# Sustainability in Robotic Process Automation: Proposing a Universal Implementation Model

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Abstract: Robotic process automation (RPA) is a key technology for automating mundane, repetitive back-office tasks that are typically performed by human workers. Because RPA instantiations, known as software robots, operate partially with the same graphical user interfaces as humans and can only replicate the business processes for which they were previously designed, they can lack sustainability as they stop working when sudden changes occur. This paper argues that RPA endeavors should be planned as long-term journeys through the era of digital transformation. Based on a systematic literature review and interviews with experts from industries that have successfully implemented software robots, this study summarizes and proposes a universal model for sustainable RPA implementation. The model consists of three phases, from planning to development to maintenance and scaling of projects. Although thorough evaluation is required through careful application of the proposed workflows, a useful addition to the body of knowledge on RPA could be created as all design decisions were made with the approval of industry experts.

## 1 INTRODUCTION

In the modern business world, automating various processes, both physical and digital, is not a new phenomenon. However, the question of what should be automated at all and what should better remain in qualified human hands is still fundamental in business and information systems engineering (BISE) (van der Aalst et al., 2018). While in manufacturing, the outsourcing of entire production lines to robots is already realized (Scheer, 2019), the office work in the background is still a field with unleveraged potential for the automation of repetitive digital tasks (Siderska, 2020). Robotic process automation (RPA), taking its beginnings around the year 2015 (Wewerka and Reichert, 2023), describes the adoption of software robots that can interact with computer systems' user interfaces in a manner like how a human would and that can imitate the learned behavior (Daase et al., 2020; Scheer, 2019). Gartner, a major market research and consulting company, defines RPA as tools that "*perform 'if, then, else' statements on structured data*" and that map "*a process in the RPA tool language for the software 'robot' to follow*" (Tornbohm and Dunie, 2017).

Software robots are usually divided into two types: attended and unattended ones. The basic difference between both is the role of human workers during task execution. While attended robots are actively started, monitored, and interacted with by responsible employees, unattended robots run independently in the background on a server and are triggered either by external events or according to a schedule (Langmann and Turi, 2022). As a potential combination, hybrid robots can take on characteristics of both to enable end-to-end automation for processes that involve human workers as well as back-end functionalities (Javed et al., 2021).

As intuitive as the approach to develop software robots based on the imitation of human actions on graphical user interfaces may seem, issues arise when underlying process flows undergo changes and robots lack the ability to adapt dynamically. Given this challenge and the fact that RPA has proved its use in the application in a multitude of fields, such as banking, insurance, healthcare, telecommunications,

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and logistics (Ivančić et al., 2019; Siderska, 2020), it is critical to find long-term solutions for deploying RPA. In context of this paper, making RPA solutions robust and suitable for long-term usage is to be understood as making them *sustainable* as further explained in the second section. This paper contributes to the understanding and improvement of RPA projects in various scenarios by highlighting factors that affect the efficiency directly and indirectly, by collecting data from experts involved in the field of industry automation, and by proposing a model for the sustainable implementation of RPA.

To achieve these goal, empirical research is conducted by combining a systematic literature review (SLR) on perspectives from scientific publications and interviews with experts from the industry. The research is formalized with three research questions (RQs). First, the literature on the application of RPA is examined to identify factors that determine when an RPA solution is in an appropriate, meaningful state that is worth to be made sustainable. Second, organizational factors that facilitate the successful implementation of software robots need to be identified to assemble the final model for sustainable RPA integration. Third, precise strategic approaches for the design and implementation process of RPA solutions that target sustainable implementations have to be analyzed and synthesized into a unified model.

**RQ1:** How do RPA adopters assess performance after the implementation of RPA projects?

**RQ2:** What are predominant organizational factors responsible for the success of RPA projects and how can they be measured?

**RQ3:** How could a strategic approach for sustainable design and implementation of software robots look like, based on currently followed approaches in the industry?

