The implementation of Robotic Process Automation (RPA) technology and its impact on efficiencies of organizational business processes

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By:

Timi James Ngoboh

Primary Supervisor:

Dr. Meera Sarma

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Abstract

Research question

I was tasked with setting up and managing a new Robotic Process Automation (RPA) and Intelligent Automation team that will implement Robotic Process Automation in our Credit Cards business unit in my organization, one of the major banks in the United States. The goal was to use RPA and the infusion of Artificial Intelligence to automate the multitude of operations processes that were currently worked manually by employees, to reduces cost, eliminate, or minimize risks and improve the effectiveness and efficiencies of the processes and impact on the organizational performance. Robotic Process Automation is a technology that uses software to build Robots that emulate human activity in interacting with digital systems and computer applications.

To help me better understand how RPA can impact the efficiencies of processes, I decided to focus my research on the research question:

Has the implementation of RPA and AI improved efficiencies in the business processes in my organization?

Research Approach

Upon completing a literature review and gaining a good understanding of existing knowledge on my research topic, I conducted a qualitative research and utilized a Participatory Action Research (PAR) approach with participants within the organization that were native to the process and case study. I collaborated with the participants to address the research question in which numerous iterations resulted in the findings of determinants and measurements that impacted the efficiency of the process in the case study and research.

Findings

The research found numerous determinants and measurements that conclusively demonstrated that Robotic Process Automation and the infusion of Artificial Intelligence improved organizational processes. Several determinants and measurements that were found in the case study were consistent with the literature, including, FTE (Full time Effort), cost reduction, faster processing time, risk reduction and improved quality of the process. While new determinants and measurements were found in the study such as bot maintenance and bot availability and fixes.

Implications

As a result of the findings that the determinants and measurements showed that RPA improved the efficiencies of processes, there were implications to the organization in that the RPA brought a change to the organization that is enabled by RPA and AI Information Technology (Brannick & Coghlan, 2007), which changes the way it operates with organizational processes, including companywide RPA expansion and bots and humans collaborating, which is also a change to organizational culture. There were also implications to organizational practice with the knowledge gained from the Participatory Action Research going forward. The PAR also impacted my professional practice in that I gained knowledge and experience that positively changed my mindset as a scholar-practitioner in my daily decision making and practice.

Declaration of Work

I hereby declare that this Thesis or parts of it has not been submitted to any other university or institution of higher learning for candidacy of a Doctorate or any type of degree. This Thesis also represents my own work except for citations of the work of others and references for which I have given due credit.

Signed: *Timi Ngoboh*

Date: January 10th 2023

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Tables and Figures

Chapter 1. Introduction

1.1 Robotic Process Automation and the infusion of Artificial Intelligence

Two emergent technologies in the financial industry in recent years are Robotic Process Automation (RPA) and Artificial intelligence (AI). Robotic Process Automation is a technology that uses software to build robots that emulate human activity in interacting with digital systems and computer applications (Romao, Costa & Costa, 2019). The Robots mimic humans and in working rule-based processes that are high volume manual, monotonous, repetitive and tedious processes that require low judgment but consume enormous time in terms of human efforts, seamlessly, much faster than humans and accurately (Aguirre & Rodriguez, 2017). Banks in the financial industry have multitudes of back-office and front-end processes in their operations including Customer Relationship Management (CRM), Credit Card and loan processing and maintenance systems, Data Management Systems (DMS) Task Queue Management Systems (TQMS), Enterprise Resource Planning (ERP), and Fraud Management Systems (FMS) amongst others, that are tedious and repetitive and worked manually by employees. The processes cost banks millions in labor annually. Most of the processes that can be automated are, however, found in back-office operations (Smeets et al., 2021). These processes can be automated with Robotic Process Automation and worked by robots, which will allow the employees to focus on more human centric and cognitive work (Aguirre & Rodriguez, 2017).

Artificial Intelligence (AI) provides the option to mimic human judgement, and carry out cognitive ability and decision making (Doumpos et al., 2022; Donepudi, 2017; Kaya, 2019) to the capacity of the robots or virtual workers. The merging or infusion of intelligence capabilities such as AI and RPA is referred to as Intelligent Automation (IA) (Patel, Colombetti & Dorigo, 1995; IBM Cloud education, 2021; Blue Prism, n.d.). The Artificial Intelligence components that are integrated with Robotic Process Automation include, Natural Language Processing (NLP) and speech recognition that enables the analysis and conversion of speech to text and text to speech, and Machine Learning (ML) (Jha et al., 2021; Stravinskiene & Serafins, 2021). Along with Optical Character Recognition (OCR), Machine Learning (ML) enables robots to read and decipher structured data from image documents with a high level of accuracy. Machine Learning technology allows robots to learn via data patterns and

practice similar to human learning (Mitchell & Jordin, 2015). The combination of RPA and AI is also sometimes referred to as Intelligent Process Automation (IPA) or Cognitive Robotic Process Automation (CRPA) (Villar & Khan, 2021) as well as Intelligent Automation (IA). Robotic Process Automation is now intelligent with the addition of Artificial intelligence, which provides a lot of advantages (Viehhauser, 2020; Rebeiro et al., 2021; Chakraboti et al., 2020; Anagnoste, S. 2018; Casale, 2015; Kirchner, 2017; Javed et al., 2021).

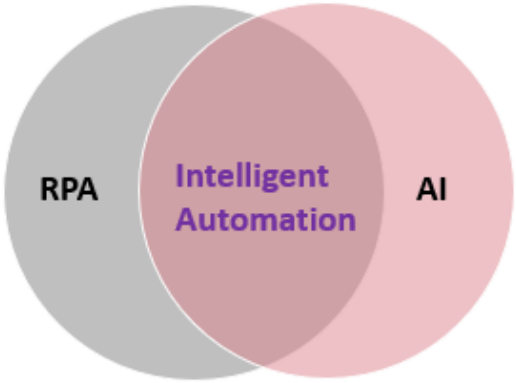

Figure 1 - Intelligent Automation

1.2 Advantages and benefits of Robotic Process Automation

The Advantages of Robotic Process Automation (RPA) are immense for organizations (Romao, Costa & Costa, 2019; Del Row, 2017; Zhou, 2021; Ng & Alarcan, 2020; Casale,2015 Smeets et al., 2021). Benefits include:

- Expedited automation implementation life cycle at a much lesser cost than traditional automation methods. RPA requires as little as few days to just weeks to automate and implement a process. Unlike traditional automation methods that require months to years to complete
- Faster processing time. Robots work faster than humans and can work processes up to 95 percent faster
- Elimination or at least a dramatic reduction of human error and the risk they pose. Humans make errors that can be costly to the business, since bots are built per requirements, they do not make the same errors humans do

- improved quality of the process and output, scalability at no additional cost which enables the bots to work high and increased volumes seamlessly
- Cost reduction including labor costs and maintenance, elimination or reduction of FTE (Full Time Equivalent by humans) which enable and frees up employees to focus on more critical task that speak to human strengths.

Hence, RPA is a more economical and effective option for my bank as it looks to reduce costs, maximize profits, eliminate the risks caused by human error, enhance its competitiveness and differentiate itself in the financial industry. However, it must be implemented effectively (Gotthardt et al., 2019). RPA technology is also preferred because my bank is focused on the automation of hundreds of back-office and some front-end operations processes that are repetitive, manual, have high volumes that require low decision making. AI will be infused or merged to complement RPA in areas beyond the capability of RPA that require decision making and intelligence. Thus, the main benefits of AI, decision making and mimicking human cognitive intelligence (Raisch and Krakowski, 2021), will enable the bots to consistently work repetitive tasks end to end with a decision driven approach which will allow the Bots to not only emulate human activity as they work processes and digital systems but to also emulate human cognitive strengths (Viehhauser, 2020; van der Aalst et al., 2018) when applicable. However, there are also some disadvantages to RPA

1.3 Disadvantages of Robotic Process Automation

Despite the numerous benefits and advantages of Robotic Process Automation, it does have some disadvantages for organizations to understand.

Acquiring the expertise of RPA and skilled personnel can be time consuming. Although the development and coding of a bot is not as cumbersome as the traditional coding methods and languages, it does take time, experience and proficiency to become a skilled RPA developer and the acquisition of skilled employees can be competitive due to demands in the industry, which can delay the implementation of RPA projects . Furthermore, the maintenance of the developed bots or digital workforce require skilled developers and engineers whose availability is critical (Boekhoudt, 2019; Smeets et al., 2011).

Since bots mimic humans as they navigate multiple systems and applications, changes in the systems could mean disruption to the bots as they have to be recoded to match the systems and application changes. This may be time consumer and the bots cannot work the processes until the changes are

made. Thus, causing the risk of missing deadlines and Service Level agreements (SLA) if humans employees are not able to work the processes (Boekhoudt, 2019).

Bots mimic humans, so they need access and login credentials to systems and applications, as such the access to systems for the bots need to be managed effectively to avoid situations that the bots cannot access or login to systems (Boekhoudt, 2019).

Resistance of Robotic process Automation (Smeets et al., 2021). Resistance of Robotic Process Automation can come from leaders of team and departments to the employees that work the process, as such efforts must be made to counter this for a successful RPA introduction and implementation.

The banking industry in the United States has seen an increase in the implementation of RPA and RPA teams and the infusion of AI to help them reduce cost, risk, optimize processes and improve efficiency and effectiveness and the bank I am employed with is not an exception as they also decided to implement Robotic Process Automation and Artificial Intelligence.

1.4 Background of my organization on Robotic Process Automation and Artificial Intelligence

The Bank I am employed with, A major Bank in the U.S., is one of the major banks in the United States that offers consumer banking products, including loans, deposit accounts, mortgages and credit cards, all of which have back-office and front-end processes worked by employees. Credit cards are the largest product and departments that generates the most revenue within the bank and also has the most number of employees. My organization wanted to take advantage of the benefits of Robotic Process Automation and decided to start a new Intelligent Automation and Robotic Process Automation team. Given the multitude of operational processes in the cards business unit and their high cost to process and maintain, the bank sought to save the costs of the processes and eliminate human error and the risk they may cause and improve the efficiency of the processes.

As a Technology Sr. Manager in the bank, I was tasked in 2018 to set up and manage a new pilot Robotic Process Automation team that will implement RPA and automate the operations processes in our credit cards business unit in the organization. Upon the completion of the research of various Robotic Process Automation and IA software and providers in the market, we chose one of the leading software in the Intelligent Automation industry called SS & C Blue Prism and I proceeded to

hire developers, Engineer and RPA Business Analysts to start off and build my RPA team. Although this was a challenge for me, I planned to acquire all the necessary knowledge and information to do the work necessary for my new team to succeed. As a doctoral action research student, it was also an opportunity for me to implement and make a positive change in the bank with RPA and AI and perform action research for my doctoral DBA studies at the University of Liverpool.

1.5 Research aim and objectives

As the technology senior manager assigned to build a new Robotic Process Automation team in the Cards business unit and with over 15 years of banking technology experience, I had vast knowledge and experience in the bank's front-end and back-office operations processes, technology software and applications used to process them, and the rules and regulations that govern their operations. I was aware that my organization wanted to build an RPA and intelligent automation team to automate its manual processes and enable it to reap the benefits of implementing RPA that include cost savings, risk reduction and to ultimately improve the efficiency of the processes. However, we were new to RPA and Intelligent Automation and had not done this before in the organization. We had no organizational RPA and IA implementation history or experience , which meant there was a knowledge gap at that point. As such, in order to make a change in my organization, fill the gap and determine if the goals of the implementation of RPA were met, knowing that we had not yet implemented RPA in the organization, I had to identify processes to be automated and automate them, study them and their results. Therefore, I had to address the crucial problem and question which is also my research question:

Has the implementation of RPA and AI improved efficiencies in the business processes in my organization?

My research question is critical to my research and organization that sought to implement Robotic Process Automation. Therefore, to enable me to answer my research question, I had to consider several objectives.

My first objective was to have a thorough understanding of the reasons my organization wanted to implement Robotic Process Automation and what their expectations were (Kirchmer, 2017). The investment was costly and my organizational leadership had goals along with financial goals (Kotlar, 2018) in mind that included return on investment (ROI). The organizational investment includes the

RPA Software licenses, Servers, consultation costs and salaries of members of the RPA team. So, the understanding of the goals and expectations of my leadership is critical to the success of my new team, the implementation of RPA and my research (Kirchmer, 2017).

The second objective was to acquire the required knowledge of Robotic Process Automation and Artificial Intelligence and its implementation in organizations, especially in the financial industry, and how this may have impacted the organizations and their processes. I had to research and find existing knowledge on this subject that is contextual to my research question (Levy and Ellis, 2006) to help me understand what is known and the unknowns to aid me to identify gaps and also how I can apply the known knowledge to my research and add to existing knowledge with my action research and findings.

Understanding the implementation of Robotic Process Automation includes the robot System Development Life Cycle (SDLC) which comprises of the identification of the processes that will be automated and thorough analysis of the processes to understand them. Followed by the identifying their RPA viability before the requirements will be gathered and documented. The current state and future state flows will be created and subsequently the designing and coding of the Bots carried out. The last steps will be User acceptance testing, bot implementation and maintenance phases.

Figure 2 shows and example of a bot System Development Life Cycle (SDLC)

- Boxes in blue are the main steps while the once in orange are subsets of the main steps

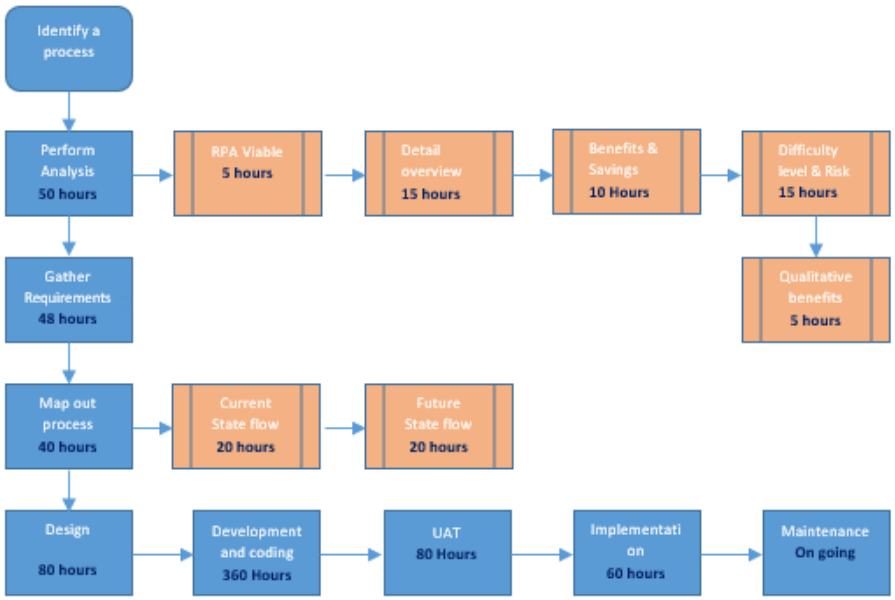

Figure 2 – Robot implementation/ System Development Life Cycle (SDLC) example

The third and critical objective was to understand the factors, determinants and measurements that will help me establish if the implementation of Robotic Process Automation improved the efficiencies of organizational processes. The study was on a case study example of an RPA/AI implementation in my organization in February 2022. My primary literature review revealed several determinants and measurements to help determine whether the implementation of RPA and AI improved the efficiencies of organizational processes including cost reduction, faster processing times, Full Time Employee (FTE) reduction or elimination, human risk elimination or reduction and improved employee morale. These factors would help me show whether the processes are more efficient after the automation and RPA implementation.

My research is critical and important and will not only help provide answers to my organizational leadership goals in implementing RPA and AI, it will also show whether the RPA implementation improved efficiencies in my organizations processes, help me identify gaps in RPA knowledge and add to existing knowledge through my action research.

1.6 Thesis Structure

My thesis structure was formatted in five chapters; literature review, methodology, findings, discussion and conclusion.

Literature review:

Upon the identification, definition and clarification of my research questions, I had to understand the knowledge that already exited on the subject in detail and how it relates to my research question. As such, I proceeded with a critical literature review. I reviewed academic literature that provided insights on the implementation of Robotic Process Automation predominantly in the financial industry in the context of my research question (Levy and Ellis, 2006). My evaluation included finding knowledge that already exists in the implementation of Robotic Process Automation, along with the differences and similarities in the literature, their protocol findings and impacts on organizations from which I drew from and applied to my research. The information provided me the framework to support my research and research question.

Methodology:

Upon the completion of my literature review, I had gathered, documented and understood the relevant information from diverse literature including information that showed the impact of the implementation of RPA and AI on organizational processes and their efficiencies. As such, based on my understanding from the literature, I decided on the suitable research paradigm and methodology approach I would use to help me answer my research question. I considered the ontological beliefs and epistemology construction, along with the ethical considerations and theoretical framework (Creswell & Creswell, 2018), to help me achieve my goal of answering my research question.

Findings and discussions:

My findings and discussions section detail how I addressed the research question along with my participants, my analysis, the interview iterations, my data collection and their analysis. Along with the outcome and results of the data collection that show the impact of my action research and the change implementation with Robotic Process Automation and Artificial Intelligence. It also provides details of the determinants and measurements that show the impact of the implementation of RPA on the efficiencies of my organizational process and case study that help me answer my research question.

Conclusion

In my conclusion section, I provide a summary of how I addressed the research question, my research approach and its effectiveness and findings. I discuss how it impacted my professional and organizational practice, the implications for my organization, gaps that I found and suggestion for further research. I also provided my thoughts overall on how the implementation of Robotic Process Automation and Artificial Intelligence impacted the efficiencies of my organizational processes in reference to my research question.

Chapter 2. Critical Literature Review

2.1 Introduction

Organizations implement technology to support their efforts and strategy in meeting their goals. They also use technology to solve problems and continuously strive to improve the efficiencies of organizational information technology applications and software that support operations, which is essential for them to remain competitive, (Syed et al., 2020; Javed et al., 2021). There is a wide range of literature that portrays the association of technology, organizations and their structure (Barley, 1986). According to Farhanghi et al. (2013), technology has a direct impact on organizational structure and performance. Furthermore, many literature study how technology has helped to form and impact the practice in organizations (Leonardi 2011, 2013; Orlowski, 2007). The technology in the context of my literature review is Intelligent Automation

In my literature review, I start with what the focus of the literature review is and then discuss the articles I reviewed. This was followed by the key debates in the literature and information on the impact of Robotic Process Automation on organizational practice. I also discuss the measurements of RPA benefits and impact on organizational processes and efficiencies along with future of Robotic Process Automation. In ending, I provide a summary of the chapter in the conclusions.

2.2 Focus of my Literature Review

With my research question, has the implementation of RPA and AI improved efficiencies in the business processes in my organization?, I reviewed literature that provided insights on the implementation of RPA in the financial industry and in other organizations in the context of my research question. My analysis included finding knowledge that already exists in the implementation of Robotic Process Automation, the differences and similarities in the articles, their protocol, findings and impacts on organizations from which I could draw from and apply to my research. Therefore, the focus of my literature review will be:

- To examine literature that are mostly peer reviewed and can be related to my research question for which the impact of the implementation of RPA and AI on organizational

processes are evident and discussed and how the improvement in efficiencies of the organizational processes were determined and found.

- Make context of the existing frame of knowledge for my research (Levy and Ellis, 2006) and identify applicable criterion and paradigms that would benefit my research and support my arguments, which will help provide me the theoretical context in my research (Faryadi, 2018) and research question.

I employed a systematic literature review approach that involves three phases; planning my review, reviewing the literature found and ultimately reporting on the review findings to conduct my literature review (Kitchenham & Charters, 2007; Breretona et al., 2007, cited in Xiao, et al., 2019), as this provided a good guideline for my review.

I developed a concise research protocol to include a description of all the components, such as the purpose, research questions, the exclusion and inclusion criteria, my search tactic, how to assess the quality and data extract and analysis before the ultimate reporting (Gomersall et al., 2015 cited in Xiao & Watson, 2019). Furthermore, ensure that I include literature that is still current enough and relevant to my research topic (Xiao, et al., 2019; Faryadi, 2018). I excluded literature that may be too old and or did not fall within the context of my research question and thus irrelevant, such as articles older than 10 years, not related to the financial industry were not empirical or peer reviewed. Reviewing the current literature is important, given the rapid advancement, changes and developments in technology including Robotic Process Automation and Artificial Intelligence. A reflection on my research topic made it apparent that the focus of my analysis should be on the goal of my literature review, which was to contextualize my research question in the literature, understand existing knowledge and deliberate on other contexts and paradigms that will help me in my investigation. Thus, to better understand my research question, these questions were examined:

- What are the expectations of my organization of RPA/AI implementation?
- What were the key motives that led to organizations' decision to introduce RPA and AI and are they applicable and similar to my organization?
- Did the RPA/intelligent Automation implementation goals involve the efficiency/improvement of business processes?

The next step was to perform the search for applicable literature that met criteria and research question, which initially, seemed to a be daunting task, as my initial search criteria provided a

multitude of results and sifting through them was not just time consuming but they did not often yield desired results. Therefore, I made several modifications to my search criteria, such as:

- To attain the level of academic integrity and scientific rigor required for my inquiry, mostly peer-reviewed articles and literature were considered and used that were within 10 years of publication. I considered peer reviewed articles because of their quality haven been analyzed by peers of the authors. I initially included literature that was only within 4 years. I discovered that literature found within 4 years was not sufficient and that older literature was relevant with critical and vital knowledge. Most of the literature that I found and considered for RPA and AI were within 6 years but a small number that involved other relevant context that are applicable but older than 6 years were also considered.
- My search criteria included vital words and phrases that referenced my research question and subject, such as title word and key words that include “RPA in banking” “Automation intelligence implementation” “ Robotic Process Automation’ RPA process impact” “RPA efficacy”, “Automation in financial industry”, “Artificial Intelligence”, “Robotic Process Automation efficiency” Automation in banking” and “intelligent Automation”.
- I used reputable sites and resources that include the University of Liverpool online library, Publish or Perish, Dspace@MIT, Google scholar and ResearchGate.
- My initial decision to include articles was based on the abstract, which identified if it did not meet criteria, of which the criteria included peer reviewed status, the year of publication not older than 10 years I also focused on articles that were not only relevant to my research but also showed rigor in the context of Robotic process automation implementation.
- Additional articles where then identified by a backward and forward search. Backward research was done by reviewing the references cited by the articles and the forward search was done by searching for articles that cited the authors of the articles I’ve reviewed (Levy and Ellis, 2006).

2.3 Reviewed Articles

Firstly, I narrowed my search results to only include titles that seem to match my criteria and then reviewed the abstract to determine which ones provide insights and align with my research question

according to Creswell (2005) techniques to conducting a literature review. Then I grouped them by year of publication, peer reviewed and emphasis and objective. I also included number of citations in my grouping but found that a good number of the articles I found had fewer citing or hadn't been cited, which reduced the list of cited articles or cited articles with a high or medium citing, which may have been due to the area and subject of inquiry of RPA and AI that continues to develop. Some search engines filter criteria did not have the option to filter searches by peer reviewed, so I had to review the articles to find out if they were peer reviewed or not.

Figure 3 shows and example of how I tracked and classified articles:

Title	Year	Search engine engine	Peer eviewed	Site	# of citations
Robotic Process Automation at TelefónicaO2	2015	Google scholar	Yes	http://eprints.lse.ac.uk/64516/1/OUWBPS_15_02_published.pdf	4 >
Impacts of Robotic Process Automation on Global Accounting Services	2018	Publish or Perrish		https://ejournal.ukm.my/ajac/article/view/25271/8771	12
Robotic Process Automation for Auditing	2018	Google scholar - in research gate		https://meridian.allenpress.com/jeta/article/15/1/1/9413/Robotic-Process-Automation-for-Auditing	
Robotic Process Automation: A Case Study in the Banking Industry.	2019	UOL Library	Yes	https://ieeexplore-ieee-org.liverpool.idm.oclc.org/stamp/stamp.jsp?tp=&arnumber=8760733	
Robotic Automation Process - The operating system for the digital enterprise	2018	Pubish or Perrish	Yes	https://content.sciendo.com/view/journals/picbe/12/1/article-p54.xml?product=sciendo	5
RoboticProcessAutomation:Contemporaryt themes and challenges	2020	Google Scholar		https://pdf.sciencedirectassets.com/271439/1-s2.0-S0166361519X0010X/1-s2.0-S0166361519304609/main.pdf?X-Amz-Security-	18
Turning Robotiic Process Automation in to a Commercial Success	2016	Semantic Scholar via Publish and Perrish	Yes?	1 https://www.semanticscholar.org/paper/Turning-robotic-process-automation-into-commercial-Asatiani-Penttinen/6d0587b7c17174285626effe7014d8f41f2e87c8 2 http://ceur-ws.org/Vol-2725/paper4.pdf	77
Hofmann, P., Samp, C., Urbach, N. (2019) 'Robotic Process Automation' Electronic Markets: The International Journal on Networked Business. 30(1), 99 - 106	2019	UOL Library	Yes	https://link-springer-com.liverpool.idm.oclc.org/article/10.1007/s12525-019-00365-8	
Osman, C. (2019) Robotic Process Automation: Lessons Learned from Case Studies. Informatica Economica. (23) 4.		UOL Library	Yes	https://eds-b-ebscohost-com.liverpool.idm.oclc.org/eds/pdfviewer/pdfviewer?vid=2&sid=716c99e0-e33d-42ec-b0fa-a08207865849%40pdc-v-sessmgr04	
RPA Has Its Upsides: Robotic process automation has	2017	UOL Library	Yes	https://eds-b-ebscohost-	

Figure 3 – Example of how I classified articles

The categorization of found literature helped me perform practical screening for inclusion of only articles that are related to my research question, data extract, and quality appraisal (Okoli and Schabram, 2010) to exclude the literature that will not add value to, benefit or will not be relevant to my research subject and efforts (Faryadi, 2018). In the process of searching and identifying articles that related to my thesis topic, I found a lot of literature that initially seemed appropriate for review,

but upon further evaluation beyond the abstract, they were eliminated due to lack of rigor, not having the required context for my research or scholarly significance and quality. However, I found adequate relevant applicable literature, in academic journals and other nonacademic but practical journals, books, conferences and articles from the key mentioned search resources to be included in my literature review. The nonacademic journals found provided a practitioner perspective of Robotic Process Automation.

Examples of articles that were in the context of my research question and showed that the implementation of RPA and AI improves the efficiency of processes were seen in the articles by Parker and Appel, (2021); Pramod, (2021); Ng and Alarcon (2020); Anagnoste, (2018); Lacity & Willcocks (2015); Fernandez & Aman (2018); Kokina & Blanchette (2019); Moffitt, Rozario & Vasarhelyi (2018); Casale (2015) and Vijai et al. (2020). Robotic Processes Automation improved the efficiencies of processes by at least 40 percent (Kirchmer, 2017). To gain more insight, I reviewed their cited articles as well, which yielded additional applicable findings, increasing, the number of viable articles I considered. Parker and Appel (2021) also showed the reduction in FTEs (Employees), error reduction, faster processing times and even better employee work experience in addition to the improvement in efficiencies of the automated process. Maalla, (2019) and (Langmann and Turi, 2021) mentioned another key efficiency of RPA, as Bots do not interfere with existing IT systems and applications as they interact with them, which Casale (2015), agrees with. Thus, showing that RPA not only improved efficiencies of processes, but also improved the efficiencies of existing organizational information technology applications and saving significant cost in the development, upgrade, User Acceptance Testing (UAT) and maintenance of the IT applications and systems.

I also considered the inclusion of diverse literature from different parts of the world, including Asia, Europe, Australia and the Americas to help me understand the different perspectives they may have along with the inevitable similarities and differences. The diverse literature, authors and articles seemed to agree on the benefits of RPA, including cost savings, fast implementation timelines, faster processing time, risk reduction or elimination, elimination of human error, FTE or cost of labor force savings and the ultimate improvement in the efficiency of business processes, including Lacity & Willcocks (2015); Fernandez & Aman (2018); Kokina & Blanchette (2019); Moffitt, Rozario & Vasarhelyi (2018) and Casale (2015).

With the above-mentioned considerations along with my literature inclusion and exclusion criterion and following Okoli & Schabram (2010) and the Creswell (2005) techniques to conducting a

literature review, I was able to identify the relevant literature I needed for my research and some key debates.

2.4 Key Debates

As I look to address the key factors that could determine the improvement of efficiencies in my organization by the implementation of RPA, I decided to investigate the key debates in the literature. I found several common debates and examined them to help me determine which RPA/AI implementations in organizational processes context would benefit my research.

First, a common debate is the discussion on the positive impact and benefit of RPA on the organization. The most common benefit was cost savings and reduction, which mostly constituted the reduction in number of FTE (Full Time Equivalent) employee (Lacity and Willcocks, 2015; Fernandez and Aman, 2018) along with hours saved (Kokina and Blanchette 2019) upon the RPA implementation. Others mention time savings and risk reduction (Fernandez and Aman, 2018; Thekkethil et al., 2021; Moffitt, Rozario, and Vasarhelyi, 2018; Radke et al., 2019). Knowing that organizations focus on cost reduction (Ghosh, 2018) and profit maximization, aside from the quantitative benefits of RPA and AI, there are also qualitative benefits that could be used to illustrate or measure the positive impact of the implementation of RPA and AI on organizations. Qualitative benefits include, employee job satisfaction, as employees can focus on more cognitive engaging task (Kokina and Blanchette, 2019; Hofmann and Urbach, 2019; Anagnoste, 2018; Javed et al., 2021). Cognitively engaging tasks such as the part of the process that requires human judgment and leaving the monotonous repetitive tasks to the Bots which can improve employee morale (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Enriquez et al., 2020). Parker and Appel, (2021) however, mentioned the employee qualitative benefits, which also sum up to the improvement in efficiencies of processes. However, these thoughts would contribute to my research objective.

Another debate I'd like to mention is the area in which RPA is implemented in organizations. Some literature mentioned back-end operations processes (Anagnoste, 2018) as ideal for RPA, while others think auditing processes or front-end processes are ideal for RPA automation. Most articles agreed that the optimal area would be business processes that involve the tasks that employees conduct to operate the business successfully. This also include operations processes which involve humans working tasks that involves data inputs to achieve specific outputs as they work the processes from end to end such as structured tasks in back-end banking operations that involve data inputs that go

through specified workflow processes to provide required outputs or products that add value to the business. However, there were differences in the specific areas RPA/AI was implemented. According to Romao, Costa and Costa (2019), the main area RPA is implemented in the financial industry is operational and back-office processes of organization, Smeets et al. (2021) research found that 80 percent of organizations agree that RPA's possibilities are found in back-end processes in banking. which matches what my organization is doing, along with some front end processes, as it applies to the RPA use cases that I have identified in my organization. However, others, such as Moffitt, Rozario and Vasarhelyi (2018) suggest that RPA should be used in auditing firms such as in CPA (Certified Public Accountant) firms, which I agree with, upon making further research based on Moffitt, Rozario and Vasarhelyi (2018). Here in auditing, unlike general business processes, RPA is used to automate the examination and controls to ensure adherence to specified rules and standards, such as financial statements.

