Robotic Process Automation: Exploring the Technological and Organizational Dimensions for Successful Implementation in Organizations*

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Abstract

This thesis proposes a case study focusing on Robotic Process Automation (RPA) in the context of digital transformation. The study aims to address RPA from both technological and organizational perspectives.

From a technological viewpoint, task selection is a crucial first step in RPA. In that context, process mining (PM) is a key technique for identifying suitable tasks, and this research aims to study how PM can aid in systematically selecting tasks for RPA.

From an organizational perspective, RPA projects require organizational support to overcome resistance and achieve employee commitment. However, there is limited literature addressing RPA from a strategic management perspective. This study seeks to explore the barriers and levers organizations encounter during RPA implementation from a strategic management viewpoint, using McKinsey's 7S framework.

The research methodology involves a mixed approach. For the technological perspective, a quantitative case study will be conducted to apply PM process discovery techniques. For the organizational perspective, qualitative research with semi-structured interviews based on the 7S framework will be employed. The case study will be carried out in collaboration with a Spanish regional bank experienced in RPA implementation.

The proposed solution aims to bridge the gap in RPA literature by addressing the challenges in task selection using PM techniques and exploring RPA deployment from a strategic management perspective. The innovative mixed methodology may open new research directions linking strategic management and RPA deployment.

Keywords

Digital Transformation, Process Mining, Business Process Management, Robotic Process Automation, 7S, Strategic Management, Change Management

1. Introduction

Digital transformation is commonly used to refer to the profound changes that companies must undergo to successfully adapt to new digital technologies [1]. These changes affect all kinds of organizations. Its management is not an easy task. In fact, between 66% and 84% of

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digital transformation projects fail [2]. The McKinsey consultant group concludes that process automation will be one of the aspects of digital transformation that will have the greatest impact on organizations, with the potential to automate between 57% and 89% of tasks within departments such as finance [3]. Our thesis focuses on one of the automation technologies that has been more successful in recent years: Robotic Process Automation (RPA) [4]. The thesis project that we present aims to study RPA from two points of view: a technological one and an organizational one.

From a technological perspective, RPA is based on small programs called bots that mimic human tasks in interactions with different software systems [5]. These tasks involve interactions with internal management software (ERP, spreadsheets, email, etc.) or external systems such as web browsers. The suitable tasks for automation should be labor-intensive, with a high volume of simple activities, and a fast cost reduction impact [6]. RPA can be implemented in several ways, ranging from a fully automated end-to-end process where no human handle is needed, to citizen development where employees code the robots on their own to automate small tasks [7]. Our research focuses on a hybrid approach in which certain tasks are automated, while humans handle the remaining tasks, usually involving decision-making. For this approach, distinguishing between tasks that can be automated and those that must be carried out by humans is essential for the success of an RPA project [8]. Process mining (PM) is a key technology for that purpose [9]. Process mining focuses on discovering, monitoring, and improving real processes by analyzing activity logs recorded in a company's information system [10]. It can help to identify the relevant indicators for the appropriate selection of processes to automate.

Technology is not the only aspect to be considered in process automation. The organizational aspect is equally important, as automation affects people the most [11]. According to Ernst & Young, 30-50% of automation projects fail due to poor management approaches [12]. Achieving employee commitment and preventing any form of resistance is essential for automation projects [13]. The fear of losing their job, the resistance to new technologies, the need for new skills, the involvement of IT, or the impact on the enterprise architecture are some of the impacts that organizations should take into account [14]. From a strategic perspective, it requires a cultural change from the beginning of any RPA project [15].

This thesis aims to address these issues by presenting a case study carried out in a Spanish regional bank. Following a mixed research methodology, we will focus on analyzing the implementation of RPA from a technological and organizational perspective. On one hand, from a technological point of view, we will develop a quantitative case study with the aim of studying how PM can help identify suitable tasks for automation through RPA. On the other hand, from an organizational point of view, we will carry out a qualitative research, that seeks to study how a strategic management approach can aid to minimize the impact of RPA implementation on organizations. For that purpose, we will employ McKinsey's 7S framework, which has been used in both digital transformation and change management contexts.

2. Research Problem

2.1. Technological perspective

After the introduction of RPA, there are three types of tasks. One type of task is handled by the information system using traditional automation, where the task has high frequency and there is no human involvement. A second type would be a low-frequent task that is still done manually. And the third type would be in the middle, where some of the human repetitive tasks could be automated but traditional automation becomes expensive. There is where RPA arises as a cost-effective technology [16]. At this point, it is essential a correct selection of tasks that can be automated through RPA [17]. PM is a suitable technology that can aid to identify those routine tasks [18]. It is based on event data, stored in an event log registered by the information system, and it can be classified into four types: process discovery, conformance checking, process reengineering, and operational support. The first one creates a process model from event data. The second one detects the differences between the event log and the process model. Process reengineering, instead, tries to improve the process model based on event data. And finally, operational support provides warnings and recommendations for the process [19]. We will focus on the first type, process discovery. However, the aim of using PM techniques in RPA is for task discovery and not process discovery [20]. Task discovery is a time-consuming job and is usually carried out by human teams [8]. It remains as a technological challenge, as Syed et al. (2020) mentioned: " there is a need for formal, systematic and evidence-based techniques to determine the suitability of tasks for RPA".

Our study aims to respond to these challenges by providing a case study conducted within the context of a process-mining project. Specifically, the research question we want to answer is:

"How can the PM process discovery technique be applied for a systematic selection of suitable tasks for RPA?"

