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Sustainable Banking through Robotic Process Automation: What Role does ESG and Cognitive AI play?

Olivia Joseph*

Institut Mines-Telecom Business School, France

Abstract

This study explores the factors for implementing Robotic Process Automation (RPA) solutions that contribute to the advancement of sustainable banking. The banking industry faces the dual challenge of maximizing operational efficiency while embracing environmental responsibility to align with long-term sustainability objectives in an era of technological advancements and intelligent tools. Employing a qualitative research approach, this study leverages a prominent French bank case study supplemented by semi-structured interviews with bank personnel. Drawing insights from an extensive literature review and interview responses, the findings uncover three factors (Cognitive AI, Environmental, Social, and Governance (ESG) objectives, difficulty of implementing the RPA solution) critical for effectively implementing sustainable RPA within the banking sector. The findings of this research offer practical insights and relevant solutions for promoting sustainability within the banking sector while harnessing the potential of robotic process automation.

Keywords

Robotic Process Automation, Sustainable Banking, ESG, Cognitive AI

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1. Introduction

In today's rapidly evolving technological landscape, industries are tasked with finding innovative ways to balance efficiency with environmental responsibility. As a cornerstone of global economic activity, the banking sector is no exception (Brunen & Laubach, 2022). The need to foster environmental stewardship within the banking industry has become paramount amid growing concerns about climate change and sustainable development. In the context of increasing awareness regarding the impact of human activities on society and the environment, sustainable banking has become an increasingly important topic for financial institutions (Azin et al., 2021). Indeed, these key actors must ensure that they respect environmental and social standards and actively participate in sustainability development. Sustainable banking provides "financial products and services, which are developed to meet the needs of people and preserve the environment while generating profits" (Yip & Bocken, 2018). This includes various measures such as supporting environmentally friendly projects, impulsing financial inclusion, and reducing the negative impacts of activities on local communities (Brunen & Laubach, 2022). To be labeled as sustainable, the bank's activities must contribute to at least one of the three pillars of sustainable development, also known as the Environmental, Social, and Governance (ESG) objectives. The actions can be related to various topics such as gender equality, and carbon emissions, as it is shown in Figure 1.

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*Corresponding author: e-mail addresses: oliviaj.joseph@yahoo.fr (O. Joseph)

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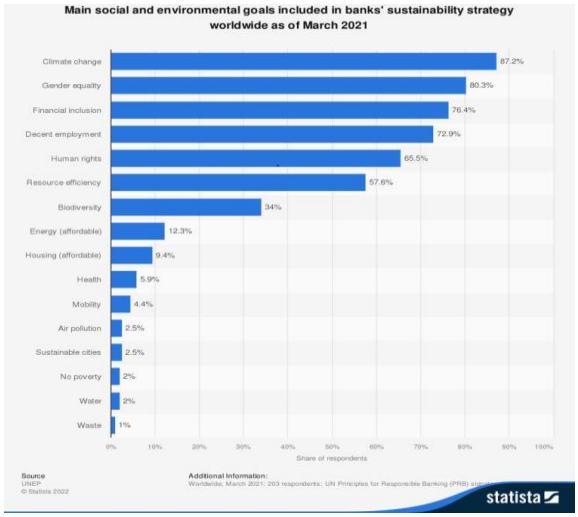

Figure 1: Main social and environmental goals included in the bank's sustainability strategy worldwide (Statista, 2022)

Over the past few decades, we have seen the emergence of new technologies in the banking industry, with the primary goal of increasing worker productivity and profits (Khattak et al., 2023). RPA is a technology that helps achieve this goal. Robotic Process Automation is a technology that uses software robots or "bots" to automate repetitive tasks and rules in business processes. By using RPA, organizations can automate repetitive manual tasks using software "bots" or "robots" that can mimic the actions of a human user. RPA can be used to “automate tasks such as data entry, transaction processing, and responding to customer inquiries” (Huang & Vasarhelyi, 2019). The quoted benefits of RPA are commonly regrouped around erasing repetitive tasks, reducing cost, and improving quality and efficiency, as shown in this graphic. In this context, using RPA can be seen as a solution to improve the energy efficiency and sustainability of banking processes. "Although banks are not considered to have a direct negative impact on the environment, they do have indirect impacts due to the intensive use of paper, substantial energy consumption, and unsustainable actions of their customers" (Furrer et al., 2012; Korzeb & Samaniego-Medina, 2019). Robotic process automation (RPA) has been increasingly adopted by various industries in recent years, including healthcare, insurance, and the automotive industry (Erebak & Turgut, 2021).

The topic of RPA in sustainable banking is interesting to develop because we can notice two major gaps in the literature. The first concerns the concrete benefits of RPA in the sustainable banking sector. Indeed, in the articles, many mention the benefits of the solution but never through specific examples (Moreira et al., 2023). The second is related to the implementation of sustainable RPA. We have little information on the critical success factors for implementing RPA in sustainable banking. *“There are no works that contemplate the pillar of Environmental Sustainability, which leaves the door open to be one of the first works that evaluate technology in terms of this level of sustainability”* (Patrício et al., 2023).

It is in this perspective that this study aims to answer the following question:

RQ 1: *How can RPA solutions and their implementation in bank activities contribute to the development of sustainable banking?*

RQ2: *How to implement a sustainable RPA that would impulse bank institutions' sustainability?*

To provide the most complete answer to this problem, here are aspects that must be studied:

- The concrete benefits of Sustainable banking
- The main factors that play a role in Sustainable banking through RPA solution
- The existing framework and how it can be improved in the context of sustainability

Table 1: Literature Review

Paper Title	Objectives/ Research Question	Theory/Model/Framework	Methodology	Results
(Plattfaut et al., 2022)	What are CSFs for RPA, how can these be categorized, and how do they interrelate? How do these CSFs for RPA differ from the generally accepted CSFs of other process-related technologies or process im- improvement approaches?	The RPA lifecycle	Systematic literature review	This study provides valuable insights into the CSFs for RPA, which can be used by organizations to improve their RPA implementation efforts.
(Moufty et al., 2021)	What are the key characteristics of the ESG controversies in the European market?	Generalized Linear Model (GLM)	Qualitative and quantitative	Provides insights into the types of issues that can arise when businesses do not prioritize environmental, social, and governance factors.
(Whang et al., 2022)	How personalized messages from chatbots influence consumers? What are the possible mediators in the relationship between personalized chatbot messages and consumers' patronage behavior?	Technology Acceptance Model (TAM) Interactivity Theory The concept of cognitive control	Quantitative method	Personalized messages allowed by chatbots have a positive impact on customers' behavior. It happens that consumers feel comfortable receiving suggestions and pieces of advice from a robot.
(Sobczak, 2022)	To develop a classification of the approaches to RPA positioning within enterprises, based on literature studies and proprietary research, and to determine the consequences of choosing each of these approaches; and to verify whether companies that strategically position RPA and treat it as a tool for digital transformation increase their organizational resilience.	The Homogeneity Analysis Method (HOMALS)	Mixed-Method approcah	Based on the interviews, the study confirms that RPA "ensures a high level of organizational resilience, which is demonstrated by the. "
(Hsiung & Wang, 2022)	The objective of this study is to explore the relationship between the characteristic variable gender, daily use time of the system, CEO support, and the six factors of information system success. (Information quality, system quality, system satisfaction, system use benefit, system use attitude, and use willingness to use the system)	Technology Acceptance Model (TAM) and Information System Success Model (ISSM) Theory of Reasoned Action (TRA)	Literature review and closed questionnaire	This study identified various factors that play a role in the good implementation of RPA through a case study of a firm in Taiwan.
(Cabello Ruiz et al., 2022)	To define a framework for RPA implementation that takes into consideration the psychological, technical, and governance factors. To identify the challenges related to human-robot collaboration.	Human in the loop theory The BPM-centric approach (Business Process Management) The RPA-centric approach.	Creation of a materialized RPA situations	The framework created in the study benefits the collaboration of humans and robots. It has been tested in real-life situations and it was shown that it is applicable.
(Taneja & Ali, 2021)	To understand the customers' perspective of environmentally sustainable banking services in the	Theory of planned behavior (TPB), Innovation Diffusion Theory (IDT), Theory of Reasoned Action	Structured questionnaire	The results revealed that bank customers develop sustainable consumption and use of banking services