Although business processes and operations tasks are distinct, along with auditing, they both can be automated with RPA and IA. My practical experience has taught me that RPA cannot only be implemented in operational processes but also in routine tasks that humans across organizations perform (Kaya, Turkyilmaz, and Birol, 2019), a thought the literature could have emphasized more on, as I believe this is often overlooked. Tasks such as the sending of faxes via physical machines which can be automated and digitalized as seen in one of the use cases in my research, is an example of a routine task that can be automated. Overall, the articles clarified that RPA and AI automations of processes would benefit organizations and help them become more efficient (parker & Appel, 2021; Del Rowe, 2017; Pramod, 2021; Radke et al., 2019). The key debates are also further discussed in the RPA impact on organizational processes below

2.5 RPA impact on organizational processes

2.5.1 Introduction

In this section, I discuss the impact and advantage of Robotic Process Automation on organizational processes found in the literature, including cost savings due to bots replacing humans and faster processing times by bots. I also discuss other benefits such as scalability, improved process quality and risk reduction along with compliance to regulations, improved customer service, process optimization, employee morale, improved productivity and RPA not impacting existing organizational systems.

2.5.2 overview of the evaluation of the benefits of RPA

I wanted to review in detail how the literature showed the benefits of RPA in improving organizational processes and how organizations benefited with the implementation of RPA and AI. I found that the majority of the articles enumerated a number of benefits of RPA on organizational processes and the efficiency they brought to operations, including cost savings, reduction in FTEs (Full time Equivalent), time savings in working the processes, improved quality, risk reduction, scalability, faster processing times, improved employee morale and improved customer service. Cost savings and the improvement of operational efficiencies benefits were motivations of organizations for the decision to implement Intelligent Automation (Santos, Pereira & Vasconcelos, 2020; Del Rowe, 2017; Pramod, 2021; Maalla, 2019; Anagnoste, 2018; Syed et al., 2020). Sobczak, (2021) adds that organizations implement RPA to decrease the cost of executing business processes without increasing the number of employees.

When Robotic Process Automation is introduced to an organization, it is a new information technology initiative, and according to Castillo (2016), a new technology initiative should reduce operational costs, diminish and mitigate risks, increase revenue, enhance customer service and also engage compliance and regulatory requirement. Ulla (2014) suggests that organizations that practice continuous improvement and deliver on their planned IT initiatives achieve cost maximization. Castillo's description of the characteristics of a new technology initiative aligns with the benefits Robotic Process Automation will bring as stated by Anagnoste, 2018; Del Rowe, 2017; Maalla, 2019; Pramod, 2021; Santos, Pereira & Vasconcelos, 2020; Sobczak, 2021 and Syed et al., 2020. These operations processes are worked by humans who are paid salaries, provided benefits and resources that are organizational costs, so automating the process translates to cost savings and the improvement of processes and operational efficiency (Koenig et al., 2020).

Furthermore, organizations spend and budget millions of dollars to build and maintain IT applications, software that support business processes. Organizations spend 3 percent of their budget on information technology (Forbes, 2017). Information technology is a vessel that enables organization to differentiate themselves, achieve cost differentiation, improve services and gain market share (Mitra, 1999). However, because of the low cost of investment of RPA and the fact that its automation Bots do not interfere with or disrupt existing technology and applications as they interact with existing company and Enterprise software (Enrique et al., 2020; Langmann & Turi, 2021;

Asquith & Horseman, 2019), significantly high cost savings are enabled, because the existing systems will not be disrupted nor will IT personnel be required to perform testing or maintenance due to RPA and AI automations (Maalla, 2019). Organizations implement RPA because it is a low-cost solution that reduces compliance risks and saves time (Radke et al., 2019). Taulli (2020) added in his book, a survey from Forrester that found 86 percent of survey respondents acknowledged that they saw an increase in efficiencies due to the implementation of Robotic Process Automation.

2.5.3 Bots replacing employees leading to cost savings

Organizations use technology to find solutions to their business problems and operations and are continuously looking for ways to improve the efficiencies of their information technology applications and software that support their operations, which is essential for them to remain competitive, (Syed et al., 2020; Javed et al., 2021). Robotic Process Automation is a technology that offers solutions to improving efficiencies (Chakraboti et al., 2020; Radke et al., 2019). A key part of operational efficiencies improvement is cost savings and reduction. Cost savings is the leading benefit and advantage of RPA according to most of the articles , which could bring immense cost savings to organizations, that made RPA and AI very attractive (Gartner, 2019). RPA and AI software companies along with their providers and consultants use cost savings and FTE reduction as the main selling and presentation point to organizations and businesses, which my bank found with all RPA software vendors during the RPA software choice decision making phase.
Moreover, in order for organizations, to compete, remain competitive and succeed, they must reduce cost and increase revenue, which RPA and AI enables, thus making it attractive to organizational leaders and decision makers and why they opted to introduce RPA and AI to their organizations (Chakraboti et al., 2020; Javed et al., 2021).

2.5.3.1 FTE (Full Time Effort) Savings

RPA automates operational processes that are rule based and structured, repetitive, with low-level decision making that involve if, then else, (Tornbohm & Dunie, 2017; Langmann & Turi, 2021; Radke et al., 2019) rules and have a high volume (William & William, 2020) . The inclusion of AI adds a level of intelligence that leaves decision making to the Bots, which increases the scope of what can be automated (Casale, 2015). Organizations including mine, and those in the financial industry, have a

multitude of such monotonous front and back-end processes and tasks that require multitude amounts of hours to work manually, and employ a large number of people to work the processes.

Bots can perform the structured tedious tasks faster, more accurately and reliably, are scalable and often the automation involves optimization of the process which overall leads to cost savings (Parker and Appel, 2021). Because the bots can perform the task more efficiently at a lesser cost, it is more efficient and effective to automate and have Bots perform the task in place of employees (Lacity et al., 2015). Eikebrokk & Olsen (2020) claim that organizations implement RPA in order to eliminate employees or not replace them after retirement, which aligns with Cewe et al. (2018). Radke et al. (2019) adds that organizations implement Robotic Process Automation to save time. According to Casale (2015), the implementation of Robotic Process automation will reduce workforce cost between 25 and 40 percent and that one Bot will replace 3 to 5 employees. Casale (2015), further states that by 2025, RPA and AI automation will eliminate 140 million employees worldwide.

There were several cost saving factors according to the articles but FTE savings was a major one, and a quantitative benefit that could be proven (Villar & Khan, 2021; Scheppler & Weber, 2020). For example, in the implementing of RPA at Telefonica02, hundreds of FTEs were eliminated or diverted to other tasks annually in the automation of 15 processes and they saw a return on investment of 650 to 800 percent (Lacity, Willcocks and Craig, 2015). Taulli (2020) adds that Telifonica02 had a return on investment in Robotic process automation of 650 Percent. A European Bank eliminated 25% of its employees in areas that RPA was implemented in the first year (Wright et al., 2017).

An example of how RPA saved costs and reduced FTEs in the financial industry is the implementation of RPA and AI in Deutsche Bank to automate its manual large volume back-office processes that were time consuming.

Deutsche Bank created an automation 4.0 program in 2019 to focus on the automation of operational processes and was able to reduce £6 billion in cost (Villar & Khan, 2021**).** Villar and Khan's article also showed that the redeployment of FTEs due to automations saved Deutsche Bank £39 million in 2018 and £32 million in 2019 and respectively. This provided empirical knowledge that not only revealed that RPA can save a significant number of FTEs and costs but also show the improvement in the efficiencies of organizational processes.

Additionally, because the Bots are not paid a salary (Asatiani and Pentinnen, 2016). FTE costs are reduced by 50 percent with RPA automations (Osman, 2019). These are staggering numbers that could propel productivity, which is why organizations, including mine are implementing RPA coupled with AI. (Anagnoste, S. 2018).

In another banking example, Barclay's Bank saved the equivalent of 150 Full Time Employees along with a yearly bad debt provision of 250 million dollars (Taulli, 2020). Taulli also mentioned another global bank that deployed 150 Bots that perform tasks at 30 percent the cost of an employee, which saved 40 million dollars. These examples also show the potential of the implementation of RPA in banks that I can draw from as I implement RPA in my bank.

Although RPA saves cost by reducing FTEs it also facilitates collaboration between the Bots and humans, as the Bots can take over the repetitive monotonous and low decision-making tasks, while humans can focus on more cognitive stimulating high decision-making tasks that speak to human strengths, thus improving efficiencies and productivity overall (Villar & Khan, 2021; Aguirre & Rodriguez, 2017; Sobczak, 2021; Wojciechowska-Filipek, 2019). According to Smeets et al. (2021), 5 percent of all processes can be fully automated and additional 30 percent out of processes can be automated, which shows the favorability of a collaboration between robots and humans as the ideal solution for organizations seeking to reduce costs and increase efficiency. Furthermore, employees can learn new skills and take on better jobs as seen with Deutsche Bank. Papageorgiou, (2018) did however, mention in his articles that RPA's goal is not to eliminate employees or save FTEs but rather, to take away the monotonous tasks from them and allow employees to focus on the improvement of client services. Ellingrud, (2018) also states that the goal of automation is not to eliminate jobs but to have employees focus on more value-added work, while Bots take on the mundane repetitive tasks, and that automation can create jobs, as employees can learn new higher valued skills and take on jobs that require more human intellectual strengths. Papageorgiou and Ellingrud (2018) take a somewhat different position from the majority of articles I found that mention FTE savings as the main reason for implementing RPA, along with numerous examples of where FTE were saved.

My action research is taking place in my organizations, which is also a bank, so Deutsche Bank not only relates to my research question but can be directly applicable to the activities and change I will make in my organization. Furthermore, although Deutsche Bank is a larger bank that was established 1869 with twice as much annual revenue as the bank I am employed with (established in 1985), banks have similar products and operational processes so I can find parallels with Deutsche bank and my organization as I perform my research.

However, it is important to account for the return on investment (ROI) of RPA. Organizations have created diverse forms of measurements to help them determine their RPA return on investment

(ROI) including FTE reduction, process quality improvement, decrease in errors, time saved and improvement in efficiency and effectiveness (Kokina & Blanchette, 2019).

According to Wright et al. (2017) the time it takes to get the return on investment or remuneration is about 11.5 months. Taulli, (2020) posits that the average return on Investments is 18 months from a research of 250 organizations with revenues between $20 million and up to billions, which is still comparably very low compared to other standard investment on technology in organizations, due to the low cost of implementing RPA (Lacity, et al., 2015). According to Javed et al. (2021) and Hallikainen et al. (2018), significant return on investment can be acquired by the process owners of automated processes and the organization as a whole with Robotic Process Automation. The gap in return on investment between Wright et al. (2017) and Taulli (2020) may lie in the time of their research publication, which was three years apart and Taulli's focused on larger organizations with revenues as mentioned above. Smeets et al. (2019), mentions another factor to be mindful of when discussing Intelligence automations, namely, that as the number of automations increases so do the maintenance cost. This is another important factor I must consider in my action research and implementation of RPA in my organization. Many articles discuss the benefits of RPA, such as faster processing time (Stravinskiene & Serafins, 2021) but not enough on the cost of maintenance as the fleet of Bots or virtual workers and automated processes grow, which I find is a gap in the automaton literature that should be addressed.

2.5.4 Processing time savings of automated processes

RPA implementation also saved valuable time, as Bots could work processes much faster (Aguirre & Rodriguez, 2017; Kokina & Blanchette, 2019), work 24 hours a day every day of the week, including weekends and holidays (Langmann & Turi, 2021; Thekkethil et.al, 2021; Stravinskiene & Serafins, 2021) without breaks and more accurately than humans (Radke, et al., 2020). The Bots are able to work faster because they seamlessly access and navigate through screens in applications via element recognition mapping (van der Last et al., 2018) and can read and write, compare, and reconcile data, upload or download information and perform calculations effortlessly and accurately and are more efficient compared to humans (Hallikainen et al., 2018; Taulli, 2020).

Since RPA Bots can work processes at a much faster velocity than humans, they are able to complete work queues and batches much faster, which ensures a faster process output (Syed et al., 2020; Hallikainen et al., 2018). Ghosh, (2018) explains that 28 minutes of human manual work can be completed by a Bot in 2 minute which equals 93 percent lesser time than an employee. This aligns with Wojciechowska-Filipek (2019), who found that bots worked cases in a bank case study, 83

percent faster than humans. Robotic Process Automation is able to reduce task performance times by 90 percent and reduce costs by 80 percent (Nallicheri, 2018). The New York Mellon Bank increased processing handling time by 88 percent with the implementation of Robotic Process Automation (Wojciechowska-Filipek 2019). Since RPA automation Bots can work faster than humans it ultimately leads to a reduction in processing times, cost reduction and improvement in efficiencies of the automated processes (Radke, 2020).

Delivery deadlines and service level agreements (SLA) or fulfillment time are met or exceeded using RPA (Anagnoste 2018). A service level agreement is a contract or arrangement between the parties involved to commit to delivering IT performance and services within a specified timeframe (Castillo, 2016), for example an agreement between the RPA team and the business team that owns the process. RPA Bots are also built to work a process within weeks unlike humans who may need months to reach the potentially of full capacity, as Anagnoste (2018) found, which improves the efficiency of processes which can lead to improvements in productivity (Casale, 2015; Bourgouin et al., 2018).

Meeting Service level agreements (SLA), as Anagnoste (2018) mentioned, is crucial to process and task efficiencies in my organizations, as our bank processes have SLA's that vary from 24 hour to a few days and is also tied to the performance goals of employees and teams in my organizations. Therefore, this is directly related to my research and research questions and provides guidance to an area that shows the impact of RPA and AI on organizational processes and one measurement of criteria that I must be attentive to in my action research.

2.5.5 Scalability

Having established that RPA enables faster processing times, as Bots work faster than humans, another factor and advantage that goes with faster processing time is scalability. So, what happens if the volume of an automated process increases dramatically? Scalability enables Bots to work processes when the volumes fluctuate, increase rapidly or when there is growth, and still meet deadlines (Lacity & Willcocks, 2016; Tornbohm & Dunie 2017, Gartner.com, 2019; Langmann & Turi, 2020; Casale, 2015). Taulli (2020) describes this as cloning the Bots to meet the demand of increased volumes. For example, when the daily average volumes of a process doubles or triples, regardless of how fast a Bot works, it may not be able to work them fast enough to meet deadlines and service

level agreements (SLA), which could create a risk. RPA provides the solution to deploy multiple Bots to work a process in a queue, thus completing the task faster and timely and avoiding a bottleneck or blockage (Chappell, 2018), and the deployment of bots can be flexible, deploying as many as needed.

This form of increasing the workforce is not unlike what occurs in my organization with employees that work task queues manually when volumes of a process increase. More employees are thrown at the task, which increases employee cost and salary including overtime pay, so this is another part of the solution I will bring to my organization with the implementation of RPA. Stople et al. (2017) agrees and state that scalability is easily achieved with RPA. Gartner (2019) clarifies that the number of processes that can be automated is limitless as long as they meet RPA automation criteria. Langmann & Turi, (2021) provided an example of a European Energy organization that uses 300 bots to perform the work of 600 employees and only 2 automation developers supervising the bots. Chappell (2018) answers a critical question that is faced in operations in Banking that I must be aware of as I solve problems with RPA automation in my organization with my action research. It also highlights another aspect of how RPA improves efficiencies.

Scalability also allows the broadening of the use of RPA in multiple areas in an organization. For example, if a process is automated for one business unit, other business units in the bank with the same or similar processes can simply be added to the queue without the need for a new automation or with just minimal changes (Chappell, 2018). This avoids the work of building and developing a new Bot for a similar process thus saving time cost and improving efficiencies. Lacity & Willcocks (2016) also mentioned that the reuse of the code and functions of already built Bots in new ones saved the European Utilities about 30 to 40% time in the development of new bots. The reuse of existing code and components, as mentioned by Chappell (2018) and Lacity & Willcocks(2016) is another advantage and important aspect I will incorporate in my implementation of Intelligent automation and action research and also shows the improvement in efficiencies and cost savings.

Chappell (2018), however, mentions the additional cost of scalability involving the licenses for Bots, as seen with the case of the RPA and AI software provider Blue Prism. Blue Prism charges for individual license per Bot, so the more Bots required or deployed, the more licenses that will be required which increase cost. So, per Chappell, scalability enables efficiency but can increase cost. Taulli (2020) asserts that scaling is the holy grail of RPA automation but can become difficult if not planned and managed well. Nevertheless, the authors agree that the increase in cost of scalability is in not significant enough to dramatically impact overall automation cost savings. My bank uses the software provider, Blue Prism, so, Chappell, points out a vital factor I must consider in my

implementation of RPA and AI in my organization, along with my research. Therefore, the management of my bots or virtual workers on working the automate processes effectively is critical.

Explanation of figures 4 and 5 below. Showing how multiple bots can be deployed to work:

- Figure 4 below shows bot scalability. As the volume of cases to be worked increase, additional bots are added to work the process, which enables the bots to complete the task on time regardless of the size of the increase in task or cases. It shows that 1 bot works 1000 cases and when cases increase to 2000, 2 bots work the cases and so on.
- Figure 5 shows 10 bots deployed and working 10000 cases simultaneously. The 10 bots can work 10000 cases in lesser time to meet deadlines.

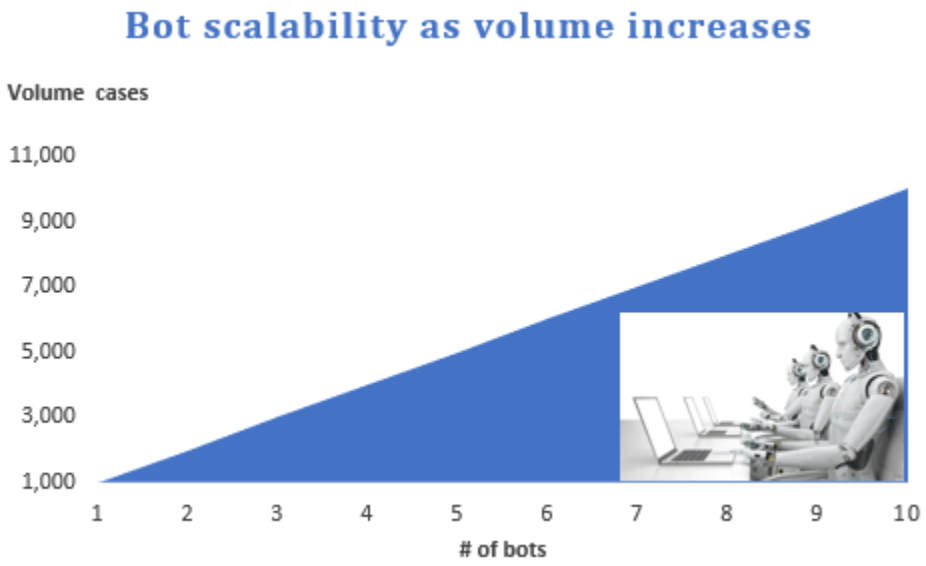

Figure 4 - Example of Bot Scalability with and increase in Bots as volumes increase

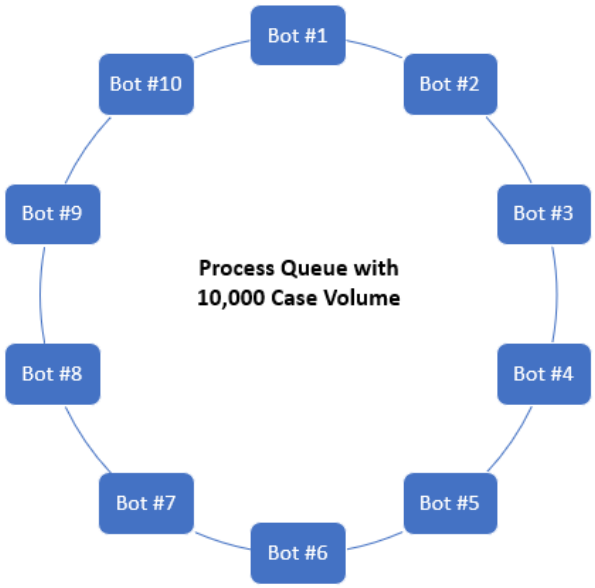

Figure 5 – 10 Bots simultaneously working queue with 10K cases

2.5.6 Improved quality and risk reduction

Much of the literature I found clarified the risk reduction aspect provided by RPA. Risks that are caused by factors such as human error (Laxity and Wilcocks, 2016), including typographical errors when humans enter incorrect information or data, clicking the incorrect buttons in applications, transferring the wrong data or files when reconciling information, along with errors caused by human fatigue (Langmann & Turi, 2021) as they work the monotonous operational processes. Such errors caused by humans in low or highly critical data pose risks that have various degrees of consequences and can cost organizations millions of dollars and reputational damage. RPA Robots are coded to perform these tasks accurately. Essentially, Bots eliminated or dramatically reduced the human error risk in the process, thus improving quality (Fernandez and Aman, 2018; Laxity & Wilcocks, 2016; Thekkethil et al., 2021).

2.5.6.1 Risks caused by human error

One of the characteristics of processes that RPA automates is high volume repetitive tasks performed by humans, since humans work the processes manually, errors are abound, which can be eliminated by RPA bots (Patri, 2020, Wright et al., 2017; Ghouse & Sipos, 2022; Radke, 2020; Asquith & Horseman, 2019; Casale, 2015; Kirchmer, 2017; Leno, 2018; Kedziora & Penttinen, 2020). Several articles and authors mention and align with human errors in working processes being mitigated by RPA automation. According to Syed et al. (2020), the elimination of human error can be 100 percent and a study showed accuracy levels of 99.9 percent in RPA automations in an organization, which aligns with Patri (2020); Wilds (2019) and Wojciechowska-Filipek (2019). According to the authors, these human errors occur in processes that require manual input such as typing or reading and writing in systems and matching information which are seen in most operations and back-end processes that humans work (Lacity & Willcocks, 2016), which is not dissimilar from the operational processes that I will be automating in my organizations.

Langmann & Turi (2021) provides an example of a financial institution that reduced the error rate in one of its automated processes to zero percent. Patri (2020) also shows an example of a use case in Banking in which RPA Bots processed fraud transactions 90 percent faster than employees at a 100 percent accuracy rate, which reduced fraud, eliminated the human errors and improved the efficiency of the process. Kedziora & Penttinen, (2020) discussed how RPA improved the efficiencies of processes at Nordea bank. Knowing that human errors in banking can be very costly to organizations, along with possible regulatory violation fines, error elimination is a major advantage as the literature shows.

The literature could highlight the impact of human error and the consequences much more, which is a key factor, so, I see this as a gap in the literature. The financial industry, which I am part of, receives steep fines due to errors and non-compliance to industry regulations (Donohue & Went, 2012). Banks in the United States and the UK were fined a total of $326 billion in 2016 due to noncompliance to regulations (Macartney & Calcagno, 2019).
Before a process can be automated, it requires an end-to-end analysis. In my experience, risk and quality gaps were sometimes found and were then fixed in the automation or brought up to the processes owners to remediate, thus optimizing the process and increasing the quality of the process and saving additional potential cost that could be incurred in terms of fines, which can be in the million-dollar range. Furthermore, organizational reputational damage that can be caused by human error is also dramatically reduced. Organizations can lose revenue due to reputational damage that

may require a long time for them to rebound from. The literature I found did not mention this advantage of the implementation of RPA and AI, so, it is a gap that should be filled.

Moreover, with the Bots working the processes and eliminating human error due to RPA automation, employees are freed up to focus on profound task that require human judgement (Romao, Costa & Costa; 2019, Sandy et al., 2020; Fahland et al., 2020). Some of these tasks may be components of the process the Bots could not complete or automate, which now allows employees to be fully dedicate to these tasks and ultimately providing a better service (Syed et al., 2020). This collaboration of humans and bots helping reduce errors help organizations meet regulatory compliance rules.

2.5.6.2 Compliance to regulations and risk management

Financial organizations are regulated by several entities in the United States of America both at the state and federal levels (Costello et al., 2018). The regulation covers several aspects including, how they do business, perform transactions and even how customer data is handled used and stored, along with the use of technology to perform transactions and operations, which includes the systems and applications that support operations such as automation. Financial organizations must be in compliance with the regulations or face penalties including monetary fines (Marshal & Prescott, 2001; Rowe, 2021) and suspension of license and their ability to function (Apostolik & Donohue, 2012), which also can result in reputational damage (Wallace 2011). Financial regulatory bodies include the Office of the Comptroller of Currencies (OCC), Federal Deposit Insurance Company (FDIC), The Federal Reserve Board (FED) (Costello et al., 2018; Wallace, 2011) and consumer protection agencies like the Consumer Financial Protection Agency (CFPB) (Rowe, 2021).

The consequences of not been in compliance or following applicable regulations can be steep and costly (Rowe, 2021), as such, organizations are implementing RPA as another tool to help reduce compliance risk (Radke et al., 2019; Wright et al., 2017). RPA and AI can create tools to track compliance of regulations (Syed et al., 2020). For industries and organizations that are highly regulated such as Banks and Insurance companies, RPA is a life saver (Casale, 2015) as it helps them to become more compliant. Information Technology requirements including security and audit are features that RPA enable organizations to attain (Stople et al., 2017).

Wallace (2011) also found that a good way to measure the fulfillment of a banks compliance to regulations is to examine their enterprise systems, a task that RPA can be implemented to accomplish. Wallace also shows that it is important for banks to have robust enterprise compliance

and risk management system, to ensure that they eliminate errors and are in compliance with regulations established by the industry controls and standards. Since banks are implementing RPA to reduce compliance risks (Radke et al., 2019; Wright et al., 2017; Casale, 2015). RPA automations will also be a measured for banks compliance to regulations Wallace (2011), because Bots are now performing the tasks employees used to, so the Bots may fall under the same scrutiny of compliance to regulations. Robotic Process Automation software and applications have a detailed tracking method of the work the bots perform in form of log tracking, which allows for compliance to regulations, as the bots are coded based on these regulatory requirements (Hallikainen et al., 2018; Syed et al., 2020; Wojciechowska-Filipek 2019; Asquith & Horseman, 2019; Laserfiche, n.d.; Casale, 2015) which helps mitigate operational risks. Casale (2015) states that because RPA tracks the activities of the bots, organizations can not only be compliant with regulations, but they can also become more audit compliant. Kirchmer (2017) agrees and states that a benefit of RPA is that it helps with the administration of compliance regulations. Villa and Khan (2021) add that RPA and AI have the ability to automatically generate reports from systems, along with report generations from processes they worked to ensure compliance and it management. These authors provide critical insight to important factor of compliance and regulations that they agree on which I must be aware of and as I proceed with the implementation of RPA in my organization and perform my action research.

2.5.7 Improved Customer Service

Providing good customer services is essential in the banking industry, as satisfied customers are more likely to remain with their banks and recommend their bank and services to others and also more likely to return for more business, which helps the bank to remain competitive (Dilley, 2012). Villar & Khan (2021) postulate that banks are under pressure to improve the quality of customer service and improve efficiency in order to be competitive. Customer service can help banks differentiate themselves and provide services that meet customer's needs, which helps them remain competitive, gain market share and increase revenue (Hawcroft, 2006; Arasali et al., 2005). Both Dilley (2012) and Hawcroft (2006) agree that banks invest substantially in their customers services strategy and train their employees to have the necessary skills to provide quality customer service. The top performers in the financial industry will be those that use data meaningfully to provide quality customer service (Villar & Khan 2021). Soliha et al. (2018) postulate that in order for companies to survive and be sustainable, they must provide quality customer service. To provide

quality customer services, banks must have efficient and current technology to support operations that enables employees to make prompt and efficient decision making, which in turn enables quality customer service (Hawcroft, 2006).

The implementation of Robotic Process Automation technology primarily focuses on the automation of repetitive, monotonous manual tasks, freeing up employees that perform these mundane tasks to focus on more value-add work that are more cognitively engaging and astute to human strengths (Anagnoste, 2018; Ellingrud, 2018; Hofmann and Urbach, 2019). One of the areas that the employees can now dedicate more time and focus on is providing better customer services and experience to customers (Casale, 2015, Jha et al., 2021). Casale makes a good point here, but it does not clarify that employees may have to be retrained to now perform customer service work, which can be a cost to the organization as they look to improve customer service and experience. Employees can collaborate with Bots so that they can focus on high impact tasks that improve customer experience while the bots take on the monotonous time-overwhelming tasks (Laserfiche.com n.d.). Banks have recognized the need for Robotic Process Automation in their front and back-end processes as it directly impacts the quality of customer relations and services they provide (Wojciechowska-Filipek 2019). Ellingrund (2018) and Lacity et al. (2015) also support's this by saying that automation will improve customer service. Lacity et al. (2015) expands on this and contend that organizations that had successful RPA implementation strategies improved their customer service and employee productivity. Ellingrud (2018) considers it a risk if organizations focus overly on the cost savings that RPA provides and overlook opportunities on its ability to facilitate better customer services. Ellingrud (2018) and Lacity et al. (2015) make valid points that I must consider in my action research, as costs savings and revenue maximization is the focus of my organization and a significant number of processes that I will automate involve employees that also perform customer services.

2.5.8 Optimization of processes

Organizations look to optimize their processes to help make the processes more efficient, reduce cost and improve productivity. Banks continually optimize their process to meet the global changes in the industry and keep up with the worldwide competitive landscape (Wang et.al 2012). Banks have also implemented Robotic Process Automation to optimize their existing processes and systems. Zhou (2021) found in her research that banks have used RPA to optimize their financial workflows, business processes, job responsibilities, accounting data storage, which resulted in the

elimination of human errors, reduced FTEs and material resources and overall, improved efficiencies. Villar & Khan (2021) assert that banks use RPA to optimize their processes and that the successful banks use intelligent automation, (Robotic Process Automation and Artificial Intelligence) to optimize their processes, save costs and improve efficiencies Which aligns with Stravinskiene & Serafins (2021).

The analysis of processes that will be automated is thorough and detailed which often uncovers gaps in the process, RPA not only uncovers the gaps but also helps to fill them and optimize the process which improves the efficiency of the process (Casale, 2015). Plattfaut (2019) found in his case study that the implementation of Robotic Process Automation in organizations enabled the optimization of processes which improved their efficiency, while Leno (2018) says that RPA improved process performance. Stople et al. (2017) found that a Norwegian bank implemented Robotic Process Automation for several reason including process optimization to improve the efficiency of their processes and have a faster means to optimize them, namely RPA. Stople et al. (2017) also found that the bank optimized its processes at a low cost with RPA and the IT team was not involved nor were the legacy IT teams, their applications and systems impacted, which avoided costs. The thoughts of the authors on how RPA optimizes processes align is another critical point that applies to my research which I must incorporate as I implement Robotic Process automation in my organization and do my action research.

2.5.9 Employee Morale and improved productivity

Repetitive and monotonous high-volume task that require low to medium judgement can be boring task for employees, which is where RPA is mostly implemented (Leno, 2018). Once these tasks are automated, employees can be more cognitively engaged with more value-add task (Anagnoste, 2018; Casale, 2015; Langmann & Turi 2021; Javed et al., 2021), can become more creative and focus on decision making and relationship building, thus, improving their morale and increase productivity (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). Fahland et al. (2020) found that employees want to transfer monotonous tasks to robots and keep tasks that are innovative and involve interaction with humans. The implementation of Robotic Process Automation improved employee and end user satisfaction (Anagnoste, 2018). The authors show that good employee morale often leads to better quality and productivity, so this is a key factor to be aware of.

An example of how employee morale can improve efficiencies can be seen in cases where humans still have to work parts of a process that could not be automated (Anagnoste, 2018). Radke et al., (2020) postulate that with the RPA automation of monotonous processes, employees were no longer required to perform the repetitive tasks, which improved the job satisfaction levels and morale, which aligns with Javed et al. (2021), who adds that this also increases the efficiency of employees productivity. Since the employees no longer have to perform the low repetitive tasks, they are able to dedicate themselves to the unautomated piece of the process and do it better than before, this is also another gap I found in the literature that should be filled, because this is critical and was not elaborated on.

Morale, however, can also be a negative impact of RPA implementation, as employees may view automation and Bots as their replacements and a threat to their jobs (Asatiani and Pentinnen, 2016). Fernandez and Aman, (2018) add that when bots replace humans, it can create a competitive environment between humans and the bots.