Subsequently to this introductory section, the term *sustainability* in terms of RPA is defined as used in this paper. In the third section, the adopted methodology for the construction of a model for sustainable RPA implementation is presented. In the fourth and fifth section, respectively, are the results of the SLR and of the conducted interviews explained in detail. Section six is focused on the final composition of the previously outlined model. Section seven concludes this work with a summary of the most important findings from the research. Furthermore, limitations and potential future directions are outlined.

# 2 SUSTAINABILITY IN RPA

Before factors and approaches for the sustainable implementation of software robots can be evaluated, the term *sustainability* in this regard needs to be defined. RPA is primarily designed to automate structured, repetitive tasks that would otherwise require manual labor, for example by using virtual keyboards and user interfaces as a human would do (Scheer, 2019). By introducing RPA, employees can be freed to perform tasks that are more value-adding for the respective organization. This paper argues that the use of RPA should be long-term, meaning that even after the customer has received the desired product, the company should continue to provide services such as maintenance and post-deployment support.

Once companies try to scale their automation endeavors, the number of involved software and applications increases, which can lead to a situation where the company suffers a significant loss if multiple robots fail due to a shared yet malfunctioning system. Such a failure may seem inevitable from time to time, since software robots are usually built on top of existing applications. For example, the robot will fail as soon as the user interface of any involved software changes. Therefore, striving for *sustainability* with respect to this research means developing a model that enables a workflow that minimizes such failures and enables long-term use of software robots by anticipating potential problems and providing adequate maintenance.

# 3 METHODOLOGY

This work adopts the guidelines on design science research (DSR) by Hevner et al. (2004) which is a branch of research in information systems intended to solve identified business problems by developing a so-called *artifact* as a working solution. In this case, the outcome of this effort is a model for sustainable RPA integration which is informed by systematic theoretical groundwork. The organizational problem to be solved is bridging the gap between the targeted use of software robots at a given point in time and the long-term benefits of the same. The six individual research steps are derived from the DSR methodology proposed by Peffers et al. (2007). First, the problem is identified and motivated. This is conducted within the introduction by outlining the benefits of RPA on organizational performance and by stating the

challenges regarding technical sustainability of the robots. Second, objectives of a solution shall be defined. Since the outcome is a model for a recommendable development and maintenance process, the objectives are derived, on the one hand, from case studies and similar in scientific literature and from the experience of experts in the field. Third, the design and development follow. This is conducted by reasoning and connection the acquired knowledge from the theoretical groundwork. Up to this point, the steps carried out form the theoretical basis, while the remaining three steps represent the practical work that builds on this (Daase et al., 2022). Forth, the artifact should be demonstrated in a suitable context. Since the model encompasses all stages of RPA integration in a universally applicable form, this demonstration does only take place through explaining how its phases would guide the integration process in theory. Fifth, an evaluation of the artifact is recommended to gain knowledge about it which could, in turn, be used to iterate back to the design for a refinement. As the complexity and scope of the model require a broad evaluation in various contexts and companies, this step is postponed to future work. The sixth step, the communication of the work, is performed by providing the insights of this research to the scientific community. Figure 1 summarizes the overall methodology.

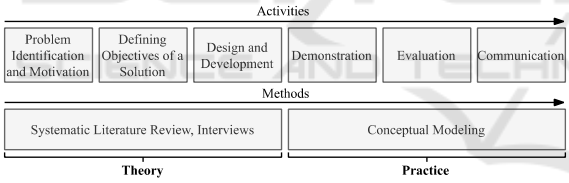


Figure 1: Design science research process.