	Indian economy.	(TRA), Technology Acceptance Model (TAM), Unified Theory of Acceptance & Use of Technology (UTAUT)		intentions due to a positive attitude towards sustainable use of services.
(Huang & Vasarhelyi, 2019)	The objective is to create a framework for a good implementation of RPA processes in an audit. Therefore, it will facilitate its adoption in various industries.	The Automated Contract Analysis System (ACAS) framework of Zhaokai and Moffitt (2019)	Systemic Literature review	The framework created in this paper help to impulse the introduction of RPA in audit, by proposing a tailor-made plan. It also highlights the potential benefits of this solution in the sector that mostly remain unexplored.
(Kanakov & Prokhorov, 2022)	What are the possibilities of combining RPA and Artificial Intelligence?	Analysis of RPA processes architecture on UiPath software.	Literature review	Combining the two technologies allow us to emphasize the already existing benefits of RPA but also to go further in the field of application.
(Ogbemhe et al., 2017)	To highlight the achievements made by automated processes in the manufacturing industry. The second objective is to understand how robotic processes can sustain complex manufacturing systems.	The Framework of AREUS approach on eco-friendly manufacturing. The Seam Tracking system of Wang, Zhang	Literature review	Industrial robot processes have a leading role in improving productivity while promoting sustainable practices in the manufacturing sector.
(Patrício et al., 2023)	What are the decision models for the implementation of Robotic Process Automation that exist in the literature?	Analysis of decision support models for RPA Implementation RPA Governance Assessment Model RPA Financing Return Assessment Model RPA monitoring assessment model	Literature review and bibliographic analysis	The sustainable aspect of RPA implementation is widely discussed in the literature review, but almost only through the aspect of the economy.
(Tongkachok et al., 2022)	"The paper gives several things: it provides the fundamental concepts underlying employee engagement, it discusses the factors necessary to ensure that AI encourages employee engagement, and issues of AI control and its impact on employee outcomes such as job satisfaction, meaningfulness, and retention. "	Theory of Social Identity	Literature review	For Artificial Intelligence & RPA to contribute to Diversity and inclusion within a company, it must respect 3 factors: “Bring in the appropriate knowledge, adopt fairness standards, Make use of the relevant information and methods”
(Moreira et al., 2023)	"• RQ1: How to define RPA technology? RQ2: What are the benefits that companies get from RPA adoption? RQ3: What are the challenges in RPA adoption? RQ4: What are the main characteristics of the processes eligible for RPA? RQ5: What are the gaps in research related to RPA?”	SLR Method	Literature review	The definition and the theoretical benefits of RPA are well explained in this literature review. The results also highlight the gap in the literature regarding the concrete benefits of this technology in a company and open the path for another future research.
(Flechsig et al., 2022)	“RQ1: What are the potentials and barriers for RPA implementation in PSM? RQ2: What should organizations consider for implementation, and which PSM application areas arise? RQ3: What are the differences between private and public procurement organizations regarding RPA? “	Technology-organization-environment (TOE) framework	Applied qualitative research, case studies, and semi-structured expert interviews.	Organizations can assess their digital procurement readiness and maturity by evaluating technical, organizational, and environmental factors and using a scale to quantify their readiness.
(Azamfirei et al., 2023)	"The analysis aims to reveal how the quality inspection is currently performed. Furthermore, the current study aims also to identify issues and weaknesses of the current practices that need to be tackled in future research studies	Zero Defect Manufacturing (ZDM) framework.	systematic literature review	By integrating automation and Industry 4.0 technologies, manufacturers can achieve more efficient, accurate, and adaptive quality inspection processes.

	and will help towards ZDM and Zero-Waste productions."			
(Azin et al., 2021)	How does the integration of electrified infrastructure and automation contribute to cleaner mobility systems? What factors need to be considered when planning charging facilities for autonomous electric vehicles? How to explain the concept of the coupled electricity-transport network (CPT) and its role in the demand coverage optimization model?	Chargers' allocation optimization model and use of a CPT optimization framework.	Literature review, and CPT optimization framework	The integration of infrastructure and electrified automation, particularly in the context of driverless electric vehicles, plays a crucial role in promoting cleaner mobility systems by reducing emissions, improving energy efficiency, and ensuring the transition to sustainable energy sources.
(Sánchez-García et al., 2023)	To give a better understanding of how the Adaptive-Comfort-Control-Implementation Script functions and how it could be a useful script for energy-related issues.	The Adaptive Comfort Control Implemented Model ("ACCIM"), Adaptive Comfort Model, Energy Management System (EMS), ASHRAE Standard 55, and European standard EN16798-1 models.	Data from the Energy Plus application	The model permits to enhancement of a building's energy efficiency, by allowing it to regulate energy consumption and therefore avoid waste. Nevertheless, the method might be too time-consuming because most of the process requires manual/ intervention.
(Yip & Bocken, 2018)	Which sustainable business model archetype(s) would benefit the sustainability of the banking industry? Which archetype(s) would receive the best customer traction? Which archetype(s) would enhance customers' loyalty?	The theory of planned behavior	Mixed-method approach and semi-structured interviews	There are no radical changes observed in the bank practices and the adoption of these sustainable practices. Imposing a radical new sustainable model for banks could be dangerous for their activities. It is better to take the changes slowly.

2. Literature review

The following is a sample of the various articles that were used to achieve this study. All the articles quoted in this paper were found on Google Scholar, Science Direct and Business Source Complete. The articles are all peer-reviewed and were published over the last decade.

2.1 Cognitive Artificial Intelligence Linked to Sustainable Banking through RPA

The modern banking industry is undergoing a profound transformation driven by technological advancements. Among these technologies, Cognitive Artificial Intelligence (AI) stands out as a powerful tool with the potential to reshape the landscape of sustainable banking (Gradim & Teixeira, 2022). This transformation is further facilitated by integrating Cognitive AI with Robotic Process Automation (RPA), a synergy that offers a unique avenue for enhancing operational efficiency while aligning with the imperatives of sustainable banking practices (Hong et al., 2023). The use of RPA helps to minimize the impact of human activities on the environment. This solution can be made even more effective by combining it with existing new technologies (Ogbemhe et al., 2017). This section will explore how cognitive AI can contribute to sustainable banking through RPA. Cognitive AI refers to using advanced machine learning, natural language processing, and other forms of AI to enable computers to understand and process information like human cognition (Lieto et al., 2018). This can include text comprehension and interpretation, pattern recognition, and data-driven decision-making.