2.5.10 RPA's non-impact on existing applications & software

Robotic Process Automation is the use of software to build virtual robots that mimic the activities of humans as the interact with digital systems and applications as the perform tasks or work processes (Cernat et al., 2020; Lacity et al., 2015; Fahland et al., 2020). Because the robots emulate human activity, they essentially do not impact the system and applications that they interact with, the bots are in fact virtual employees, (Lacity et al., 2015; Javel, et al., 2021; Radke, 2019; Wojciechowska-Filipek, Fahland et al., 2020). Moreover, unlike traditional ways of automating processes, RPA Bots do not interfere with existing IT systems and applications in an organization(Casale, 2015; Stople et al., 2017; Enrique et al., 2020; Langmann & Turi, 2021; Asquith & Horseman, 2019) because RPA sits on top of applications (Enriquez et al., 2020). Stople et al. (2017) also found in their study of RPA implementation in a bank that RPA did not impact existing systems and applications, thus was faster in optimizing the processes that were automated and saved the bank IT costs.

The literature and authors all align with the fact that Robotic Process automation does not disrupt exiting organizational, legacy or enterprise systems it interacts with, which saves organizations a lot

of money. Which is unlike the traditional Information Technically protocol that will require the teams of all the applications impacted by an automation to participate and conduct detail User Acceptance Testing along with concise regression testing of their applications to ensure they function erroneously, which increases operational and employee costs and prolongs the system development life cycle and automation project. A gap I found in the literature that was not mentioned is that although Robotic Process Automation does not interfere with the systems and applications in interacts with, the bots sometimes have challenges accessing or reading data from some applications or browser-based applications, which may require extensive trouble shooting and creativity to resolve and can stall and delay the automation and implementation of process. This is what I found in my practical experience with Robotic Process Automation. The impact of RPA can be seen in the measurements that show the benefits of RPA on organizational processes.

2.6 Measurements of RPA benefit and impact on processes and efficiencies

Most of the literature established that one of the most direct methods to determine the benefit of RPA success is cost, specifically FTE savings as seen in the example of Telefonica02 (Lacity, Willcocks and Craig, 2015). A comparison of the number of employees that worked a process pre and post RPA implementation is often significant. The cost of RPA implementation, however, is often low (Javed, 2021). Examples of FTE reduction in the implementation of RPA are:

- At Telefonica02, hundreds of FTEs were eliminated or diverted to other tasks annually in the automation of 15 processes and they saw a return on investment of 650 to 800 percent (Lacity, Willcocks and Craig, 2015)
- Banking example, Barclay's Bank saved the equivalent of 150 Full Time Employees along with a yearly bad debt provision of 250 million dollars (Taulli, 2020).
- The redeployment of FTEs due to automations saved Deutsche Bank £39 million in 2018 and £32 million in 2019 and respectively (Villar & Khan, 2021**).**
- A European Bank eliminated 25% of its employees in areas that RPA was implemented in the first year (Wright et al., 2017).

The literature mentioned several other practicable key performance indicators (KPI) factors that are good measurements of benefits and efficacy, including bot Accuracy and reduced or elimination of human error (Fernandez and Aman, 2018; Lacity, Willcocks and Craig, 2015; Villar & Khan, 2021; Asquith & Horseman, 2019; Casale, 2015; Bourgouin et al., 2018), employee satisfaction, increased productivity, and faster processing time (Hofmann, 2019). Humans make errors in reading typing and data entry, errors that may occur due to fatigue, negligence or otherwise (Chakraboti et al., 2020). Feldman (2004) found that 15 to 35 percent time of knowledge workers is spent on finding data, which reduces productivity. If the process is automated via RPA based on requirements the bots can easily access and find data, do not make errors thus eliminating the risk caused by human error. The elimination of risk does not only reduce costs but also makes the process more efficient, so I agree with the authors that bot accuracy and reduced or elimination of human error (Fernandez and Aman, 2018., Lacity, Willcocks and Craig, 2015; Asquith & Horseman, 2019) are adequate measurements of benefits and process efficiency.

Another measurement of process efficiency is time savings (processing times) (Fernandez and Aman, 2018; Lacity, Willcocks and Craig, 2015). Bots can work automated process much faster than humans (Parker and Appel, 2021) thus saving immense time. Therefore, more work can be done in much lesser time which can improve SLA, save time and increase productivity (Syed et al., 2020; Asquith & Horseman, 2019). Thus, this is also another concrete measurement of the measurement of the efficiency of automated processes.

The improved quality of the Bots process and outputs (Lacity, Willcocks and Craig, 2015) is another measurement. Since the Bots do not make the errors humans make the quality of the output is better and improved. Additionally, when processes are automated via RPA, the processes are often optimized to corrected gaps in the process or new ideas of improvement that are incorporated in the Bot and automation. So, here also, we have a good and quantifiable measurement of improved processes.

Error and risk reduction is another viable measurement of improved processes (Casale, 2015;

Moffitt, Rozario, and Vasarhelyi, 2018). Unmitigated risks can be very costly to the process, impact the business and customers, lead to fines by regulatory bodies and even organizational reputational damage. Processes automated via RPA in Banking would reduce risk, therefore it is a measurement of process efficiency.

I believe as shown in some of the articles, a comparison of the metrics pre and post RPA implementation would provide vivid results for efficiency determinations.

Figure 6 shows a list of the determinants and measurements and their subsets

	Determinants & Measurements
1	FTE reduction cost savings - Cost savings
2	Faster processing time of processes - Improved SLA - Scalability
3	Risk reduction - Bot accuracy - Human error elimination - Compliance & Regulations
4	Improved quality of process - Optimized process
5	Improved team productivity - Bots & humans collaborating
6	Improved employee moral - Improved job satisfaction
7	Improved customer service

Figure 6 - Determinants and Measurements of RPA Implementation Improving Process Efficiencies

2.6.1 The future of Robotic Process Automation

Robotic process automation focuses on the automation of manually worked monotonous and tedious tasks that involve low decision making (Tornbohm & Dunie, 2017; Langmann & Turi, 2021; Radke et al., 2019). Organizations, such as the banks, have a large number of such tasks in their front and back-end operations, for which they hire employees to perform (Anagnoste, 2018; Lacity et al., 2015). RPA evolved to include the infusion of Artificial Intelligence and Machine Learning (ML), making it Intelligent Automation (Casale, 2015).

The main benefits of AI, with RPA is decision making and mimicking human cognitive intelligence (Raisch and Krakowski, 2021), which will enable the Bots to work repetitive tasks consistently with a decision-driven approach. Therefore, allowing the Bots to not only emulate human activity as they work digital systems but also emulate human cognitive strengths (Viehhauser, 2020; van der Aalst et al., 2018), increases the scope and type of tasks and areas in which automation can be done. According to Casale (2015), the future of RPA will see humans working in collaboration with Robots, changing the way business is done to reduce costs and improve customers service and efficiencies, which aligns with Siderska, (2020). The literature shows that the future of RPA is such that it will

continue to replace employees and very importantly, will become more intelligent and increase its ability to make decisions and continue to grow.

The industry and area in which RPA will be implemented will continue to grow worldwide and expected to increase by 36 percent annually and reach $1.2 Billion in 2021 (Madakam et al., 2019). By 2025, RPA and AI automation will eliminate 140 million employees worldwide Casale (2015). The growth of Robotic Process Automation software was 38.9 percent and 1.9 billion dollars in 2021, making it the area that had the most growth in the Information Technology software market (Gartner.com, 2021). Here also, the literature shows that Robotic Process Automation will continue to evolve and grow in the foreseeable future.

Figure 7 shows that RPA robots improve process efficiencies. However, when humans and robots collaborate, process efficiency is further improved. (Graph is my own work)

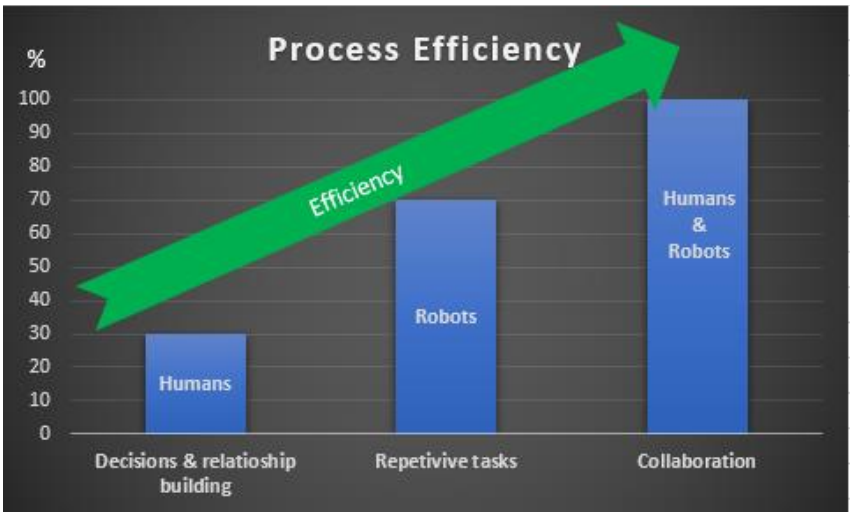

Figure 7 - Graph showing increased optimal increase in efficiencies when robots & humans collaborate

2.7 Conclusion

In conclusion, the literature I reviewed in my critical literature review were very applicable to my research subject and question; has the implementation of RPA and AI improved efficiencies in the business processes in my organization? They showed that the most prevalent area that RPA is implemented in Banking is in back-end processes but also front-end processes and operations and that the financial industry, of which my research is in, is a leader in its implementation. The benefits of RPA included quantitative benefits such as cost and time savings, FTE (Full Time Equivalent) reduction or elimination, faster processing times and according to Osman (2019), research found that FTE costs is reduced by 50 percent with RPA automations, along with error and risk elimination or reduction. Qualitative benefits, such as employee morale and creativity were also noted. Based on the data extracted for the literature I included in my review, it was evident that RPA and the infusion of AI reduced cost and positively impacted the efficiency of organizational business processes (Del Rowe, 2017). Furthermore, it helps me understand that the determinants, which can be quantitative or qualitative, can be used to measure the benefits of RPA and how they improve efficiencies and I have to consider if one or both will apply to my study.

Wojciechowska-Filipek (2019) found in her case study that the implementation of RPA improved efficiencies in Banking front and back-end processes. I also found relevant information to show that the improvement in processes due to RPA and AI is quantifiable through Bot accuracy and reduced or elimination of human error, processing time savings (Fernandez and Aman, 2018; Lacity, Willcocks and Craig, 2015 Improved quality of the Bots, the process and outputs (Lacity, Willcocks and Craig, 2015), and reduce risks caused by errors (Fernandez and Aman, 2018; Moffitt, Rozario, and Vasarhelyi, 2018). All of which provided the framework to support my research and research question.

Chapter 3. Methodology and Methods

3.1 Introduction

My literature review uncovered several factors that impacted and led to the improvement of efficiencies in organizational processes and organizations due to the implementation of Robotic Process Automation and Artificial Intelligence. My understanding of these factors provided me critical insights on how they will apply to my implementation of RPA in my organizations and my action research, along with the automation of processes in my organization as a technology solution to solving the problem of manual work in operational processes and tasks.

To that end, I needed to make a decision on the suitable research paradigm and methodology approach I would use to help me answer my research question. To make that decision, I considered the ontological suppositions and epistemology construction, along with the ethical considerations and theoretical framework (Creswell & Creswell, 2018), to help me achieve my goal of answering my research question, has the implementation of RPA and AI improved efficiencies in the business processes in my organization?

3.2 Context

My research question was considered because I was tasked by my organization to start, build, lead and manage a pilot Robotic Process Automation team to automate operational processes across our Cards business unit in the bank, in the United States, with the goal of reducing costs and improving efficiencies. Thus, not only was I willing to take the task, I realized it was also an opportunity for me to make a change in the organization and also perform research on the topic. My literature review found that organizations reaped the benefits of implementing RPA along with several factors that cumulated or led to improvements of the efficiencies of their processes in the organizations . Therefore, the approach I use to perform my research must be conducive to and accommodate my research question entirely. To begin the research, my first task was to choose the appropriate research paradigm.

3.3 Research paradigms

Having a good understanding of the different research paradigms was the first step in helping me decide which paradigm will be most appropriate for my research. Researchers should understand and convey the essence of reality, the nature of knowledge, how knowledge is acquired and with what methods (Rehman & Alharthi, 2016). Kuhn (1962), describes a paradigm as a method and standard format to understand and communicate assumptions about primary values and beliefs. Paradigm is the world view or rudimentary belief structure that guides a research (Guba & Lincoln, 1994; Lincoln & Guba, 2007). According to Reman and Alharthi, a paradigm is a way of belief along with a theoretical framework and theories about ontology, epistemology, methodology and methods, which aligns with Guba and Lincoln (2007). Three common paradigms are positivist, interpretivist and pragmatist, and the elements of these paradigms are ontology, epistemology, theoretical perspective, methodology and methods of the research.

Positivists assume that reality is factual and take an ontological position of one reality and an epistemological stand of objectivism backed by methodical research (Creswell & Creswell, 2018; Slawecki, 2017). Interpretivist is the belief in many realities and assume an ontological stand of numerous realities and an epistemological stance of subjectivism, in which reality can be interpreted (Krauss, 2005). In contrast to positivist and interpretivist, pragmatist is more of a combination of positivists and interpretivist beliefs, and belief in both single and several realities. Pragmatists take an ontological stance of one and multiple realities and epistemologically assume reality can be both objective and realistically subjective or numerous realities (Creswell & Creswell, 2018).

Figure 8 shows 3 different paradigms and the elements. My paradigm is interpretivist

	Paradigm	*Paradigm*	*Paradigm*
Elements	**Positivist**	**Interpretivist**	**Pragmatist**
Ontology	One Reality	Multiple realities	One or Multiple realities
Epistemology	Objectivism, dualist	Subjectivism, Reality can be interpreted	Objective, Subjective or numerous
Theoretical Perspective	Positivism	Active constructive, social construct, Participatory research, Critical Theory	Relational, research type appropriate to issue at hand
Methodology	Experimental or manipulative	Action research, Case study Narrative, Empathetic Interaction, Ethnography, grounded theory	Experimental or manipulative and empathetic interaction, Narrative research
Research Type	Quantitative	Qualitative	Mixed Method

Figure 8 – Paradigms & Elements. My paradigm is highlighted in yellow

Adopted from Creswell & Creswell, 2018; Guba & Lincoln, 1994; Pickard, A.J, 2018; Krauss, S. 2005 and Kivunja & Kuyini, 2017

The paradigm that a researcher chooses is influenced by the researchers world view, philosophical assumptions or beliefs that direct action, including the research design, method, collection of data, the analysis and how the data is interpreted (Creswell & Creswell, 2018; Dobson, 2002; Kivunja and Kuyini, 2017). My philosophical world view or paradigm in this study is interpretative, in which I ontologically believe that there will be multiple realities created and epistemologically, along with the knowledge I have acquired from my literature review, the realities and experiences from my research will be interpreted. Therefore, I have to apply my chosen paradigm to the context of my research question in my research to help me arrive at a decision or answer to my research question. The focal points of my research is the implementation of Robotic Process Automation, its impact on processes and critically, if RPA implementation improved the efficiencies of organizational processes. Therefore, my ontological belief of processes and efficiencies along with my epistemological understanding of how efficiencies are impacted, which is subjective and will be interpreted, would help me understand the best methodological approach. The literature I reviewed also provided insights on the elements that cumulate or led to the improvement in efficiencies of processes automated with RPA.

3.3.1 Ontology

Ontology is the philosophy involved with our assumptions that enables us to perceive something as real or make sense of it (Kivunja & Kuyini, 2017). Ontology is the nature of one's belief regarding reality and the inclination of that reality and its existence (Richards, 2003, cited in Rehman & Alharthi, 2016). Krauss, (2015) posits that ontology is the philosophy of what reality is. Lincoln & Guba (1985) ask the questions as to what the nature of reality is?

The nature of my reality related to my research and research question is the implementation of Robotic Process Automation and the RPA systems, along with the people involved, including my RPA team of engineers, developers and business analysts, the Bots and the business process owners for whom we are doing the automations for. In computer science, for instance AI and RPA, what exists is what can be represented (Staab & Studer, 2009). Having established what ontology is and my perspective , I looked at the paradigms involved with ontology, namely, positivist, Interpretivist and pragmatists.

Positivists espouse one reality or truth and are objective, thus with the positivist point of view, there will be only on truth (Creswell & Creswell, 2018; Krauss, 2005). Given that my research aim is to find whether RPA improved efficiencies of processes and the determining factors of whether efficiencies were improved are numerous, many truths and outcomes will prevail, as such, I do not ascribe to the positivist point of view, as I do not find it appropriate for my research. Onwuegbuzie and Leech (2005) believes that the positivists paradigm is narrow and restricts research and possible outcomes. Furthermore, positivists separate themselves from the world of their study (Krauss, 2005), however, I will be preformation action research, insider action research and participatory action research, and will not separate myself but rather, be within the research, thus disqualifying the positivist approach. The Interpretive paradigm on the other hand, posits multiple truths.

Interpretivism counters the dominance positivism, alluding to more than one reality existing, rejecting the thought of one realism (Rehman & Alharthi, 2016). Interpretivists embrace a stance of social construction in which multiple realities exist (Krauss 2005; Easterby-Smith et al., 2012). The knowledge of what is real is influenced by our social conditioning, therefore the knowledge cannot be understood autonomously of the participants in the research (Dobson, 2002). Interpretivists are not separated from their research, instead; they are an intricate part of their research, with interactions among individuals who are involved in the research and create meanings to their

findings which are different. My research and I are imbedded, as such, to answer my research question, I will be part of my research.

The interpretivism paradigm allows for different knowledge and meaning to be created by individuals or participants in the research, hence individuals and participants will have multiple interpretations to their findings (Grix, 2010). Meanings are the intellectual categories that defines an individual's perception of reality and through which actions are described (Chen, 2001 cited in Krauss, 2005). I along with my participants will interpret the meaning of our iterations differently and as such, have a diverse knowledge on the research topic during the process of making meaning or sense of the findings. Even if the same meaning is found, it would have been through social construction of the sense making process and the diverse factors that were influencers (Krauss, 2005). In parallel to this, there will be multiple determinants and factors that will lead to the efficiencies of organizational processes determinants, and each, along with the participants, will have their own meanings. I, as the researcher, will establish the meaning of improvement in efficiencies in the organizational processes from the participants viewpoint (Creswell & Creswell, 2018). The above factors further consolidate my decision that the interpretivist paradigm, which creates multiple subjective realism is appropriate for my research. Nevertheless, as I was considering the options in paradigms, I did look at the pragmatist option.

The pragmatists paradigm involves one or multiple realities, thus allowing both, and is suitable for research where the combination of both positivist and Interpretivist paradigms are used (Creswell, 2005; Creswell & Creswell, 2018). Whereas I ruled out the positivist approach, the pragmatist approach did have elements that made me consider it, including the elements of Interpretivist I mentioned earlier. Pragmatic research allows the researcher to be flexible in the methods used for research making it possible to deal with questions that develop during the research (Onwuegbuzie and Leech, 2005). This would be advantageous since my research involve technology systems and individuals with different philosophical mindset, thus when questions arise, that may involve the different factors to determine processes efficiencies, there flexibility would allow them to make adjustments to their decisions . Pragmatic research also encourages collaboration amongst individuals performing the inquiry, regardless of their philosophical stance (Onwuegbuzie and Leech, 2005), Collaboration, especially amongst researchers is an essential part of action research (Greenwood & Levin, 2007; Coghlan & Brannick, 2014; McLaughlin & Thorpe, 1993; Webb, Scoular, 2011). Since I am performing action research this could be an advantage. However, the Interpretivist paradigm has all the factors that are more relevant to my research, as single realities truths or meanings would not apply to my research, nor would I perform a mixed method inquiry. Therefore,

since my focus and expectation is to have multiple realities, meanings and interpretations of the determinants of RPA improving efficiencies in organizational processes from the research, the thought of a single reality will not be necessary and redundant.

3.3.2 Epistemology

Epistemology is the nature of knowledge and the method used to acquire knowledge (Krauss, 2005). It is the philosophy of knowledge and how we come to know about the knowledge and confirm the knowledge (Gall et al., 2003). Since epistemology is about what knowledge I have and how I know that knowledge, putting that in context to my research question of whether RPA and AI improved efficiencies in processes, I have the knowledge of Robotic Process Automation and about the determining factors of improvement in efficiencies of processes, based on my literature review. Therefore, for my research, to find the determining factors that would or would not show the improvement of process efficiencies in my organization, I could approach it either by logical reason or empirical observation (Khalidi, 2017). However, since I have determined that the interpretivist paradigm is best for my research and my ontological view point is multiple realities or truths that will be socially constructed, epistemologically, I would have to eliminate objectivism, which is a positivist notion that aligns with empirical observation (Rehman & Alharthi, 2016), which requires numeric information. Hence, my approach to acquiring knowledge of whether process efficiencies were improved will be reasoning.

Reasoning can be inductive, deductive or abductive (Rehman & Alharthi, 2016). Inductive reasoning builds or assesses inductive arguments based on specific observations from a sample or what is known, while on the other hand, deductive reasoning builds or evaluates arguments based on hypothesis or commonly accepted assertions and facts (Gregory & Muntermann, 2011). Abductive reasoning involves making decisions based on what is known. Okoli (2021) posits that in inductive theorizing, the researcher starts with empirical data and develops a theory based on the data, while in deductive theorizing, the researcher begins from theory and then infers what the data is expected to show based on the theory. Inductive reasoning begins with observation, examination and quantifying or measurement, simplifying and discovering of patterns in the data, before a theory is established (Bryman, 2008 cited in Gemma, 2018) . Lastly, the abductive theorizing begins with a suggested or backed theory that would lead to a new theory that may be proposed, suggested or optimized (Okoli, 2021).

Since I will use an interpretivist approach, that involves participants building their own social construction and the decisions and conclusions will be derived from their construction, observations and data collected, the inductive approach is the most appropriate option for me. This eliminates both the deductive and abductive reasoning approach. According to Grix (2004), Interpretivists choose the inductive approach over the deductive approach, as they believe theory is developed from the collection of data and not by the motivation of the research. Walsham (2006) also posits that the interpretative approach to research, begins from the point that the knowledge of reality along with the realm of human action is a social construction by people. Inductive reasoning enables the potential of developing new theory based on the data and observation, unlike deductive reasoning that limits the potential of developing new theory and decisions are based on common theories (Gregory & Muntermann, 2011). Therefore, to avoid limiting the developments of new notions in determining whether RPA improved the efficiencies of processes and making conclusions based on general theory, I will exclude the deductive reasoning approach. The epistemological questions I ask myself and should be aware of in my research is what type of relationship is present between the knower and the known? (Lincoln & Guba, 1985).

With the inductive reasoning approach, I will start with the empirical data that is gathered from participants and their many subjective realities and truths, which could have been based on the determining factors of improvements in organizational processes and use the data to create the theory of whether indeed RPA improved efficiencies in organizational processes or not. Thus, I conclude that I will use the inductive reasoning approach.

3.3.3 Theoretical perspectives

My literature review revealed several theoretical perspectives that I should consider, based on the information I gathered from Creswell & Creswell, 2018; Guba & Lincoln, 1994; Pickard, A.J, 2018; Krauss, S. 2005 and Kivunja & Kuyini, 2017, and the information I have in table 7. The perspectives are critical theory, positivism, social constructivism and participatory research.

Positivist theory ascribes to an objective realism in which only one truth exists and reality exists autonomously from the individuals creating the reality (Pickard, 2018; Creswell & Creswell, 2018, Guba and Lincoln, 1994), researchers are separated from the object of study and draw conclusions from their observations (Pickard, 2018). In positivism, reality is identical for all individuals (Gemma,

2018). The positivist theory does not align with my research, so I will not consider it, because it contradicts the social constructivism theory.

Social constructivism theory has many realities and theory is subjectively developed from the many participants that I will have and the participants will be within the research subject and not be separated from it (Kivunja & Kuniyi, 2017; Guba & Lincoln, 1994; Pickard, 2018). So, the social constructivist approach is consistent with my research. I will be performing action research and will be native and embedded in the research and not perform research externally away from the subject of inquiry, as I attempt to answer my research question of whether the implementation of RPA and AI improved the efficiencies of organizational processes.

Participatory action research emphasizes on collaboration between those involved, locally or impacted by the research, thus there is collaboration between stakeholders and researchers with insider experience, know-how and subject matter experts (Jagosh et al., 2012). Participatory research is ideal for my research and is the best option, as I will have multiple participants, some of whom are native to the issue while others are the owners of the processes I will be automating. Furthermore, participatory research provides research to action approach (Cornwall & Jewkers, 1955, cited in Vaughn & Jacquez, 2020), and provides real world perspective of the findings that would have occurred from their social construction (Vaughn & Jacquez, 2020). As I collaborate with the participants to gather their data and findings from my real-world research setting and situation, this approach will provide real results as to the impact of the RPA and AI automation implementations to the efficiencies of our organizational processes. Along with the participants, I will collaborate in a socially constructed setting, create our meanings from the research to develop a theory and truth that would yield answers to my research question. Furthermore, our theories regarding the impact of the implementation of RPA on the efficiency of processes are ways of making sense of the research and our collective meanings arise from intersubjectivity (Walshum, 2006).

The critical theory approach focuses on the power struggle and relationships. It questions world perspectives along with the organizations that produced them (Gemma, 2018). In organizational studies, the focus is on creating elimination domination and encouraging an environment of equal opportunity (Alvesson & Deetz, 2006). My research is in the area of technology and how the technology, RPA and AI impacts organizational processes. Therefore, unlike the participatory research approach, the research of whether RPA and AI implementation improved organizational efficiencies, will not benefit from critical theory, so it will not be applicable and I eliminated critical

theory. My focus will be on the most appropriate approach that I have chosen, which Is participatory action research that aligns with my action research.

3.3.4 Research Strategies

In consideration of which research strategy, I should use my research is located in a natural setting in my organization with the process owners and developers of the bots, of which I am native to, and as such, is an ideal issue to research qualitatively. According to Creswell (2013), there are five prevalent qualitative research approaches, namely, ethnography, phenomenology, narrative, grounded theory and case studies. Therefore, I reviewed each one to decide which one is appropriate for my research and research question. My research is to find the impact of the implementation of RPA and AI on organizational processes, specifically, to see if the implementation improved the efficiency of organization processes. My research will occur in my organization setting and the best way to examine the impact of RPA on processes will be to research specific cases of automations with RPA and AI. Therefore, a case study approach will produce the desired level of insight practice and thoroughness to help answer my research question. In the technology industry, case study methodology is the most commonly used approach (Myes, 1997) which I find appropriate as I can study actual cases that were implemented and their impact on the efficiencies and the organization**.**

Case study research consist of the study of a problem or subject by examining single or multiple cases within a bounded structure or setting, such as an organization, in which the case or multiple cases are chosen for research, (Creswell, 2007). I will choose a single case study approach to allow focus of efforts on the case, as studying more than one case can insipid the analysis and means less depth (Creswell, 2007). Creswell also adds that the research occurs over time with concise data collection stemming from various sources of data including interviews reports, observations, and documents. Creswell description of case studies aligns with my research and context, supporting my strategy for the case study option. However, as Creswell (2007) suggests, the challenge of the case study approach is choosing the right case study, therefore I must be attentive and perform thorough analysis to ensure the selected case study has the attributes for the research to help answer my research question. Also, to conduct the study, I will have stakeholders participate in the inquiry, since they are native to the issue and subject of research (Brannick & Coghlan, 2007).

Having concluded that I would have stakeholders who are insiders in my research subject, I contemplated the appropriate method that is conducive with participants and my research question and determined that the participatory action research (PAR) was the best method.

In participatory action research, the researcher and participants, such as stakeholders in the subject of study, collaborate in the research and reflect on it for a better understanding and enhancement of the issue or subject and take actions to enable change (Baum et al., 2006). In participatory action research practitioners are involved as coresearchers and subjects, and PAR's goal is to establish an environment that allows participants to exchange legitimate information, freely make informed decisions and create internal dedication to the findings of their research (Argyris & Schön, 2011). Participatory Action Research aligns with my Interpretivist paradigm that ontologically allows for multiple realities and truths, as I will have multiple participants who will, in a socially constructed environment, develop their own meanings. PAR also aligns with my epistemological subjectivism were the realities of the impact of RPA and AI on organizational process efficiencies will be interpreted by the individual participants from their own perspectives. The inductive reasoning method from which observation are made from samples to make arguments from what is known before conclusions or a theory is made, also supports my decision to use of PAR. Argyris and Schön (2011) also specify that participatory action research is a form of action research. Greenwood et al. (1993) suggests that Participatory actions research is a type of action research in which professional researchers collaborate with organizational members to study and change the organization.

3.4. Participatory Action Research

In participatory action research (PAR), researchers and participants work together and collaborate to investigate a problem with the goal of positively changing the problem (Wadsworth, 1998 cited in Kindon et al., 2007). Organizational members actively participate in the research as opposed to only being subjects of it with the goal of taking action, enabling the researcher to become involved and contribute to the practitioners realm. The practitioners are involved in the research and partake in the research results (Eden & Huxham, 1996), a thought that Walter (1993), Creswell, (2007), Danley & Ellison (1999) and Lawson (2015) agree with. My research will have the business process owners and developers that will be impacted by the issue, which is the implementation of RPA and AI to automate organizational processes, collaborating and examining the issue, and take necessary action to help determine how RPA may have improved the efficiency of the processes and created new knowledge. Greenwood & Levin, (2007); Coghlan & Brannick, (2014) and McLaughlin & Thorpe, (1993) agree that when individuals support themselves and collaborate, a communal, intellectual and emotional change occurs which creates new knowledge. Participatory Actions Research's objective is to advise practice and add to existing knowledge on research (Fletcher et al., 2015).

In PAR, individuals impacted by the problem participate in the planning , conducting, evaluating and applying the result. Due to their nativity to the issue, these individuals can recognize and suggest applicable and likely better solutions than outsiders (Bell et al., 2004). PAR is a reflective practice that allows researchers to take action and incorporate new findings and understandings to the current process instantly leading to a higher degree of creativity and solutions (Bell et al., 2004). Action is attained via a reflective cycle in which participants gather and examine data, determine the action to be taken next and upon taking an action, the action taken is analyzed leading to another reflective cycle (Baum et al., 2006). PAR was also best soothed for the problem, because, in addition to having nativity, the collaboration, planning, decision making, action taken and reflection of the participants and I will result in knowledge creation. All of which were elements and advantages of action research according to Greenwood & Levin (2007) and Marquardt and Waddill (2004). One critical advantage as mentioned by Bell et al. (2004) is that my participants are subject matter experts that are experienced in the issue, which puts them in a better position to identify and make suggestions on conclusions that will enable valid findings of the impact of RPA to the efficiencies of the processes, thus, enabling finding the determinants and facts that will help answer my research question. This will be further facilitated by the reflexivity that PAR allows, as I and the participants perform iteration in our participatory action research. The action research iteration cycle involves planning, taking actions, reflecting on actions taken and making corrections (Coghlan, & Brannick, 2014).

The focus of the participants and myself in the research will be identifying the determining factors that impacted process efficiencies and how these factors improved or did not improve the efficiencies of my organizational processes. The PAR reflective iterative cycle for my research question will be such that the research question will be reviewed, then the participants and I will collaborate, collect and analyze the data and plan an action, take the action, and observe the action taken and reflect on it. Which will complete the first cycle of Iteration. Then we will collaborate, collect and analyze the data and plan an action, before taken the action. Upon taken the action we will make observation of the action taken and continue the cycle of iteration until it is determined or that the research question was answered.