## 3.1 Systematic Literature Review

An SLR is a method for assessing and comprehending all existing research pertinent to a certain research question, topic, or phenomenon of interest. SLR assists in recognizing any gaps in the existing research and recommending topics for additional study (Kitchenham and Charters, 2007). According to Hevner et al. (2004), rigor comes from efficiently using that body of current knowledge for the development of the artifact. The search was conducted in the four databases ACM Digital Library, ScienceDirect, Scopus, and SpringerLink. Based on the specified research objectives, pilot searches, and iterative refinements, the search phrase was constructed. To keep a broad enough knowledge base as well as a manageable number of articles, the following query was found to be sufficient:

**Q:** *"robotic process automation" AND ("sustainable RPA" OR "RPA governance model" OR "intelligent process automation" OR "RPA return on investment" OR "RPA ROI" OR "cognitive robotic process automation" OR "enterprise automation")*

For ACM Digital Library, Scopus, and ScienceDirect, the query was searched for in abstracts, titles and keywords. For SpringerLink, the individual components were entered into the general search field and the search was limited to conference proceedings or journal articles. The time frame was limited to articles published between 2010 and 2022. A total of 313 articles were retrieved as a result.

The search then was further refined by applying inclusion and exclusion criteria during a phase of reading the titles and abstracts. Articles were rejected if they were identified as duplicates, either exactly or semantically, and when they consisted only of an abstract, a patent, or of an introduction to proceedings. On the other hand, the articles were included in the further investigation only if they covered the topics of software robot development and implementation as the main topic.

After this phase, 89 articles remained in the literature pool. In a subsequent phase, when reading the contents of the publications, articles were excluded in case potential challenges of RPA integration were not pointed out, thus omitting a critical discussion. To pass this phase, articles were expected to consider key performance indicators for RPA adoption and to cover impacts on the adopting organization as well. A total of 23 papers remained after this detailed examination. The selection criteria are summarized in Table 1.

Table 1: Inclusion and exclusion criteria for the SLR.

| Inclusion criteria | Exclusion criteria |
|---|---|
| Software robots and their active implementation are the main topics of the publication. | Duplicate |
| The publication considers key performance indicators for RPA adoption. | The article is a patent, abstract only, or proceeding's introduction. |
| The paper covers impacts on the organization trying to utilize software robots. | Critical discussions are omitted by leaving out considerations of potential challenges. |

Figure 2 depicts the workflow of the SLR, including the numbers of remaining articles after each phase.

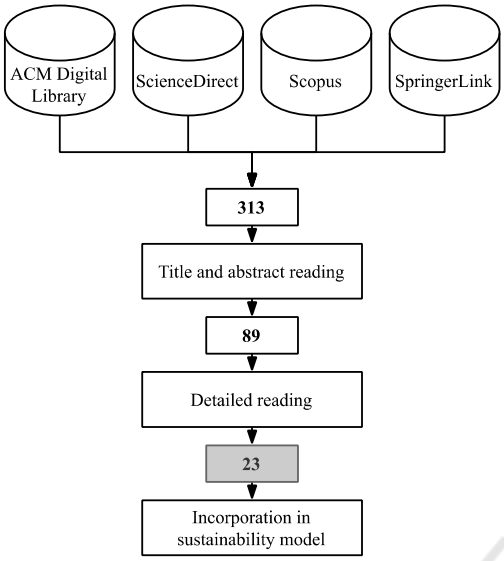


Figure 2: Visualized SLR workflow.

## 3.2 Interviews

The intention for conducting interviews was to gain knowledge about RPA projects carried out in the industries from the people who were actually involved. Thus, insights from both theory (academic literature) and practice (interviews) are integrated in the research. A group of three experts from different countries and on different levels of experience in the field of RPA was composed and as a result, different viewpoints on how to achieve a sustainable deployment of RPA could be gained. The details on the three interviewees are summarized in Table 2.

Table 2: Professional experience of the interviewees.

| Interviewee | Role | Country |
|---|---|---|
| Int1 | Solution Architect / Operations Manager | Germany |
| Int2 | RPA Consultant / UiPath chapter lead | France |
| Int3 | Senior RPA Developer / Intelligent Automation Consultant | India |

The experts were asked whether they wanted to add additional steps to be included in an RPA roadmap or whether they wanted to omit steps. Apart from the identifiers of the company and the interviewees for confidentiality reasons, all information from the interview was transcribed.

