdN faced coercive isomorphism, demonstrated by significant investments in information systems to drive digitalization and meet regulatory and customer demands. Interviewees reported increased stakeholder demands, particularly from regulatory bodies and the state under the concession contract, contrasting their previous private sector experience. The following quotation illustrates this:

... in this sector, demands are increasingly rising ... from quality to reporting and the more bureaucratic aspects. This is evident in inspections and audits ... we see the growing importance of environmental issues ... the demands are ever-increasing, which is reflected in the costs of executing tasks. (7_POpc_2023)

Table 3. Interviewees’ description and responsibilities

Interviewee identifier	Position, position acronym	Years in the position	Years at AdN or AdP	Experience with RPA (Years)	First round date, length in minutes	Second round date, length in minutes	Main RPA responsibilities
1_Dir	Director of the DIS&T (IT Director)	5	9	3	19/04/2022 (20)	28/07/2023 (49)	Project sponsor
2_PMan	Application Coordinator of the DIS&T (Project Manager)	8	19	3	13/04/2022 (49)	12/09/2023 and 19/02/2024 (47)	• Select, analyze, and approve processes for automation • Manage robot operations • Liaise between the internal infrastructure team and external implementer • Oversee external service provider’s technical implementation • Ensure smooth post-implementation by addressing bugs and identifying improvements
3_POacc	Accounting Coordinator (Process Owner: Accounting)	20	20	–	04/04/2022 (41)	12/09/2023 (33)	a)
4_PUacc	Process User: Accounting	7	14	–	–	19/01/2024 (18)	Employee directly affected, below the Accounting Coordinator (“Supervisor”)
5_POpmc	Responsible for PMC (Process Owner: PMC)	20	20	–	06/06/2022 (27)	12/09/2024 (13)	a)
6_PUpmc	Process User: PMC	19	19	–	–	19/01/2024 (25)	Employee directly affected, under the responsible for PMC
7_POpoc	Responsible for Product Quality (Process Owner: Quality)	7	20	–	07/04/2022 (36)	12/09/2023 (32)	a)
8_Ext	Coordinator of the External Development Team (External Implementer)	8	–	6	03/05/2022 (38)	16/02/2024 (50)	• Analyze processes • Prepare project documentation • Develop robots • Conduct testing • Provide process support

Note(s): a)Identify high-potential processes for automation, providing detailed descriptions (including inputs, outputs, process flow, actors, requisites, rules and exceptions) for analysis by the project manager and external implementer; provide final validation of automation during the hypercare phase

Source(s): The authors

Aligning with previous studies highlighting DT practicality in public sector organizations (Agostino *et al.*, 2022a; Chua *et al.*, 2022; Lino *et al.*, 2022; Lindgren *et al.*, 2024; Vollenberg *et al.*, 2024), our findings reveal a significant sense of accountability overload, which complicates compliance with deadlines and limits time for value-added tasks. This, in turn, garnered broad support for the technology-related changes. A key example is the PoC process that led to Project Sophia, which involved monotonous, time-consuming tasks for external reporting to the Portuguese Environment Agency. These tasks required manual data compilation across multiple platforms, and resource limitations, combined with their repetitive nature, caused frequent delays in meeting reporting deadlines.

Alongside, normative pressures, driven by the increasing professionalization of public sector management and influenced by the NPM movement (Hyndman and Lapsley, 2016; Lapsley, 2008), further motivated AdN to adopt RPA. The main objectives were to reduce monotonous tasks, accelerate work completion, and create opportunities for enhanced thinking and analysis:

The main reason for Project Sophia was to alleviate colleagues from monotonous and repetitive tasks and to free up some time for us to think and examine the processes. We're all here 'putting out fires and trying to keep these processes running', and we aimed to create some time to conduct a critical analysis of the processes. (2_PMan_2023)

The goal of this overall process was to shift from the routine task of manually entering subsystems and waiting for all the files to update to focus on analyzing the values ... so we can dedicate ourselves to what truly matters: ... explaining deviations. (5_POpmc_2023)

The emphasis on transparency and accountability in public organizations requires robust systems capable of minimizing errors, ensuring data accuracy, and organizational efficiency. Consistently, in the registration form for the Kaizen Portugal 2021 Award, AdN summarizes the objectives of Project Sophia as follows:

The primary objectives of the Sophia project are to enhance the efficiency of AdN's business operations through the automation and optimization of key processes, thereby ensuring the following outcomes: (1) reduced cycle times and improved performance, (2) flexibility and scalability, (3) greater precision, (4) enhanced customer and employee experience/satisfaction, and (5) 24/7 availability (Águas do Norte, 2021b).