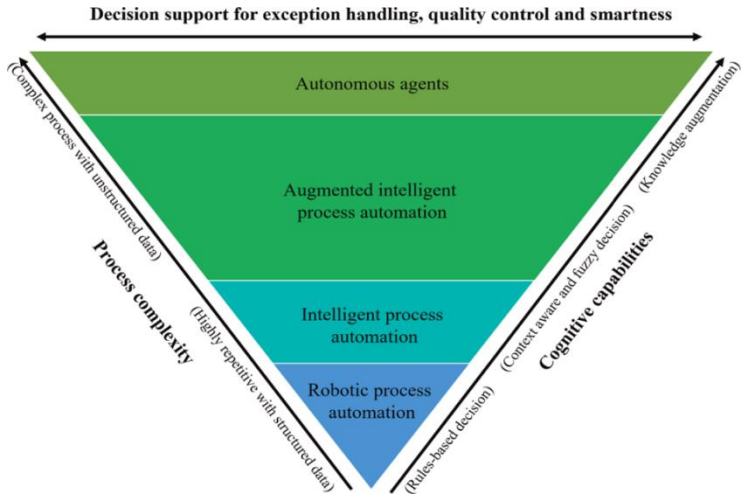

Figure 1: An overview of IA application scenarios (Ng et al., 2021)

Figure 1 highlights the different types of Artificial tools and the use cases they're the most adapted to Ng et al. (2021). The more AI is in a tool, the more it will be able to handle complex tasks. RPA is the first step of automation because it is not an intelligent tool. It operates based on its program and can only handle structured data and repetitive tasks. On the other hand, the autonomous agent is the most innovative tool, having the ability to operate on highly complete tasks and handle unstructured data (Hsiung & Wang, 2022). This schema can help understand how much of a key factor Artificial Intelligence turns out to be for sustainable banking through RPA. In the context of improving existing technologies, cognitive artificial intelligence and RPA could be used to automate various processes and improve efficiency, reducing manual labor and improving task accuracy. Cognitive artificial intelligence (AI) is a subset of AI that enables machines to understand and learn from complex data sets (Veiga et al., 2023), making it an ideal tool for sustainable banking. For example, a bank could use RPA to automate loan application processing while using cognitive AI to analyze customer data and provide personalized financial product and service recommendations (Kanakov & Prokhorov, 2022).

Combining the two factors in the context of sustainable banking will help create an optimized process that will improve sustainability efficiency. Another area where cognitive AI can contribute to sustainable banking is customer service.

Banks can provide customers with personalized and efficient service 24/7 by using chatbots powered by cognitive AI. These chatbots can answer questions, assist customers with transactions, and provide financial advice, improving the customer experience while reducing banks' operational costs. The advantage of the chatbot solution is that it works at any time (Korzeb & Samaniego-Medina, 2019). Therefore, a consumer could ask their question to the chatbot whenever he needs it, and the chatbot would be able to provide an answer. It formulates personalized answers to the customer, which reduces the risk of a customer's feeling the lack of interaction (Kanakov & Prokhorov, 2022).

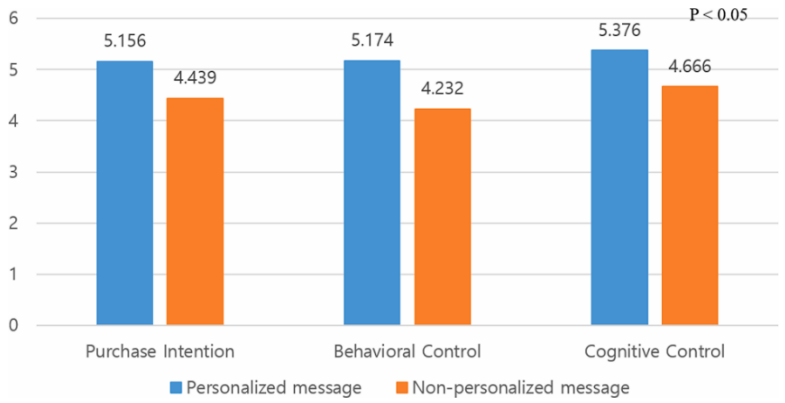

Figure 2: Main effects of personalized messages of chatbot

Figure 2 shows that personalized messages sent by chatbots positively impact the consumer (Wang et al., 2022). The behavioral control variable measures how easily the chatbot has made the buying process. The cognitive control variable measures how easily interacting with the chatbot is. The participants had to answer various questions regarding the three pillars according to a Likert scale from 1 to 7. Therefore, the numbers shown on the diagram are the averages calculated by every answer (Waheed et al., 2016). It highlights that with personalized messages, consumers are willing to buy the products promoted because they feel the solution suggested is adapted to their needs and have the impression that the chatbot understands their problem and is taking it into account in the process. In addition, chatbots can help banks identify customer needs and preferences, allowing them to tailor their products and services to customer demand (Whang et al., 2022). Cognitive AI can also contribute to social challenges within the bank by promoting inclusion, diversity, and employee engagement. For a company, this concept can be defined as attracting the employees' attention to keep them interested in their missions and their position in general (Yip & Bocken, 2018).

Figure 3: Employee Engagement

Two main theories are used to achieve this goal (Tongkachok et al., 2022):

- The first one is the idea that it is important to value employees' work. This can be done through rewards or by the manager being available to the employees, listening to them, and guiding them if necessary (it is included in the "leadership" category of the schema). But it is also promoted by giving the employees professional opportunities, allowing them to achieve more and feel useful.

In this context, AI can be used to identify and recognize employee achievements and contributions. AI systems can analyze data relating to individual performance, targets achieved, and positive feedback to offer personalized rewards and incentives. This promotes employee motivation and engagement by recognizing their hard work and reinforcing a positive environment.

- The second theory explores the idea that employee engagement is linked to their happiness regarding their mission and workplace happiness. (“Employee well-being” and “work relationship” items of the schema). This also includes the inclusion and diversity factors.

Artificial intelligence could be a great asset to promote the agents' well-being. AI can analyze large amounts of data. It could be used to analyze employee-related content, such as satisfaction surveys, employee feedback, and performance data, to identify trends, patterns, and opportunities for improvement. This information can be used to make data-driven decisions, implement targeted initiatives to improve employee engagement, and anticipate potential problems.

2.2 The difficulty of implementing the RPA solution

Implementing Robotic Process Automation (RPA) solutions presents a promising avenue for improving operational efficiency across various industries, including the banking sector (Gradim & Teixeira, 2022). RPA involves automating rule-based, repetitive tasks using software robots or "bots," which can reduce human errors, increase speed, and enhance resource allocation. However, adopting RPA is not without its challenges, which become particularly intricate when viewed within sustainable banking practices (Khattak et al., 2023). To introduce RPA solutions in sustainable banking, there is the need to ensure that ethical and environmental considerations are addressed. Banks need to be aware of their automation processes' impact on employees, customers, and the environment (Erebak & Turgut, 2021).

For example, the main common idea when using RPA solutions is the fear of robots replacing humans. Indeed, the development of new technologies increases the feeling of Job Insecurity. Another challenge of implementing RPA solutions in sustainable banking is complying with regulatory requirements and ethical standards. Banks operate in a highly regulated industry, and compliance with regulations and ethical standards is critical to maintaining customer trust (Kitamura, 2022). Implementing RPA solutions that do not comply with regulatory requirements or ethical standards can

result in costly fines and damage the bank's reputation. Therefore, banks must ensure that their RPA solutions follow the same standards as the rest of their activities. The RPA projects must be followed closely and monitored to be sure that they respect the ethics of the banks, which would allow the banks to be even more sustainable. The technical difficulty of RPA solutions is not specific to sustainable banks (Taneja & Ali, 2021). Indeed, RPA solutions require significant investments in technology, infrastructure, and training, which can be costly (RPA being a low-code software, there is a need to buy licenses for the developers of the company, which can be expensive) and time-consuming (Asatiani et al., 2023). In addition, RPA solutions must be integrated into existing systems and processes, which can be a complex and challenging task. Sometimes, the use cases the banks select do not meet all the criteria for the technology to be implemented. In this case, it is better to look for another type of technology (Stauropoulou et al., 2023). Banks must ensure that their RPA solutions are scalable, flexible, and adaptable to changing needs and circumstances. They must be certain that they have the resources to implement such projects. **Error! Reference source not found.** is an example of the questions that must be answered before launching an RPA program (Asatiani et al., 2023). It is a good basis that regroups the main characteristics involved in the process (IT practices, sensibility of the process, development).