# 4 SLR RESULTS

A part of the IT users has long expressed concerns that the extensive usage of robotics may lead directly to an increasing unemployment rate (Frey and Osborne, 2017). On the other side of the spectrum, robots have been portrayed as rescuing humanity from mundane and laborious occupations, allowing people to concentrate on more valuable work and more fruitful intellectual pursuits (Lamberton et al., 2017).

In the literature, special attention is paid to the digitization of operational and business processes in businesses of service firms, mainly those in the financial, banking, insurance, marketing, accounting, public administration, and logistics sectors (Madakam et al., 2019; Mendling et al., 2018; Siderska, 2020; van der Aalst et al., 2018). However, there is no agreement on a fixed definition of RPA in the literature identifiable. From the selected publications, the lowest common denominator among the authors is that RPA is a recent strategy that uses robots to automate monotonous digital work. These bots, for instance, may analyze emails, perform calculations, open and move files, log into applications, connect to APIs, create invoices, query databases, obtain web data, create content, and extract data from messages (Madakam et al., 2019; Mendling et al., 2018; Santos et al., 2020).

Software robots have various advantages for businesses, including enhanced productivity, data security, shorter cycle times, and better accuracy, while freeing up staff (Leshob et al., 2018). When compared to traditional process automation, RPA promises to be simpler to adopt, relatively inexpensive, and able to scale, audit, and improve security and compliance (Fung, 2014; Hallikainen et al., 2018; van der Aalst et al., 2018). Syed et al. (2020) give a detailed overview of the basics of RPA, its benefits, and the related challenges. As per this study, RPA literature is mostly dominated by position and white papers, case studies, and experiences directed at higher-level management.

In their research in the automotive industry, Wewerka and Reichert (2021) identified bottlenecks that are related to RPA implementation. The authors summarize the challenges on five levels which can be used to guide industries trying to start their RPA journey: 1) determining the business operation for automation, 2) comprehending the elements impacting acceptance and usage, 3) conveying RPA as a concept to the end-users, 4) designing the bot to ensure interaction between the bot and its user, 5) establishing governance and best practices for the bot

development. Similarly, Asatiani and Penttinen (2016) focus on issues that the OpusCapita Group had when deploying RPA and the various business models it encompasses. The study states that answering certain questions before the actual implementation is crucial. These questions include which models should be chosen for the technology, how to ensure RPA leadership in the long run and what value the organization can provide to customers with it. Money (2021) suggests that enterprises employing or adopting RPA technology should pay close attention to the data controls, management, and security elements. The recommendations for special attention include identity and access management, data encryption (including credentials), maintaining policies for data classification, data retention, data storage, and data location, monitoring of logs and regular auditing, and vulnerability scanning of all bot programs prior to promotion into the production environment.

According to Wewerka et al. (2020), any RPA initiative will not be successful if it is not accepted by the users. The authors created a model for evaluating RPA user acceptance and the factors that affect it. The findings support the notion that perceived usefulness is positively influenced by social influence, job relevance, and result demonstrability. Positive impacting factors of perceived ease of use include trust, innovation, delight, and enabling circumstances. As a conclusion of this paper, factors that influence user acceptance make the RPA implementation sustainable. A common topic of discussion in white papers has questioned the impact of RPA and to some extent concluded that the software robots would replace the existing workforce, such as accountants (Sarilo-Kankaanranta and Frank, 2022). Contrary to this, organizations that have embarked on the RPA journey still recruit accountants for their services. Another group of researchers from New Zealand focused on service-oriented workforces as their quintessence (Brougham et al., 2020). This study's respondents perceived automation as giving them new chances, possibly even boosting their current professions, which could be considered a noteworthy benefit. To complement the findings from the literature, individual expert opinions and experiences from the interviews are presented in the following section. In Table 3, the findings for RQ1 on performance assessment are summarized with corresponding questions to be asked.