As mentioned, I will have participants that are native to RPA and AI, such as narrow AI/machine learning and general AI/machine intelligence, and the processes that are being automated in my organization, and the success rate of the research also depends on the ability and reliability and willingness of the participants. Therefore, the proper selection of the participants is critical.

Figure 9 shows the Participatory Action Research process

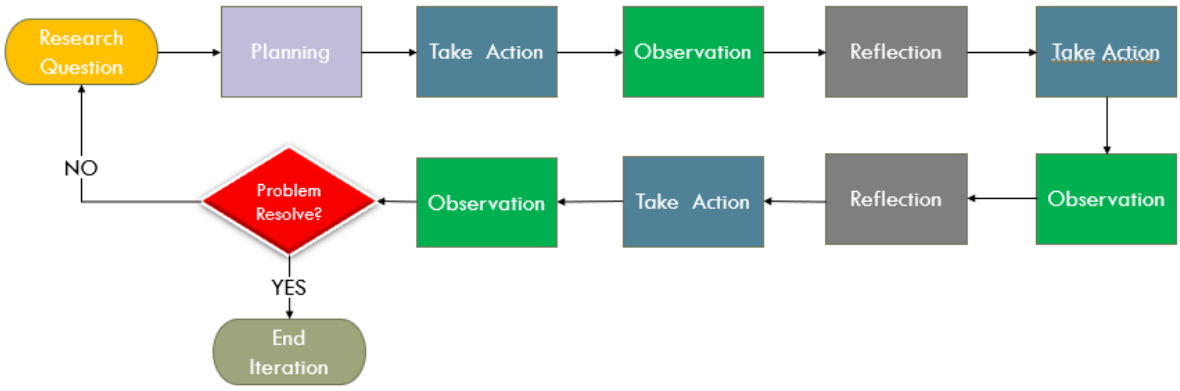

Figure 9 - Participatory Action Research Iteration process.

Adapted from Baum et al., 2006; Walter, 1993; Coghlan, & Brannick, 2014.

3.4.1 Research participants selection

To achieve my goal of answering the question of whether the implementation of RPA and AI improved efficiencies in the business processes in my organization, I will be performing insider action research. My initial actions will be to create a group of participants for collaboration. Identifying the best possible candidates for the group of participants who will not only effectively participate in the research, but are also qualified and knowledgeable was critical to ensure a successful research process and collaboration. Therefore, since my research is an insider research study, the participant candidates must be part of my organization and have existing and good knowledge of the processes that I am researching (Coghlan, 2001; Breda, 2014). The participants must also have knowledge of and be familiar with the target applications and systems involved, and also have interest in the findings of the research. The setting or location of the research was also important. Consequently, my research will be in a naturalistic setting at my workplace (Mohajan, 2018) which is conducive for participatory action research.

The participants I chose for my research should be aware of the implementation of RPA and AI in the organization and very importantly must be subject matter experts or knowledgeable about the processes that are being automated with Robotic process automation and the process for my case study. I found that our pre-understanding was just as important and crucial. Being native to the

issue, both I and the participants were familiar with the issue, our organizational culture, dynamics, politics and processes (Coghlan & Brannick, 2014; Björkman & Sundgren, 2005) which was an advantage in resolving the issue, an advantage someone non-native to the issue wouldn't have. Therefore, I chose the manager and business process owner of the process that I will use in my case study, secondly, the Project Manager that works with his team and my RPA team during the system development cycle of the process automation was chosen. I chose the team lead of the employees that work the process manually, as she has the hands-on experience of manually working the process in the case study. These three individuals are employees of the organization, have comprehensive knowledge of the process before the automation of the process and are involved during the automation of the process, thus native to it. Furthermore, they both have keen interest in the outcome of the research, which is to find out if the RPA automation improved efficiencies of their business process.

To ensure I have more diversity in the participants (Lawson, 2015), I sought other individuals who are native to the process too but are part of the RPA team, but will have a different perspective. As such, I chose one Developer, one Principal Automation Engineer and an RPA Business Analyst. These individuals are also employees of the organization, are native to the process being automated and also have a vested interest in the outcome of the automation of the process and research. They all participated in the pre-automation detailed analysis of the process, became very knowledgeable about it pre automation and are just as knowledgeable about the automation process and the post automation state of the process.

The fact that I am native to the RPA environment and the senior manager and subject matter expert, I have an advantage of being close to the facts (Brannick & Coghlan, 2007) and having access to stakeholders. I, however, must be cautious to avoid having bias and preunderstanding that may negatively impact my decision making and research, and feeling overconfident (Björkman & Sundgren, 2005), along with ethical implications as I make my decision or research participants and collaborate with the participants.

Figure 10 shows diverse group of participants. A mixture of Business and Technology professionals

Organization	Team	Job Title	Knowledge Level	Pre-Automation knowledge of process	RPA Automation SDLC and Post-Automation Knowledge
Employee-Insider	Operations - Process Owner	Manager	Subject matter expert for the process	Yes	Yes
Employee-Insider	Operations - Process Owner	Project Manager	Subject matter expert for the process	Yes	Yes
Employee-Insider	Operations - Project Management	Team Lead	Subject matter expert for the process	Yes	Yes
Employee-Insider	Robotic Process Automation & IA	RPA Developer	Subject matter expert for the process and RPA automation	No	Yes
Employee-Insider	Robotic Process Automation & IA	Principal Automation Engineer	Subject matter expert for the process and RPA automation	No	Yes
Employee-Insider	Robotic Process Automation & IA	RPA Business Analyst	Subject matter expert for the process and RPA automation	No	Yes

Figure 10 - Participants. A mixture of Business and Technology professionals

3.4.2 Ethical implications of Participatory Action Research

A major characteristic of participatory action research is that participants and researchers can collaborate to examine an issue that impacts them in an organizational setting and actively participate in the research to resolve the issue and make a change (Wadsworth, 1998 cited in Kindon et al., 2007), in my case, to answer the research question. As my participants and I partake in the research, the goal is to take action, which allows me, as the research lead and expert, to be involved and contribute to the participants world, while the participants also contribute to the research results to help answer my research question (Creswell, 2007; Lawson, 2015; Eden & Huxham, 1996). However, therein lies some ethical concerns, possible bias influences and risks that I must be aware of, as I lead the research and participants and provide guidelines and monitor the research.

My participants are novices to action research and depend on me to introduce, coach and provide them guidelines of PAR and the approach. Therefore, I have to ensure that I do not let my relationship with them or the research and my research goals or desired outcome bias to influence my leadership of the research and participants, such that I unintentionally influence their decisions towards a desired outcome. Furthermore, since I am the leader of the RPA team and also the researcher, I am committed and entrusted with both the success of the automations as well as the success of my research and have assumptions or expectations. I must be keenly aware of this to ensure I do not let my assumptions and commitment bias negatively influence the research and its findings (Creswell, 2007).

Some of the participants are on the operations team that own the process that is being automated and have a long-time history and pre-knowledge of the process before its automation. As such, their pre-knowledge, although an advantage, may also have biases that would influence their efforts,

thoughts and outcomes of the research (Creswell, 2007). On the other hand, some participants are part of the RPA automation team and may like to see the success of the automation from a technology perspective. Therefore, I must be aware of this and prepare, inform and educate them of these biases, to ensure the research to answer my research question is not influenced by their process pre-knowledge and experiences or technological knowledge in a negative manner.

I also had to ensure that participants are not harmed due to their selection to participate; as such, I had to ensure I maintained their privacy and confidentiality (Creswell, 2007; Van Holm, 2021). They also agreed to and signed consent forms as specified requirements by the University of Liverpool and I as the leader of the research. Therefore, I must adhere to and maintain confidentiality.

As a scholar practitioner with a dual role of being the senior manager of the RPA automation team and the lead researcher, my dual role sometimes had conflicts. Hence, I had to be cautious not to allow my dual roles as an inside action researcher and manager influence me to being biased and make decisions that favor me and my team (Brannick and Coghlan, 2007). In conclusion, I had to be cognizant of the above-mentioned risks and biases during my research and while working with my participants to ensure thorough decision-making and the success of the research.

3.5 Research methods

With the conclusion on the methodology, I will use for my research, the next step I took was deciding how to implement it by choosing a research approach. As previously mentioned, I will be using participatory action research so, my approach will include selecting the research study population and choosing the most suitable sampling methods, collecting the data and processing and analyzing it along with interpreting and diffusing the data.

3.5.1 My Research approach

3.5.1.1 Study population

The study population of my research will be organizational employees in different functions and roles that are stakeholders and insiders, native to the processes that were being automated (Coghlan, 2001). Being native to the processes, they were also subject matter experts of the processes (Breda, 2014); in many cases, they had years of experience with the processes, and also familiar with my RPA team. So, it is also critical that they were familiar with the case study for my research. Therefore, they met my criteria to be participants and suitable to help answer my research question. My literature review found several determinants that helped provide the findings of whether RPA and AI improved efficiencies in organizational processes. Given that my study population is native to the processes and are subject matter experts, it is possible that they will find new determinants in additional to the ones I found in my literature review. When participants collaborate in PAR, they create new knowledge and have a better understanding of the problem (Townsend, 2013 cited in Fletcher, 2015, Creswell, 2013).

I did consider including other informed employees, such as our Finance team members that were not native to the processes and senior managers of the processes, but stakeholders were keen in knowing the benefits of the implementation of RPA and AI to the business teams in the organization. I am aware that some participants may decide to no longer participate or leave the organization, so I have the option of adding to or replacing participants if necessary, with the mentioned individuals or others. However, I ensured, as much as possible with the information I have about the participants that the chosen study population will continue their participation for the duration of the study (Breda, 2014).

3.5.1.2 Case Study to be researched

After reviewing the different options of either a multiple case study or a single case study, I decided to use a single case study option. A single case study enables efforts and resources to be focused on it and allows for a more detailed and in-depth analysis and study, unlike a multiple case study that may sap resources and impede detailed analysis and thus less depth (Creswell, 2007). My participants and I are full time employees and have to complete our required daily tasks and meet business goals while working on the research. Since we have limited time and resources, it was

better focusing on an intricate RPA automation case that met the objective that we can concentrate on and be able to work on in detail and in depth to help find the evidence of the impact of the implementation RPA on the efficiency of the automated process and answer my research question.

The process that will be studied in the organization is one that is critical to the Cards business unit of the bank and its customers and involves collections on delinquent customer accounts.

Process name:	Outbound Futures Dialing
Process Description:	The bank has thousands of customers with credit card accounts that are delinquent in payments for not making due minimum monthly payments. An account is considered delinquent if the required minimum payment has not been made for thirty days or more. For this process, employees manually review each account in multiple systems and applications using diverse criteria to determine if the customer should be called for collections or not. Once it is determined that an account meets the criteria to be called, employees make a call to the customer to inform and remind the customer of due payments and their obligation to make payments on amounts owed on their credit card, and request payments or payment arrangements.
Daily Volume:	30000 accounts daily
Number of Employees:	55 Employees currently work full time on this process
Hours Spent:	114400 hours yearly/9533 monthly
Applications Involved:	5
Impacted Entities:	The bank, because it loses money, Compliance and Risk, and Bank customers
The Problem:	Employees spend 90 percent of their time searching for valid customer contact information and reviewing accounts to make a decision on whether they can or cannot call a delinquent account for collections and only spend 10 percent of their time making calls. Employees should spend more time calling customers and less time reviewing the accounts. The goal of this process is to call delinquent customers for collections.
Automation Goals:	Use RPA and AI to automate the reviewing of accounts by Agents to enable employees to focus on calling delinquent customer for collection

3.5.1.3 Key concepts and measurements

According to van Holm (2021), concepts are theoretical way of thinking or general beliefs that occur in our minds, thoughts or language which address things we are considering. The aspect being considered in my research is whether the implementation of RPA and AI improved the efficiencies of my organizational processes. I have to operationalize the concept by identifying ways to measure it (Blackstone, 2012; Van Holm, 2021).

My literature review revealed several factors and determinants that were used as measurements to establish the impact of the implementation of RPA and AI on the improvement of efficiencies in organizational processes. Measurements are the way we define and assign meaning to the essential facts or notions (Blackstone, 2012). The determinants I found in my literature review came from valid research and scholarly literature that I can use in my research. In the evaluation of my measurements, I have to ensure that there is validity and reliability (van Holm, 2021). van Holm posits that validity informs us whether we are measuring the right things while reliability is about the quality and specifically, consistency, to ensure that I get the same results if the same factor is measured multiple times, or that it is repeatable. I am using an interpretivist paradigm and in consideration of my epistemological approach, my discussions with my participants on their thoughts on the relevance of the determinants as measurements to my research question will be sought.

3.5.1.4 Data objectives and collection

The objective of my research is to answer my research question. To accomplish this, I am using the interpretivist approach with an otology of multiple realities and a theoretical perspective that is constructive, involving participatory action research methodology. Therefore, my research type is qualitative (Ghauri, et al., 2020). Thus, I sought to collect qualitative data, through my conversations and observations with my participant (Cassell & Johnson, 2006; Ghauri, et al., 2020). The objective of my data collection was to assemble the information from the participants that will help me understand their inputs in answering the research question of whether the implementation of RPA improved the efficiency of the process in the case study. To accomplish this, several authors suggested aspects I as a researcher should be aware of, including building a rapport with the interviewees (Prior, 2017), being empathic (Creswell, 2007; Prior, 2017; Patton, 2015; Ghauri, et al., 2020) which can help improve social camaraderie between I and the interviewees and facilitates the

gathering of individual evidence from them (Ghauri, et al., 2020). I should also be sensitive and mindful during the interview (Ghauri, et al., 2020; Patton, 2015).

Building a good rapport with my participants was critical. My rapport building with most of the participants started during the initiation and system development life cycle of automation process in the case study, so I had built and maintained a relationship with them up until their selection as participants and during the research, throughout the research, interview and beyond. My rapport building used an interactional approach while being pleasant, attentive and engagement, and fostering intersubjectivity (Prior 2017). Prior also theorizes that rapport is connected to empathy.

To be empathic with my participants and interviewees meant that I had to share and understand their individual perspectives involving the research, research questions and very importantly, their answers and responses in our conversations, thus sharing their perceived emotions (Prior, 2017). Being empathic with the interviewees would facilitate an environment for them to be comfortable to share their honest answers. I also ensured that I was sensitive and mindful during the interviews to ensure that I was not only acknowledging my interviewees but also recognizing key responses, including body language and gestures that may also lead to follow up questions. In doing so, I also have to be mindful of any biases I may have.

Researcher bias can influence the research and interview question responses by the participants. As the lead research performing insider research with intimate knowledge of the research and its objectives and interviewer, I must remain neutral and eliminate or reduces any biases I may have that may influence the questions I ask and coerce the answers of the participants to provide answers that I want to hear and ensure that I ask the right questions so they can provide their honest right answers for me to collect the right data. Therefore, I must leave the answers to the questions utterly to the interviewees. We have biases we are aware of and those we are not, as such, we must constantly be mindful and remind ourselves of them (LeBaron, 2010). This will help to reduce bias in my data collection that may result from not collecting data that will represents all relevant aspects (Easterby-Smith, et al., 2012).

Regarding my data collection approach, the qualitative method offered several options, including case study, surveys, observations, interviews and focus groups (Ghauri, et al., 2020), documents (Denzin & Lincoln, 2008; Creswell, 2007) ethnography, (Ghauri, et al., 2020). I already established that I would be using a case study to enable me conduct a research that will be in depth with an

intricate business process. Since I have too many variables and concepts in my research topic, along with a smaller group of interviewees and participants, I eliminated the survey method which is also better for a large number of participants (Ghauri, et al., 2020).

During the process automation system development life cycle, detailed documents were gathered, including requirements and reports that included information on the business process before the automation. The documents included some key processes efficiency determinant and measurement factors I found and mentioned in my literature review including, the number of FTEs that work the process, the time it took employees to work the process or processing time, risk due to employee error rate, service level agreement (SAL) and process case volumes or number of cases worked monthly/yearly. This data is also critical in helping to determine the improvement in process efficiencies after the automation and implementation of RPA. As seen in the literature review, the research participants and I used the pre automation information and post automation information to see the differences and changes to help make the determinations.

Observations involves watching and listening to my participants and interviewees in a manner that allowed learning and logical interpretation. My observations enabled me to interpret and understand the observed behavior of the participants and occurrence more accurately in some instances and notate the crescendos of social behavior that I otherwise may not have captured via the interview questions alone, (Ghauri, et al., 2020) during conversations and the interview.

The main method of data collection was to interview my participants. I had to decide, however, if I should have individual participant interviews or focus groups. Interviews and focus groups are the most frequently used in qualitative data collection method (Isaacs, 2014; Ghauri, et al., 2020). Individual interviews provided the participants an environment where they were one on one with me, where we both had each other's attention without the participant being concerned about other participants, their thoughts or judgements on answers they provided to the interview questions. Which provided them privacy and a comfort zone to freely answer their questions honestly (Isaacs, 2014). Therefore, I chose and conducted individual interviews. Although individual interviews were good, I also considered the focus group option.

Focus groups facilitate discussion amongst participants, which supports a socially constructive environment for the participants to make meaning of their conversations (Cassell & Johnson, 2006) and the interview produces valuable and in-depth data from the participants. Focus groups should have six to ten members and also encourage new idea (Ghauri, et al., 2020), while Gill et al. (2008) suggests six to eight. I had six participants. My literature reviewed provided several determinants

and measurements to show the improvement of process efficiencies. I believe the focus group interviews could generate new thoughts, determinants and measurements that may not have been in my literature review, thus, creating new knowledge, which is a characteristic of PAR and Action research (Coghlan, 2001; Cassell & Johnson, 2006). So, in addition to the individual interviews, I also used a focus group interview with the participants group. However, Ghauri, et al. (2020), asserts that focus group participants may influence themselves as information is exchanged and discussions materialize, so I had to be mindful of this and lead and be in control the focus group interviews. Additionally, I anticipated that the information I collected from the focus group could be different from the information I gathered from the individual interviews (Ghauri, et al., 2020). My option of a mixture of individual and focus groups would generate both individual detail responses and a group oriented social construct response for a more concise research result.

To this end, I chose a semi structured interview option which enables an in-depth analysis and response, and promotes a reflective process to reach a conclusion (Fletcher et al., 2015), unlike a structured interview that is not flexible. Participants are also free to discuss their perspectives and actions (Gioia et al., 2012 cited in Ghauri et al., 2020) without being bound by limited questions that a structured interview brings. Which will allow me to acquire a more precise and clear interpretation of participants view and behavior (Ghauri et al., 2020). The semi structured interview also enabled me to monitor the situation, adapt to emergent circumstances and build trust (Ghauri et al., 2020). The flexibility of the semi structured option allows the explanation of information that leads to new and important factors and findings that may not have been thought of before (Gill et al., 2008), which can occur during the PAR Reflexive and iterative cycle (Baum et al., 2006). Which benefits my research.

In my first iteration, I deliberated to conduct individual interviews with the goal of obtaining the individual perspectives and in-depth information of the participants on the research question (Denzin & Lincoln, 2008; Van Holm, 2021) and my interview was based on 6 broad open-ended questions that covered the research question but meant to initiate the interview and direct, facilitate and encourage the participants to provide context and answer the questions freely (Isaacs, 2014). To be consistent, I provided all participants the same questions**.** I also thought it was better not to provide the participants the determinants and measurements of the improvement in efficiencies of business processes by the implementation of RPA and AI in this first iteration in order not to influence their initial responses to my questions.

My second iteration was also an interview with individual participants. Since the participants provided their points of view and thoughts on the research question in the first iteration, which I gathered and reviewed, I thought it would be beneficial to build on the results from the first iteration. I also provided insights on the determinants and measurements I found in my literature review in the second iteration. The nature of my insider research is such that it is within my organization and the participants were also stakeholders in the process in the case study. Consequently, it was inevitable that the participants were at least somewhat familiar with themselves and may have shared information or discussed questions and responses from the first iteration with themselves, which could influence the next iteration. Therefore, I decided to have a third iteration that would provide a joint interview.

My third Iteration was with the focus group that comprised all the participants. I planned to have a research result that will be based social construction in which multiple realities exist (Krauss 2005; Easterby-Smith et al., 2012). As such, participants theories regarding the impact of the implementation of RPA and AI on the efficiency of processes are ways of making sense of the research and their collective meanings arise from intersubjectivity (Walshum, 2006), which is a characteristic or AR ad PAR. An individual derives meaning from or provides meaning to actions and involvements and these involvements start to make sense as the individual performs their mental thoughts (Krauss, 2005). Having prepared and trained the participants on conduct and expectations (Krauss, 2005), they were aware that for the purpose of the research and interview session, that they were equally free to provide their opinions, evidence and thoughts regardless of their titles in the organization.

I also had to make a decision on the location the interviews will be performed. The participants were in two geographic locations and states, given the size of the organization, my initial plan was to have the interviews with the individual participants in the different locations that I had unrestricted access to and travel to regularly, and then have a video conference call for the focus group. However, due to the outbreak and impacts of the COVID -19 pandemic, my entire organization of thousands of employees now work remotely from home. This left me no option but to conduct my interviews remotely via video conferencing. My organization has an updated meeting and video conferencing system with good acoustics that allows for the observations and identification of body language and speech, which also records transcripts. Also, by the time I conducted the interviews, organizational members, including my participants were all very well familiar with the video conferencing system such that the usability of the technology was not a concern.

I had three iterations. The first two were individual and the third one was with the focus group. The individual iterations were between 45 minutes and 70 minutes long while the focus group was 90 minutes long. I had all participants participate in the individual and focus group iterations. Figure 11 below depicts the PAR iterations and participants

Figure 11 shows the PAR iterations and the participants

First Iteration - Individual interview	Second Iteration - Individual Interview	Third Iteration - Focus Group
1 Manager	1 Manager	1 Manager
1 Project Manager	1 Project Manager	1 Project Manager
1 Team Lead	1 Team Lead	1 Team Lead
1 RPA Developer	1 RPA Developer	1 RPA Developer
1 Principal Automation Engineer	1 Principal Automation Engineer	1 Principal Automation Engineer
1 RPA Business Analyst	1 RPA Business Analyst	1 RPA Business Analyst

Figure 11 - PAR Iterations & Participants

Before I conducted each iteration, I created a list of interview questions beforehand to ask the participants, which was consistent for each individual participant. Prior to that, I had done a thorough analysis of my research question and with my understanding of It, I was able to realize the type of information I needed from my participants, as the purpose of data collection via interviews is to collect valid information from the most qualified individuals for the research (Ghauri et al., 2020).

For each iteration, the PAR reflective iteration cycle of planning, taking action, observation of action taken, then reflection was followed (Baum et al., 2006; Walter, 1993 & Brannick, 2014) as seen in figure 8, PAR iteration life cycle. I performed the planning for the first iteration, the action taken was me asking the participants the questions and their responses in the initial stage questions, then the observation of the outcomes was done by me. The first iteration reflection was completed by me and the participants. My reflection was in my decision of what the interview questions for the next iteration will be while with the participants, reflection occurred because the new questions were derived based on their answers in the first iteration. The third iteration followed the same format with the exception that it was with the focus group, at which point, I felt the iterations had answered my research question.

3.5.1.5 Data Processing and analysis

The main reason for data processing and analysis is to acquire understanding and awareness of the data collected (Ghauri et al., 2020). Having established that the interviews with the participants would be done via video conferencing and with the participants consent, the conversations from the interviews in the various three iterations was the data to be processed. Transcripts of the video conference interviews were captured, and with the collaboration of the participants, updated to correct minor errors that the individual participants all confirmed for accuracy and correctness. Subsequently, I coded the individual transcripts based on the identified determinant and measurement factors that showed the impact of process efficiencies due to RPA implementation to support the PAR reflection phases and observations made.

According to Ghauri et al. (2020), to facilitate the analysis of the complex qualitative data and make conclusions from them, I should summarize the data in to a manageable composition and the authors suggest the example from Miles and Huberman seen in figure 12 below, including the PAR iterative cycle steps, which I adapted.

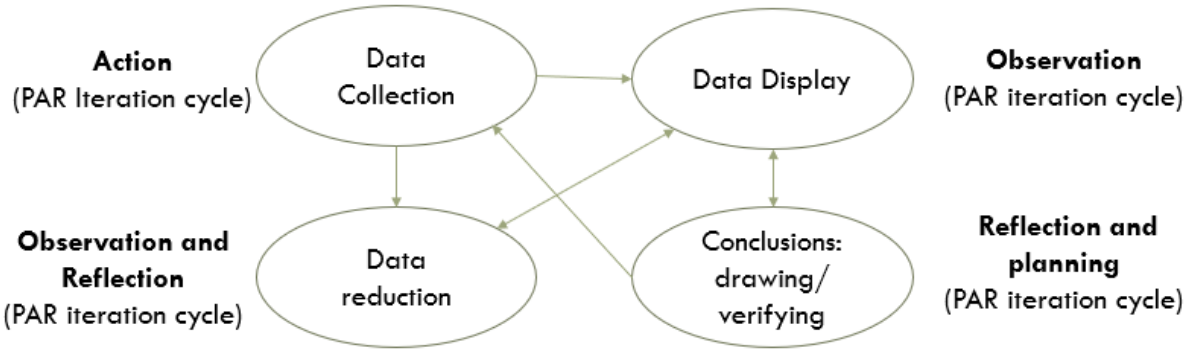

Figure 12 - Qualitative data analysis Adapted from Miles & Huberman, 2014

I collected the data via the video conference and the transcripts from them and the display and analysis of the data was completed in two techniques. Firstly, for each individual participant's transcript, I created a table that consisted of a category from the identified determinants and measurements of the impact of RPA on process efficiencies, along with themes and patterns that I identified, and emergent themes for analysis (Ghauri et al., 2020) of each paragraph.

Participant	Category	Theme # 1	Theme # 2	Emergent theme
Team Lead	Process Risk	Employee error	Compliance	Bot fails/down

Figure 13 - Example of themes analysis table by participant

Secondly, I created another table in which I entered the data from the first table to perform analysis of the themes by the numbers of observations and participants. Subsequently, I used the grounded theory method to review and analyzed the data for possible social construction that may be emerging within the participants data. This entailed using an analytical method informed by grounded theory which involved the creation of first order and second order themes (Gehman et al., 2018; Gioia et al., 2013) See table 14 below and the table in section 8.4.4 in the appendices. I reviewed the data from the participants to find themes and patterns that matched the determinants and measurements of whether RPA improved the efficiencies of organizational processes, including FTE reduction and cost savings, faster processing time, risk reduction, improved quality of the process due to the automation, improved team productivity, improved employee morale. I then assigned the comments from each participant to the matching themes/determinants and measurements. This showed which participants provided what theme. The grouping of the themes also showed how often they emerged and aligned with others. See the emergent theme summary table in the appendices in sections 8.4.4 My Investigation of the data from each iteration shaped the development of the next iteration question (Ghauri et al., 2020). I repeated the same process for each subsequent iteration. Findings were modified with each subsequent iteration, which is a characteristic of Action Research (Eden & Huxham, 1996).

Action	Observation	Reflection	Planning
Interview answer	Determinants/Measurements	Emergent Themes	Next Iteration questions
with the implementation of the Bot and the increased productivity, the reamaining Agents are concerned about their jobs, shouldn't we inform them that their might be more reductions?	Team Productivity	Employees deserve to be informed early that they may loose their jobs to be fair to them	How do we know that the Organization will not need them? Why are the employees not informed early if they will no longer be needed? Are their negative impacts for informing them that they may no longer be required?

Figure 14 - Transcript table example

The final table that summarizes the emergent themes/determinants and measurements in the three iterations along with the correspondent participants that provided the themes can be seen in the appendices in section 8.4.4. The correspondent participants comments can also be seen in the appendices in section 8.4.5.

3.5.2 Research limitations

Participatory action research, including those involving single cases such as mine, has its limitations and challenges also when it is being performed within an organization by organizational members (Fletcher et al., 2015). Being aware of the challenges and limitations, I planned to manage them during my research. I identified a couple of challenges that I'll discuss below.

3.5.2.1 Groupthink

Groupthink is a way of thinking that happens when there is a high cohesion in a group of individuals where their efforts to be unanimous supersedes their reasonable judgements and decisions that would otherwise be different (Janis, 1991). My option to choose a PAR approach means that participants will have to work together and with me as the research lead. Our decision-making process can be impacted by bias and influences that stem from groupthink (Janis, 1973). So, as the research leader, I have to remain cognizant and avoid such traps to enable better decision making in the research process.

The comfort that may exist in the group of participants, based on familiarity with one another and being insiders in the organization and the research can lead to groupthink which can lead to loyalty to the group and participant influenced by group pressure syndrome (Leavitt, 1974) in making decisions or answering questions during the focus group discussions and research. Therefore, I have to be mindful to guide the team away from such influences. Janis (1973), postulates that group decision making can be influenced by groupthink and the higher the degree of loyalty in the group, the higher the chances of groupthink. Therefore, I must be cognizant of these groupthink influences and disadvantages and avoid them to support and facilitate good decision making as the leader and scholar practitioner of the research.

3.5.2.2 Scholar practitioner role duality and Insider bias

As a scholar practitioner, being the manager of my team and also the leader of my research, I have a dual role that sometimes conflict. I have to meet my team and organizational goals and function as a manager and pursue the goal of my action research to answer my research question which can be a quandary (Holian, 1999 cited in Coghlan, 2001). Therefore, I have to balance both roles and play both roles to the best of my ability.

An advantage of performing insider action research is that I am within the organization and have a good preunderstanding of my organization, its culture, politics and being native to the research subject and data. My preunderstanding was an advantage, as it helped me make several decisions for my research, including the research topic. As the senior manager tasked to create a new RPA team in the organization, I was in a good position and well informed, which helped me decide on the research topic. I also had the advantage of being the senior manager that led the projects, made the decisions and had oversight on the RPA and AI team, thus I had thorough knowledge and understanding of the processes, and had firsthand information on developments and issues, along with successes, shortcomings and emergent issues and resolutions. Which impacted my study positively. My preunderstanding was also critical in the identification and selection of viable research participant candidates. However, According Coghlan, (2001), my closeness and familiarity with the research subject and data can become a disadvantage.

An example of where my preunderstanding could be a disadvantage is when interviewing participants, as I may assume to much, become overconfident that I know all the answers and not be open to new framework or learning and not investigate diligently, which could impact the outcome of the research and cause me not to fully achieve the goal of the research and action research which was to make a change in the organization and create new knowledge. Brannick and Coghlan (2001), also suggest that the dual role of a manager and insider action researcher can influence me to being biased and make decisions that favor me and my team. I took Coghlan's advice and reminded myself daily during the research to be mindful of this and other biases I may have as the manager and researcher.

It was critical for me and my research to ensure that I am mindful of my preunderstanding biases and minimize and possibly eliminate them. Coghlan and Brannick suggest ensuring that I remain open to

learning and emergent thoughts as I collaborate with participants, the authors also suggest involving participants and working on knowledge sharing with others for awareness and transparency which may expose biases. For instance, my literature review found several determinants and measurements of how the implementation of RPA impacted the efficiencies of organizational processes. I should ensure that I do not let this knowledge impact my expectancy of the subjective realities and constructive findings that the participants may provide and remain open to learning about new determinants and measurements that they may find. Coghlan (2001) posits that action research managers should follow the issues as they evolve. Coghlan also suggests that with my dual role and preunderstanding, I can use my experiential knowledge to reframe the thoughtfulness of circumstances I am close to. For example, I could use my experiential knowledge and understanding of participants responses to the interview questions to reframe the iterations in follow up questions in the PAR iteration cycle during my interviews and data analysis.