AdN seeks to maintain service quality and client satisfaction while contending with demands for financial efficiency, which aligns with the intensification of NPM in public services as governments strive to sustain service levels with fewer resources (Hyndman and Lapsley, 2016).

Interviewees' views consistently aligned with NPM arguments that public sector thinking mirrors the private sector's focus on efficiency and effectiveness. Most had extensive private sector experience and unanimously saw no differences when asked about human resource factors affecting robotization. For example, the experienced external implementer with backgrounds in both sectors noted:

From people's point of view, I honestly don't see much difference because ... everyone wants to work a little better ..., whether in the private or public sector. (8_Ext_2024)

Benchmarking against successful RPA implementations in other sectors created mimetic isomorphic pressures, prompting AdN to adopt similar technologies. In line with the corporate DT strategy, the IT director spearheaded the automation initiative, with strong support from the applications coordinator, who later took on the role of project manager. The IT director's interest was piqued upon learning of an RPA implementation at a successful firm by the same supplier (1_Dir_2022; 2_PMan_2022), illustrating mimetic isomorphism. This firm, with a strong reputation in professional and academic circles, provided valuable insights and shared the supplier's experience in RPA for some of Portugal's most prominent companies in

banking, insurance, and logistics (1_Dir_2022; 2_PMan_2022). As a result, the IT director's exposure to peer success stories highlighted the legitimacy and feasibility of RPA, particularly the UiPath platform (1_Dir_2022; 1_Dir_2023).

When evaluating UiPath's RPA solution, AdN prioritized its reputation, market experience, and extensive online community, reflecting normative isomorphism (Figueiredo and Pinto, 2021). Recommended by the external implementer, UiPath was deemed "intuitive", "user-friendly", and "a robust solution with many years of experience, one of the pioneers in RPA implementation, offering extensive documentation and free online courses" (2_PMan_2022), following evaluation by the IT director and project manager. The choice of UiPath also aligned with institutional pressures, as it complied with public contracting guidelines and was selected for its reputation for robustness and scalability.

Empirical data aligned with the literature highlighting RPA's potential in accounting tasks involving multiple systems and high transaction processing (e.g. Jackson and Allen, 2024; Zhang *et al.*, 2023), emphasizing its role in addressing challenges specific to public sector organizations (Matthies, 2020; Vollenberg *et al.*, 2024). Due to the nature of the services provided and the variety of suppliers and clients, AdN must navigate multiple application systems that often lack integration. This challenge, compounded by human resource pressures from processing large volumes of information, has led to efficiency issues and decreased productivity across business areas. For example, in accounting process #8, a user described the previous manual work as "very dense, very repetitive, very tiring" (4_PUacc_2024). The technological feasibility of automating resource-intensive public utilities operations was a key driver of Project Sophia, aimed at resolving issues like massive unintegrated databases and data handling and reporting inefficiencies. Below are representative excerpts from the accounting process owner:

Here, we handle files with 300,000 to 400,000 lines, which is unthinkable in a typical private company. The available technologies and programs are also completely different, so there is a whole workload and level of demand that are completely different ... This technology has provided a solution: it operates automatically overnight. When we arrive the next day, we have the results. (3_POacc_2022)

I can tell you that we always record over 3,000 invoices per month! About 50% are energy invoices, and each energy invoice corresponds to a location with a meter and we have around 2,000 of such locations ... For all other invoices [backed by a purchase order], considerable work is involved in reviewing the invoice and checking if the contract manager has entered the goods in the iPortal (i.e. validated it), which demands considerable time opening and closing the programs. (3_POacc_2023)

RPA platforms like UiPath, built for complex processes, effectively bridged application interoperability gaps. This was seen as a preferable alternative to costly, time-consuming system integration that risked overdependence on application providers:

... consolidating everything onto the same platform ... takes much time and requires a significant financial effort, and Sophia is an alternative ... much faster and more agile to operationalize. Therefore, some situations we thought would be temporary became permanent. (1_Dir_2023)

In sum, implementing RPA was driven by a confluence of coercive, mimetic, and normative isomorphic pressures, reflecting the unique dynamics of public utility organizations. These institutional pressures – rooted in regulatory and compliance requirements, public sector accountability, and peer and market influences – drove AdN to adopt RPA, aligning organizational practices with broader institutional expectations while advancing the "digital government" paradigm for enhanced public sector integration (Carlsson-Wall *et al.*, 2022).