Table 3: Summary of RPA performance indicators.

| Attributes | Corresponding performance question |
|---|---|
| Reduced Handling Times | How much human working hours are saved by through software robots? |
| Cost Savings | How much money can be saved by deploying software robots? |
| Lower Error Rate | How high is the error rate with respect to total process executions compared to a human's performance on the same task? |
| Employee Skill Growth | How have the employees' qualifications developed since the adoption of RPA? |
| Bot Usage | How heavily are the robots utilized compared to their maximum capacity? |
| Standardization | To what extent has the diversity of process execution workflows been reduced? |

# 5 INTERVIEW FINDINGS

The participants of the interviews were questioned about their experiences regarding the impacts of RPA on the performance of their companies and their thoughts and recommendations for sustainable implementation. While the former answers primarily RQ2, the latter forms a further basis for answering RQ3. For comprehensibility, the identifiers from Table 2 are used. Asked for the impact factors, Int1 responded that especially time savings and the reduction of errors as well as the constant availability of services, independent of human employees, are considered as the main advantages for his business. The monitoring of these factors was explained with "*We share weekly and monthly performance reports on each process from different bots to understand the success/exceptions*". In contrast to these quantifiable measures, Int2 stated the quality of work, number of impacted workers, and job satisfaction as a few more qualitative factors. As the means for assessment, "*customer feedback, stakeholder meetings, and discussions*" were mentioned. The third participant, Int3, focused his answers on time-related aspects, stating bot utilization, potential for reusage, general time savings and delays in execution as additional factors to the overall quality of work. For assessment, "*project monitoring and stakeholder meetings*" were stated for measuring RPA impacts.

In summary, answering RQ2, seven umbrella terms for organizational impacts could be agreed on: (1) productivity and (2) quality improvements, (3) increased cost effectiveness, (4) employee and (5) customer/stakeholder satisfaction, (6) adaptability and reusability of robots, and (7) improved compliance and comprehensibility of processes. The responses provided throughout the interview suggest that the majority of the time, sustainability is

dependent on the demands of the client and any potential post-deployment problems. When questioned about the post-deployment support offered by their organization, Int1 replied: "*In some cases, we have a production support team responsible for monitoring and resolving any immediate issues before raising them with the development team. In other cases, we have trained the client's team to handle such issues. For the rest, we ourselves are responsible for post-deployment support*". Int2 highlighted the importance of a dedicated unit for software robots in a company: "*The center of excellence takes care of delivery. It keeps updating documentation and upgrading versions*". Project sustainability is heavily influenced by an organization's capacity to serve its customers and the warranty period for such assistance. Int3 advised to have separate teams for post-production support. First, developers who are responsible for handling technical problems related to the bots and, second, controller team responsible for operative maintenance (scheduling, starting, stopping, and troubleshooting). As a description for the support process, Int2 stated: "*It is the user that notices that the bot is malfunctioning. If the error is not a business one, they open a ticket, and the center of excellence goes to see the logs. If they notice a change in the user interface, they modify the code in the validation environment first. Then the documentation is updated"*. Therefore, it is important to note that a sustainable implementation should be ongoing. In addition, effective change management and employee acceptability are essential for the long-term implementation of RPA in an organization. To reduce uncertainty within an organization, *RPA awareness* should be raised early, emphasizing the advantages and potential of the technology.

# 6 SUSTAINABLE RPA IMPLEMENTATION MODEL

In this section, a sustainability model for successful long-term RPA implementation is proposed, according to the definition presented in section 2. It provides an overview of the guidelines with regard to the various stages of RPA implementation. Businesses that want to build a sustainable operating model for their automation and gain maximum enterprise-level benefits typically triangulate aspects such as identifying scaling factors, acquiring resources that make the model self-sufficient, and organizing the automation team for a successful drive.

The insights from the expert interviews frequently overlap with the findings from the literature when studying the stages of a typical RPA project lifecycle. The model presented here divides RPA projects into three phases and incorporates many factors that have been gathered through the theoretical groundwork.

The first phase is based on the project life cycle's planning and conceptualization phase, which may alternatively be considered as initialization. In order to simplify the mapping process, the solution design and user acceptance phases have been integrated into phase two. Furthermore, this involves designing, developing, and testing the software bot. The RPA phases known as deployment, maintenance, and scaling are consolidated in a single step termed as maintenance and scaling. The overall model is depicted in Figure 3 and subsequently explained in more detail in the following sections.