Table 2: "The full operating-model decision checklist"

	"Does your organization have a sourcing policy or strategy in place that prescribes a specific sourcing model for IT projects?"
"Who?"	"What are your organization's relevant software development capabilities at present?"
	"What are your organization's relevant process-development capabilities at present?"
	"Do you foresee a need for rapidly scaling the RPA projects up or down?"
	"Does your organization have established practices, policies, or strategies for IT deployment?"
"How?"	"Does your RPA project require direct control over the robot while it is performing the tasks?"
	"Do you foresee a need for rapidly scaling up or down the number of robots deployed?"
	"What are the feature requirements for your RPA project?"
	"What other/add-on services does your RPA project require, beyond the generic
"What?"	features?"
	"Do developers within your organization prefer to work with any RPA technology?"
	"Do the external consultants prefer to work with any specific RPA technology?"
	"How sensitive is your project to costs associated with IT procurement?"

According to the present research, all these questions must be answered to launch an RPA process accurately. This is a good way to avoid potential errors or problems during the different steps of the launching phase. Ensuring data security and confidentiality is a key challenge in implementing RPA solutions in the sustainable banking industry. RPA solutions require access to sensitive and confidential data and ensuring the security and privacy of this data is essential to maintaining customer trust (Sobczak, 2022). Banks must ensure that their RPA solutions are designed to protect data privacy and security and meet regulatory requirements and ethical standards (Moreira et al., 2023). Next, the impact and likelihood of each risk need to be assessed and prioritized. Risk assessment for Robotic Process Automation (RPA) involves identifying, evaluating, and managing the risks associated with using software robots in an operational environment (Hong et al., 2023). The first step is identifying potential risks, such as data security, confidentiality, business process integrity, and regulatory compliance. Mitigation controls should be put in place to mitigate identified risks, such as additional security measures and monitoring procedures (Fosch-Villaronga & Heldeweg, 2018). This also includes legal regulation. An incident management plan should be developed to respond to RPA-related incidents.

Figure **4** is a general framework on how to be prepared in case of an incident. It can be applied in various sectors, including RPA in banks (Caldwell, 2012). To create such a framework for RPA, it is important to analyze all the potential incidents that could happen. Then, there is a need to find a

solution for each scenario. Therefore, if one of these "worst-case scenarios" happens in real life, the company will already have a plan to follow to contain the incident and repair the RPA process (Sánchez-García et al., 2023).

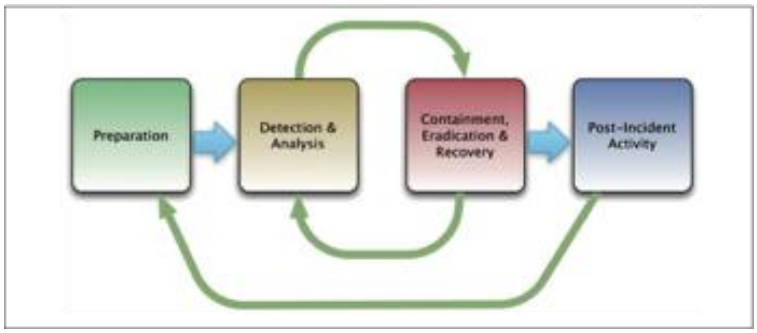

Figure 4: The incidence response Lifecycle

User training and awareness are essential to reduce the risks associated with the inappropriate use of software robots. Ongoing monitoring and evaluation can identify new threats and measure the effectiveness of mitigation measures.

2.3 Environmental Social Governance Objectives through RPA

2.3.1 Environmental Objectives through RPA

Reducing paper-based processes is the most common idea regarding sustainable RPA. Traditional banking processes generate significant paperwork that must be printed, scanned, and stored. This process consumes paper ink and energy for printing and storage. Robotic Process Automation can automate these processes by capturing data from digital sources and automatically filling out the required forms. This automation eliminates the need for paper-based processes, reducing the environmental impact of banking operations and energy consumption. RPA can help banks move to digital documents, reducing the required physical storage space and simplifying document retrieval. This reduces the carbon footprint associated with physical storage. The same approach can be applied regarding energy consumption. It is another important sustainability goal for banks. RPA can help banks achieve this goal by automating tasks that require large amounts of energy, such as data entry or processing. By automating these tasks, RPA can reduce banks' energy consumption and carbon footprint. This significantly reduces the energy banks consume, lowering energy bills (Azamfirei et al., 2023). These examples are like Zero-defect manufacturing because it aims to avoid waste through an RPA solution (here, it would be a waste of energy and material such as paper), to create an efficient process. This also positively impacts the workforce because the agent will be able to focus on more critical, complex, and precious tasks. The agents will feel useful to the company, as it prevents them from "wasting their talents"(Gradim & Teixeira, 2022). The RPA's contribution to environmental issues in the banking sector can also be done through small actions. RPA can be used to optimize energy use in buildings, reducing the amount of energy needed for heating, cooling, and lighting (Moreira et al., 2023). By monitoring and adjusting heating and cooling systems according to occupancy patterns, RPA can reduce energy consumption and improve building efficiency. This reduces the amount of carbon emissions released into the atmosphere, thereby reducing the carbon footprint of banks. The literature review highlights that RPA can indirectly impact the bank's activities and help it be more "eco-friendly".

2.3.2 Social Objectives through RPA

RPA is a powerful tool that can contribute to the social goals of sustainable banking. This technology has the potential to create significant social value by improving the customer experience,

enhancing access to financial services, and increasing transparency and accountability. One of the most common and quoted benefits of RPA is its ability to reduce the costs of activities Moreira et al. (2023) which directly impacts society. Automating routine tasks allows banks to reduce the cost of financial services, which makes them more affordable and accessible to customers. Customers are at the center of many objectives of the banks. Therefore, sustainable banking is to improve the customer experience. Customers expect a seamless and personalized experience when interacting with their bank. RPA can automate routine tasks such as greeting customers, opening accounts, and processing loans (Kanakov & Prokhorov, 2022). Banks can then free their employees to focus on more value-added activities, such as providing personalized customer service. This can improve the customer experience because it allows to reduce waiting times, improve accuracy, and increase customer satisfaction. This can work through the implementation of chatbots, as discussed earlier in this paper, with chatbots directly interacting with the customer. But it can also be done through an automatized process for the customer (Irimia et al., 2022). When opening a bank account, the robot will send them papers they will have to fill with their information. Then, the RPA will analyze the documents to check if nothing is missing. If so, the RPA will continue the process of opening the account. Otherwise, it will mail the customer detailing the missing pieces of information. RPA appears to be even more efficient with intelligent tools such as optical character recognition (OCR) for this particular use case. The social objective of sustainable banking also includes the promotion of financial literacy and education. RPA can contribute to this goal by providing customers personalized financial advice (Ng et al., 2021). By analyzing customer data, RPA can identify trends that would be helpful to the customers, making them more informed about financial decisions.

By improving the customer experience, facilitating access to financial services, enhancing transparency and accountability, promoting financial literacy and education, and ensuring data privacy and security, RPA creates significant social value in the banks. Banks that use RPA to achieve social goals can reap many benefits, including improving customer satisfaction, increasing financial inclusion, improving transparency and accountability, and strengthening data privacy and security. By adopting RPA, banks can become more socially responsible and contribute to a more sustainable future.

2.3.3 Governance Objectives through RPA

Robotic process automation can play a crucial role in contributing to governance objectives. One of the governance objectives of sustainable banking is to ensure compliance with regulatory requirements and ethical standards (Syed et al., 2020). RPA can help banks achieve this goal by automating compliance monitoring and reporting. Banks can, therefore, ensure they meet regulatory requirements and ethical standards. RPA could also be used to improve the accuracy and efficiency of compliance reporting, reducing the risk of errors and omissions (Wang et al., 2022).