4.2 The role of the actors: institutional work and practitioner agency

Project Sophia highlights the pivotal role of individual agency in institutional change (e.g. Hampel *et al.*, 2017; Leca and Laguecir, 2023; Modell, 2022; Smets *et al.*, 2017). The key

actors in shaping the project's trajectory—through their contextual perceptions (Carlsson-Wall *et al.*, 2022; Haug *et al.*, 2024), their “inhabited institutionalism” and/or institutional work (Leca and Laguecir, 2023) in response to macro-level institutional pressures—were the IT director, the project manager, the process owners, and the external implementer. With strong support from the applications coordinator (project manager), the IT director accredited legitimacy to the project (Lawrence and Suddaby, 2006; Leca and Laguecir, 2023) through transparent communication and by fostering collaborative engagement. Early PoC trials demonstrated quick wins, fostering acceptance and legitimation of Project Sophia (consistent with, for example, Kokina and Blanchette, 2019). Only after the successful PoC was the project presented internally, using a narrative that reconciled human and machine roles, dispelled fears, emphasized benefits (which had been tentatively quantified), and encouraged spontaneous automation requests.

Additionally, AdN enlisted the external supplier to devise a strategy to make Sophia “famous” and ease employee fears or resistance. This collaboration led to the external implementer actively participating in several internal sessions from the outset to clarify the RPA's scope and objectives. The following remark highlights the key role of transparent and effective communication:

When deeply ingrained working methods are disrupted, our intervention can sometimes be unsettling, right? It can cause discomfort if communication is unclear and it is not evident to people that we are there to help. However, I did not sense that this was the case at AdN . . . which is not exactly the case in many other organizations, including private ones. (8_Ext_2022)

As the project progressed, internal awareness and word-of-mouth were crucial in generating quick widespread support, with employees eager to apply RPA to their processes. They saw the DT as important, not something imposed or merely mimicked, which played a key role in supporting automation-induced change and legitimizing process changes (Haug *et al.*, 2024). As one noted, “once a project succeeds, it becomes contagious, sparking motivation in others” (8_Ext_2024). Within less than three years, “it's not the IT department seeking to automate processes; rather, it's the departments themselves making the requests” (2_PMan_2022). Thus, AdN's RPA implementation was not driven by IT, as the literature suggests (Kokina and Blanchette, 2019), but by those directly involved in business operations. This is significant, as public sector challenges—such as poor working conditions, lack of technological infrastructure, and legal restrictions (Matthies, 2020; Vollenberg *et al.*, 2024) - present additional hurdles to overcome.

Beyond the IT director's role as the “entrepreneur” (Smets and Jarzabkowski, 2013, p. 1304), agency was also exercised by individual practitioners (Smets *et al.*, 2017). These actors—process owners, project manager, external supplier—engaged in (un)intentional practices that drove institutional change (Modell, 2022) throughout the RPA project implementation phases (see Appendix 3 for a description of these phases). The process owners, selected for their in-depth knowledge of the processes, acted as the interlocutors for the business areas. The sub-projects of Project Sophia, identified and described by process owners, were centralized by the project manager for feasibility assessment, leveraging experience with process challenges.

After internal IT approval, the external supplier provided a budget for the time and financial effort required. A cost-benefit analysis by the project manager prioritized projects based on expected time savings reported by the process owner. If deemed viable and aligned with the goal of optimizing efficiency and effectiveness (e.g. Matthies, 2020; Vollenberg *et al.*, 2024), the external supplier created the PDD to begin implementation. The supplier carried out the technical implementation with no involvement from the process owner. The automation entered the ‘hypercare’ phase following successful testing, as outlined in Appendix 3.