3.6 Research methodology conclusions

Upon completing my literature review, I developed my research methodology with the aim of providing the process and methods I used to identify, choose, document and analyze data to reach a conclusion in answering my research question of whether the implementation of robotic process automation improved the efficiencies of organizational processes. Based on my analysis, I decided to use the interpretivism paradigm which allows for different knowledge and meaning to be created by participants in the research, hence the participants will have multiple interpretations to their findings (Grix, 2010). Which matches my ontological stand of multiple realities.

My epistemological choice was subjectivism and since I used an interpretivist approach, that involved participants making decisions and conclusions derived from social constructivism, observations and data collected, I chose the inductive approach. I also decide that the participatory action research method was ideal for my research as I had multiple participants who were native to the issue of the processes I was automating. Furthermore, participatory action research provides a research to action approach (Cornwall & Jewkers, 1955, cited in Vaughn & Jacquez, 2020). My qualitative research used a single case study and I applied grounded theory to derive meaning from the data I collected from my interviews, while using the PAR iterative cycle in the process. My data analysis strategy was one that allowed me to code and compare the interview results of the

participants to determine patterns and themes that helped me reach a conclusion. Lastly, I considered the scholar practitioner role duality and biases that could impact my research and measures to reduce or eliminate their negative impacts on me, the participants and my inquiry to answer my research question. The chosen methodology and research approach led to findings that I discuss in the next chapter.

Chapter 4. Findings

4.1 Introduction

The literature review provided me insights on the implementation of RPA in the banking and other industries, as well as an understanding of the determinants and measurements of the impacts of the implementation of RPA and AI to their organizational processes. This insight aided my understanding of the research question: has the implementation of RPA and AI improved efficiencies in the business processes in my organization? Subsequently, I considered the various research methodologies to determine the appropriate approach for my research. The next step was to work with my research participants to navigate the context of my research question and answer it. The action research and interview iterations with the participants yielded several determinants and measurements that showed that the automation and implementation of RPA in the use case improved the efficiency of the organizational process use case. Thus, I discuss how I planned the participants action research iterations and coded the participants for anonymity. I also provide the details of all the findings of the various determinants and measurements for the iterations that showed the impact of the RPA automation on the organizational process.

4.2 Participant Action Research iteration plan

I selected participants that were native to the process that was being automated, as it was important for them to have a thorough understanding of the process and its history before the automation, during the Bot system development life cycle, and after the RPA automation of the process in order for them to provide the necessary insights and effectively participate in the research. Therefore, in

my first iteration I sought to capture what the participants' perceptions were of what the determinants and measurements of the impact of RPA implementation on the efficiencies of the organizational process were, specific to the case study that my team is automating, in comparison to the determinants and measurements that I found in the literature review, without revealing my literature findings directly. My first iteration was individual interviews with each of the six participants with interview questions based on six mostly open-ended questions that covered the research question and framework but meant to initiate the interview and enable and encourage the participants to provide context and answer the questions unreservedly (Isaacs, 2014; Van Holm, 2021) in their own voice so they would share new information and thoughts (Van Holm, 2021). My first iteration questions were:

- What does the automation of the Outbound Futures Dialing process via Robotic Process Automation mean to you and the Team in general?
- What would you say are the key objectives or what are the critical factors that must be met in order for the RPA automation to be considered successful?
- How will the automation of the process impact risks and compliance given that it is a highly regulated process?
- What opportunities do you think are there with the automation of the process that could or should be harnessed?
- What challenges or obstacles do you see or anticipate with the automation of the process?
- How will the automation impact the employees that work the process from your perspective?
- Are there other concerns or considerations regarding the automation of the process that should be addressed?

My first iteration was held via video conference due to the COVID-19 pandemic implications because employees in my organization all worked remotely from home. This was also an advantage, as it gave us the flexibility to conduct the interviews during or outside their regular working hours whenever the participants were available. I had varying interview times and days with the different participants.

I understood and documented the perceptions of determinants and measurements of the individual participants in the first iteration and based on my observation and analysis of them. I created the

interview questions for the second iteration, in which I directly infused the determinants and measurements I found in my literature review with the answers the participants provided with themes and emergent themes in the first iteration. My intention was to have a more in-depth conversation and gain further insights from the participants towards answering the research questions. I narrowed down the questions for the second iteration from 15 to 10 after thorough review to enable more depth and elaboration on the themes and emergent themes from the first iteration.

The second iteration of interviews was also individual and completed via video conferencing, too. Like the first one, all the participants were available for interviews and the questions yielded a more in-depth response from the participants on their thoughts on determinants and measurements of the impact of the RPA implementation on the process, as I had planned and hoped for. Additionally, I began to notice the common themes that were developing with the iterations at that point.

Unlike the first two iterations, the third iteration was a focus group that was comprised of all the participants. I was pleased that they could all attend after several rescheduling of the interviews due to time and meeting conflicts. After the completion of the second iteration, I was convinced that the first two iterations had provided sufficient data and insights from the individual interviews and thought it was time to have the focus group, which facilitated discussion amongst participants and supported a socially constructive environment for the participants to make meaning of their conversations and develop new thoughts and determinants and measurements that may not have been discussed or apparent in the individual interviews (Cassell & Johnson, 2006). The interview questions were derived and built on the questions from the second iteration mostly. Having all the participants attend the focus group, enabled the thoughts of each individual participants to be shared and built on in the conversations, as the goal of the third iteration was to ensure the focus group shared and answered the updated interview questions.

For all three iterations, the Participatory Action Research principles and iterations were applied, in which I planned the interviews, took action by collecting the data from the interview sessions, then observed the data I collected in form of the responses from the participants. I then reflected on the responses and planned the next iteration by creating the questions for the next iteration until after the third iteration in which I drew my conclusions. The observations were done via analysis of the determinants category and themes analysis table and the subsequent transcript table I created. I used the grounded theory method to analyze and determine the themes. My examination of the

data from each iteration shaped the development of the next iteration interview question (Ghauri et al., 2020).

The first iterations occurred between September 25th and 28th, 2022 while the second iterations occurred between October 9thth and 12th , 2022. The third iteration occurred on October 24th, 2022. After the implementation of the automation, we had two months in which both Bots and employees worked the processes parallelly to assess the success of the automation before the gradual reduction in the number of employees that worked the process.

4.3 Managing iterations

In the early stages of the analysis of the process to be automated, I informed possible participants about my pending research and that they may be asked to participate, which helped me prepare them for the official invitation. As such, the participants that were finally selected were all aware and not surprised to be invited and ultimately selected. Upon the completion of my iterations and interview questions, I sent out the invitations via emails to the individual participants, as I was able to see their calendar availability. All three iteration interviews were held via video conferencing.

The invitations for the first iteration were accepted by a few right away, while I had to work with the remainder to find an agreeable time for their interviews. All the interviews in the first iteration occurred as scheduled, except for one that had to reschedule due to personal reasons and another that cancelled at the last minute but we were able to reschedule the interview time. I had also provided the participants the expectations and format of the interviews, which was beneficial, as they were mostly calm and cordial during the interviews and I noticed some excitement in some of them during the interview, which was helpful. I had to rephrase a couple of questions for one of the participants, however, as he initially seemed a bit unsure, but we did clarify the question and completed the interview well. All the participants were asked the same questions. To conclude the first iteration interview, I reminded the participants that I would send them invitations for the second interview.

The invitations for the second interview followed a similar pattern as the first one, with most of the participants accepting the interview times while adjustments and accommodations had to be made for others to find amicable meeting times. Reminders were also sent to the participants a day before the interviews which was helpful. The participants were also asked the same set of questions that were developed from the answers, themes and emergent themes from the first iteration. Some questions implied what was asked in the first iteration. Although I received similar answers as I did in

the first interaction for the question in some cases, the answers had more depth and details in most of the time, which indicated a growth or modification in their understanding of the research question and determinants and measurements of the impact of RPA to the efficiency of the process, since the first iteration interview. In one of the questions, a participant did not have the specific details and referred me to the manager of the process owners team for specific details, who was also a participant. Here also, at the end of the interview, I informed the participants that there would be one more interview to avoid any surprises.

The third iteration was in a focus group format. As I did in the previous iterations, I sent the meeting invitations ten days early with the expectation that there would be potential issues getting all participants to attend, so I could be flexible to adjust the meeting schedule. All the participants accepted my second modified invitation to accommodate everyone. However, a few days before the interview, the Team Lead requested a time adjustment which I made that worked for all participants and I. I also sent a reminder beforehand as I did in the first two iterations. I was pleased that all the participants accepted and attended the interview meeting. The focus group participants were by now more familiar with one another and they seem to have a comradeship as participants in the research which I thought was helpful during the interview. I shared my computer screen during the interview, so they could all see and read each interview question I asked, to ensure there was no ambiguity or misunderstanding of the questions I was asking with any or amongst the participants. This iteration was in a conversational format. The interview questions were also as result of my PAR observation and reflection on the various answers and thoughts from the second iteration interview, so there were some similarities in the questions, which some participants answered as they did in the first one. As the interview proceeded, I observed a social construction occurring as the participants confirmed and agreed on determinants and measurements of the impact of the automation on the efficiency of the process, and in instances, participants built on the answers of others who in turn agreed and confirmed the new thoughts. I however, had to ask the Team Lead to complete her answers on two occasions in which she seemed to default to the manager, who was also the manager to whom she reported. Overall, I was able to lead the interview and conversations with success with the cooperation and consideration of the participants of one another.

4.4 Participant Codes

Given that I am conducting insider research with participants that are internal within the organization and native to the subject of my research, I decided to maintain their confidentiality and

identity in my documentations. I chose the participants based on their knowledge of the process that was being automated and started their interview documentation by using their job titles, however their job titles were not confidential enough to protect their identity, as it was possible for someone else with knowledge of the process, that is not a participant, to identification them via their job titles due to deductive disclosure or internal confidentiality. When there is deductive disclosure or internal confidentiality, attributes of participants can enable them to be identified in reports or documents (Kaiser, 2009) Therefore, I coded the participants job titles to protect them from being identified, but I could identify them and what group they belong to, which not only maintains the confidentiality of the participants identity but also their job titles. Furthermore, coding the participants also enables me to seamlessly do my analysis and matching of the data from the participant's responses from the iteration interviews.

Participants	Code
Manager	MB
Project Manager	PMB
Team Lead	TLB
RPA Developer	DR
Principal Automation Engineer	PAE
RPA Business Analyst	BA

Figure 15 - Participants codes

4.5 Findings by the determinants and measurements

The research interview and conversation response evaluation and findings from the interview iterations based on the RPA implementation that occurred in February 2022, were condensed by the determinants and measurements of the impact of the RPA implementation on the efficiency of the automated process. The participants provided several determinants and measurements that aligned and complemented the determinants that were revealed in my literature review.

Determinants and Measurements of RPA Implementation improving process efficiencies	
Main Impact	**Subsets**
FTE reduction cost savings	Cost savings
Faster processing time of processes	Improved SLA, Scalability
Risk reduction	Bot accuracy, Human error elimination, Compliance
Improved quality of process	Optimized process, Reporting
Improved team productivity	Higher number of Agent calls, Higher collections dollars, Humans collaborating with Bots
Improved employee moral	Agents focus on calls, More incentives for higher collections

Figure 16 - Determinants & Measurements of RPA Implementation Improving the Efficiencies of the Process

A table that summarizes the emergent themes/determinants and measurements in the three iterations along with the correspondent participants that provided the themes can be seen in the appendices in section 8.4.4. The correspondent participants comments can also be seen in the appendices in section 8.4.5.

4.5.1 FTE (Full Time Effort)/Employee Reduction

The literature review established that there were several cost saving factors due to the implementation of RPA, however, the cost savings brought about by FTE or employee reduction was dominant and the main cost saving factor that was a quantitative benefit that could be proven (Villar & Khan, 2021; Scheppler & Weber, 2020). Several banks saved tens of millions of dollars in employee cost due to the implementation of RPA. For example, the redeployment of FTEs due to RPA automations saved Deutsche Bank £39 million in 2018 and £32 million in 2019 respectively (Villar & Khan, 2021), and Barclay's Bank saved the equivalent of 150 full time Employees due to RPA automations (Taulli, 2020). The automation of the process in my research also saved FTE costs.

The interviews with the participants also showed that that the RPA automation of the process in the case study significantly reduced the number of employees that worked the process before the RPA automation. This became apparent in the first iteration, in which the participants that were part of the business team which owned the process excitedly explained that the RPA automation dramatically reduced the number of employees, as seen in examples of the first iteration responses:

- "The fact that we actually saved 2.6 million dollars in labor cost was a big win." PMB
- "The automation meant that we could move to predictive dialing and meet the new department collection goals that our VP set for us. We had a large team with high costs and we knew that predictive dialing would reduce that cost and we wanted to reduce

the head count from 55 to 7 and to optimize the process. So, I was happy that the FTE goal was achieved with the automation." MB

- "We had a large team but couldn't catch up with the growing backlog of accounts because of how long reviews take. The RPA bots mean that we don't need the large team and can now save employee costs." TLB
- "The goal was to reduce employee count dramatically which came up to 87% reduction and improve productivity. I am glad to be part of the facilitators on the project." BA
- "I am happy to be part of a ground breaking RPA automation in the company that provides a high cost reduction to the Outbound Futures Dialing team that also helps them increase revenue." PAE

Their responses indicated and showed that there was significant reduction in FTEs. The participants responses were provided based on open-ended questions. However, based on my PAR iteration process of observation and reflection on the various answers and thoughts, I modified the question for the second iteration in an attempt to get more depth on the FTE reduction and the participants answers were similar but more specific in terms of the FTE savings, which was in part due to the fact that time had elapsed since the first iteration and there were concrete developments in that regards. Some responses that further showed the reduction in FTE include:

- "The RPA automation saves 2.6 million dollars annually by eliminating 48 out of 55 FTE" PAE
- "We went from 55 Agents to 7. This was a major change for the team and also a major reduction in costs which saves 2.6 million dollars yearly." TLB
- "The employee reduction expectations with the RPA automation was a success. The employee number was reduced by 87%, from 55 down to 7." PMB
- "…we gradually reduced the number of employees and we are now down to 7 employees who only perform collection calls. Before RPA, we had 55 employees which was reduced by 48 to just 7. So, the RPA automation actually exceeded our employee reduction goals" MB
- "This automation led to a reduction of FTEs by 87% which saves 2.6 million dollars yearly. This is the cost of 48 employees that are no longer needed…" BA

The second iteration further confirmed the significant FTE savings but the questions enabled the participants to be more specific in their responses. My third iteration was with the focus group with all the participants. Here also, the open-ended question was modified and updated upon my PAR

reflection of the responses from the second iteration the interviews and conversations provided. The focus group took turns in answering the questions and also had conversations confirming each other's answers and thoughts as social construction was in effect as they made meaning and sense of their responses. They agreed and confirmed that the RPA automation reduced FTE numbers by 48 from 55 or 87% which was a yearly cost savings of $2.6 million dollars. They also agreed and confirmed that the reason for the savings is because the bot does all the searching and review of the accounts to be called, so Agents now only focus on calls, which also leads to increased and higher collection dollars and rates. They also confirmed that Agents used to spend at least 90% of their time reviewing the accounts and systems, but the bot now does the work, which conforms with Papageorgiou (2018) that part of the goal of RPA implementation was for Bots to take on the monotonous tasks from employees and allow them to focus on the improvement of client services. The confirmations mostly came from the business process owners including the manager, Team Lead, Project manager and RPA Business Analyst. The others provided responses based their answers on information and reports received from the business process owners.

My findings, based on data from participants interviews from the iterations, empirically showed that the RPA automation reduced at total of 48 employees which was an 87 percent reduction and will provide a yearly savings of $2.6 million, which was the cost of employing the employees that were no longer needed, thus, reducing cost and improving the efficiency of the process (See the document from my employer and organization from my Director in section 8.5 of the appendices that shows further proof). This aligns with the literature that RPA reduced the employee numbers and costs, along with improving process efficiencies as seen in other banks like Deutsche Bank and Barclay's bank. It also shows that it is a quantitative benefit that could be proven (Villar & Khan, 2021; Scheppler & Weber, 2020). The findings of the RPA implementation regarding FTE savings far exceed Casale's (2015) claim that the implementation of Robotic Process Automation will reduce workforce cost between 25 and 40 percent, as mine was 87 percent. However, the iterations also revealed some concerns regarding FTE reduction.

Figure 17 shows that the employee count was reduced by 87% from 55 down to 7 employees due to the RPA automation

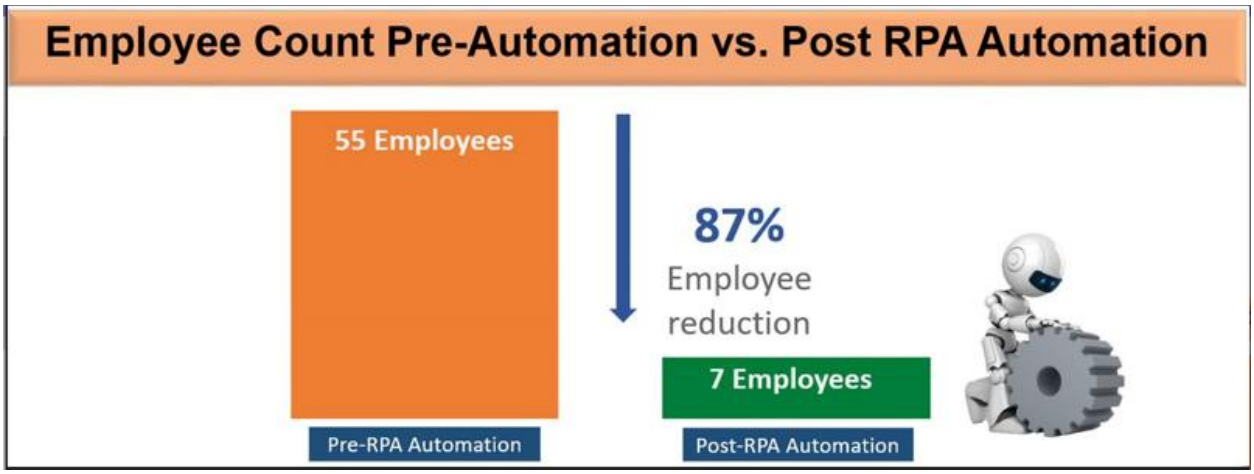

Figure 17 - FTE count before and after RPA implementation - 87 % FTE reduction

4.5.1.1 Concerns regarding FTE reduction

A participant was concerned about the employees being informed early enough about their pending job losses and thought it would be fair for them to be informed earlier than later. The process owners, however, said that HR took responsibility of informing the Agents and that severance packages were offered to the employees that were no longer needed, while others were placed on other teams or tasks.

Another employee concern was the low morale of the employees that were let go once they became aware that they would eventually no longer be needed, along with concerns by the ones that were kept. My literature review also found that morale can be a negative impact of RPA implementation, as employees may view automation and Bots as their replacements and a threat to their jobs (Asatiani and Pentinnen, 2016).

The participants from the business that owned the process however, clarified that morale of the employees that were left improved after they were assured of their jobs and that they were needed to make collection calls, as the Bot is not qualified or capable to call customers. Subsequently, the morale of the remainder employees further improved, as they no longer had to perform the tedious repetitive high-volume task of reviewing individual accounts in multiple systems, which was not only time consuming but also error prone, to determine if a customer could be called, but could focus on making collections calls. Their new main focus of making collection calls is critical in that they were now able to improve on making efficient and quality calls and more so, dramatically increased their

collections rate. This finding aligns with Anagnoste (2018) and Radke et al. (2020) from the literature review who asserted that with the RPA automation of monotonous processes, employees were no longer required to perform the repetitive tasks, which improved the job satisfaction levels and morale.

4.5.2 Faster processing time of the automated process

In the literature review, faster processing time was another major benefit, determinant and measurement of how the implementation of RPA and AI improved the efficiencies of organizational processes. RPA implementation saves valuable time, as Bots could work processes much faster (Aguirre & Rodriguez, 2017; Kokina & Blanchette, 2019) without breaks and more accurately than humans (Radke, et al., 2020). Because RPA Bots can work processes at a much faster velocity than humans, they are able to complete work queues and batches much faster, which ensures a faster process output (Syed et al., 2020; Hallikainen et al., 2018). The New York Mellon Bank increased processing handling time by 88 percent with the implementation of Robotic Process Automation, while Bots worked cases in another Bank case study, 83 percent faster than humans (Wojciechowska-Filipek 2019). The participants' interviews also revealed this as a determinant and measurement for the process in the case study.

In my interviews with the participants faster processing time was also found to be another determinant and measurement that improved the efficiency of the process that was automated. In the first iteration of interviews, I asked all the participants the same open-ended questions regarding the key objectives that would determine the RPA automation a success. A common objective that they all mentioned was faster processing time and how the automation increased processing time which was critical to the success of the automation. Some provided their answers in numbers and percentages while others expressed the faster processing time in hours or days Their answers all definitively described that the automation enabled faster processing time which was key to the efficiency of the process . Some examples of the participants responses are:

- "Thankfully the bot now works the daily batches within hours..." MB
- "The processing time is phenomenal it went from 4 weeks per batch to within 24 hours." PAE
- "The file is now processed on the same day which previously took a month." TLB
- "…increase the processing time which was a major success because the bot now completes the file in a few hours." DR

- "Objectives include faster processing time, which we knocked out the park with an increase of 96%." [BA]
- "For me the automation success means that the bots work the reviewing of the accounts to enable Agents to focus on calls. Faster processing times, which increased by 95% was critical." [PMB]

Upon my completion of the first iteration interviews, I analyzed the participants responses by performing the PAR iteration cycle and process of observation and reflection and after much consideration of the various responses, I modified, updated and summarized the question for the second iteration to allow the participants to provide more depth and insights in their responses regarding the improvement in processing time due to the automation. The interviews with the participants in the second iteration interview followed the same format as the first. However, their responses provided more insights on the impact of improved processing time. While some answers focused on the improved time, others now indicated of other impacts, such as SLA, meeting deadlines and compliance. This iteration clearly provided more depth to the effects of the established improvement in processing time, further confirming that the RPA automation provided a much faster processing time for the automated process. The examples of the participants responses to the interviews below were pivotal in clarifying their thoughts:

- "…we went from processing 30000 accounts in over 4 weeks to the bots now processing them in hours. Which is a 95% increase in processing time that as resulted in the meeting of SLAs." [MB]
- "..very impressed to see that the bot was now processing the accounts 95% faster. The bots process a month's batch in hours" [PMB]
- "Processing time was reduced from 1 month to 1 day or same day completion, which is one of the major benefits of RPA". [PAE]
- "I am still very impressed when I received the daily notifications that the 30000 average daily account batch is completed each morning, which also helps our compliance.." [TLB]
- "The average daily volume is 30000 that required 4 weeks for the Agents to complete. Our bots work faster and with RPA scalability, we are able to complete the task in about 3 hours daily." [DR]

With the completion of the second iteration interviews, I proceeded with my PAR iteration cycle to analyze the data collected from the participants responses and made another slight modification to the questions regarding the faster processing time based on the collected data for the third iteration.

I was also careful in the update of this question knowing that my next iteration was with the focus group with all the participants.

The participants' responses in the third iteration were also conversational and in addition to the known and agreed upon improvement in processing time of 95 percent, the discussion now included the exceeding of SLA's due to the faster processing times, which was no longer a concern due to the automation. Responses also included compliance, because the team was no longer facing the risk of not being compliant to set regulations and rules, and bot scalability because multiple Bots can be used to process the daily 30000 cases. One of the highlights was the statement that "… If we had applied Robotic Process Automation earlier, we would have increased collections and had a more effective process years ago." [TLB] With the same day processing time, we are now able to call delinquent customers much earlier which makes us more efficient and the result has been an increase in collection dollars." [MB] . Another key participant statement said, "The advantage of RPA scalability is what enables us to process 30000 accounts in a few hours daily" [DR] . The focus group agreed and confirmed the findings in the second individual iterations, but built on it and added more thought on SLA and compliance. A participant asked a question as to whether we knew what the new yearly average collection dollars would be with the RPA automation and the Business manager said they needed more time to provide that forecast.

The responses from the three iterations showed and provided proof that the RPA automation improved the processing time of a file of 30000 from 4 weeks to same day or under 24 hours, a reduction of 95 percent. This was also determined by comparing the historic processing time by employees before the RPA automation and the processing time after the automation. These findings align with the literature review findings that showed that Robotic Process Automation is able to reduce task performance times by 90 percent (Nallicheri, 2018), and that RPA automation exponentially improved processing times of organizational processes making them more efficient (Wojciechowska-Filipek, 2019; Radke, 2020; Gosh, 2018; Hallikainen et al., 2018; Taulli, 2020).

Figure 18 shows that the processing time dropped by 95 % from 20 business days to 1 due to the RPA automation of the process

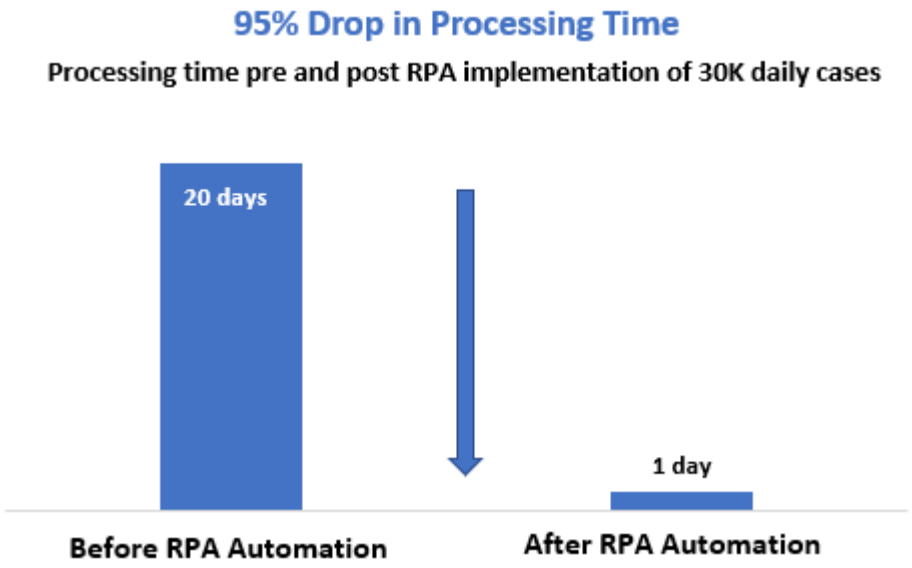

Figure 18 - Processing time before and after RPA the implementation

4.5.2.1 Concerns regarding faster processing time

Although the participants were in unison in all iterations that the RPA implementation exponentially increased the processing time of the automated process, there were some concerns mentioned by some participants. These concerns emerged during the focus group iteration in which the second concerned developed or arose due to the first concern being mentioned and discussed. The concerns focused on what the impact to processing times would be if there is an unexpected sharp increase in case volumes and bot resources license numbers should such major spike in volumes occur.

The first concern and question was focused on whether the Bot would be able to maintain the one day processing time if cases volumes unexpectedly increased dramatically (asked by [MB]). This was a concern that I thought was valid which I clarified, because one of the advantages of RPA is scalability. Scalability enables Bots to work processes when the volumes fluctuate, increase rapidly or when there is growth, and still meet deadlines (Lacity & Willcocks, 2016; Tornbohm & Dunie 2017, Gartner.com, 2019; Langmann & Turi, 2020; Casale, 2015). Basically, additional Bots are added to the

existing Bots to work the process, increase the digital workforce, which Taulli (2020) describes as cloning the Bots to meet the demand of increased volumes. Scalability was also a topic that was also found and mentioned by several authors in the literature review and aligned with the thoughts of the focus group. Furthermore, the RPA team already planned for this and has a fleet of back up Bots or clones that can support the process. However, the scalability question led to the second concern.

The second concern was regarding Bot licenses and scalability, which focused on the back up Bots solution and what would happen if we wanted to scale up Bots due to an increase in case volumes but we don't have enough licenses due to license usage by other process automation bots (asked by [PAE]). Bot licensing is information that is known by RPA subject matter experts and this question was brought up by a participant from the RPA team. This was a valid emergent concern for which the RPA team had back ups but needed to be addressed and further solve. So, for me personally, not only as the lead researcher but also and more so the manager of the RPA team, this was a concern that I had addressed but apparently needed to be readdressed to avoid the risk of falling behind the one day processing time, should such remote but realistic concern happen. Therefore, this was new knowledge that emerged due to the focus group interviews and conversations and an example of a focus group reflection of the findings and developing new insights and knowledge, which also helps me the researcher (Kumer & Urbanc, 2019). Also, the new insights occurred through social construction of the sense making process of the PAR focus group (Krauss, 2005). The literature review also provided understandings of the impact of licensing, so the emergent licensing concerns aligns with findings from the literature review and Taulli (2020) contends that scaling is the holy grail of RPA automation but can become difficult if not planned and managed well.

4.5.3 Risk reduction

Risk reduction was another determinant and measurement that was discussed in the literature review by several authors. Before the RPA automation, employees worked processes manually and they made errors, which can be eliminated by RPA (Patri, 2020, Wright et al., 2017; Ghouse & Sipos, 2022; Radke, 2020; Asquith & Horseman, 2019; Casale, 2015; Kirchmer, 2017; Leno, 2018; Kedziora & Penttinen, 2020). A financial institution reduced the error rate in one of its automated processes by 100 percent due to RPA automation (Langmann & Turi (2021).The implementation of RPA dramatically reduced the human error risk in the process, thus improving quality (Fernandez and Aman, 2018; Thekkethil et al., 2021). The responses from the interviews with the participants also echoed the risk factors found in the literature review.

I asked open ended questions surrounding risk in the first interview iteration, which was with individual participants and all the participants were asked the same questions. The participants provided responses regarding the high human error rate that was eliminated by the RPA automation. The participants that were part of the team that owned the process showed satisfaction and relief that RPA had completely eliminated the high human error rate that existed that they regularly audited due to the risk the errors posed. The responses below showed their thoughts on the RPA impact on human error risk:

- "With the bots working the cases, we now meet SLAs and the risk that we had due to Agent negligence was eliminated by the bots and we are now in compliance." MB
- "We saw errors when Agents worked the accounts which was a major risk for compliance if the errors were not caught by audit. But because the bots work correctly without mistakes I don't worry about that risk anymore." TLB
- "The automation completely removed the human error issue. So, the business no longer has compliance and regulation violation issues." DR
- "The process falls under highly regulated rules and employee errors was a risk that violated compliance. The Bots work accurately which corrected the problem." BA
- "The reduction of the risk of Agent errors was a compliance problem. The Bots work accurately which removed the compliance problem." PAE
- "RPA solves the Agent error problem that was a major risk for regulations and compliance." PMB

As seen in the above participant responses, all confirmed without exception, that the RPA automation eliminated the human errors and a participant mentioned that the eliminated errors also reduced her auditing of the errors the Agents used to make. Although it was clear that the Bot eliminated the human error, in order to have a better understanding and more insight of the participants thoughts on the topic and adhere to the PAR interaction principles, I analyzed the participants responses by performing the PAR iteration cycle through observation and reflection on the responses and regarding risk. Therefore, I updated the question for the second iteration.