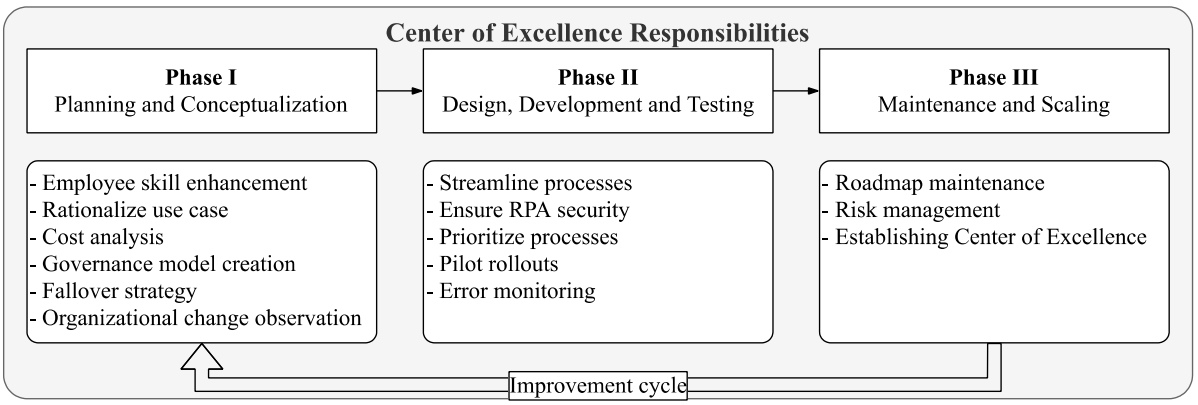


Figure 3: Model for sustainable RPA implementation.

### 6.1 Phase I - Planning and Conceptualization

The fate of an RPA project is determined by a number of factors and challenges. Preparation in the form of skills and awareness before beginning the RPA journey might be crucial to the project's long-term sustainability. This is made possible by doing a thorough study of processes to determine their degree of automation, identifying problems encountered throughout the various phases of the project, analyzing variables to overcome these challenges, and implementing business process reengineering if necessary.

**Employee Skill Enhancement Program.** The unavailability of trained and skilled employees for development, support, upgrade, and post deployment maintenance of RPA technologies pose a potential bottleneck for management trying to invest into a new technology. Delays in deployment could result from a lack of training resources for creating, deploying, supporting, and upgrading software robots. Employee training, along with other client services like customer support and maintenance services, should be prioritized while using RPA (Ivančić et al., 2019). The training could consist of several intensities, beginning with basic instructions in the use of RPA software to constantly learning and improving technical skills.

**Rationalize Use Cases.** The main agenda behind using RPA is to standardize processes, reduce the overall costs and time taken to execute a particular process. Automation enables companies to reduce employee costs and instead use a robot that performs the same function much cheaper with lower execution time. Hence, it is critical to identify and rationalize business use cases that can be streamlined and then automated. It is essential to understand how to compare the current costs of running a process by humans and the costs of running an RPA program, which involves different types of expenses such as licenses, installation, maintenance, support, and training. The comparison between the two variants of the process, one with an employee and the other with automated bots, should be positive. If not, the organization will suffer losses. In order to use RPA sustainably to improve business processes with a positive return on investment, a use case should be identified as *ideal* for automation first. For RPA to be successfully implemented and widely adopted, a central hub as a *center of excellence* (CoE) should exist and made responsible for all RPA-related endeavors. The CoE should have deep knowledge of all aspects of the business and be able to assist with internal expansion plans.

**Cost Analysis.** RPA vendors guarantee drastic lowering of costs while raising the quality of work. Before beginning the automation process, stakeholders must assess the costs involved, not just in terms of spendings but also returns. Also, a major benefit to be considered which augments users' return on investment is the repositioning of internal employees.