Consistent with prior research highlighting that one of the greatest challenges companies face when implementing RPA is “the level of complexity associated with the need to document

a process at a granular level of detail” (Kokina and Blanchette, 2019, p. 7), especially when individuals are not RPA experts (Eulerich *et al.*, 2022), our findings revealed that process owners often provided incomplete accounts of their work initially, requiring adjustments to the RPA’s initial development. As one process owner noted, “what makes the project succeed or fail hinges on the person leading it being able to map out every step to minimize errors, as its only when it goes live that those difficulties will fully surface” (7_POpoc_2022). The external implementer clearly expressed the difficulty of translating human tasks into programmable rules:

In almost 100% of organizations, processes are not documented according to how they are executed. Even when creating the PDD with those involved in the tasks, there are always gaps . . . People don’t always have the capacity to remember and communicate everything they do . . . If the robot doesn’t have all these rules, it will eventually fail. (8_Ext_2024)

The final phases of the RPA project implementation frequently exposed flawed workflows, as some processes were neither clearly nor efficiently structured:

. . . we often concluded that the process itself was flawed and ended up not automating it . . . we found that if we approached it differently, automation wasn’t necessary. Even though we didn’t implement that process, it often helped us improve it. (2_PMan_2024)

A collaborative effort among the external supplier, process owners, and project manager to revisit processes and design the PDD was key in driving process improvements and disrupting inefficient systems. Overall, this close collaboration in identifying automation opportunities and addressing implementation hurdles exemplifies institutional work in creating new practices, contributing to limited studies on RPA implementation in the public sector and highlighting the importance of collaboration across different voices (e.g. Lindgren *et al.*, 2024).

4.3 Institutional complexity of public services organizations

Implementing RPA at AdN revealed structural complexities and systemic barriers inherent in public sector environments, particularly legal requirements and budgetary constraints (Matthies, 2020; Vollenberg *et al.*, 2024). These obstacles hindered the realization of Project Sophia’s objectives, as resource and time scarcity could not be addressed as they might in the private sector. This highlighted the need for adaptive management and context-sensitive strategies to navigate institutional complexities (Modell, 2022), particularly those specific to the public sector. In some cases, individual practitioners’ efforts demonstrated the power of agency in overcoming these institutional barriers.

Public contracting rules impose lengthy approval cycles, causing a loss of initial momentum and dampening enthusiasm for the project:

In a public company, there is always a longer process: procurement procedures and cycles must be followed, which can sometimes discourage investments . . . From the initial stage, where there might be some initial interest in the technology, there can be periods of inactivity, sometimes lasting six months, during which the initial momentum dissipates and fades away. (8_Ext_2024)

Despite AdN’s project team navigating lengthy procurement processes and adapting to bureaucratic constraints by prioritizing PoC trials to showcase early successes and sustain organizational support, compliance with public contracting rules slowed progress. The need for public contests after each contract term posed a risk to continuity, further aggravated by the limited number of UiPath suppliers in Portugal. This delayed Project Sophia’s progress until continuity with the current supplier was secured. In this context, creating the PDD emerged as an adaptive, context-sensitive strategy that not only promoted process improvement but also mitigated the risk of supplier changes, ensuring the smooth development of Project Sophia, as acknowledged by the external implementer:

The PDD is essential . . . if the service provider changes tomorrow, or if they need to make adjustments to the process but lack internal capacity, they have a document outlining what the robot is doing. (8_Ext_2024)

From the outset, RPA implementation was handled by an external supplier “not due to incapacity or lack of training [of the internal IT], but due to the volume of work” (2_PMan_2023). The internal IT team faced significant capacity limitations, relying heavily on the external supplier, whose availability and budgetary constraints have hindered the project’s scalability:

Many automation requests started to come in from various departments, and priorities had to be set . . . the budget isn’t unlimited, and the available hours are not unlimited . . . It was also somewhat related to the availability of both IT and business areas. (8_Ext_2024)

In a resource-constrained setting, Project Sophia evolved gradually with minimal planning, driven by emerging needs, challenges, and spontaneous requests from business areas, prioritized through a cost-benefit analysis. Representative comments include:

There wasn’t much planning. What we have been doing results from a set of needs and obstacles. (1_Dir_2022)

We simply allocated an annual budget to maintain existing automations and address emerging needs. Then, on a case-by-case basis, we evaluate whether the effort is worthwhile . . . People are constantly challenging us to automate processes . . . we don’t have the capacity to digitalize and automate all the processes in our organization! (1_Dir_2023)

The reliance on the external supplier left many process owners and users disappointed and eager for further automation developments, as the limited contract hours restricted the ability to address all automation requests. For example, the three projects selected for automation in PMC (P3, P5 and P7) remained on hold as of March 2024 despite early advances in 2019:

We had high expectations when we saw it [P3] working for the first time . . . we saw that what we had been hoping for was possible . . . like a miracle, right? However, when it didn’t move forward, it was a disappointment. (6_PUpmc_2024)

A critical challenge faced by AdN caused a greater strain on resources: systemic rigidity/inflexibility, jeopardizing the sustainability of automation. Specifically, changes in external systems, such as regulatory platforms, often required costly and time-consuming revisions to automated processes. This institutional constraint taught the project manager that successful automation does not necessarily entail replicating human work. For example, while the PoC initially focused on front-end automation [2], interviewees reported issues that arose a year later despite its initial success:

The process [PoC] goes to a website where we have the laboratory, logs in just as we do manually, and then interacts with the tables and menus. What happened after a year? . . . the laboratory itself decided to change the page layout. Naturally, the robot had to be revised because the button that used to be on the left side could no longer be clicked from that side. (2_PMan_2024)

Front-end automation proved vulnerable to system changes, prompting a shift towards back-end solutions for better stability:

My initial projects were all basically done on the front end of applications. As the applications changed, I realized I had to adapt and go directly to the databases where the data structure is stable . . . Currently, I try to access the database directly for all projects, rather than interacting in the way people used to . . . This way, there’s no need for a second or third investment to reformulate the entire process. (2_PMan_2024)

The inability to fully address automation requests due to budgetary constraints was compounded by the growing need for resources to handle unforeseen amendments (e.g.

platform changes, process mapping gaps, undocumented exceptions), security issues, troubleshooting, and process improvements. Evidence gathered indicated that, despite accruing experience, automated processes were rarely flawless, especially in the early phases, often requiring adjustments to initial mappings. For example, in accounting, while P6 is now fully operational, its initial version ran within a restricted timeframe, overlooking invoices recorded later in the day. To resolve this, the robot was rescheduled to operate after business hours. Additionally, P6 was updated to comply with mandatory electronic invoicing for public entities and the transition from physical to digital files. Furthermore, some accounting processes were too volatile for RPA or required extensive stabilization. For instance, automating impairment recording (P4) was delayed due to the dynamic layout of Excel files, which changed with billing program updates, complicating parameterization. As of March 2024, P4 remained in testing, since 2019, “until it is confirmed that the task is repetitive and always follows the same pattern” (3_POacc_2024), to ensure accuracy and prevent financial reporting errors.

These tasks consumed significant time from key project actors, whose availability was constrained by two main factors: (1) being “caught up in responding to immediate needs” (5_POpmc_2024), and (2) high personnel turnover as “people struggled to adapt . . . everything was new . . . they didn’t yet have the sensitivity to the processes” (2_PMan_2024). Changes in the organizational structure, driven by staff mobility between Group companies, area restructuring, and retirements, disrupted continuity, created expertise gaps, and slowed the progress of Project Sophia.

The resource-constrained environment, particularly the limited availability of the accounting process owner and internal IT, exacerbated process-related obstacles faced by automation in accounting. For example, the final implementation of P4 “could likely happen” during the second half of 2024 “depending on internal IT availability” (3_POacc_2024) and on the completion of P6 amendments by June. In this environment, priority was given to updating P6, using its insights to support P4 - reflecting how trial and error led to continuous process improvements. The project manager emphasized that simpler processes laid the foundation for successfully implementing more complex ones.

This evidence illustrates how everyday practices interact with institutional dynamics (Smets *et al.*, 2017), driving institutional change. Previous research has emphasized “the importance of individuals that navigate institutional contexts and strategically pursue digital [. . .] solutions” in the public sector (Wilson and Mergel, 2022, p. 1). Project Sophia experience was one of hands-on learning, with valuable lessons drawn from mistakes made during the process. The study shows that RPA implementation success requires significant dedication and close collaboration among key actors. This collaborative learning environment, combined with effective prioritization in a bureaucratic, resource-constrained setting marked by significant personnel changes, was crucial in preventing means-ends decoupling (Leca and Laguecir, 2023, p. 614) and resuming Project Sophia’s development.

The following subsection demonstrates that by focusing on practitioner agency and adopting adaptive strategies, public service organizations can navigate their unique institutional challenges and unlock the transformative potential of RPA.