The second iteration interviews followed the same pattern as the first and here also, the participants confirmed their responses from the first iteration, with more details this time, that the RPA automation eliminated the human risks they had as seen in their responses below:

- "The risk issue was indeed a major concern because we could be fined for being out of compliance and also sued by customers. So having RPA bots that work accurately is a game changer and another major win for us. Our auditors haven't found a single error that was caused by the bot to date. Risks due to Agent errors are now a thing in the past." MB
- "This was another big win and impressive benefit of the RPA automation. The futures bot works the account reviews accurately, eliminating the diverse Agent errors that were hard to track and root cause of the regulatory violations and compliance failures. The risk of being out of compliance has been eliminated." PMB
- "… although I was skeptical about the bot completing the reviews 100 % correctly, the RPA team and Bots have proven to do the reviews 100% correctly without errors." TLB
- "The bots are able to work the process without errors because we gathered concise requirements and did a detailed analysis of the process. We then coded the bot based on the requirements along with long UAT period. This has made the bot to work accurately without errors and has solved the human errors problem." DR
- "The automation removed the risk caused by Agents manual work so they no longer have compliance issues." PAE
- "The risk that was caused by employee errors was completely eliminated because the RPA bots are reviewing the accounts accurately and there are no recorded defects due to bot errors so far." BA

The second iteration interview responses provided more depth to the risk impact on human errors and compliance, for instance, a participant mentioned that the automation now ensures that they are no longer out of compliance due to the eliminated error rate. While another mentioned that the Agents no longer mix up customers with the wrong contact information. Yet, another expressed her satisfaction with the eliminated human errors because it was part of her job to correct found human errors. For the third iteration interviews, I used the new and modified question I created after performing the PAR interaction cycle.

In the third iteration with the focus group, the participant responses conformed again that the bot eliminated the human error, however the discussions spawned additional thoughts, including statements like "The 7 percent error rate has been eliminated with the bot reviewing and dispositioning cases accurately" BA . This provided actual numbers, which the process owners were able to gather after the second interviews. The actual percentage of Agent errors shed more clarity

as to the difference the RPA automation made to error rates with the automation. Seven percent is very high given the 30000 daily account volume, which is unacceptable in a highly regulated banking industry. Another fact that arose through the conversations in the focus group was that due to the eliminated human error, customer experience was improved, as the customers and their information now matches 100 % of the time. Furthermore, the participants also found that the error elimination reduced the potential of reputational damage should a disgruntled customer decide to sue the bank.

The interview responses and their analysis revealed that the RPA automation completely eliminated the human error factor, which aligns with the literature review in which RPA was shown to eliminate human error by 100 percent (Syed et al., 2020), or that RPA automations have an accuracy level of 99.9 percent (Patri, 2020; Wilds, 2019; Wojciechowska-Filipek, 2019). The participants' responses also showed that RPA helped them remain compliant and provide better customer service which reduced the risk of reputational damage. The individuals who audited and manually corrected found human errors now also have a better job satisfaction experience. However, they did raise some concerns.

Figure 19 shows that the human error rate was eliminated and reduces to zero % with RPA

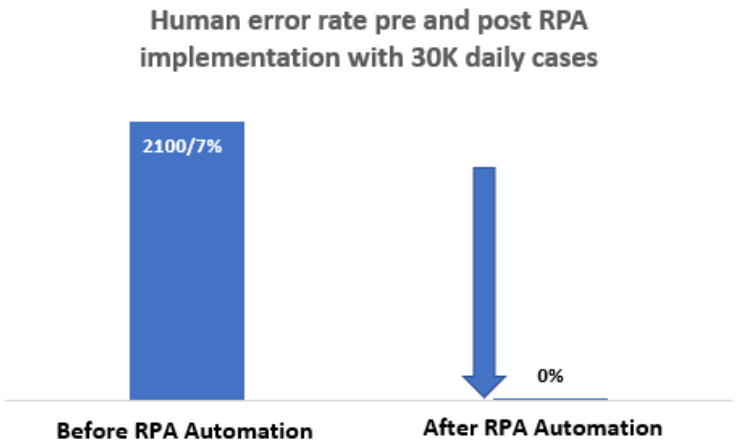

Figure 19 - Human Error Rate Pre & Post RPA

4.5.3.1 Concerns regarding risk

Although the participants all agreed that the RPA automation had a 100 % accuracy rate thus eliminating the human error and ultimately the risk that was caused by it, they raised some concerns in their responses and conversations. Concerns regarding risk were:

1. If the Bot stopped working or had issues, it will present a risk because the process will not be worked and the team no longer has enough employees to do the work manually. Interview response example:

    i. "My main concern was if the bot breaks and we fall behind, we will no longer have the number of Agents to work the process." TLB
    ii. "I was concerned about possible down times of the bots when the bot has issues and can't run." PMB
    iii. "One concern I had was the consistency of bots and what would happen if the bot had defects and could not run and if your RPA team has a backup up plan." MB

2. The automated process uses up a lot of RPA Bots due to scalability as a result of the high volume of cases, thus creating a risk that other automated processes that may need to be scaled cannot be scaled. Interview response example:

    i. "This process has a very high daily volume of about 30000 that require the RPA resources to be scaled so it uses up a lot of resources which can impact other automated processes." PAE

The first concern regarding Bot issues or if it stopped working, was a valid concern that I and the RPA team already considered and had a solution for should we have technical issues. It is standard for us to have back up Bots or as Taulli (2020) describes it, clones of the main Bot that support the process should we have issues. Furthermore, we have the capability to solve Bot issues within a reasonable time such that it does not impact SLAs. Although this concerned was already planned and solved for by my RPA team, the participants brought up a critical concern that I would have now been aware of to solve, if I hadn't solved for it. Which showed the value of the participants and findings of interviews and conversations, propelled by the PAR and the PAR iteration cycle. PAR is a reflective practice that allows researchers to take action and incorporate new findings and understandings to the current process instantly leading to a higher degree of creativity and solutions (Bell et al., 2004).

The second concern regarding the automated process using up Bot resources and possibly impacting other automations was also a valid concern that was brought up by the participants. The concern was raised by a participant that was a member of the RPA team, due to his insider knowledge of RPA

and its dynamics and a concern that a non-RPA member was most likely not to be aware of and couldn't have recognized. Furthermore, this showed the advantage of having diversity in expertise such as in business and technology in the participants, as I had a combination of participants from the business and process owners and the RPA/AI team. To address this concern, the RPA team has a Controller that manages the RPA team's digital workforce or bots and my team had also ordered additional Bots to meet the demand of the high volumes, thus, this critical concerned was also planned and solved for, but it ensured that I was aware of it, if I hadn't solved for it and also served as a reminder to me of its criticality. This finding was also as a result of PAR iteration cycle and the PAR which allows participants to exchange legitimate information, freely make informed decisions and create internal dedication to the findings of the research (Argyris & Schön, 2011).

4.5.4 Improved team productivity

Another key aspect of the determinants and measurements of RPA implementation that improved the efficiency of organizational processes found in the literature review was improved productivity. RPA enables the automation of manual repetitive and monotonous tasks that are worked manually, which enables employees to focus on more value add and cognitive task (Anagnoste, 2018; Casale, 2015; Langmann & Turi 2021; Javed et al., 2021), such as interacting with humans (Fahland et al., 2020), which ultimately leads to increased productivity and efficiency. (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). The responses from the interviews in iterations I had with the participants reflected what was found in the literature review.

In both iterations of the individual interviews, I asked the participants the same open-ended questions around productivity. In the first iteration, the participants' responses all pointed to improved team productivity. The participants that were part of the team that owned the process were more specific as to the increased team productivity as the team was now making a higher number of calls for collections despite the dramatic reduction in the number of employees. The below interview responses confirmed the increase in team productivity as seen below:

- "The RPA automation was a great opportunity for us to make more calls since the bot has a much faster processing time than employees. We are now making calls and collections and save employee costs. So, we are in effect more productive." [MB]
- "I'd say the major opportunities were reducing our FTE headcount and improving productivity by increasing collection dollars." [PMB]

- "We had the opportunity to increase calls, right party contact and collections." TLB

- "The business can now have the employees focus on calls alone so they can make more collections. They can also now focus on other issues or plans they have for their team improvement or goals." DR
- "A ground breaking RPA automation in the company that provides a high-cost reduction to the Outbound Futures Dialing team that also helps them increase revenue." PAE

The responses above showed that productivity increased and participants that were process owner specified that they now make more calls with a significantly fewer Agents, the responses also showed that the employees need some time to adjust to the change in working with the output of the Bot but soon got accustomed to it and their productivity increased. For the second iteration, like I did in others after the PAR iteration cycle, I modified the question regarding productivity that I presented to enable the participants provide more details.

The individual interviews in the second iteration followed the same format with the new question and the participants were able to provide more depth in their answers regarding the increase in team productivity, which was also because they had more information since we had the first interview as seen below:

- "We are now more productive, generate more collections and have a low risk of being out of compliance, so we have increased productive with the automation." TLB
- "I am also very pleased to say that the RPA automation has helped my team increase productivity. We have reduced headcount by 48. Collection dollars have also increased because, we now have more right party contacts with the remainder 7 employees." MB
- "Productivity is up for the team because they make more calls, reach more customer which has led to an increase in collection dollars, with a much smaller team. The main reason of the team is to make collections for delinquent accounts and the team now focuses effort on that. So, the automation has significantly increased the team productivity." PMB
- "The business reported that because of our automation their productivity went up." DR
- "Productivity increased overall because they now have 7 employees making more calls and collections than 55 Agents, because the Bots now do the majority of the work." PAE

- "The automation has caused productivity to go up because Agents now concentrate on making collection calls and no longer spend time reviewing accounts that took 90% of their time. The faster processing time was also a critical factor in the productivity increase." [BA]

The responses in the second iteration not only confirmed that productivity increased, they also provided more details. Including that they were making more calls and achieving a higher right party contact (Right party contact is when they call a correct number and get to speak with the intended individual and not a relative or someone else in the household). A higher right party contact also increases the chances of making collections or payment arrangements. The responses also informed that the employees were also making more customer payment arrangements. Upon my completing of the analysis of the responses from the second individual interviews and my PAR iteration cycle, I did not deem it necessary to modify the question, so I asked the same question in the final interaction.

Although, I asked the similar questions in the third iteration, which was with the focus group, I hoped the focus group and the conversations would help develop new insights. However, the focus group conversations only confirmed the responses from the first and second iteration, revealing the satisfaction of the participants from the team that owned the process. Overall, the participants and their responses were in agreement that the RPA automation increased productivity because the remainder 7 employees were able to make more calls than the team of 55 employees, because they no longer had to the manual work of reviewing accounts that took over ninety percent of their time. Because they made more calls they were able to reach more delinquent customers which increased collection dollars and payment arrangements. This empirically showed that RPA improved the team productivity, which aligns with the literature review that the automation of monotonous task by RPA enables employees to become more creative and focus on decision making, thus, improving their morale and increase productivity (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). Although the automation of the manual work was a catalyst in the increased productivity, the improved morale of the remainder employees was also a factor.

4.5.5 Improved employee morale

The literature review showed that improved morale of employees was also a positive factor in the automation of processes with RPA. Radke et al., (2020) postulate that with the RPA automation of monotonous processes, employees were no longer required to perform the repetitive tasks, which improved their job satisfaction levels and morale, which aligns with Javed et al. (2021), who asserts that this also increases the efficiency of employees' productivity. My interview with the participants also revealed that the RPA automation increased the morale of the employees.

For the individual iterations and focus group iterations, the participants provided insights on how morale was improved by the automation of the process. Although they showed that morale was initially down after employees were informed of the change and that most of them would ultimately no longer be needed for this task, aligning with Asatiani and Pentinnen's (2016) thought that RPA automation can negatively impact morale when employees view Bots as a threat or replacement of their jobs. Morale increased for the 7 employees that remained who then increased their productivity along with the teams productivity after accepting the change and assured of keeping their jobs. Some responses of the participants on the general morale questions are:

- The morale on the team was low as the batches of Agents were informed that they would no longer be needed. However, many were reassigned to other tasks and teams by HR and packages were offered to others. For the remainder 7, morale actually went up later because they were assured of their jobs, were no longer required to do the tedious account reviews and got more incentives because they increased collections. MB
- "I understand that the morale of the Agents was low when they found that they may lose their jobs, which was natural. HR took care of informing the Agents and some moved to other departments. However, the morale of the 7 employees left is up because they were assured of their positions and got incentives and now appreciate the bots." PBM
- "After we concluded the employee reduction, the employee morale went back up due to positive compensation changes and assurance that the reduction was complete." TLB
- "We were informed by the business that morale was down due to the reduction of employees but morale is up with the remaining 7." DR
- "However, the morale of the employees is good now according to the business manager, because the 7 employees will be kept and now have new incentives because of the increased productivity." PAE

- "Employee morale was bad due to the FTE reduction but has since changed for the better since the conclusion of the employee eliminations." [BA]

The participants' responses indeed showed that morale, although low at the beginning after the implementation of RPA, increased beyond the pre-automation levels for the employees that were left, which contributed to their efforts to increase calls, make collections and payment arrangements. The responses also showed how employee morale can improve efficiencies of organizational processes in cases where employees work the unautomated piece while the bots work the tedious time-consuming tasks and part of a process (Anagnoste, 2018).

4.5.6 Improved quality of the process

The participant responses from the interviews in the various individual iterations and the focus group provided several determinants and measurements that showed that the RPA automation improved the efficiency of the process that I've mentioned. Which were all parts and pieces that improved the quality of the process, including the elimination of the human errors, which led to the elimination of the risk they caused and enabled the team to be compliant with specified regulations, faster processing times that was dramatically improved, better employee morale and increased team productivity. These benefits of RPA automation were also in alignment with those found in the literature review.

However, the participants' responses also provided insights on additional benefits of the automation including, process optimization. Before the automation, the RPA team did a thorough analysis of the process for an in depth understanding of it and found some gaps, that involved delinquent accounts that were being overlooked for collection and arrangement calls. We then coded the bot to account for these delinquent accounts as well, thus optimizing the process. The below participant response examples showed their thoughts on optimization that added to the improved quality and efficiency of the process:

- "The Robotic Process Automation optimized the process by identifying the gaps and solving them. This was an additional risk that they avoided which added to the efficiency of the process and increased its quality." [BA]
- "Another benefit of the RPA automation was the optimizations. I was somewhat embarrassed about the gaps we had and that we went so long without their identification. But RPA again came to the rescue and the resolution of the identification

of the gaps and all the other benefits of the automation and optimization improved the quality and efficiency of the entire process." [MB]

- "We now have an optimized and robust process. The RPA team went beyond just automation. They found hidden issues, brought them to the process owners attention and the issues were resolve, which further reduced risk and efficiency." [PMB]
- "We found gaps during the analysis and brought it to their attention and fixed the gaps which further optimized the process." [DR]
- "The complexity of the process and regulations were the reason my team was not aware of the gaps. Here again the efficiency of the RPA team and process optimization skills identified the gaps and we included them in both requirements. So, the gaps were filled." [TLB]

The participants, as seen in their above responses found and agreed that the RPA automation optimized the process and improved its efficiency, which aligns with the literature review that showed that banks used RPA to optimize their processes and that the successful banks use intelligent automation, (Robotic Process Automation and Artificial Intelligence) to optimize their processes, save costs and improve efficiencies (Villar & Khan, 2021; Stravinskiene & Serafins, 2021). The research findings also show that RPA Improved the quality of the Bots process and outputs (Lacity, Willcocks and Craig, 2015).

4.5.7 New thoughts provided by the participants

The responses from the participants provided new determining considerations on efficiencies, specifically on the maintenance of the Bot. Given that the process is intricate and has a very high daily volume of 30000 and cost savings of $2.6 million dollars, the Bot requires and gets more attention than other automations that my team has to date. The time spent by the RPA team to maintain the Bot should be considered in the determination of the efficiencies of the process in its new state. This was a thought that originated from participants from the RPA team and those well informed on the Bot System Development Life Cycle of the automation. Some participants' response from the interviews in this regard are:

- "This process was at the high end of automation and requires more maintenance and time by the RPA team. " [PAE]

- "Because the process is complicated with very high daily volumes, the bot has to be closely monitored by the controller and this takes up a lot of time and effort." DR
- "The challenge I see is the maintenance of the bots." DR
- "There was a concern on the time and cost of maintaining the bot." BA

This determinant that the participants brought up is one I had considered but their thought allowed me to look more closely in to it, analyze and reevaluate my solution to come up with a better solution. I used the PAR as a reflective practice that allows researchers to take action and incorporate new findings and understandings to the current process instantly leading to a higher degree of creativity and solutions (Bell et al., 2004). The literature review did mention the cost of maintenance of Bots, but did not include the time and efforts to maintain individual intricate processes as a part of the impact on the efficiencies of processes by Robotic Process Automation & Artificial Intelligence.

4.5.8 Conclusions on findings

The findings that arose from the interviews from the three interview iterations found several determinants and measurements that provided empirical evidence that the automation of the process via Robotic Process Automation conclusively improved the efficiency of the process. The determinants and measurements found include FTE reduction cost savings, faster processing times which improved SLA, risk reduction through the elimination of human errors and Bot accuracy that helped the team and process to be compliant to regulations, increased team productivity due to the automation benefits and improved employee morale. These determinants all sum up to another determinant and measurement seen in the improved quality of the process. These findings aligned with those determined in the literature review that the implementation of RPA improved the efficiency of organizational process along with the benefits, determinants and measurements mentioned above(Lacity & Willcocks (2015); Fernandez & Aman (2018); Kokina & Blanchette (2019) Moffitt, Rozario & Vasarhelyi (2018) and Casale (2015).

However, the interview with the participants also yielded additional determinants and measurements along with other factors that added to the existing knowledge. Including the high maintenance time that may be required of the RPA team due to the high volume and $2.6 million yearly savings. Along with the management of bot resources for high impact processes to avoid risks of limited Bot resources and ensure that there are enough bot resources and licenses for other

automations that may need to be scaled. Details that I also discuss in my reflection in my discussions chapter.

Chapter 5. Discussion

5.1 Introduction

I embarked on this research with the main purpose of discovering the factors, determinants and measurements that will help me substantiate whether the implementation of Robotic Process Automation and the infusion of Artificial Intelligence improved the efficiencies of business processes in my organization. To that end, critically reviewing existing literature on the topic as seen in my literature review section revealed how the implementation of RPA and AI impacted organizations and their business processes, along with the determinants and measurements that showed the impact on business processes. The determinants and measurements from my findings also corroborated those from the literature review but also revealed new factors and knowledge. Which conclusively proved that the implementation of Robotic Process Automation and Artificial Intelligence improved the efficiencies of my organizational process.

This chapter includes a discussion on the findings and my reflection on the determinants and measurements and how they relate to the implementation of Robotic Process Automation in my organization, how my findings as the researcher relate to the literature, comparison to existing knowledge, the contribution of the participants and my learnings from the perspective of an action researcher performing insider action research. These discussions further help answer the research question**:** Has the implementation of RPA and AI improved efficiencies in the business processes in my organization?

5.2 Determinants and measurements

In the literature review, I identified numerous determinants and measurements that showed that RPA improved efficiencies in organizational processes. The implementation of RPA and my research in my organization also yielded similar determinants and measurements with my research showed

additional determinants and measurements. In the following segment I discuss the significance of these findings and my thoughts.

Figure 20 shows the determinants and measurements that were found both in the literature and my organizational study

	Determinants & Measurements	Literature Review	My Organizational Research
1	FTE reduction cost savings	Yes	Yes
	- Cost savings	Yes	Yes
2	Faster processing time of processes	Yes	Yes
	- Improved SLA	Yes	Yes
	- Scalability	Yes	Yes
3	Risk reduction	Yes	Yes
	- Bot accuracy	Yes	Yes
	- Human error elimination	Yes	Yes
	- Compliance & Regulations	Yes	Yes
4	Improved quality of process	Yes	Yes
	- Optimized process	Yes	Yes
5	Improved team productivity	Yes	Yes
	- Bots & humans collaborating	Yes	Yes
6	Improved employee moral	Yes	Yes
	- Improved job satisfaction	Yes	Yes
7	Improved customer service	Yes	Yes

Figure 20 - Determinants and Measurements found in the literature and my organizational research

5.2.1 FTE (Full Time Effort) savings and cost reduction

I found that in the literature review, the foremost highlighted benefit of Robotic Process Automation was cost reduction due to employee/FTE savings which improved process efficiencies of their processes (Villar & Khan, 2021; Scheppler & Weber, 2020), as bots can work processes much faster than humans (Ghosh, 2018). This made sense to me as most organizations and banks focus on and want to save costs and maximize profits. The literature provided several examples of banks that save millions of dollars with Robotic Process Automation. For example, Deutsche Bank created an automation 4.0 program in 2019 to focus on the automation of operational processes and was able to reduce £6 billion in cost (Villar & Khan, 2021). RPA and AI provide the opportunity for organizations including mine to save millions of dollars. The participants involved in the case study in my research and the implementation of RPA in my organization all confirmed with enthusiasm that

RPA saved 87 percent in employee costs. In which 55 original employees were reduced to seven, which is $2.6 million dollars savings annually for just one process, which was also confirmed by data (Also See the document from my employer and organization from my director in section 8.5 of the appendices. This was consistent with what I found in the literature review. Furthermore, the team and the process was now more efficient with only 13 percent of the original number of employees. The manager and leader of the team that owns the process mentioned that this goal and expectations were far exceeded with the RPA and AI implementation. This showed that there was a goal to save employee cost with RPA. I am obliged to say that I did expect us to save employee cost but did not expect the automation to save 95 percent in employee costs yearly, so, this was proof that RPA and AI saved costs and improved the efficiency of the process in my organization.

One of the inspirations for my organization to implement Robotic Process Automation and Artificial Intelligence was cost savings and the improvement in efficiencies of operational processes. This was also consistent with the information from the literature I found that stated that cost savings were the reason organizations implemented RPA and AI (Syed et al., 2020, Santos, Pereira & Vasconcelos, 2020; Del Rowe, 2017; Pramod, 2021; Maalla, 2019; Anagnoste, 2018; Syed et al., 2020). Thus, my organization set out to implement RPA and AI with the goal of saving costs and to improve operational efficiencies too specifically, employee costs, which was met. I was aware of this goal which also made it a challenge for me wearing the dual hats of a researcher leading action research and an employee of the organization that had to meet set goals. To help me overcome the challenge, I focused on leading and managing my team diligently with the implementation to meet our goal and also diligently followed the empirical action research protocol and found that the dual roles also complemented themselves sometimes and I had to negotiate and navigated the two roles which provided me the opportunity to learn, develop intellectually and my skills as a scholar practitioner.

A couple of the participants also mentioned their concerns of the employees and jobs lost to automation. One of the participants also felt that the employees should have been informed earlier about their potential replacement by bots since they would then have time to look for new employment. As the leader of the RPA team and researcher, this was also a challenge for me, as some employees viewed me and my team negatively because they felt we were facilitating bots replacing employees. It was a challenge for me because the employee concerns were part of the reasons for resisting RPA and AI, and I had to work hard and use counter measures that include informing them about the benefits of RPA and AI, how it could benefit them to reduce the resistance or change their resistance to acceptance. My organization's HR team was in charge of informing employees that were no longer needed. However, I was aware that organizations like mine use

technology to find solutions to business problems and operations and are continuously looking for ways to improve the efficiencies of organizational information technology applications and software that support operations, which is essential for them to remain competitive, (Syed et al., 2020; Javed et al., 2021). The technology this time is intelligent Automation with bots that work faster and more efficiently than humans.

5.2.2 Faster processing time

The literature also revealed that faster processing time was another key determinant and measurement of RPA improving organizational processes because bots work faster than humans (Aguirre & Rodriguez, 2017; Kokina & Blanchette, 2019), enabling them to complete processes at a much faster time (Syed et al., 2020; Hallikainen et al., 2018). For example, the New York Mellon Bank increased processing handling time by 88 percent with the implementation of Robotic Process Automation, while bots worked cases in another Bank case study, 83 percent faster than humans (Wojciechowska-Filipek 2019). Automation is able to reduce task performance times by 90 percent (Nallicheri, 2018). Faster processing time was also a key factor that was identified by the participants in my research and implementation of RPA in my organization.

All the participants confirmed the faster processing time, which showed that the bots completed working the automated process within a day as opposed to 4 weeks when worked by employees, reducing the processing time by 95 percent. This was also consistent with what I found in the literature. However, the faster processing time seen here actually exceeds most of the processing time found in the literature, taken the example seen in the New York Mellon bank. In my discussion with the participants, they clarified their understanding that the faster processing time was vital and a catalyst to the success of the RPA implementation. It was also discussed that scalability was the critical enabler to faster processing time, given the 30000 daily cases that had to be worked. The criticality of faster processing time found in my research was also consistent with what I found in the literature.

The participants also mentioned the criticality of meeting Service Level Agreements (SLA). Due to the faster processing time of one day, the business now not only meets required SLA but exceeds it. Service Level Agreements are vital to meet, because if not met, it impacted customer accounts, account statement information, revenue generation and noncompliance to regulations to name a few points but the team struggled to achieve it and was operating without meeting SLAs so, this was another win for the implementation of RPA and the business. SLA and its impact was not mentioned

in the literature so this gap is one that should be filled in the literature given its importance in operational processes in banking.

The literature also stated that scalability was a form of cloning the bots or duplicating the bots (Taulli, 2020), allowed the flexibility of multiple bots to work a process when volumes are high and fluctuate, enabling the meeting of deadlines. (Lacity & Willcocks, 2016; Tornbohm & Dunie 2017, Gartner.com, 2019; Langmann & Turi, 2020; Casale, 2015). Scalability was also a key factor in my study that was also brought up and discussed by the participants and also aligned with what I found in the literature. This was brought up by a participant on the RPA team based on his expertise and experience with Intelligent Automation and the case study. Although, the other participants did not mention the word scalability, they understood the concept and mentioned the use of additional bots that help accomplish the goal. For the process in my study, individual bots worked faster than humans, but due to the daily batch high volume of 30000, multiple bots are used for process runs each day which leads to the completion of the bot within hours as opposed to four weeks.

As a researcher and the manager of the RPA team, I was knowledgeable about the importance of scalability being a function of RPA and planned to have multiple bots work the high volume and knew it was a critical part in ensuring the bots working the process can meet deadlines. As such, careful planning on my part was crucial which was consistent with what was found in the literature in which Taulli (2020) contends that scaling is the holy grail of RPA automation but can become difficult if not planned and managed well. Despite the agreement of the participants that scalability and multiple bots help achieve the improved processing times, they brought up two concerns.

A participant mentioned the concern of whether the bot could still maintain the new one-day processing time if daily batch volumes increased. This was a concern that was brought up by the participants in the focus group that led to further discussions. In heeding to Taulli's (2020) advice of thorough planning, I had already planned to have additional back up bots available should we see a spike in batch volumes, thus, this concern was already addressed. Planning carefully and ensuring one has additional back up bots is vital to ensure there are available bot resources to be deployed should there be an increase in volumes or if assigned bots become defective. Although the literature mentioned backup bots, more emphasis should have been made by the literature on its criticality when automating intricate process with very high volumes like mine, otherwise it could lead to failures in meeting set processing timelines. Therefore, this was a gap in the literature and the wider professional practice should be aware of this. However, the discussion with the participants led to a second concern regarding bot licensing.

Bot licensing was a valid concern as each bot and Virtual Desktop Infrastructure (VDI) requires a license from the software provider and each license comes with a cost. Therefore, the more bots we intend to use the higher the cost would be. This discussion was critical because it highlighted the importance of planning for and having sufficient bot licenses to ensure there are enough bots to meet demands. However, I had also planned for additional licenses with the additional bots. Despite my pre-planning, I became more aware of the criticality of bot licensing for process automation with RPA especially for processes with high volumes and critical timelines requirements for completion. The literature on Intelligent Automation also mentioned the issue with bot licensing cost as scalability improves the efficiency of bots but could be costly due to license requirements (Chappell, 2018; Taulli, 2020). The authors in the literature review shed critical light on licensing and scalability that I was able to implement in the implementation of RPA in my organization. However, only a couple of the literature mentioned the licensing issue regarding scalability. Furthermore, given the criticality of bot licensing, which could impede the efficiency of the bots and RPA, the authors could have elaborated more on the criticality of the limitations licensing issues can have and bring with it along with the consequences, which I believe could be a failure point and is therefore a risk.

5.2.3 Risk reduction

The literature provided information on Robotic Process Automation elimination risks which made the automated process more efficient. A major risk that was eliminated was the risk caused by human errors as they work the operational processes. When RPA bots are deployed to work processes, they can eliminate the human errors (Patri, 2020, Wright et al., 2017; Ghouse & Sipos, 2022; Radke, 2020; Asquith & Horseman, 2019; Casale, 2015; Kirchmer, 2017; Leno, 2018; Kedziora & Penttinen, 2020), because bots can work with accuracy Patri (2020), unlike humans. The case study also identified the elimination of human errors, which was also discussed by the participants and is consistent with the literature. The error elimination rate by RPA as discussed and provided by the participants and records was 100 percent.

The participants informed me that the human error rate before the RPA automation was 7 percent which was eliminated by 100 percent with the implementation of Robotic Process Automation and the bots working the process. This was also consistent with the literature where a bank eliminated errors by 100 percent (Langmann & Turi (2021). The elimination of the 7 percent error rate with RPA in my research use case was critical because 7 percent errors impacted 2100 accounts daily which was not acceptable by my organizational and bank standards. The participants also clarified that the 7 percent errors had to be found, reviewed and corrected by supervisor, which was a tedious task. As

such, the automation also eliminated the work of the supervisors correcting errors, who could now focus on their supervisory duties that added more value to their team.

I must, however, add that in order for bots to work accurately, they have to be coded correctly based on requirements. The requirements must also be without gaps and must be complete and upon building the bots, they must be rigorously tested in User Acceptance Testing (UAT) environment for accuracy and any defects, errors or issues must be satisfactorily fixed before deployment. The literature on RPA hardly mentioned the criticality of building the bots accurately and performing UAT to ensure they work without errors and eliminate the human errors. The configuration and coding of the bots and testing are part of the bot System Development Life Cycle (SDLC) and must be strictly adhered to for a successful automation deployment. This should be emphasized to RPA and AI teams and should be clarified in the literature. This in my opinion should also add and enhance existing knowledge on RPA and AI.

The findings also revealed that the team working the process was out of compliance and did not meet required compliance regulations with the 7 percent error rate but were now in compliance with the elimination of the human errors by Robotic process Automation. The resolution of the error rate with the automation was very important in helping the team meet overall goals.

The literature also found that RPA and AI helped organizations including banks to remain compliant to regulations by eliminating the risk caused by human errors (Casale, 2015). This also aligned with the findings of my study with the implementation of RPA in my organization and the participants elaborated on the new status of compliance due to the RPA automation. The elimination of risks by RPA was a major win and critical because banks are highly regulated in the United States (Costello et al., 2018) and can be fined steeply when they are not complaint (Rowe, 2021). Which was also mentioned in the literature as a benefit of RPA and AI. I believe that this benefit of RPA eliminating risks is very critical and should be highlighted as one of the major cost saving and efficiency benefits and risk and compliant teams in the banking industry should take advantage of RPA and AI as a cost efficient, effective and faster way to eliminate risks and be compliant with regulatory requirements. I have personally enhanced my intelligent automation evangelism with this and the implementation of RPA in my organization is proof of the efficiency of RPA in eliminating risks. Based on my learning and from the literature and my action research in my organization, I advocated to put a process in place for a review of all risk and compliance processes to identify areas we can implement Robotic Process Automation to eliminate risks and help my organization remain compliant of banking regulations. The reduction of risk by the bot also helped improve the quality of the process.

5.2.4 Improve quality and process optimization

Another benefit of robotic Process Automation identified in the literature was the improved quality of automated processes. The participants also agreed with the literature on this and shared their thoughts in the discussions. The literature mentioned several factors that led to the improved efficiency of processes that ultimately led to improved quality of processes including the elimination of risk caused by human errors due to the bots working processes accurately and faster processing time (Fernandez and Aman, 2018; Laxity & Wilcocks, 2016; Thekkethil et al., 2021). Likewise, the participants in this research study indicated that the elimination of risk caused by human error, faster processing time and meeting of SLA helped improved the quality of the process.