**Governance Model Creation.** IT governance is a structure for an organization that ensures the alignment between IT strategy and business strategy. The governance team is in charge of a specific number of responsibilities, including but not limited to the control of risks, the protection of data, and the recovery of the system after it has faltered. When integrated with other technologies, RPA creates a complex structure that necessitates the establishment of a reliable governance system (Willcocks et al., 2018). In the conducted interviews, the respondents included factors such as IT governance model, a well thought out internal audit and compliance strategy, error handling, documentation and discussions with process subject matter experts to really understand processes. According to Int2, in their respective firm, the amount of time needed for software robot deployment was drastically cut down due to the standardization and centralization of development as more and more procedures were automated. Organizations can gain a firm grip on a project by first laying a solid groundwork of careful planning and then creating a set of well-thought-out governance models. This eventually leads to a stable ecosystem for the organization to grow.

**Failover Strategy.** Business continuity and system failure hampers business as usual. It is critical that executives at the highest levels of the organization provide support to the IT team, ensuring better failover and system reliability. IT teams are completely responsible to identify any potential impact for systems, storage and backups, as well as providing the necessary access rights for certain jobs. An emergency staff member should always be available in case a malfunctioning robot requires human intervention.

**Organizational Change Observation.** Organization structure might have to be reorganized to include RPA into the plans (Smeets et al., 2021). All

organizational changes due to automation should be openly discussed in meetings and made transparent. Changes in the work process are common and must be dealt with by all departments in order to compete at the greatest level.

## 6.2 Phase II - Design, Development and Testing

Project managers, developers, solution architects, and business analysts all collaborate to work efficiently throughout this phase of an RPA project. Planning both short-term and long-term objectives facilitates the implementation of comprehensive customer solutions. During this phase, the RPA team and the partner vendor define the appropriate process as well as the technical and business stack needed to successfully implement the software robots.

**Streamline Processes.** The analysis shows that RPA implementations with high success ratings have much greater levels of pre-work done in recording and documenting processes. Another essential aspect is process preparation with subject matter experts. After approval from the stakeholders and management, the RPA project advances to its planning phase. For large RPA projects, the project should be broken down into sub parts, as this structure allows the development team to assign tasks objectively. Here, the team, along with the project manager or solution architect and other assigned members, would establish the project's scope, including strategic goals, budgeting, milestones, functions, and timeframes. Processes should be streamlined depending on the complexity of the tasks at hand. According to the interviewees, the success of RPA implementations is dependent on their ability to be monitored and secured under governance.

**Ensure RPA Security.** Data leakage and fraud are two of the major potential risks for automatically operating software robots. During the initial process assessment and analysis phase, a business analyst and the IT team should conduct workshops to identify processes and perform risk assessments. Factors of RPA security, pre-implementation risk assessment, risk analysis, hazard analysis, and threat analysis can help to overcome the challenges that a typical RPA implementation may encounter (van der Aalst et al., 2018).

**Prioritize Processes.** Not all processes are suitable for this type of automation because, as previously stated, robots used RPA are designed to do repetitive tasks (Fung, 2014). A pipeline of tasks which satisfy the criteria of being repetitive, high volume, based on mostly structured data, and with only few changes expected in the future is ideally selected for automation and then arranged based on the level of difficulty and the team's bandwidth in terms of available time resources.

**Pilot Rollouts.** Based on the findings from the interviews, it is common for businesses to want to skip parts of the preparatory work required for RPA implementations. Often, the expectation is for speedy and low-cost installation, which results in the system not performing to its full capacity. This has frequently resulted in pilot program failures, and it may also make scaling the company's RPA journey difficult. Therefore, pilot rollouts for RPA implementations are critical for companies. *Proof of concept* is often used to refer to preliminary RPA implementations that are still in the pilot stage. Such implementations can act as confirmation of the practicality and viability of RPA technology for the specific application (Willcocks et al., 2018).

**Error Monitoring.** Lack of ownership and poorly defined responsibilities along with inconsistency of data in different environments all lead to poor execution or create pitfalls for the development team. Following predefined security considerations within the IT team can help ensuring a smooth execution of development and deployment approaches.