4.4 Outcomes: institutionalization of RPA and enhanced capabilities

The outcomes of Project Sophia highlight both anticipated and emergent benefits, demonstrating RPA’s transformative potential in addressing public sector challenges such as regulatory compliance, resource constraints, and inefficiencies (Lindgren *et al.*, 2024; Vollenberg *et al.*, 2024), as well as driving institutional change when the implementation is properly developed. Overall, these benefits align with those attributed to RPA in private organizations, granting it legitimacy as a transferable tool from the private to the public sector under NPM tenets (Eriksson and Andersson, 2023).

Automation minimized human errors, improved data accuracy, and reduced the time required for regulatory reporting, helping AdN meet stringent public sector requirements. For example, in the case of external reporting to the Portuguese Environment Agency (the PoC), the process owner highlighted the enhanced compliance:

Before, the deadlines were often unmet – hence the need for Sophia ... now we meet the deadlines ... Considering the company's size, we must rely on something like Sophia ... (7_POpc_2023)

By alleviating repetitive tasks, RPA reduced employees' stress and boredom, allowing them to focus on higher-value analytical work. This improvement enhanced reporting and facilitated quality and timely decision-making. Representative quotes include:

This allowed people to feel more fulfilled and motivated, with more time to think, make better decisions, gather, and engage with each other ... Some benefits are not tangible and non-financial, but they represent improved quality of life and translate into productivity through employee well-being and motivation. (1_Dir_2023)

I can do other things [rather than inputting values] that are not as tedious, like data processing and analysis ... calculating product quality indicators, doing follow-ups, creating action plans for non-compliance, writing reports ... (7_POpc_2023)

It makes a big difference to have data ready for decision-making by 9 a.m., rather than still needing to process it and only having results by the end of the day, when decisions might be too late. (2_PMan_2022)

This shift aligns with expectations that RPA will replace routine tasks while augmenting those best performed by humans—particularly those requiring higher levels of judgment and sensemaking (Figueiredo and Pinto, 2021; Vollenberg *et al.*, 2024) - ultimately strengthening the organization's capacity to manage institutional complexity. For example, by alleviating workforce pressures, the RPA reduced the need for additional hires despite growing workloads.

Evidence from interviews highlights that RPA-driven efficiency gains extend to accounting functions, as argued in previous studies (Cooper *et al.*, 2019; Harrast, 2020; Jackson and Allen, 2024; Zhang *et al.*, 2023). For instance, in P6, the user reported increased productivity and compliance: "I process more invoices instead of wasting time on data matching" (4_PUacc_2024). The accounting process owner further emphasized the significant time savings achieved through automation:

P6 has brought significant time savings in document retrieval and in linking documents ... benefiting the accounting and treasury departments ... the treasury no longer needs to contact us; they can now directly access invoices and verify whether they have already been recorded. (3_POacc_2022)

Consistently, interviews with process owners and users indicated that automation-driven time savings fostered the emergence of more analytical accounting tasks alongside improved compliance:

... for example, [Sophia allowed] a more systematic and periodic review of unrecorded invoices in order to contact requesters to help resolve issues related to those pending invoices ... we had around 300 invoices per month that we couldn't record, and now we've reduced that number to about 30. (3_POacc_2022)

Recruiting new employees had been considered to address past non-compliance issues in accounting, but Project Sophia successfully averted the need for additional hires (3_POacc_2022).

Despite clear evidence of Project Sophia's benefits, no objective measurement – financial or in hours saved, consistent with the literature. Kokina and Blanchette (2019, p. 10) show that as organizations progress in RPA implementation, they discover that its impact is "multi-faceted, complex, and not easily measurable". Similarly, our findings reflect Figueiredo and Pinto's (2021) observation of rapid, mimetic RPA adoption despite limited quantification of outcomes.

Finally, participants expressed differing views on the project's future: the IT director saw RPA as a temporary fix for poor system integration, while the project manager and the external implementer envisioned integrating it with technologies such as AI, IoT, and chatbots, including potential expansion to municipal clients.