The participants revealed that the improvement of the quality of the process and they emphasized on the risk elimination due to bot accuracy and the 95 percent increase in processing time which they thought were main characteristic that led to the good success of the automation. Reflecting on the 87 percent decrease in employee cost due to the RPA implementation, faster process time along with bot accuracy, these were critical drivers in the $2.6 million savings, thus, it is critical to be mindful of these factors in the implementation of Robotic Process Automation to ensure success and avoid failures in RPA implementation, which the participants also agreed with. The participants also mentioned that the elimination of the risk caused by humans enabled the team to be compliant with specified banking regulations, which removed or dramatically reduced their chances of being fined by regulatory bodies, also increased the quality of the process. My organization spends millions of dollars in ensuring our bank is compliant with regulations, therefore, the elimination or reduction of risks with RPA and AI will help the bank to reduce compliance costs. Another factor that was identified as helping improve the quality of the process was the optimization of the process.

5.2.4.1 Optimizing the process

Another critical factor that improved the quality of the process mentioned by participants was the optimization of the process. Similarly, the literature revealed that optimization can be achieved by saving costs and improving the efficiency of the processes (Villar & Khan, 2021; Stravinskiene & Serafins, 2021) along with risk reduction and error elimination. The RPA implementation

optimizations mentioned in the literature were achieved in my study and RPA implementation, however, for my study, we achieve additional process optimization by identifying gaps in the process which the participants also mentioned and discusses but was however, not mentioned in the literature.

My RPA team performed a detailed end-to-end analysis of the process and gathered requirements. We found gaps in the analysis of the process, brought them to the attention of the process owners and coded the solution in the bot to fix the gaps in a collaborative effort with the process owners. This resulted in the identification of additional accounts to be called for collections and the elimination of accounts that would have been erroneously called for collections and led to a further increase in collection dollars. I find it critical to perform a detailed and thorough analysis of a process before the coding and configuration of the bot, to avoid an incomplete automation or a prolonged automation that will increase costs when issues are found after the completion of coding and implementation. This will ensure that possible gaps or process improvement opportunities can be found and identified early on and coded to the bot, thus optimizing the process and increasing the quality of the process and saving additional potential process and bot issues and the time and cost to resolve them in the future. This is a gap I found in the literature.

Furthermore, this could benefit the wider professional practice in the implementation of Intelligent Automation. For me as a scholar-practitioner, although I am knowledgeable in technology and Software Development Life Cycles (SDLC), I was able to use my knowledge and experience to lead my team in identifying the gaps in the process and fixing them. However, it was additional learning for me to be even more aware of the risk of missing existing gaps in process that will be automated and the advantage of performing thorough analysis provides a tool to find opportunities to improve and optimize operational process. My approach to automation is not to simply automate a process with bots replicating humans, but rather, to look at the problem wholistically to optimize the process and fill existing gaps or provide additional solutions to ensure that after the bots are implemented, the RPA and AI automation would have optimized the process to its utmost potential, leaving the business and process owners with a much better process performance and output than what they had prior to the automation. Automation with RPA and AI should also be an opportunity to find better solutions to the process. I believe that the above-mentioned points are knowledge that the professional practice and academic research can benefit from.

5.2.5 Improved team productivity and employee morale

The automation of the process with Robotic Process Automation resulted in a higher team productivity. The literature showed that when bots work tedious repetitive tasks in place of employees, the employees are able to focus on more human centric and cognitive tasks (Casale, 2015; Langmann & Turi 2021; Javed et al., 2021) which improves the employee morale and when morale is good, employees tend to more productive (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). My findings and the participants confirmed that this was the case with the automated process, which agrees with the literature.

The improvement in team productivity was another critical benefit of the RPA automation. All the participants were enthusiastic in their confirmation of this. The process owners team were exceeding collection goals with 87 percent lesser employees compared to pre-automation of the process. Although the literature showed that RPA improved productivity, the improvement in productivity exceeded expectations of the process owners. The participants clarified that not only was employee costs dramatically reduced, they were making more quality calls that resulted in collections. The key reason for the quality calls is that the bot accurately identified accounts that meet all the criteria to be called with a potential higher probability of collection expectations.

Furthermore, the bot excluded all calls that did not meet criteria or had a very low potential to be called. My findings showed that prior to the automation, about half of accounts that were being called that should not be or had a low probability of making collections on. The thorough pre automation analysis of the RPA team, the gaps found and findings during RPA testing contributed to the enhancement in criterion to identify accounts with a higher probability of making collections. The automation of the process was intricate and complicated, which required creativity and innovation on the developers part in building and testing the code for the gaps identified in the process by our analysis. The findings also showed that with improved quality of identified accounts to be called couple with the improved employee morale further improved team productivity. The improved morale was also facilitated by good quality accounts with a higher collection potential.

5.2.5.1 Employee morale

The participants provided information on the improved morale of the remaining employees. However, morale was initially low after the automation as employees were informed they would no longer be needed on the team. Likewise, the literature showed that morale can also be a negative impact of RPA implementation, as employees may view automation and Bots as their replacements and a threat to their jobs (Asatiani and Pentinnen, 2016). Fernandez and Aman, (2018). The participants expressed the disappointment of the employees that perceived they would no longer be needed but were also relieved to know that some were moved to other tasks and remained with the organization.

The findings also showed how the low team morale ultimately changed to a high morale with the remaining employees who were assured they would keep their positions. Morale also increased due to the higher quality of identified accounts to be called and increased incentive benefits for the remaining employees who were now achieving a higher team goal compared to pre-RPA automation times. As such, the morale increment was also as a result of the job satisfaction of the remainder employees, because the employees no longer had to do the monotonous and error prone task of identifying accounts to be called and having a low collection call rate. Similarly, the literature stated that when employees are no longer required to perform monotonous repetitive task with low judgement, job satisfaction and morale increase (Radke et al., 2020) and employee efficiency and productivity also rise (Javed et al., 2021) because they can perform more cognitive stimulating and rewarding tasks. The supervisors also had a better job satisfaction, as they no longer have to find and correct employee errors and could focus on more value add tasks.

Therefore, the conclusion was that because the employees made more calls, they were able to reach more delinquent customers, which increased collection dollars and payment arrangements. The automation of the process facilitated this increase. This study empirically showed that RPA improved the efficiency of the process and team productivity, which aligns with the literature review that the automation of monotonous task by RPA enables employees to become more creative and focus on decision making, thus, improving their morale and increase productivity (Kaya, Turkyilmaz, and Birol, 2019; Madakam, Holmukhe and Jaiswal, 2019; Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). The findings also showed that the improved productivity was also facilitated by bots and humans collaborating.

5.2.5.2 Collaboration between bots and humans

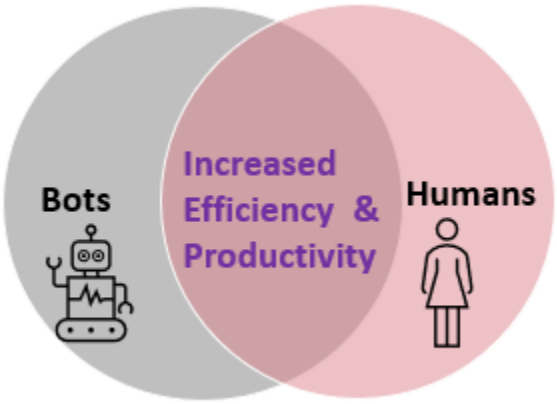

Figure 21 - Collaboration between bots and humans increases efficiency and productivity

The improved productivity was also achieved due to a work collaboration between the bots and the remaining employees. As stated above, the bots performed the task of identifying the high-quality accounts to be called with a high probability of collections and provided the output to the employees. while the employees used the bots output as their input and did the human centric task of calling the accounts, interacting with humans and making collections and payment arrangements. The participants shared their thoughts on this collaboration which was also critical in the success of the automation and improving the efficiency of the process.

Although automation of the process was the main focus, the bots were not going to make customer collection calls, so, employees were still required to make calls to the customers with the delinquent accounts, which led to an increment in collection dollars. The infusion of Artificial Intelligence to RPA enabled us to add some decision making to the automation. However, the bots are not equipped to make customer calls and convincingly request customers to make payments. As such, collaboration between bots and humans was also essential to the improvement in efficiencies and productivity of the process. It also aligns with the literature showing that the future of automation is bots and

humans collaborating and working together changing the way business is done to reduce costs and improve customers service and efficiencies, which aligns with (Casale, 2015; Siderska, 2020).

The implementation of RPA in my organization shows that the suggested future of automation with bots and humans collaborating mentioned in the literature is already occurring. I have also learned from this automation and added the collaboration of humans and bots to my pillar of automation. I believe this also allows one to seek opportunities to improve efficiencies by having humans and bots collaborate. Furthermore, I believe that if humans or employees understand that collaboration with bots can help them have a better job satisfaction, become more productive and efficient, there will be lesser resistance to the automation of RPA and AI and more acceptance of it. The improvement in process efficiency and productivity as a result of the collaboration of humans and automation bots as seen in the implementation of RPA in my research, is one that professionals in practice of automation and researchers should be aware of as its potential can be immense in helping banks and other organization in improving the efficacy of operational processes.

5.2.6 Improved customer satisfaction

The literature provided insights on the importance of customer service in banking and that banks have recognized the need for Robotic Process Automation in their front and back-end processes as it directly impacts the quality of customer relations and services they provide (Wojciechowska-Filipek 2019). The participants agreed and showed that the automation of the process with RPA helped them improve customer services, which further aligns with the literature that RPA improved customer service (Lacity et.al., 2015).

The implementation of RPA improved customer service in my organization and study because employees for focus on making calls and no longer had to perform the monotonous work of identifying accounts to be called, because the bots now do the work for them. As such, employees solely focus on making calls and improving their customer service skills. Employees were also focused and calling accounts that met criteria and had a high probability of getting collections. This also confirmed the findings in the literature that the implementation of Robotic Process Automation technology although primarily focuses on the automation of repetitive, monotonous manual tasks, frees up employees that perform these mundane tasks to focus on more value-add work that are more cognitively engaging and astute to human strengths (Anagnoste, 2018; Ellingrud, 2018; Hofmann and Urbach, 2019), such as customer service and experience (Casale, 2015, Jha et al., 2021; Casale, 2015). I must add that the high error rate that caused employees to call accounts that should

not be called, before the automation, also impacted their poor customer service rates, as the participants also agreed on.

As the researcher in my study and bank employee, I was aware that good customer services enabled us to remain competitive (Dilley, 2012). However, the findings in my study and discussions with the participants further emphasized the importance of customers service to me, and that although we are using RPA and AI technology to automate processes, one should be aware that we can facilitate good or better customer service with good automation (Lacity et al., 2015) and must be cognizant of this during the bot System Development Life Cycle. Furthermore, I agree with Ellingrud (2018) who considers it a risk if organizations focus overly on the cost savings that RPA provides and overlook opportunities on its ability to facilitate better customer service. This is a thought that practitioners in the industry should be aware of to enhance their automation abilities, as good customer service is indeed a benefit of RPA and determinant and measurement of improving efficiencies in operational processes when applicable.

5.3 Comparison to existing knowledge

The participant responses confirmed the determinants from the literature, which was revealed in the three iterations of the Participatory Action Research (PAR). However, the participants and my study also presented additional determinants and measurements that showed that the RPA implementation provided the findings and improved the efficiencies of the bank's work. In this section, I discuss the similarities and contrasts of the determinants and measurements in the literature and my findings.

5.3.1 The determinants and measurements

The savings of Full Time Effort cost was a dominant determinant and measurement of Robotic Process Automation improving efficiencies in organization processes in the literature. The literatures showed numerous examples of the FTE cost savings in the banking industries with several banks examples saving millions of dollars yearly as seen in Deutsche Bank with £39 million (Villar & Khan, 2021) and $40 million at a global Bank (Taulli, 2020). My organization's findings showed that implementation of RPA saved $6.2 million dollars in FTE costs, which aligns with the literature. The examples in the literature were for RPA automations for multiple processes while my case study was for one process complex process, which explains the difference in amounts. The literature also showed that FTE cost savings was the primary motivation of organizations to implement Robotic

Process Automation (Syed et al., 2020, Santos, Pereira & Vasconcelos, 2020; Del Rowe, 2017; Pramod, 2021; Maalla, 2019; Anagnoste, 2018; Syed et al., 2020). It was also confirmed that cost savings was also one of the primary reasons for implementing RPA and AI in my organization. Furthermore, both the literature and my findings show that FTE cost savings was a determinant and measurement that was a quantitative benefit of RPA that could be proven.

The participants however, showed that more care and concern should be shown to employees that will no longer be needed or lose their jobs, The literature did not mention care or concern for employees; it did however state that employees could learn new skills and take on better jobs (Ellingrud, 2018), which was also seen in my findings with some employees.

Faster processing time was another important determinant and measurement that was found in the literature and my findings with my research in my organization was consistent with the literature. As a key characteristic of RPA with Bots working faster than humans, the literature provided examples such as the New York Mellon bank that increased processing time by 88 percent, whilst the processing time saving in my organization was 96 percent. The literature also showed that scalability facilitated faster processing time and that faster processing time helped organizations meet Service Level Agreement (SLA) requirements deadlines (Casale, 2015; Lacity & Willcocks, 2016; Langmann & Turi, 2020 Tornbohm & Dunie 2017). My findings also confirmed this but provided more insight on the criticality of Service Level Agreements for the case study which was perilous due to the large daily 30000 delinquent account cases that had to be worked and how missing SLAs deadlines can be a risk, as such without scalability, the bot would not be able to work the cases in hours and meet Service Level Agreement requirement, which I thought was remarkable and insightful because the RPA automation solved the problem of the team not meeting SLA's in the past. Therefore, my study and the findings with the participants showed that SLAs and scalability are critical in the success of RPA automation to improve efficiencies and must be considered as early as the planning stage of the bot development Life cycle. Both the literature and findings from the study were aligned that faster processing time improved the efficiency of organizational processes.

Risk reduction was another important determinant and measurement that was found in the literature which my participants and findings also showed in my research. The literature showed that bots could eliminate the risk caused by human error at one hundred percent, which was confirmed in my action research and case study. However, given that risk elimination is critical in the financial industry and could make or break the success of automations, the literature could have provided more even more details on this and emphasized on its criticality in the automation of processes. In

my study, I found that the complete elimination of the human error risk was also pivotal to the success of the automation. The findings showed that as a result of the elimination of the risk, the business was now able to be compliant to banking regulations and make better quality calls which led to higher collections. So, there could have been more emphasis on the cruciality of risk elimination in the literature. Furthermore, I also find that since banks, like my employer spend millions of dollars on Risk teams and risk avoidance, RPA is a lower cost technology that can help identify and eliminate risk. The end-to-end analysis to identify gaps in my process was also vital in the elimination of risks.

Improved quality of processes was a determinant and measurement that both the literature and my participants and findings were aligned and consistent on. They both showed that due to the elimination of the risk caused by human errors, faster processing times and scalability, the quality of processes were improved by the implementation of RPA (Laxity & Wilcocks, 2016; Thekkethil et al., 2021). Another factor that both the literature and my findings identified was process optimization, which also helped improve the quality of the automated process.

While the literature showed that process optimization can be achieved by saving costs and improving the efficiency of the processes (Villar & Khan, 2021; Stravinskiene & Serafins, 2021) along with risk reduction, which my case study also confirmed. However, my study further showed that processes can be optimized by performing thorough gap and risk analysis of a processes in the early stage of the automation and bot System Development Life Cycle (SDLC). Because I did this, I found critical gaps that we corrected and enhanced my automation, which optimized the process and dramatically improved its quality which the participants also confirmed. The literature did not show the importance of gap and risk analysis for automations.

Improved team productivity was another benefit of automation with RPA. The literature showed that when bots work tedious repetitive tasks in place of employees, the employees are able to focus on cognitive tasks that speak to human strengths (Casale, 2015; Langmann & Turi 2021; Javed et al., 2021. Because employees can focus on cognitive tasks, this can improve morale which leads to improved productivity (Asquith & Horseman, 2019; Javed et al., 2021; Syed et al., 2020). Likewise, the findings in my study also confirmed this in the case study. The improved productivity was also facilitated by the fixing of the gaps I found in the analysis and the improved productivity showed how the implementation improved the efficiency of the process. Another benefit that both the literature and my findings and participants showed was that employees also had a better job satisfaction rate,

because they did not have to do monotonous work (Radke et al., 2020), increasing their efficiency and productivity (Javed et al., 2021).

Improved customer service was another benefit of Robotic Process Automation that the literature showed. The literature clarified the importance of customer services in banking as a necessity to remain competitive and differentiate themselves (Hawcroft, 2006; Arasali et al., 2005). My organization also emphasizes on customers services and is a leader in banking customer services in the United States, which aligns with the literature. The literature also demonstrated that the implementation of Robotic Process Automation improved customer service because Employees no longer needed to perform the manual and repetitive tasks that the bots now did and could focus on customer service while bots supported them with other tasks. My findings were consistent with the literature as well in the implementation of RPA in my organization. The employees in my organization could focus, improve and provide better customer service facilitated by the bots which showed a collaboration between the bots and employees.

The literature postulates that the future of RPA is humans and bots collaborating to reduce costs, risks improve customer service and efficiencies (Casale, 2015; Siderska, 2020). I agree with the literature which was proven by my research and implementation of RPA in my organization in which the bots and human collaboration was a critical factor in the success of the automation, in which the bots did the manual and intelligent work while employees focused on interacting with bank customers which improved the efficiency of the process and increased team productivity, which participants also confirmed. So, indeed I can say we are already living that future of Intelligent automation mentioned in the literature.

5.3.2 Determinants and measurements found in my organizational research but not in the literature

The findings in the implementation of Robotic Process Automation in my organization revealed determinants and measurements for process efficiency that were not considered in the literature that I find critical. This includes the efforts and cost of maintaining the bots, the limitation of the bots in accessing some applications and bot resources and the impact of existing applications on new ones.

5.3.2.1 Maintenance of the bots

Upon the completion of the automation of a process and its implementation, the bot has to run daily or as required as the new business protocol, so bot maintenance was required. Maintenance is the last phase of a bot system life cycle after implementation, which is an ongoing task to keep the bot(s) running, and for the process, maintenance was higher than the average automation. The process in my case study was intricate and required intelligent automation innovation and creativity to complete. The process also had a very high daily volume of 30000 that had to be ran and completed daily to meet Service Level Agreement (SLA), due the high volumes, we had to use scalability (clone bots) to work the process. Additionally, the process now only had 13 percent or 7 of the original employees left, so the team now depends on the bot to complete the process and make collections.

Furthermore, the process automation now saves the business $2.6 million yearly. Therefore, the process was of high importance and an RPA engineer monitors the bot runs daily and performs maintenance as necessary. As such, the time and effort spent by the RPA team to maintain the bot should be considered in the determination of the efficiencies of the process in its new state. If the RPA team fails to monitor and maintain the bot to run daily, it creates a risk for failure of the bot and the team to meet goals, which was also identified by participants from the RPA team Therefore, this is critical and should be considered when automating a process as it can impact the efficiency of the process. The maintenance phase of a bot can vary depending on the intricacy of a process and bot and the maintenance can impact the efficiency of the bots running and thus the automation. The higher the intricacy of the process or bot code the higher the maintenance levels, so maintenance is a critical part of the System Development Cycle that should be emphasized on for both practitioners understanding and research.

Figure 22 shows that the bot maintenance trajectory increases as the level of intricacy of a process increases. The more intricate a process is, the more Bot maintenance is required

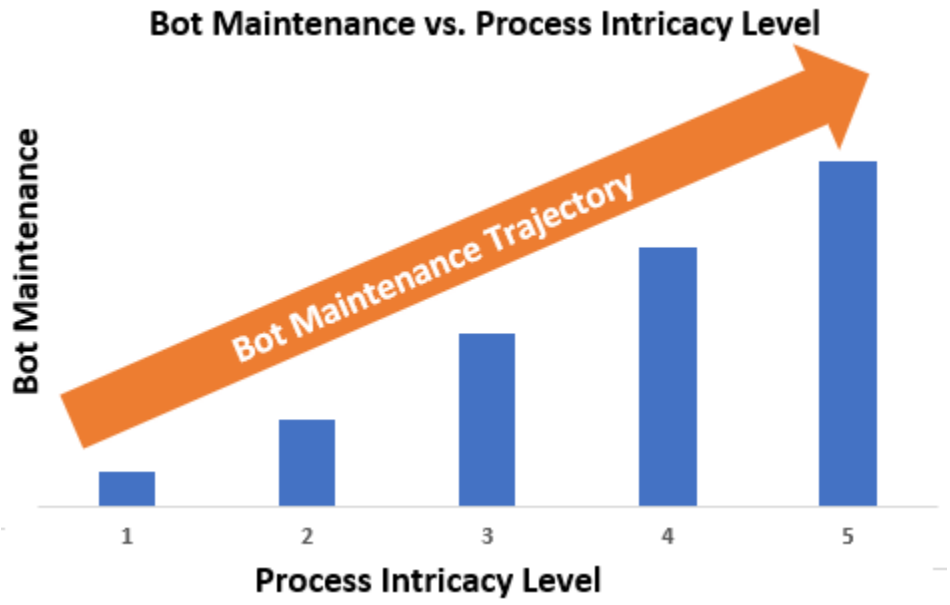

Figure 22 - Graph showing that when the process intricacy increases, the bot maintenance increases

5.3.2.2 Bot limitations in accessing some applications

Another important finding I made that was not mentioned in the literature is that although Robotic Process Automation bots do not interfere with the systems and applications they interacts with, the bots sometimes have challenges accessing or reading data from some applications or browser-based applications, which may require extensive trouble shooting and creativity to resolve and can stall and delay the automation and implementation of process. Beyond that, the applications get updated periodically, changing their look and navigation, which impacts the bots as well and can only be resolved by recoding the bots to understand the changes. The time and effort to resolve such issues can vary and can negatively impact the efficiency of the bot running on schedule.

5.3.2.3 Bot resources and impact of existing automations and new ones

A further determinant and measurement that could impact the efficiency of automated process is RPA bot resources that are available to be used for all automated process. RPA and intelligent automation teams have a fleet of bots or virtual works that are available and assigned to run processes, the more the number of automated processes increase the more the number of bots required to run them will increase. Should there be a shortage of bots or their unavailability to run, then some automated processes cannot run until bot resources become available, which creates a risk for automated process not running and meeting deadlines.

Furthermore, due to scalability, bots can be cloned, which can also mean that bots are set up to work multiple processes and if a process is using up a multipurpose bot or cloned bot, then others cannot be ran, so it is critical to have a concise and dynamic schedule to run processes when a team has automated multiple processes and as the number of automations grow. For my automation in the case study, this was a finding that we encountered and the participants also discussed it in our iterations. The volumes are very high (30000 daily) and the process requires a multitude of cloned bots for scalability to run the process and meet SLA's. We experienced a shortage in bot resources when the business unexpectedly had a fifteen percent increase in volumes of accounts that needed to be worked. Since my team had other automations that also ran daily, I had to delay other automations and use their bots as clones to help bridge the fifteen percent increase in volumes to meet deadlines, which delayed other less critical processes. Therefore, this was a lesson that I learnt to ensure that I have enough bot resources and a solid and concise schedule plan to run all our automations to avoid the risk of conflicts and failing. Also, there is an acquisition cost per bot and a delivery and set up time, so automation teams must plan for acquiring new bot resources ahead of time as automation numbers grow.

The risks after the implementation of RPA include, risks during the maintenance phase when there are failures to run the bot due to issues that may arise. Issues may include unexpected changes to the applications the bots to interact with. The more intricate a process, the higher the risk and cost of maintenance and technical issues impacting the bots. Dramatic increase in volumes that could mean using more bot resources as a result of scaling the bots may impede other processes from running is another risk. Other risks include bot licenses and their costs, the more processes that are automated the more bots and licensing that will be needed which can drive up costs, and when bots and licenses are insufficient, processes cannot be worked timely and SLAs cannot be met. Another critical risk is the ever-present threat of hacking and attempts to breach controls and access bank

sensitive data by unauthorized individuals, thus RPA controls must be thorough and meet required standards and best practices. There is also a risk when unanticipated dramatic increases in demands that not only impact bot resources, but also because there aren't enough employees anymore to work the automated processes.

The above-mentioned examples shows the criticality of been aware of the risks in RPA maintenance phase and having enough bots for a growing RPA team and automated processes along with a concise bot run schedule to ensure the bots can run automated operations processes efficiently. Otherwise, despite coding and building a bot successfully, if the risks are not planned for and mitigated and there aren't enough bot resources or virtual workers to meet demands, it will impact and impede the efficiency of automations.

5.4 Participant contribution

The participants' contributions were pivotal in my research and findings and I had no issues with access, connecting and communicating with them as they were all employees of my organization. I was very pleased with their cooperation and participation given that it was the first time we were implementing Robotic Process Automation for the process owner's department. I also had participants from diverse teams and professions which was very beneficial to the research. Overall, the participants agreed and confirmed the determinants and measurements from the literature that showed that Robotic Process Automation improved the business process efficiencies.

The participants agreed with all the determinants and findings in the literature and shared them in the discussions in the 3 iterations we had. I anticipated that my research would show most of the factors in the literature but was pleased to see that not only were all of them confirmed by the participants, but additional ones were also found. In the first iteration, I asked open ended question without revealing the determinants and findings from the literature to initiate the interview and enable and encourage the participants to provide answers freely without the influence of the literature. They provided responses that matched the literature in the first iteration but their answers were broadened and more detailed in the second and third iterations. I had however included the factors from my literature in the questions in my second and third interactions. Although they agreed with the literature findings, the participants emphasized on some factors than others.

The participants laid more emphasis on FTE savings, faster processing time and risk reduction and some participants provide more details and emphasis on these determinants than others, such as

the impact of the cost savings from employees reduction, the faster processing time that enables them to meet SLAs and the elimination of the risk caused by human error. I noticed that the process owners team, especially their manager, who were stakeholders in automation and spoke passionately, were very enthusiastic about the 87 percent or $2.6 million reduction in yearly employee cost. This did not surprise me as this was a critical achievement for the team which helped exceed goals and saves millions of dollars yearly. The participant enthusiasm was also seen in the faster processing time of 95 percent and the risk reduction that helped them to be compliant of regulations. This was also appropriate and not surprising as these were critical factors that helps the team meet goals and become compliant and also showed the improved efficiency of the process. The participants however, also had concerns regarding some of the determinants and measurements

Some concerns were also brought up by the participants, which were critical and shed light on critical areas that could impact the efficiency of the bot including, fair treatment of employees that are no longer needed, employee morale, the bot keeping up with processing time if case volumes increased, the risk if the bot failed, along with availability of bots in regard to other automated processes. These concerns were brought up during the second and third iterations as the participants become more aware, confident and comfortable to freely discuss and share their thoughts and opinions along with me asking the right questions. Another key factor I noticed with the participants and their contributions and the impacts of their contribution was the diversity of the participants.

5.4.1 Participant diversity and benefits

I also had a diverse group of participants with different professional backgrounds from different teams who were subject matter experts in different areas who had a preunderstanding of the process (Brannick & Coghlan, 2007), which was effective in identifying factors and issues that only experts that were native to the subject could identify, including the business team that owned the process, others assigned to support the automation from a business perspective such as project managers and Intelligent Automation subject matter experts and engineers from the RPA team. The participants from the business and process owners team understood the process, its history issues and expectations and discussed and provided more details on factors that improved the efficiency from a business perspective, such as FTE savings, error and risk elimination, faster processing time, improved process quality, employee morale and improved customer service. These participants identified concerns that could impact efficiencies, including, the risk of if the bots failed to work,

since they had dramatically reduced employee numbers and whether the bot could cope with increased volumes.

The participants that were RPA and intelligent Automation experts, highlighted in detail the technical benefits including factors that lead to faster processing time and error elimination along with scalability and process optimization. They also identified the concerns of having back up bots, bot licensing and acquisition along with new determinants such as increasing effort for bot maintenance and the criticality of thorough process analysis to identify gaps and find optimization opportunities. Having diverse participants with varied background and knowledge and expertise (Lawson, 2015) was a key facilitator in participant contribution, in identified determinants and benefits that was consistent with literature and finding new ones that add to existing knowledge. I must however add that I had to ensure that the managers did not undermine the non-managers and I encouraged the non-managers to be liberal in voicing their opinions. The participants not only confirmed the determinants and measurements of the implantation of RPA and how they improved business processes, but the participants also found new determinants and measurements that added to existing knowledge.

5.5 Action Research learning

My action research study was complex and intricate with challenges but also provided learning that improved me as a person, manager and researcher and scholar practitioner. Having the dual role of being the manager of the RPA team and the lead researcher that facilitated the study and Participatory Action Research meant that I had to wear multiple hats, was challenging and was a process that provided me with learning opportunities. Being native to the organization and subject of study was advantageous to me and the participants but was rich in learning experience for me as the study progressed along with the Participatory Action Research iteration cycles.

The role duality of being the RPA team senior manager and lead researcher was a challenge and difficulty (Holian, 1999 cited in Coghlan, 2001; Brannick & Coghlan, 2007) I had to contend with, especially in the first half of the study. I however grew in the role having learnt from my experience and challenges. For example, I was the Senior manager of the RPA team that was tasked to implement RPA in my organization, which meant that I had organizational goals to achieve, including implementing RPA and wanted to be successful with it. On the other hand, I was the researcher performing action research, so I was sometimes conflicted, because my research had to follow the

researcher protocol, I however had to ensure and reminded myself constantly to not allow my bias as a manager that wanted the success of RPA to negatively influence my role as the lead researcher. Furthermore, being native to the subject and area of research and the senior manager of the RPA team with expertise over the participants, I had the advantage of being close to the facts and knowledgeable (Brannick & Coghlan, 2007) so, I had to ensure that my preunderstanding and bias did not negatively impact my decisions and the participants as I worked with and collaborated with them and not steer the participants towards my desired research outcome (Brannick and Coghlan, 2007) but let the research show the outcome. So, I had to ensure that I did not let my assumptions and commitment bias negatively influence the research and its findings (Creswell, 2007) and to constantly reflect and remind myself to not allow my bias influence the research (LeBaron, 2010). I also learnt to be aware of my bias during the PAR iteration cycles.

The Participatory Action Research (PAR) involved the PAR iteration cycle that was vital and a learning experience for me in my research. PAR is a reflective practice that allows researchers to take action and incorporate new findings and understandings to the current process instantly leading to a higher degree of creativity and solutions (Bell et al., 2004). I learnt the importance of not only the PAR iteration cycle but the importance of the reflective section. Regardless of the results I learnt the importance of reflecting on the actions taking regardless of the number of iterations. For example, one may stop PAR interactions after believing desires results have been found. In my study, I found that further reflection unveiled new opportunities to improve the results. Therefore, as a researcher performing the PAR interaction cycle the reflection step is essential and must be exhausted. I also learnt that my practice of critical reflection overall during my action research on my actions enabled me to reframe my interpretations of the compound issues improved my understanding and learning (Hatton & Smith 1995 cited in Rigg & Trehan, 2008) along with my personal growth (Moon, 2000 cited in Rigg & Trehan, 2008). In the implementation of RPA for my case study in my organization, my RPA team found gaps in the process that were not known to the process owners, the exhaustion of the iteration cycle, specifically the reflection on results and my critical reflection helped me find gaps and optimization opportunities that help further increase the efficiency of the process, although it increased the scope of the automation.