Moreover, banks could even go further and automate regulatory compliance monitoring. Therefore, they would ensure they meet regulatory requirements and avoid costly fines and penalties. Improving risk management practices is another key governance objective in sustainable banking. RPA can help banks regarding this aspect by providing real-time monitoring and analysis of risk data. By automating risk management processes, banks can identify and mitigate potential risks before they escalate, reducing the likelihood of financial and reputational losses (Kokina & Blanchette, 2019). Ensuring data governance is a governance objective for sustainable banking. RPA can integrate data protection and security measures into their programs. By adapting the code of their automated processes, banks can ensure that customer data is stored and processed following regulatory requirements and ethical standards (Fosch-Villaronga & Heldeweg, 2018). This point is very important because regulating Virtual assistants and integrating GDPR is considered the most significant factor of ethical automation. In addition, RPA can be used to improve the accuracy and completeness of data reporting, enabling banks to make more informed data governance decisions.

According to Ruiz et al. (2022), All the financial institutions that have adopted RPA solutions for their reporting noticed many benefits and could focus their agents on more valuable tasks because they no longer had to correct mistakes in the numbers. Improving transparency is also important for

sustainable banking (Flechsig et al., 2022). RPA achieves this goal by providing real-time updates on account balances and transactions. In conclusion, RPA offers different ways to contribute to environmental, social, and governance objectives in the sustainable banking context. Figure 5 is a good summary of the various aspects to which RPA solutions contribute (Flechsig et al., 2022).

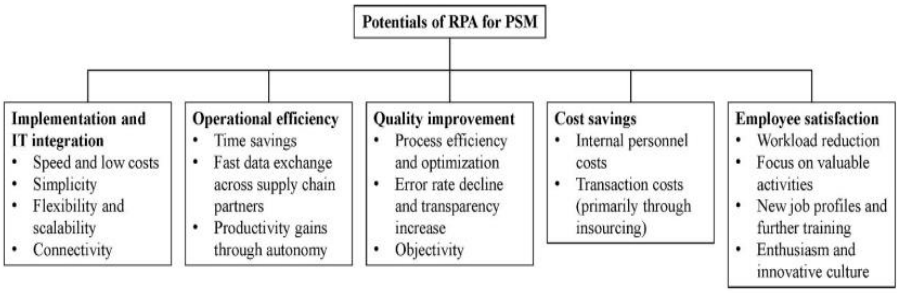

Figure 5: Potentials of RPA for PSM

The literature has not addressed the challenges of cognitive AI combined with RPA solutions. In the same way, the research on the concrete benefits of RPA on sustainability and how it can be related to cognitive AI is not mentioned in the various articles that were used in this article. Therefore, this paper aims to extend the research and propose a new innovative framework.

3. Methodology

To gain a comprehensive insight into the implementation of Robotic Process Automation (RPA) within the banking sector, a data collection approach was devised that tapped into the expertise of individuals actively engaged in banking operations and possessing a profound understanding of RPA technology. To accomplish this, data for this study were gathered through structured interviews conducted with key collaborators of a prominent banking institution. This specific choice of institution was informed by its well-established reputation for RPA initiatives and its pre-existing commitment to substantial sustainability objectives, integral to the execution of any project. The central objective was to examine the potential alignment of existing sustainable banking attributes with RPA processes, specifically at project inception, deployment, and anticipated outcomes.

3.1 Research Design

A qualitative research approach was adopted to fulfill the research objectives, complemented by a case study of a distinguished French bank. This methodology was chosen to facilitate an in-depth exploration of the functioning of RPA within the banking context and to analyze how these processes interface with the identified factors: environmental, social, and governance objectives, RPA solution complexity, and cognitive artificial intelligence. Every participant had a copy of the question, as they received it a few days before the interview, so they would be able to research if needed. If some questions were unclear or did not understand a concept, they would be given additional information. This exercise aimed to collect as detailed answers as possible for the final synthesis to answer the research questions. Therefore, the participants needed to answer all the questions.

3.2 Participant Selection and Sampling

A purposive sampling technique was employed to select interview participants. Individuals with a substantial history of involvement in RPA endeavors were targeted, enhancing the richness of the collected data. A total of 12 individuals were approached for interviews, each possessing a unique vantage point within the RPA ecosystem. The insights from these interviews aimed to provide a holistic understanding of the interplay between RPA, sustainable banking principles, and technological intricacies. Two participants could not participate in the interviews due to logistical constraints,

although their absence did not significantly impact the overall depth and breadth of insights generated.

3.3 Data Collection

Interviews were conducted with individuals occupying pivotal roles within the RPA landscape of the bank. The participants encompassed RPA leaders, recognized as authorities representing their countries in RPA, and RPA specialists, including developers and business analysts. The decision to focus on experienced professionals was deliberate, as it provided intricate insights, comprehensive responses, and illustrative use cases. Therefore, the rate in percent of positive responses is 83.3%.

- 5 participants were working in France
- 2 were in the United Kingdom
- And the 3 last were respectively from Spain, Poland, and Belgium.

The following Table 3 shows the different job positions of the interview participants.

Table 3: Job position of the participants

Job Position	Description
Chief Operating Officer	"In charge of transforming the customer value chain and optimizing the cost to serve, using levers like robotization or platformization. At corporate, the COO covers 9 main entities in Europe and some others worldwide. "
RPA Project Manager	"The RPA Project managers help countries deploy robotic programs in the collaborating countries while considering the group rules and practice**s**. They are also business partners, who are working on implementing new robots. "
Efficiency Coach	**"**Helps entities (consisting of various countries) in the development of their continuous improvement programs (including RPA) and helps them to reach their targeted ambitions in the field."
RPA Developer	"Creates virtual robots that automate tedious tasks for customers and business teams to help them in their daily lives."
RPA Technical Lead	"The difference between a developer and a Technical Lead is that I have a general knowledge of IT and the ability to share and pass on this knowledge. When a developer gets stuck, the person who can give the final answer is the technical leader. I give the go or no go on development."
Transformation Director	Responsible for driving transformation strategy & and projects "whether they are digital/automation projects, other transformation opportunities, or process design."
Transformation Automation Manager	"Manage and oversee all RPA Operations. This involves leading the RUN and Development teams to build, test and deploy Robots under the annual RPA roadmap and help support the continued transformation of business by using automation as a digital "enabler"."
ACE Leader	The ACE Leaders are responsible for the continuous improvement department (also known as the ACE department). They must "**c**arry out process analysis to

	improve efficiency and effectiveness. They look for new technologies to automate processes."

The participants were asked about:

1. Their knowledge and opinion on RPA technologies
2. Their knowledge of sustainable banking
3. Their opinion on Cognitive AI and machine learning tools and how they can be combined with RPA
4. Their opinion on AI&RPA in the context of sustainable banking.

Each participant was given a few days to return by email to schedule an interview meeting. Most returned within 10 days, and 2 people were sent reminder emails to schedule a meeting. All the interviews were conducted through the professional Microsoft Teams channel because it was easier to manage with the remote days. Only one person did not do the interview. This person originally agreed to, but due to schedule issues, could not meet the deadline. The interviews were conducted between the 15th of April and the third week of May. Each was made individually, conducted by the same person, and lasted approximately 35 minutes. The interviews were semi-structured. A guide was used as a basis (Appendix 1), but more questions were added depending on the participants. The idea was to have interviews that were like a regular exchange.

3.4 Code of the Interviews

The coding section is divided into 3 parts that represent the three main factors of this study:

- Cognitive Artificial Intelligence Linked to Sustainable Banking through RPA
- The difficulty of implementing an RPA solution in the context of sustainable banking
- The Environment, Social and Governance objectives of sustainable banking.

The coding process is shown in Table 4. All the similar statements made by the participants are regrouped under a sub-dimension (Waheed et al., 2016).