5. Conclusion

This study analyzed the implementation of Project Sophia, an RPA initiative at AdN, a public utility organization. Through the lens of institutional theory, the case illustrates how institutional pressures – coercive, mimetic, and normative – influenced technology-driven practices and shaped the agency of key actors across various organizational levels. The agency of both external and internal actors mitigated potential resistance to DT and facilitated adjustments to practices, influencing how AdN engaged with institutional demands. As [Modell \(2022, p. 356\)](#) notes, “public sector reforms often entail compulsory demands for the adoption of certain [...] practices”, but organizations do not simply respond passively. To understand institutional change, it is crucial to examine what goes on deep inside organizations while also considering the broader context in which they operate ([Leca and Laguecir, 2023](#); [Smets et al., 2017](#)). The implementation of Project Sophia shows that DT was driven not only by external demands from regulators, citizens, and global trends but also by “the everyday work of practitioners on the ground” ([Smets et al., 2017, p. 372](#)), including the project manager, process owners, and external implementer. RPA emerged not only as a technical solution but as a socially embedded practice, shaped by and shaping its institutional context. Therefore, the case study highlights the structural complexities and systemic barriers that public sector organizations face – particularly, legal requirements, budgetary constraints, fragmented systems, and staff turnover – offering evidence of key differences from private sector settings. These contextual realities influenced the project's pace, sequencing, and scalability.

This study contributes to the limited body of knowledge on the impact of technology on accountability, accounting, and management practices in public utilities organizations (e.g. [Agostino et al., 2022a, b](#); [Martins et al., 2025](#)). It offers empirically grounded, practice-oriented insights into how RPA projects unfold in public sector settings, highlighting strategies that facilitated implementation – such as early proof-of-concept pilots, cross-functional collaboration, narrative framing, and process documentation. These findings provide practical guidance on managing external pressures and internal obstacles, recognizing where automation of accounting-related processes is feasible and improving public sector accountability, and navigating constraints related to procurement, human resources, and digital infrastructure. Moreover, this research maps out the key phases of an RPA project, typical durations, associated costs, and contingencies affecting resource demands. This detailed account serves as a practical reference for public sector managers planning similar initiatives, enabling more informed decisions regarding resource allocation, timeline management, process redesign, and stakeholder engagement. Taken together, the study offers a blueprint for more effective RPA implementation, ultimately contributing to improved operational efficiency and service delivery in public sector entities navigating complex institutional environments.

Previous studies have highlighted challenges posed by DT in public sector organizations – such as blurred accountability due to multiple actors in service delivery, raising concerns about data accuracy ([Agostino et al., 2022a](#)), and accountability overload among accountants who struggle to see value in their compliance tasks ([Chua et al., 2022](#); [Lino et al., 2022](#)). This study responds to calls for more empirical research into organizational and social complexities in the public sector ([Broccardo et al., 2023](#)). Its relevance lies in demonstrating that despite these challenges, when key actors recognize the benefits of DT and are supported by transparent, collaborative strategies, technology adoption can enhance both employee performance and public service delivery.

Finally, unlike studies focused primarily on technology-centered frameworks (Carlsson-Wall *et al.*, 2022), this research underscores the relevance of a new institutional theory perspective to examine both macro and micro-level dynamics (Leca and Laguecir, 2023; Modell, 2022; Smets *et al.*, 2017). This perspective reveals how internal practices – such as the creation of PDDs, prioritization of spontaneous automation requests, and trial-and-error adjustments – interact with broader institutional forces. At AdN, a strategy involving all relevant actors helped build trust, address resistance, and ultimately led employees to request further automation.

This study presents a “success story” of DT adoption, while also acknowledging its limitations. Future research should explore implementation failures and cases of policy-practice or means-ends decoupling, which remain underexamined in the context of public sector complexity (Wilson and Mergel, 2022). Additionally, given the vital role of public utilities in promoting the common good, further research should investigate how DT can support public organizations in assuming leadership in managing essential services.

(The Appendix follows overleaf)