2.2. Organizational perspective

Organizational support is crucial in fostering individuals' involvement in RPA projects [21]. Unfortunately, organizations find themselves with multiple silos, whether at an organizational, functional, technological, or management level, which makes RPA implementation difficult and change management necessary [15]. Indeed, automation affects people in organizations [11][13]. However, HR departments are involved in RPA projects in only 16% of the cases [15]. This difference contradicts the need to place individuals at the center of any long-term automation strategy [22].

From an organizational point of view, automation requires a strategic management approach [23][15]. However, there is currently limited literature addressing RPA from a strategic management perspective. Even more, current studies do not place sufficient emphasis on a holistic consideration of the automation impacts on organizations, especially related to HRM function and employees [24].Consequently, there is a knowledge gap in the treatment of RPA from the perspective of strategic business management and the impact of process automation on organizations. From an organizational perspective, our research question is:

”What are the barriers and levers that organizations encounter in the implementation of RPA from the strategic management perspective?”

3. Research Methodology

Our research will be conducted in partnership with a Spanish regional bank. This bank possesses extensive experience in RPA development and considers it a vital element of its business strategy.

3.1. Technological perspective

To address the first research question, we will carry out a case study based on the methodology developed by Yin (2018) [25], a methodology already followed by other authors [26] [27][28]. The case study will be developed as a single-case study quantitative approach. The validity of the real-life case study method has been validated by researchers such as [29] [30][31].

Our research partner has recently implemented a PM software called Celonis. Based on the event logs recorded by his information system, their goal is to set the KPIs that allow them to establish the candidate tasks to be automated with RPA. Our work will consist of extracting and transforming the user logs, to later propose the task selection criteria in accordance with their business strategy. Once the tasks have been selected and the savings objectives established, we will proceed to implement them in the RPA software and then compare the achieved savings with the initially established objective. Consequently, our research will cover the end-to-end process, starting from establishing the task selection criteria using PM software and concluding with the final calculation of the benefits obtained with RPA.

3.2. Organizational perspective

Regarding the second research question, we selected a qualitative research methodology proposed by Miles and Huberman (1994) [32] to understand the experiences of bank employees with RPA. Concerning methodology, we can find qualitative research in RPA literature, such as [33][34][35]. We will use the semi-structured interview, which will allow us to collect the same general areas of information from each interviewee, and in turn, enough freedom to adapt the interview to our objectives [36]. The interview questions will be based on the 7S framework from McKinsey. This framework is widely used for strategic management in the field of digital transformation and change management[37, 38, 39]. The 7S framework gives a holistic vision of organizations through 7 interconnected elements [40]: Style, Skills, Systems, Structure, Staff, Strategy, and Shared Values.

The study aims to conduct no fewer than 30 interviews with individuals connected to the RPA project within the organization. Convenience sampling will be utilized, as it will be constrained by the possibilities presented by the bank [41]. In participant selection, two aspects of diversity will be considered. Vertically, by selecting individuals with different positions within the organizational structure. And horizontally, by including users from different departments of the company.

4. Proposed Solution

Our research aims to contribute to answering two gaps found in the research literature on RPA. First, from a technological perspective, the correct selection of the tasks to be automated is important. Unfortunately, this job remains manual and time-consuming. Our research aims to narrow the gap by presenting a case study where we use PM techniques to establish KPIs for the systematic selection of tasks. This case study introduces a novel approach that covers the entire process, from task selection criteria to the RPA implementation and its cost-saving evaluation. Secondly, RPA's impact on organizations is a main issue, but there is a lack of literature from a strategic management point of view. We propose to study the RPA deployment using a qualitative methodology with a strategic framework such as McKinsey's 7S model. Our innovative approach may generate future research lines linking strategic management and RPA deployment. Finally, one last contribution is the use of a mixed methodology, combining quantitative and qualitative research.

5. Related Work

Concerning task discovery, professor Van der Aalst proposes the Pareto principle to classify tasks based on their variants and frequency, proposing the use of RPA for those tasks that are rather frequent and simple but it is not cost-effective for traditional automation [42]. PM emerges as an ideal technology for selecting suitable tasks for RPA [18], as user interaction recording provides information that can be used to discover tasks that can be automated with RPA [43]. Although part of the tasks can be automated with RPA, there will still be complex tasks only executed by humans creating a human-robot hybrid scenario [7].

Management support, communication, skills, or strategic approach appear to be among critical success factors for RPA [44]. A strategic approach should also consider employee engagement [23]. Despite the fact that employees are satisfied with the increase in value-added activities due to automation, many of them seem to fear its future impact. [34][45][46][22][21][47]. Some others see automation as a opportunity to expand their skills. [48].

6. Open Points and Identified Problems

Involving a company in research often poses several challenges. One of the primary obstacles is data accessibility and quality. Gaining access to it can be a complex process due to privacy concerns. Another difficulty lies in engaging employees in the research project. Employees' participation may require their time and effort, which can be challenging.

On the other hand, we have identified some other problems that may arise in our research. From a technological point of view, the difficulties to obtain data and its quality is a problem to face. Process mining software selection is another point to take into account, as it is a company decision. From an organizational approach, employees' reactions and involvement are crucial. At this point, organizational support for our research is essential.

However, we are aware of the limitations of developing our research in a single organization. The results are not generalizable, but they can help a better understanding of RPA impact in

organizations.

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