Table 4: Sample of the coding process

Meaning Unit	Sub-dimensions
We are now able to respond in the shortest time and with the best quality.	Innovative
It opens a huge field of possibilities in terms of automation	
Helps in going paperless and maintaining proper communication with customers	Sustainable
The existing process checks that there is no sensitive data in the document we send, which fits the governance aspect.	
A robot is very expensive.	Rentable
There must be a return on investment, representing a workload equivalent to half full-time.	
The use of RPA is very dependent on the process; sometimes, it is better to use another automation and less expensive.	
If the process changes too much, then the RPA solution is not good.	Stable
The slightest change in one part of the process will lead to the rewrite of the code.	
Have the scope of view that you should consider ESG before every action within the company. This includes RPA.	Considered
The environment is a bit complicated because programming languages emit carbon, but it is difficult to estimate how much.	Limited

4. Results

4.1 Cognitive Artificial Intelligence

Innovative: The innovative aspect of cognitive AI lies in its ability to reproduce human cognitive functions, such as perception, comprehension, and the resolution of complex problems (Patrício et al., 2023; Prabhakar et al., 2023). It combines advanced machine learning techniques with natural language processing and computer vision models, enabling machines to interact more naturally and intelligently with humans. This approach is revolutionizing many fields, including virtual assistance, medicine, finance, and industry in general, opening new perspectives for automation and performance improvement.

"They open a huge field of possibilities in terms of automation – and we're only at the beginning of the AI learning tools"

"There is a lot of opportunity created from the better use of data & and predictive capabilities from machine learning" "With IDP I can go further and automate processes using RPA and IDP, which means I can do more than I could 3 years ago. »

Two main use cases were discussed:

- *"Classification of the emails: Every country needed to provide the central AI team with the cases (all the emails by each category) to learn the standard responses and the main reasons why we are being contacted. Once done in the module, we have treated with robotics some actions that haven't required human interaction.*
- *Business Cases in the collection: This is very innovative and uses Machine Learning. The process predicts which customer will probably not pay the bank back for certain reasons. We analyze and adapt the recovery strategy and give the client a choice of product to allow them not to overdue their loans but adapt an offer to them specially."*

The results show that participants think of cognitive AI as a major innovation in the RPA field and that the combination with the latter should allow wider the field of application of the technology.

Sustainable: The sustainability of AI refers to its ability to operate efficiently and ethically over the long term. It involves designing AI that minimizes its environmental impact, promotes the responsible use of data, and guarantees the transparency and accountability of its decisions (Fritz & Cordova, 2023; Korzeb & Samaniego-Medina, 2019). Sustainable AI must be able to adapt to technological and societal change, avoiding bias and promoting inclusion and equity. It also requires solid governance to oversee its use and prevent potential abuses. Finally, the sustainability of AI depends on close collaboration between industry players, researchers, political decision-makers, and society.

"The Intelligent RPA project I managed had an impact as the people doing this "thankless task" of classifying emails were then placed where their expertise could be used at better ends. They eventually felt relieved, bringing more added value to their everyday work."

"We have a process that deals with the following situation:

Let's say that the General Inspectorate comes to audit us and asks for documents. It can take time. By mistake, it is possible to send confidential data that is not supposed to be sent. Instead of sending the documents directly to the inspection and risking error, one can go through a robot and AI. We send the documents to be sent to the RPA process. Then, the RPA will send to the IDP tool that is used to analyze the documents and ensure that no data is sent by accident. If there is, AI will hide sensitive data. He then sends the document back to the RPA who will send the documents to the inspection. Coupling RPA with cognitive artificial intelligence can prevent errors and is, therefore more in line with the governance aspect of sustainable banking. All this in addition to continuing to contribute to social and environmental aspects."

Difficult: Even though the literature agrees to highlight all the benefits permitted by cognitive AI, it also highlights how difficult it is to implement it correctly, and all the challenges related to seeing technology (Prabhakar et al., 2023).

The participants all highlighted different challenges directly related to the main issues: the place of humans, the complexity, and the regulation.

"*In general, AI tools have very specific algorithms and are not necessarily compatible with RPA, although we have seen that Blue Prism has added Python packages, so in the future, we may use these algorithms."* "Not *so easy to put in place." "We are still focused on the 'low hanging fruit' and will await the maturity of AI tools before we move into these types of projects"*

"We are back to our "doing the basics brilliantly" strategy. AI tools with very specific algorithms are sometimes difficult to integrate with RPA even if we have seen that Blue Prism has added Python Packages. We are still focused on the 'low hanging fruit' and will await the maturity of AI tools before we move into these types of projects"

Regulated/ Controlled: AI regulation refers to the set of measures and policies to supervise and control the development, use, and effects of artificial intelligence (Stuurman & Lachaud, 2022). It aims to ensure the safety, accountability, and ethics of AI and protect the rights and interests of individuals and society. AI regulation addresses issues such as data privacy, algorithm transparency, algorithmic discrimination, legal liability, and the security of AI systems.

The regulation of AI is a complex and evolving challenge that requires collaboration between governments, businesses, technical experts, and society.

"If there would be too much AI, it would have to be someone that has to check that the AI is not doing too much. I recommend human control for checking that the implementation is not harming other processes because if the process is too mature, it might impact other processes. So of course, I support the implementation of such processes, but we must keep control of the quality. "

"If you delete a task done by a team to give it to a robot, sure it will relieve the agents, but in the long term, they will not remember how to do it. This will inevitably lead to a loss of knowledge in the teams. And by adding AI to the process, it is even worse. It's a bit of a Pandora's box. Therefore, the AI field of action must be strictly established."

"As for now, the RPA sector is very regulated because we are aware of the consequences that might be implied in case of mistakes. For example, we make sure not to keep confidential customer information in the database or keep it with a level of protection equivalent to the sensitivity level of the data. The databases are now encrypted, and development standards have changed. Sometimes, if the data are too sensitive, we can refuse to rely on a partner for the development and do it in-house to avoid any leak.

Even in the prioritization of scripts and the selection of developers, it is necessary to submit to the requirements of the Chief Information Security Officer (CISO)."

4.2 Difficulty of implementing RPA solution

Maintenance: Process maintenance refers to the activities undertaken to ensure the correct operation, reliability, and continued availability of a process in a system or organization (Ruiz et al., 2022). It aims to prevent breakdowns, detect and correct potential problems, and ensure optimum process performance.

"For us, the biggest barrier was the availability of the business departments which makes it almost impossible to follow up on the robots' performances and do regular maintenance, and to improve them after some time."

"*The complexity of the governance that such programs can generate while integrating operational people and various profiles of IT people, which don't always speak the same language*

"Maintenance issues are perhaps the biggest obstacle: when there are 20 robots, it's easy, but when you pass the 50 mark it requires dedicated FTEs."

Accessible: Easily accessible data for an RPA (Robotic Process Automation) is structured and numerical information available in IT systems such as databases, Excel files, APIs, or websites (Moreira et al., 2023). This data is generally organized coherently and can be extracted and used by a software robot to perform automated tasks. It may include customer data, transaction data, product information, or any other data required for the automated process. Accessible data must be reliable, regularly updated, and comply with security and confidentiality requirements. Fast, unhindered access to this data is essential for effective process automation.

"Accessibility/ Security: Robots can't use encrypted data or screens. It should be simple to access (simple passwords.) is a good business case. "

"If the applications are difficult to access, we pass the hand or automate by part of a team with other teams. There are tricks of ways to circumvent but we prefer to avoid this case."

Profitable: A profitable process is a set of activities or operations intended to maximize a company's profits while minimizing costs (Flechsig et al., 2022). A profitable process is designed to be efficient, economical, and productive, to generate a positive return on investment.

"Gains analysis: We are in countries where it is cheaper to collaborate with partners in other countries on the development part."

"There must be a return on investment because it is expensive and must represent a workload equivalent to half full-time."

"Sometimes the business case is not enough to be profitable."

Stable: A stable process operates consistently and predictably without excessive fluctuations or undesirable variations (Moreira et al., 2023). It maintains consistent and reliable performance over time. A stable process is characterized by low variation and an ability to produce results in line with specifications or expectations. There are no major changes in the way it operates and processes data. It is usually supported by quality control methods and tools to monitor and maintain its stability. Process stability is essential to ensure efficient production, reduce defects, and improve customer satisfaction.