## 6.3 Phase III - Maintenance and Scaling

Infrastructure management, a roadmap for incorporating new technologies for sustainable progress, risk management, and the establishment of a center of excellence are all necessary for the long-term viability of the RPA concept.

**Roadmap Maintenance.** One of the main inferences from the interviews was that the use of RPA is intended to be enhanced with newer technologies such as optical character recognition, machine learning, natural language processing, and so on. Since it is expected to ensure stable long-term usage, planning in this regard in terms of thinking and organizing the firm internally to have such capabilities to improve scaling efforts is vital. This adds a level of intelligence into the bots which allows a broader usage of RPA and consequently expands its applicability and sustainability. Strategic planning by

the management can ensure a smooth transition into such maturity within the organization.

**Risk Management.** Allocating IT resources and a well-structured change management can ensure a smooth integration of other technologies along with RPA. In IT, one of the most prevalent issues is a security breach, but other problems like unintentional system failures may also occur. One of the most important things to do at this stage is to create a fallback option that takes into account all of these possibilities.

**Establishing a Centre of Excellence.** When it comes to implementing and adopting RPA, a well-established center of excellence serves as a hub. It is accountable for providing consolidated knowledge across all company functions and assisting with internal scalability and it orchestrates the constant new adding of features, while supervising bug fixing in older versions. It can also aid in scaling inside the company and have specialized knowledge in various business operations. The CoE should further incorporate stakeholder interaction into its workflow. Change management and a reliable governance model are both helpful in this regard.

The overall model is extended by a continuous improvement cycle, using the proposed components and then making changes and additions through introspection to pave the way to a sustainable RPA realization.

# 7 CONCLUSION

The proposed model for sustainable RPA is designed to act as a framework for firms aspiring to implement RPA. The goal of this paper was to identify factors that lead to the success of RPA projects as well as factors that may influence their failure. To this end, an SLR and interviews were conducted to determine critical factors that cloud ultimately be used to compose a model for the sustainable development and deployment of software robots. Some of the top factors identified are sufficient pre-work and analysis in identifying appropriate processes for automation, establishing an internal center of excellence, and creating awareness amongst both employees and customers. The factors uncovered throughout the research were then amalgamated and classified into different phases of a project lifecycle. The empirically derived aspects can be used as guidelines for organizations that are starting their journey and also for firms that have successfully scaled RPA. These criteria can significantly increase the likelihood of sustainable RPA, which is especially important given the number of times companies have reported failing to scale up RPA following their pilot project. For the purpose of evaluating the model as stated in the methodology section, one could involve conducting surveys and soliciting comments on the methodological framework proposed. Furthermore, research can be undertaken in the form of case studies in various sectors and organization sizes, where the approach is put to the test while engaging all key stakeholders. When conducting case studies, it would also be valuable to see how goals and aspirations change over the course of an RPA journey. Awareness of the notion might lead to a shift in the prevailing attitude, which in turn can facilitate quicker scaling, but it is also important to keep in mind that contextual factors may play a crucial role. The list of essential success factors and requirements outlined in this paper may be expanded in light of the arrival of a new generation of intelligent automation technologies. Therefore, it is important to investigate the necessary modifications to this project management approach to make it useful for artificial intelligence and machine learning.

Pointing out the important challenges identified in the study also highlights that a significant percentage of RPA initiatives do not move from the pilot phase to the advanced phase. Case studies can be conducted to better understand stakeholder ambitions and customer onboarding. Likewise, all the critical factors mentioned in the article can be put to the test before embarking on the digital transformation journey.

Other effects that automation may provide are also worth investigating. It is important to evaluate the impacts of freeing up staff members to focus on more innovative, high-value work. Sustainable RPA is relatively new and requires more research and development in order to make it more stable and economically feasible. The model may be thoroughly evaluated from a financial point of view, with a study able to look at the total investment across the entire project and compare it to the current state of the art.

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