Table A1. Brief characterization of the 26 processes

Process #	Objectives	Year of automation/ Year of PDD submission	Status as of March 2024
P1	Proof of Concept	2019	a)
P2	Upload existing laboratory data from the Laboratory Information Management System to the ENKI web platform	2019	a)
P3	Alerts report	2019	b)
P4	Collect information for reporting purposes	2019	b)
P5	Calculate monthly clients' impairment amounts and input the corresponding accounting entries into SAP	2019	b)
P6	Send email with report	2019	b)
P7	Integrate the accounting program (SAP) with the document management system (iPortal), eliminating the need to access two platforms for complementary information	2019	a)
P8	Prepare informational reports for the business areas	2019	b)
P9	Insert the iPortal hyperlink into SAP	2019	a)
P10	Monitor expiry dates of Social Security declaration	2019	b)
P11	Monitor expiry dates of Tax Authority declaration	2019	b)
P12	Supplier debt report	–	c)
P13	Control of returned correspondence	2022	b)
P14	Invoice dispatch control	–	c)
P15	Spontaneous applications	2019	a)
P16	Data export to SQL Server	–	c)
P17 (Initially identified as P12)	Convert purchase requisitions into purchase orders	2020	a)
P18	Legal processes (Intranet)	–	c)
P19	SAP data extraction	–	c)
P20	Link AQUAWORKS and SAP systems	–	c)
P21	SAP–Control of operating contracts	2021	a)
P22	Digitize invoices	2021	a)
P23	Manage current accounts	2023	a)
P24	Invoice review management	–	d)
P25	Digital archive	2023	a)
P26	SAP–Extract, Transform, and Load (ETL) database routine	2024	a)
P27	Keep an updated non-debt certificate from Social Security in each supplier's folder	2024	a)

Note(s): a) Process successfully automated,
b) Process requiring modifications by the external development team. Ready for implementation upon completion of this phase,
c) Process that has not yet progressed beyond the analysis phase,
d) Process that has not yet progressed to the development phase
Source(s): Authors' own work

Appendix 2

Interview guide

- (1) Knowledge of the technology.
- (2) Characteristics of the technology that led to it being considered as an option for the company.

- (3) Needs and motivations driving Project Sophia (PS).
- (4) Actors and their roles in PS.
- (5) Criteria for the selection of the PS team.
- (6) Resources allocated to PS.
- (7) Phases of the PS implementation plan.
- (8) Risks and challenges/difficulties associated with implementing PS.
- (9) Objectives and expected benefits of PS.
- (10) Criteria used to select the processes involved in PS.
- (11) Objectives/benefits achieved by PS and unplanned results.
- (12) Criteria used to evaluate post-implementation performance.
- (13) Impact of the automation on accounting and accountability functions.
- (14) Adaptation of process users to the technology and training needs.
- (15) Evaluation of processes post-automation.
- (16) Progress in the automation process and adjustments to accounting-related processes.

Source(s): Authors' own work

Appendix 3

Table A3. Phases of the RPA project implementation

Phase	Description	Average time (weeks)
1. Defining objectives and planning	Establishing clear goals for automation, such as reducing errors, increasing efficiency, or saving time. Planning the activities and resources required for implementation	1
2. Process mapping and selection	Analyzing existing processes to identify those that are repetitive, rule-based and time-consuming, selecting the most suitable ones for automation	1–2
3. Choosing the RPA tool	Selecting the RPA tool that best suits the organization's needs, considering factors such as integration, cost, and support	1
4. Development and testing	Developing RPAs according to the mapped processes and conducting tests in a controlled environment to ensure proper operation	2–3
5. Pilot implementation	Implementing automation in a controlled segment of the production environment to identify and resolve potential issues before full deployment	1–2
6. Hypercare	Implementer's monitoring of automation in a live environment to validate performance and allow for adjustments, as suggested by the project manager and process owner, before final validation. Unanticipated exceptions may lead to further adjustments or a return to manual processes	2–3

(continued)

Table A3. Continued

Phase	Description	Average time (weeks)
7. Complete implementation and training (or passing on knowledge to internal teams)	Expanding automation to the entire production environment and providing training for employees to adapt to the changes	1–2
8. Continuous monitoring and maintenance	Monitoring automation performance and making adjustments as necessary to ensure ongoing efficiency	Continuous
Source(s): Authors' own work		

Notes

1. Digitization highlights the transition from analog to digital services with the addition of a technological channel of delivery, while digitalization is focused on potential changes in the processes, going beyond the digitizing of existing processes and forms. Therefore, DT “is a holistic effort to revise core processes and services of government beyond the traditional digitization efforts. It evolves along a continuum of transition from analog to digital to a full stack review of policies, current processes, and user needs and results in a complete revision of the existing and the creation of new digital services” (Mergel et al., 2019, p. 12).
2. Front-end automation focuses on automating tasks and actions directly involved in frontline interactions, whereas back-end automation streamlines tasks and processes that occur behind the scenes using RPA.

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