"Stable/mature process not susceptible to high change (or a process that can be improved by introducing automation)" "Technical parts (stability): if the application is stable and they don't change all the time it's helpful. Otherwise, we won't do it. "

"If the process changes too much then the RPA solution is not good. […] The data used need to be stable in time"

"The slightest evolution of one of the apps, you have to readapt the robot and the code."

Scalable: A reliable process is a sequence of well-defined actions or steps that produces consistent and predictable results (Aracil Fernández et al., 2021; Asatiani et al., 2023). It is based on proven methods and practices, guaranteeing the quality and reliability of the result. A reliable process is also reproducible, meaning that it can be followed consistently and produce similar results with each iteration. It is often documented in a clear and accessible way, which makes it easier for stakeholders to understand and implement. Finally, a reliable process can be subject to regular checks and continuous improvement to maintain relevance and effectiveness.

"This is one of the reasons we haven't started with Chat GPT yet; we put only what we control in place. We will not get started until we have studied, tested, and approved a technology. We need to be sure that the results are predictable and that we can handle the process. The key is to create scalable processes. We are not trying to revolutionize but we are guaranteeing security. We favor what we control."

"What limits scalability is that they are not adaptable. The code needs to be rewritten. The slightest field change, the robot stops working. This is the reason why RPA is not everywhere."

Organized: An organized team is a group working together towards a common goal. Each team member has a defined role and specific responsibilities, which promotes clarity and efficiency (Fritz & Cordova, 2023). Communication within the team is open and transparent, enabling a fluid exchange of information and effective problem-solving. In addition, an organized team puts processes and

monitoring systems in place to ensure optimum coordination and the achievement of expected results.

"This change was linked to the closer collaboration between IT and business. Before, RPA didn't require very important IT skills. Before, all the decisions made about the implementation of robots relied on business. Nowadays, all the companies that didn't integrate IT in their decision-making process have a lot of difficulties implementing an efficient RPA model."

"The Center of Expertise (CoE): Before, we were helping countries with business cases, reuse, and governance methodology. Once we set up an IT CoE, we could provide more knowledge from the IT side. Some robots have been developed by this CoE central and all the innovations have been tested locally in central"

"In central, we're organized: each RPA project manager manages a pole of countries. There are 9 countries. Each person is from 1-4 countries. Each entity runs its own RPA program with its governance. Developments and/or RPA hosting runs supervisions are done at the country's discretion, according to their in-house competencies and level of investments. We have a Centre of Expertise (CoE) that owns the infrastructure, monitoring, license, and developers."

4.3 Environment Social and Governance Objectives

Considered: The companies understand the importance of ESG objectives and spread information to their collaborators on the topic (Andronas et al., 2023). In the context of RPA, this means that they want to ensure that process automation does not harm the environment, promotes fair working conditions, and complies with ethical standards. By integrating these ESG objectives from the outset, companies seek to align their automation strategy with their values and promote sustainability and social responsibility. By considering ESG objectives before RPA, companies are demonstrating their commitment to sustainable development and addressing global issues.

"We aim to reduce the environmental impact of our business activities, including using sustainable energy and resources, preventing pollution, and practicing sustainable procurement."

"Embed agile and digital working solutions to drive reductions in business travel and paper consumption."

"Manage waste generated from our business operations incorporating reduction, reuse, and recycling following the waste hierarchy principles."

"Within the company, we are quite solicited to be aware of our impact on global issues."

Integrated: The ESG objectives incorporated into RPA solutions refer to the measures taken to incorporate environmental, social, and governance considerations into the design, implementation, and use of RPA technologies (Fang et al., 2023).

"We as a group are well aware of the ESG objectives and work as much as possible on reducing our footprint."

"We continue to procure 100% renewable electricity across our UK operations. We put a stop to single-use plastics procurement across our UK operations"

"RPA can prevent errors and is, therefore, more in line with the governance aspect of sustainable banking. All this in addition to continuing to contribute to social and environmental aspects."

Regulated: ESG regulation mainly concerns the environmental, social, and governance practices of companies(Tsang et al., 2022). Although regulation specific to RPA (Robotic Process Automation) may vary depending on the country and the industry, it is possible to approach the subject of ESG regulation concerning RPA in a general way.

"I'm an ESG officer. We are working on it. We as a company are very interested in education. I have finished the ESG academy, and this topic is very spread around the company. They created great conduct. "

"We monitor environmental performance and activities on an ongoing basis and use this information to regularly review and update our policy, strategy, and the allocation of resources." "[The organization] is involved in the green IT campaign and incites the collaborators through various organisms (depending on the countries), to follow some rules regarding ESG issues."

Limited: ESG objectives for RPA can be limited by several factors (Sheehan et al., 2023). Firstly, RPA focuses primarily on operational efficiency and cost reduction, which may not fully correspond to environmental and social objectives. In addition, key ESG indicators such as carbon footprint or social impact may be difficult to measure precisely for RPA initiatives, and in the meantime, it is considered as difficult to have real measures regarding ESG objectives for this technology. Finally, the positive impact of RPP on ESG objectives is often indirect.

"The level of carbon emission of RPA is very difficult to estimate because it is based on the low code it uses." ***"****To the best of my knowledge, there is no specific regulation or legislation around RPA & sustainability- however, there are many expectations around environmental issues we are responding to as a business. These are managed through our environmental committee."*

Human-oriented: The fact that RPA is human-centered contributes to ESG criteria by promoting social improvement and environmental responsibility (Moufty et al., 2021). By placing people at the center of technology, RPA aims to optimize processes while preserving jobs and creating new opportunities, thereby promoting a social dimension and better governance.

"No country or team has ever said that the intelligent robot stole his job. It doesn't exist. Teams love their robot; they give them names and even create logos because the robot helps them by removing repetition or overwork and allowing them to lower the pressure and free up time for higher value-added tasks to interact more with the customer. It's a very social-friendly solution. "

"Such technology allows to give customers a personalized choice of product, so improve customer service. It also contributes to making more efficient already existing projects, so it will emphasize the already existing benefits."

"Can help humans make decisions quicker, allowing them to focus on more "value add" work. Like RPA, can also increase accuracy whilst dramatically improving efficiency/overall experience for both customers and colleagues."

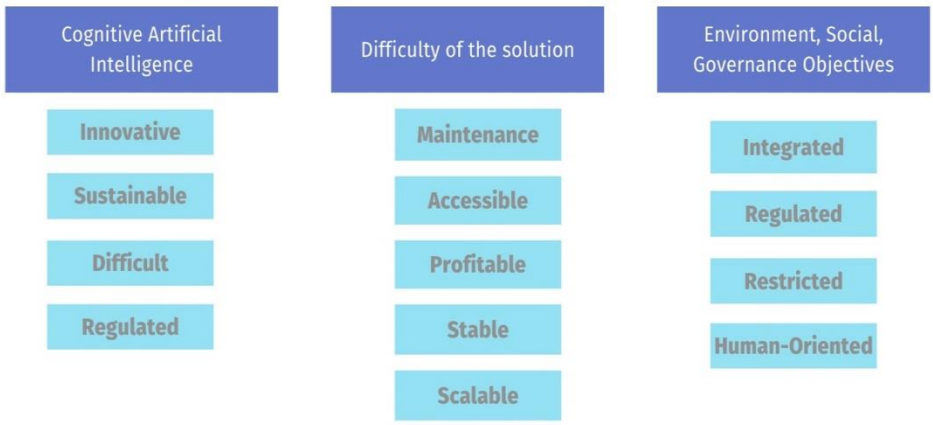

Figure 6: Identified dimensions and subdimensions for sustainable implementation of the RPA solution

The answers given by the participants allow us to create a new framework for RPA. The original model Flechsig et al. (2022) gave an overview of the important questions related to RPA implementation. The present model considers the three variables identified in this research: the Environment, Social and Governance objectives, cognitive Artificial Intelligence, and the difficulty of RPA solutions. It aims to impulse the integration of these factors in the implementation phase of the Robotic Process Automation solution. Furthermore, the Sequential framework for a sustainable implementation of the RPA solution is shown in figure 7.

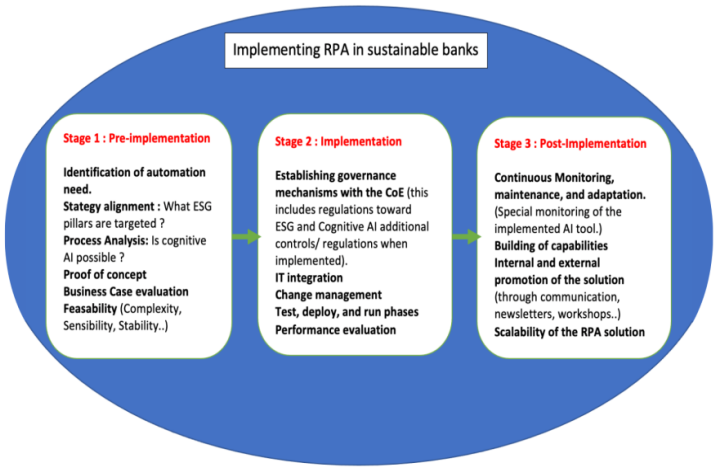

Figure 7: Sequential framework for a sustainable implementation of the RPA solution.

5. Conclusion

This study embarked on a journey to unveil robotic process automation (RPA) 's potential in sustainable banking. The intersection of RPA and sustainable banking promises a reservoir of possibilities where the amalgamation of environmental, social, and governance (ESG) factors coupled with cognitive artificial intelligence (AI) prowess can catalyze remarkable outcomes. Through the integration of ESG factors into RPA deployment, sustainable banking institutions stand to align their operational paradigms with broader environmental and societal aspirations. The study has underscored that RPA's capacity to automate rule-bound tasks translates into heightened operational efficiency and judicious resource utilization. The parallel facilitation of real-time ESG metric monitoring empowers banks to address sustainability concerns and bolster their ESG performance preemptively. The intricate and dynamic nature of ESG factors emerges as a significant hurdle. The evolution of sustainability standards and shifting regulatory landscapes necessitate adaptable RPA systems that stay in lockstep with emerging best practices.

Furthermore, infusing cognitive AI into RPA requires a robust framework for data governance, ethical deliberations, and perpetual monitoring to curtail biases and ensure the ethical use of AI. In essence, fully harnessing the benefits of RPA in sustainable banking demands a holistic approach. It compels stakeholders to consider the socio-economic ramifications, the well-being of employees, and the alignment with enduring strategic objectives. The path to sustainable banking using RPA is a complex one that calls for careful adjustments to shifting environments, moral considerations, and a steadfast commitment to striking a balance between efficiency and responsibility. As the banking sector strides into this transformative landscape, it is poised to navigate challenges and seize opportunities, shaping a future where technology is harnessed to redefine banking operations and foster a more sustainable and equitable world.

6. Implications, Limitations, and Future research directions

6.1 Theoretical Implications

The study is complementary to the quoted articles because it highlights the concrete benefits of RPA solutions in the context of sustainable banking. It also allows us to understand better the benefits of combining technologies to increase efficiency and get better results. Before this study, the three factors identified at the beginning (cognitive artificial intelligence, social and governance objectives, and difficulty of implementing an RPA solution) were never studied together. The difficulty of

implementing the RPA solution seems to be the most significant barrier for the banks. This is one of the reasons why RPA has not been developed everywhere yet. This difficulty is increased when the banks wish to include artificial intelligence in the process. However, the literature review and the interview participants agree that combining RPA and cognitive AI and implementing such a tool would contribute to the ESG objectives and sustainable banking at the biggest scale.

6.2 Practical Implications

This study holds significant value for managers striving to infuse sustainability into their operations by strategically implementing robotic process automation (RPA). The framework proposed at the end of the study on RPA implementation was modified to integrate ESG-related criteria, feasibility characteristics, and cognitive AI parameters. The rest of the lists were already part of the implementation phase and had already been tested. Therefore, the banks can use this new framework version as a point of reflection to develop a more sustainable framework or directly use it. The results of this study were already shared with the efficiency team of the company, which used them and presented them to its collaborators in other countries. The goal was to raise awareness of sustainable practices. This article is aligned with the Impulse plan of the company, which aims to create a more sustainable workplace with sustainable activities. The presentation was introduced during the bi-annual conference on RPA topics and digital transformation. It presented the results of the interviews conducted and the new framework created.

6.3 *Limitations*

The first notable limitation of this study is related to RPA and its carbon footprint. Indeed, this study aims to represent robotic process automation as a sustainable tool to achieve sustainability in banking activities. Nevertheless, it remains a polluting technology, even if it is not as damaging as other activities. It can also be highlighted that this research only focuses on RPA and cognitive AI. But it is not the only possible combination of technologies. Depending on the use case, it might be interesting to choose another variety of technologies; maybe some other technologies contribute more to the objectives of sustainable banking. This study does not try to study or find ways to make implementation easier. It acknowledges the challenge of the difficulty but does not try to solve it. Finally, the research is based on a case study within one bank. Therefore, it cannot provide a general overview of the question. It can only give a better understanding of the problem within this company. Finally, it is important to highlight that this study was conducted for only a few months. Therefore, the number of interview participants and the results were restrained.

6.4 Future Research Directions

Based on the previous limitations, future research could focus on several aspects that were not discussed in this study. The first would be to do complementary research on the AI tools and their contributions to sustainable banking since they were only discussed in this study in combination with RPA. Another interesting topic would be to see how RPA can contribute to environmental, social, and governance objectives outside of banking activities. This question would allow us to give an overview of the potential of RPA that would not be limited to bank activities and would open the field of research. Other related topics are still to be studied within the banking industry. Because this study focuses on a French bank, it leaves room for more precise studies integrating various banks from different countries. As has been highlighted in the limitations of this work, RPA remains a polluting technology. Therefore, conducting a study on the impact of RPA and its footprint could be an interesting first step to improving the tool and its efficiency. Finding a way to reduce the footprint of RPA would allow it to increase its benefits for ESG objectives. Finally, as this study showed that implementing the RPA solution is a big barrier, an interesting study would be to analyze if it is possible to reduce the difficulty of implementing RPA solutions.

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Appendix
Interview Guide:
The questions from the Interview guide were taken from the study of (Flechsig et al., 2022)

General:

What is your job position? Can you explain it?
What do you understand by RPA?
What do you understand by sustainable banking?
Which requirements did RPA-suitable processes need to fulfill?
What business area utilizes RPA the most?

RPA complexity
How did the first RPA projects get started?
Did your company start developing RPA in-house, or did you rely on a partner? a. Specify: How did you come to your solution?
Did RPA redeem the expectations, or did some other technology turn out to be better for the use case?
What do you think slows down the scalability of RPA the most?
(Growing capabilities)
How has your company organized around RPA?
What has been the clearest change in your company that has taken RPA utilization to the next level?

Environmental Social Governmental (ESG) objectives
Are you working internally within [organization] with Environmental Social Governance issues, and if so, what does that work look like? For example, increase ESG awareness, policies, and directives.
Are you working with Environmental Social Governance issues before an RPA decision, and if so, what does that work look like?
Are you working with Environmental Social Governance issues *during* an RPA period, and if so, what does that work look like? Example, control, and follow-up.

Cognitive AI:
Are you familiar with machine learning techniques/ AI tools?
What do you think about machine learning tools?
Which is helpful for sustainable banking?
Does your organization apply cognitive AI to RPA processes? How?
If not, why is cognitive AI not implemented yet in your organization?
What could be the consequences and effects of cognitive AI implementation, thereby emphasizing RPA processes?