I also learned that the automation of the process and research increased in scope and complexity as we proceeded and as issues and knowledge emerged (Greenwood and White). The scope increased due to the gaps we found. Resolving the gaps involved further analysis and enhancements to bot requirements and their ultimate coding. So, I understood that the scope of an automation can increase depending on the complexity of the process. Furthermore, as the research proceeded, I

realized my development and change in thoughts and approach as my skills and understanding as a researcher improved and I seem to remain in the researcher mode and viewing things from a researcher perspective which has influenced my decision making and the awareness that I am a scholar practitioner or researcher in the professional world. I am glad to say that I have increased my professional competence with the action research and that my study solved the practical problem in my organization and improved learning and understanding (Zuber-Skerritt & Perry, 2002).

Chapter 6. Conclusions

6.1 Introduction

I pursued this research with the aim of establishing whether the implementation of Robotic Process Automation and the infusion of Artificial Intelligence improves the efficiencies of organizational processes. As a result of the qualitative insider action research I performed, along with the contribution of participants, I found that that Robotic Process Automation improved the efficiencies in my organizations processes. The results confirmed that numerous determinants and measurements showed that RPA improved the efficiency of the automated process in the case study. In this section, I discuss how my research question was addressed by the research method, the impact of my research and doctoral student experience on my organization's along with my professional practice and my suggestions for further research.

6.2 Research approach and effectiveness

A main objective that helped achieve my research aim and question was the Participatory Action Research (PAR) approach. Understanding that I was performing insider Action Research (AR) in my organization, an effective way of finding the impact of RPA on the efficiency of processes was to research specific cases of automations with RPA and AI. As such, a case study approach was appropriate and used. I decided that a case study approach will help produce the desired level of insight practice and thoroughness to help answer my research question. I chose a complex process for the case study which I'd say in reflection was very challenging but was suitable for the research question. Also, I was going to have stakeholders that were native to the subject and case study and participate in the inquiry (Brannick & Coghlan, 2007). As I was going to have others participate in the research, I felt PAR was the best approach, which was also in alignment with the DBA program at the University of Liverpool. In Participatory Action Research, the researcher and participants, such as stakeholders in the subject of study, collaborate in the research and reflect on it for a better understanding and enhancement of the issue or subject and take actions to enable change (Baum et al., 2006). Furthermore, PAR allowed me as the lead researcher to collaborate with my organizational colleagues to study and change the organization (Greenwood et al., 1993).

To improve the effectiveness of the PAR, I had a diverse group of participants with different professional backgrounds from different teams of stakeholders who were subject matter experts in their specific areas. For example, I had participants from the business team that owned the process and participants from the RPA and AI team along with a mix of managers and non-managerial professionals, which was very effective in identifying the determinants and measurements along with concerns and issues that only experts that were native to the subject could identify. However, I had to manage and ensure that all the participants could voice their opinions freely regardless of their positions as managers or non-managers. Having diverse participants with varied backgrounds and knowledge and expertise (Lawson, 2015) was a key facilitator in participant contribution in identifying determinants and measurements that was consistent with literature and finding new ones that added to existing knowledge.

In PAR, individuals impacted by the problem participate in the planning, conducting, evaluating and applying the result. Due to their nativity to the issue, participants can recognize and suggest applicable and likely better solutions than outsiders (Bell et al., 2004). However, as the research leader and facilitator, I decided that it was more effective for me to assume the planning, observation and reflection in the PAR iterations, while the participants along with me took the actions. Given the participants' limited time to participate and research and literature knowledge, it was more effective for them to focus on actions. However, the participants were limitedly involved

in some of the reflections with my guidance when it was appliable especially in areas where they were subject matter experts. Reflecting in this approach, I find that it was the appropriate choice for my research. Overall, this approach led to solutions, such as finding the gaps in the process and new opportunities that further optimized the process and increased collection dollars, along with the creation new knowledge.

The objective of Participatory Actions Research is to advise practice and add to existing knowledge on research (Fletcher et al., 2015). Therefore, my expectations of the PAR were that the business process owners and developers will collaborate with me and take necessary action to help determine how RPA may have improved the efficiency of the process, create new and add to existing knowledge. I also anticipated that the research would confirm some of the determinants and measurements that I found in the literature, such as faster processing time and the elimination of the risk caused by human errors and the reduction of FTEs/employee costs.

It was revealing to me to see that not only did the results of the PAR and study meet my expectations, but it also exceeded my expectations as all the determinants and measurements found in the literature that showed that RPA improved the efficiencies of organizational processes were confirmed in the study. Confirmed determinants and measurements from the literature include FTE(Full Time Effort)/employee cost reduction, faster processing time, risk and error reduction, improved quality of the process, improved team productivity, improved employee morale and improved customer service. My study also found additional determinants and measurements that were not in the literature which adds to existing knowledge including bot maintenance impacts and costs, bot availability, licenses and fixes, and bot limitations that can impact the efficiency of automated processes. Therefore, my research approach and objective were effective in helping me achieving the aim of my research. It also influenced my professional and organizational practice.

6.3 Professional practice

My experience as a DBA student and performing Action Research in my organization changed my professional practice. My transformation and learning were ongoing throughout the entire research (Greenwood et al.,1993) and my mindset is now one of a researcher in my problem-solving approach and I had improved in many areas.

One area that I have improved in and much alert to and aware of is the influence of bias. We have biases we are aware of and biases we are not aware of and I had to constantly remind myself of

them (LeBaron, 2010). Working with the participants, I had to be cautious to prevent my personal biases from influencing their thoughts and decisions towards my desired outcome. For example, being native to the RPA environment and the senior manager and subject matter expert, I had the advantage of being close to the facts (Brannick & Coghlan, 2007) and had access to stakeholders. I had to be cautious to avoid my bias and preunderstanding negatively impact my decision making and research, and feeling overconfident (Björkman & Sundgren, 2005). I was committed and entrusted with both the success of the automations as well as the success of my research and had assumptions and expectations, therefore I had to be keenly aware of it and ensured I did not let my assumptions and commitment bias negatively influence the research and its findings (Creswell, 2007). Furthermore, as a scholar practitioner with the dual role of being the senior manager of the RPA automation team and the lead researcher, my dual role sometimes had conflicts. Hence, I had to be cautious not to allow my dual roles as an inside action researcher and manager influence me to being biased and making decisions that favored me and my team (Brannick and Coghlan, 2007).

Another area of my improvement in practice is the Participatory Action Research (PAR) iteration cycle. Specifically, the reflection stage. The PAR reflective iteration cycle of includes the planning, taking action, observation of action taken and then reflection on the actions taken (Baum et al., 2006; Walter, 1993 & Brannick, 2014) until the best possible results or solutions were found. When I initially started performing the PAR iterative cycle, although I went through the cycles, I was stopping too early after a few iterations, believing I had found the results or outcomes and reflected sufficiently. However, on a few occasions, upon further reflection in the iteration and revisiting my last actions and reflecting on them again, new information and knowledge was found. Ensuring that I had exhausted the iterations specifically the reflections was an eye opener for me, as we found gaps and new solutions that further optimized the process. As such, I have a better understanding of PAR and thoroughly observing actions and reflecting on them critically before making conclusions.

6.4 Organizational practice

The execution of participatory Action Research (PAR) in my study in my organizations as well as the experience of being a DBA student was a learning experience that both had impacts on my organization's practice. The impacts also had implications on my organization as the study revealed with the implementation of RPA.

6.4.1 The application of Participatory Action Research

My choice of using the Participatory Action Research approach provided me an important experience with a lot of learning. Reflecting on my PAR, I understand that although I harnessed the advantages of a PAR, there were areas that should be emphasized and can be improved on.

I proactively selected a diverse group of participants with various expertise and positions such as managers and non-managers. The diversity was crucial in success of the study and its findings. However, I had to ensure all the participants could speak freely and share their opinion to avoid the managers and leaders dominating thoughts and discussions and undermining the non-managers. Likewise, I had to encourage the non-managers to voice their opinions without concern this help me to establish democracy in the PAR. In retrospect, I would plan and manage the overseeing of the diverse participants better and prepare the managers and leaders better to make the process easier for all participants to share their thoughts and be heard.

Although I was the lead researcher and trained and prepared participants for the study, the participants did not have enough time or understanding of the literature, especially given the volume of information found. For future studies I would further simplify information from the literature that would be shared with them. During the iterations for interviews with the participants to collect data, I did not share the determinants and measurements from the literature that showed that RPA improved efficiencies in the first iteration for fear I might impact their responses. Reflecting on this, there might be situations in which infusing the literature findings in the first interaction could benefit the study and improve participants responses in subsequent iterations, which could provide additional findings.

6.4.2 Implications for my organization

Despite the experience, knowledge and success I gained from my lengthy study, it was nevertheless my first PAR implementation. As such, I would perform better in future PAR implementations in my organization. The study positively answered my research question showing that RPA improved the efficiency of the process. Although my organization tasked me with the implementation of RPA and AI and had the expectation for it to succeed, my action research was a catalyst in answering the research question and the study had implications for my organization.

My organization tasked me to create a new team and implement Robotic Process Automation in its Cards business unit for the first time and as a DBA student, I was able to also perform research with a case study using the DBA process and PAR. This was a learning experience and journey for me and by the conclusion of the study, I had acquired research and DBA knowledge that benefitted my

organization in terms of the RPA implementation. Although I was able to train and work with participants during the study they do not have my research expertise. Therefore, in my absence, the organization wouldn't have employees that could do the same. However, with my acquired knowledge and as the senior manager of the RPA and AI team, I have created an RPA and AI implementation culture a lot of which is now documented in procedures that have enhanced our bot System Development Life Cycle (SDLC) that impacts current automations and will impact future automations. The impact includes how the team implements new RPA automations.

The major implication for my organization is that the study concluded that the implementation of RPA and AI improved the efficiencies of organizational processes. The determinants and measurements that were found that showed this and benefits the organization as a business include;

- FTE employee cost savings. The process saves the organization $2.6 million dollars yearly so, the organization can continue automation of operational process to save cost
- Faster process time of processes which improves Service Level Agreements (SLA)
- Human error risk reduction that helps the organization to be compliant with regulations
- Improved process quality
- improved team productivity.
- Improved customer service. Because employees can focus on customer service
- Bot maintenance awareness and licensing
- Bot availability, fixes and limitations

The document from my employer and organization from my director in section 8.5 of the appendices also show several benefits from the automation, including the $2.6 million cos savings, faster processing time and increased collections.

Although the implementation of RPA helped the team reduce 87 percent of employees, the study also showed that there was a concern on how to manage employees that were no longer needed since bots were now doing the work of the employees. The organization may have to enhance its HR process in dealing with people in such situations.

Since the organization is a highly regulated bank and the study concluded that RPA eliminated risks and helped achieve compliance to regulations, the organizations has to review all its operational

processes that has similar risk and change its way of operation by implementing RPA. Therefore, the change that the organization started with the implementation of RPA and AI has to be rolled out to the entire organization. This is a major change in strategy which must be planned carefully which also means a change in culture in the organization.

The study also showed that the improvement in efficiencies and the cost savings of $2.6 million yearly was amplified by the collaboration of bots and humans. The collaboration of humans and bots is the future of automation (Casale, 2015; Siderska, 2020) and will change the way my organizations does business and operates along with a change enabled by information technology (Brannick & Coghlan, 2007). This is also another key implication and change for the organization and its culture going forward.

In conclusion, these are major implications of the study for my organization that will change the way we do business. Indeed, due to the findings, my organization has increased its efforts with the automation of business processes organization wide.

6.5 Suggestions for future research

The research in my thesis was performed to determine if the implementation of RPA and AI improved the efficiency of organizational processes as I was implementing RPA and AI in my organization. The research found determinants and measurements that showed that RPA and AI improved process efficiencies in in the literature as well as in the Participatory Action Research. However, I found gaps and additional determinants and measurements as seen in section 5.3 (comparison to existing knowledge) that I'd recommend for further research for a clearer understanding of their insinuations. Below are new findings from my research that may be researched further.

I suggest that further research should be done on the impacts of the maintenance of bots that run an automated process on process efficiencies. Upon the completion of automation and implementation of a process, the bots that run a process require maintenance and monitoring for the process to run as scheduled. If the bots are unable to run, this creates a risk for the process and tasks not to be completed, which can result in the missing of deadlines. So even though the automation was successful, if the bots are not able to run, it will impact the efficiency of the process and could mean a failure. This problem and cost of maintenance can be exacerbated if the process is complex; in my case study, I found that the more complex a process and automation is the higher the time, effort and cost of maintenance will be, which impacts the efficiency of the process. Furthermore, since bots

replaced the employees, should the bot fail to run or become defective, there would not be enough humans to work the process, which is another risk.

Another area that should be further researched is bot resources and impact on new automations and existing ones. RPA and AI teams have a fleet of bots that they acquire and use for automations and planed automations. Whenever a new automation is planned or completed, bots from existing bot fleets are used. Although cloning allows for multiple bots to run a process or multiple process, if there are not enough bots resources, the new automation will impact existing bots and resources as the bots will not be able to run all the automated processes. Thus, creating a risk, which impacts the efficiency of both new and existing process automations. Therefore, the precise planning, scheduling and acquisition of enough bot resources is critical to the success of automated processes and automation teams.

A third area that I recommend further research on is the analysis of process that have been identified for automation. Although it is standard procedure for process to be analyzed before their automation, if not done thoroughly, there may be gaps that can impact the automation after implementation and impact the efficiency of the process or become a failed automation. Furthermore, a complete and thorough analysis should be done, not only to find gaps but to also find improvement opportunities for optimization of the process. In my case study, we found gaps in the process due to further analysis and also found new improvement opportunities that further optimized the process and helped save additional costs, facilitated the increase in collection revenues and helped improve customer service and experience. Therefore, further research would benefit the professional practice in the implementation of RPA.

6.6 Final reflections

My research question; has the implementation of RPA and AI improved efficiencies in the business processes in my organization? was addressed in my thesis which highlighted the determinants and measurements that impacted organizational process both in the literation and my organizational action research. The qualitative research and case study concluded that the implementation of Robotic Process and Artificial Intelligent improved the efficiency of my organizational process. The findings confirmed the determinants and measurements that showed the improvement in process efficiency that was found in the literature but the Participatory Action Research also found additional determinants and measurements that added to existing knowledge and also provided recommendations for additional research. The research also added to my organizational learning and

brought a change enabled by information technology (Brannick & Coghlan, 2007), specifically RPA and AI to its business process operations and culture, as bots and humans now collaborate to save costs and improve efficiencies (Casale, 2015; Siderska, 2020). Nevertheless, the Participatory Action Research approach was key in the research and findings.

The Participatory Action Research method was chosen and appropriate for the research as the findings revealed. The research and case study was complex and the chosen participants were diverse in background and knowledge and were native to the subject of study which was critical in identifying the determinants and measurements along with issues and concerns. My collaboration with the participants led to a learning environment and a communal, intellectual and emotional change along with the creation of new knowledge and understanding (Greenwood & Levin, 2007; Coghlan & Brannick, 2014; McLaughlin & Thorpe 1993). We had a communal learning as new findings were made by individuals and also as a group, which was then shared with everyone and in some cases with the wider organizational audience. An example was the confirmation of the faster processing time of the bots, risk elimination and $2.6 million dollar cost savings which far exceeded expectations of the process owners. The experience in the research with the participants was also rich in learning for me and changed my mindset as I now apply the knowledge acquired and research skills regularly in my professional practice, and will use my acquired knowledge in subsequent Participatory Action Research going forward.

Over the course of the study, I grew to appreciate the PAR and the participants more who made themselves available for the research and data collection. My gratitude also goes to my organization and co-workers that indirectly contributed to my research and learning in the organization. I am thankful for been able to complete my qualitative PAR research that answered my research question and confirmed that the implementation of Robotic Process Automation and the infusion of Artificial Intelligence improved the efficiency of organizational processes.

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Chapter 8. Appendices

8.1 Abbreviations and Acronyms

AI	Artificial Intelligence
AR	Action Research
CFPB	Consumer Financial Protection Agency
CPA	Certified Public Accountant
CRM	Customer Relationship Management
CRPA	Cognitive Robotic Process Automation
DMS	Data Management System
ERP	Enterprise Resource Planning
FMS	Fraud Management Systems
IA	Intelligent Automation
IT	Information Technology
ML	Machine Learning
OCR	Optical Character Recognition
PAR	Participatory Action Research
RPA	Robotic Process Automation
ROI	Return on Investment
SLA	Service Level Agreement
SDLC	System Development Life Cycle
TQMS	Task Queue Management Systems
VDI	Virtual Desktop Infrastructure

8.2 Participant documents

8.2.1 Participant information sheet

Title of the research: The implementation of Robotic Process Automation (RPA) technology and its impact on efficiencies of organizational business processes.

Version # and Date: Version # 1. March 1, 2020

Invitation section

I hereby invite you to participate in my Doctoral research study which is separate from my role at A major Bank in the U.S.. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask me if you would like more information or if there is anything that you may not understand. I would like to clarify that your participation is voluntary, and you do not have to accept this invitation. You are also not required to waive your legal rights.

Thank you.

1. **What is the purpose of the study?**

   In Robotic Process Automation (RPA) and AI, Robots perform human tasks that involve working with digital systems, diverse computer applications and systems at a lower cost and faster rate while eliminating the risk of human error and improving efficiency amongst others. The purpose of my thesis research is to determine whether the implementation of RPA and AI in my organization improved efficiencies in our business processes. A qualitative methodology will be used in which two RPA automated business process use cases will be investigated with the involvement of collaborators, such as you, that are native to the processes. Data will be collected from the two cases and analyzed to determine the efficiency of the business processes post-RPA implementation, which would determine if RPA improved efficiencies when compared to the pre-RPA state.

2. **Why have you been chosen to take part?**

   You have been chosen to participate in this research because you have been an integral part, either from a business and process owner perspective or from a technology perspective in the Bot development life cycle of at least one of the processes that will be researched. Furthermore, you have been native to the processes and knowledgeable of the processes and their automation

3. **Do I have to take part?**

   Your participation in this study is voluntary and you may withdraw your participation at will without any disadvantages to you.

4. **What will happen if I take part?**

   You will participate in three interviews (up to 1.5 hours each) in which I will interview you and you will be required to provide your honest perspective and perception of the pre-automation stage, the different stages during the Bot development life cycle and post-implementation of the automation. You will also be asked to gather and provide relevant data from the automated processes.

   I will be the primary researcher of this study, will use a qualitative research methodology, and carry out the procedures.

   The other participants will also be subject matter experts like yourself that are native to the processes being researched.

   The research is expected to last a year, potentially until December 31, 2020 and beyond that, during which time I will engage you periodically. The research will not involve any visual or audio recordings.

5. **How will my data be used?**

   The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of advancing education, learning and research for the public benefit. Your personal information will be excluded in the final version that will be provided to the University of Liverpool.

Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. The Principal Investigator acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to Timi Ngoboh (Timingoboh@a major Bank in the U.S.).

Further information on how your data will be used can be found in the table below.

How will my data be collected?	Via emails and interview/surveys that may be conducted over the phone
How will my data be stored?	Your data will be stored by me as part of the research on my secure computer data drive
How long will my data be stored for?	Until the research is concluded it is fully anonymized and then deposited in the Archive of the University of Liverpool
What measures are in place to protect the security and confidentiality of my data?	The privacy rules of A major Bank in the U.S. and the University of Liverpool will be followed to ensure your privacy is protected
Will my data be anonymised?	Upon the conclusion of the research and before the final submission personal identification data it will be anonymized
How will my data be used?	Your data will be used for the purpose of the research and presentation to the University of Liverpool and education
Who will have access to my data?	Timi Ngoboh and the University of Liverpool
Will my data be archived for use in other research projects in the future?	Your data is primarily for my current research and may be used for educational purposes by the University of Liverpool
How will my data be destroyed?	All soft copies will be deleted while all hard copies will be destroyed via the use of a shredder and disposed safely

Transferring data outside the EU

All transfer of research data will be accomplished via the secure email service of the University of Liverpool. Specifically, between me in the United States and the University of Liverpool in the U.K.

6. **Expenses and / or payments**

   Expenses will not be incurred by participants during this research nor will there be any payments.

7. **Are there any risks in taking part?**

   There are no risks involved in the participation of this research and study

8. **Are there any benefits in taking part?**

   The benefits of this study will be the organization of A major Bank in the U.S. as the results of the research will determine whether the implementation of RPA and AI improved efficiencies or not.

9. **What will happen to the results of the study?**

   The results of the study will be made available to the University of Liverpool and the participants via email and personal meetings. The results/findings may be made available to my leadership at A major Bank in the U.S..

10. **What will happen if I want to stop taking part?**

    Participants can withdraw their participation in the study at any time.

    Results up to the period of withdrawal may be used, if participants are happy for this to be done. Otherwise, participants may request that the results are destroyed, and no further use is made of them. If results are anonymised you should make clear that results may only be withdrawn prior to anonymisation.

    If you wish to withdraw your participation, you can simple send me an email at your convenience at my email address (timingoboh@a major Bank in the U.S.).

11. **What if I am unhappy or if there is a problem?**

    If you are unhappy, or if there is a problem, please feel free to let me know by contacting **Timi Ngoboh. Phone: 111 111 1111, email (Timingoboh@a major Bank in the U.S.)** and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Office at ethics@liv.ac.uk. When contacting the Research Ethics and Integrity Office, please provide details of the name or description of the

study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113.

12. Who can I contact if I have further questions?

Please contact Timi Ngoboh at 111 111 1111or timingoboh@a major Bank in the U.S.**.**

8.2.2 Participant informed consent form

Title of the research: The implementation of Robotic Process Automation (RPA) technology and its impact on efficiencies of organizational business processes

Version number & date: Version Number 1, March 1, 2020

Name of researcher: Timi Ngoboh

Please initial box

I confirm that I have read and understood the information sheet dated March 1, 2020 for the above study, or it has been read to me. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
I understand that taking part in the study involves observations, interviews and surveys via email or in person.	☐
I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. In addition, I understand that I am free to decline to answer any question or questions.	☐
I understand that I can ask for access to the information I provide at any time. Results up to the period of withdrawal may be used.	☐
I understand that the information I provide will be held securely and in line with data protection requirements at the University of Liverpool and A major Bank in the U.S. until it is fully anonymized and then deposited in the Archive for sharing and use by other authorised researchers to support other research in the future.	☐
I understand that signed consent forms and questionnaires will be retained in my personal archives and that of the University of Liverpool until further notice.	☐
I agree to take part in the above study.	☐

Participant name	Date	Signature
_____	_____	_____

Name of person taking consent Date Signature

8.3 Ethical approval award letter

Dear Timi Ngoboh,

I am pleased to inform you that the DBA Ethics Committee has approved your application for ethical approval for your study. Details and conditions of the approval can be found below:

Committee Name: DBA Ethics Committee

Title of Study:
The implementation of Robotic Process Automation (RPA) technology and its impact on efficiencies of organizational business processes.

Student Investigator: Timi Ngoboh
School/Institute: School of Management Approval
Date: 24 September 2020

The application was APPROVED subject to the following conditions:

1. The researchers must obtain ethical approval from a local research ethics committee if this is an international study
2. University of Liverpool approval is subject to compliance with all relevant national legislative requirements if this this is an international study.
3. All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Integrity and Governance Officer (ethics@liv.ac.uk)
4. If it is proposed to make an amendment to the research, you should notify the Committee of the amendment.

This approval applies to the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Committee should be notified.

Best Regards,

Andrea Gorra

Dr. Andrea Gorra

DBA Ethics Committee University of Liverpool On-line Programmes

8.4 Participatory Action Research Iteration questions

8.4.1 First iteration questions

1. What does the automation of the Outbound Futures Dialing process via Robotic Process Automation mean to you and the Team in general?
2. What would you say are the key objectives or what are the critical factors that must be met in order for the RPA automation to be considered successful?
3. How will the automation of the process impact Risks and Compliance given that it's a highly regulated process?
4. What opportunities do you think are there with the automation of the process that could or should be harnessed?
5. What challenges or obstacles do you see or anticipate with the automation of the process?
6. How will the automation impact the employees that work the process from your perspective?
7. Are there other concerns or considerations regarding the automation of the process that should be addressed?

8.4.2 Second iteration questions

1. When we were in the early analysis phase of the RPA automation project it was clarified that employee reduction was expected because the bot would do most of the work reviewing the accounts. How has the automation impacted the expected reduction in FTEs in your point of view?
2. The process had a large increasing backlog that employees could not complete, so faster processing time was one of the goals of the RPA and AI automation. The RPA bots also works the processes faster than humans as the literature review also found. In regards to that, how has the RPA processing time affected the process?
3. Due to the process falling within regulatory rules, the risk that was caused by the employee errors was a concern. Please share your observations and thoughts on how the elimination of the risk has impacted the process and the team overall

4. Another key factor for the process team was productivity, which aligns with the performance goals for the employees and the team as a whole. Could you tell me how you believe the RPA automation has impacted the team productivity?
5. The Outbound Futures Dialing process account review procedure was intricate and broad and was challenging even for the Agents to determine the account that should be called from those that shouldn't. What are your thoughts on how the implementation and this challenge?
6. Due to the large backlog and the time it took to work the accounts you had 55 employees. The RPA automation however, help you achieve the goal of reducing the Agent count to 7. We understand that there was resistance by the employees with the RPA automation. what are your thoughts on this?
7. There were some questions and concerns regarding the RPA bots and what would happen if they failed or broke and could not work the process, which will jeopardize SLA and create a risk. Were the concerns addressed and what are your thoughts on this?
8. Prior to the RPA automation of the process, along with the 4 week processing time per batch and employee errors, the RPA analysis found gaps on accounts that the business was not aware of including accounts that should or should not be called and account call to be placed on hold. These gaps were then fixed in the RPA automation. What are your thoughts on the optimization and quality of the automated process in this regard?
9. The RPA automation is a change to the normal way of doing business for the employees. The literature review found that RPA automation can impact the morale of employees that used to work the automated process. Could you tell me how this automation may have impacted employee Morale?
10. In the current state of the process with the RPA automation, the tasks have been divided with bots doing the major and monotonous task of account reviews and decisions on accounts to be called, while the Agents now focus on making collection calls. The literature review found that such collaborations between bots and humans is the future and will further increase the efficiency of processes. I would like to know what you thoughts are on this in reference to this process?

8.4.3 Third iteration questions

1. All the participants were in agreement that the RPA automation of the OFD process reduced FTE by 87% from 55 to 7 which saved 2.6 million dollar yearly. This matches what was found in the literature review regarding RPA enabling cost and FTE reduction. I'd like to know your thoughts on this and whether there are any concern regarding FTE reduction. ~
   There were concern of some remaining 7 employees about their jobs and if the Bot will also make calls in the future. What are your thoughts? Is this still an ongoing concern?
2. Every participant agrees that the automation increased the processing time of the process and that bots work faster than humans which improved the SLA, which was also found in the literature review. Please tell me how the faster processing time has impacted the process and business? What are your thoughts about the impact? Are there any concerns with the faster processing time?
3. Every participant responses indicated that the risk caused by human errors was eliminated with the automation of the process which was critical. How critical were the risks that were mitigated due to the accuracy of the bot and elimination of human error?
   Are there any more risk concerns now? What other thought do you have about risk?
   What are your thoughts on this regarding Compliance and regulations?
4. Participants provided information that the Bot now works the review and call decision making part of the process while the remaining Agents now focus on making calls, a collaboration that improved efficiency. Could you please share your thoughts about this new state of bots and human collaborating? What concerns do you have with the Bot and the Agents working the process together going forward?
5. Participants also agree that the business team productivity increased due to the RPA automation. What are your thoughts about this? How has productivity increased due to the RPA automation? ~ A risk concern was mentioned regarding maintaining productivity if the bot fails to run and the time it may take to fix it. What are your opinions about this? Do you think this is an issue going forward?
6. All the participants also agree that the quality of the process improved and it was optimized by the RPA automation. The RPA analysis found gaps on accounts that the business was not aware of including accounts that should or should not be called and account call to be placed on hold.

These gaps were then fixed in the RPA automation. What are your thoughts on the optimization and quality of the automated process in this regard? What are your thoughts on whether all the gaps were identified?

7. Participants also agree that the RPA automation is a change to the normal way of doing business for the employees. The literature review found that RPA automation can impact the morale of employees that used to work the automated process. Could you tell me what your thoughts are on how this automation may have impacted employee Morale?

   Were there any thoughts on employee wellbeing and job satisfaction?

8.4.4 Table showing themes emerging from the interviews with participants

	Themes/Determinants & Measurements	1st Iteration	2nd Iteration	3rd Iteration
1	FTE reduction cost savings	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA
	- Cost savings	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA
2	Faster processing time of processes	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA
	- Improved SLA	MB, TLB, DR	MB, TLB, DR	MB, TLB, DR, BA
	- Scalability	DR, BA	DR, BA	DR, BA, PAE
3	Risk reduction	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA
	- Bot accuracy	MB, TLB, DR, BA	MB, PMB, TLB, DR	MB, PMB, TLB, DR
	- Human error elimination	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA
	- Compliance & Regulations	TLB, DR, BA,PAE, PMB	TLB, DR, BA,PAE, PMB	TLB, DR, BA,PAE, PMB
4	Improved quality of process	BA, MB, PMB, TLB DR	BA, MB, PMB, TLB DR	BA, MB, PMB, TLB DR
	- Optimized process	BA, MB, PMB, TLB DR	BA, MB, PMB, TLB DR	BA, MB, PMB, TLB DR
5	Improved team productivity	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA	MB, PMB, PAE, TLB, DR, BA
	- Bots & humans collaborating		PAE, BA,	PAE, BA TLB
6	Improved employee moral	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA	MB, PMB, TLB, DR, PAE, BA
	- Improved job satisfaction	PAE	PAE	TLB, PAE
7	Improved customer service	MB, TLB	MB, TLB	MB, TLB
8	Bot Maintenance	PAE, DR, BA	PAE, DR, BA	PAE, DR, BA
9	Bot availability and fixes	MB, TLB, PAE, DR	MB, TLB, PAE, DR	MB, TLB, PAE, DR , BA
	- Bot License and acquisition	PAE	PAE	PAE, DR

Participants	Code
Manager	MB
Project Manager	PMB
Team Lead	TLB
RPA Developer	DR
Principal Automation Engineer	PAE
RPA Business Analyst	BA

8.4.5 Participant theme comments in the interview iterations

	Themes	Participant responses	Participant responses	Participant responses	Participant responses	Participant responses
1	FTE reduction cost savings	**MB:** "Before RPA, we had 55 employees which was reduced by 48 to just 7. So the RPA automation actually exceeded our employee reduction goals.	**PMB:** "The fact that we actually saved 6.2 million dollars in labor cost was a big win"	**TLB:** -"We had a large team but couldn't catch up with the growing backlog of accounts because of how long reviews take. The RPA bots mean that we don't need the large team and can now save employee costs."	**BA:** "The goal was to reduce employee count dramatically which came up to 87% reduction and improve productivity. I am glad to be part of the facilitators on the project."	**PAE:** "I am happy to be part of a ground breaking RPA automation in the company that provides a high cost reduction to the Outbound Futures Dialing team that also helps them increase revenue"
2	Faster processing time	**MB:** "...we went from processing 30000 accounts in over 4 weeks to the bots now processing them in hours. Which is a 95% increase in processing time that as resulted in the meeting of SLAs."	**PAE:** "The processing time is phenomenal it went from 4 weeks per batch to within 24 hours."	**TLB:** "The file is now processed on the same day which previously took a month."	**DR:** "...increase the processing time which was a major success because the bot now completes the file in a few hours."	**BA:** "Objectives include faster processing time, which we knocked it out the park with an increase of 96%."
3	Risk reduction	**PAE:** "The reduction of the risk of Agent errors was a compliance problem. The Bots work accurately which removed the compliance problem."	**PMB:** "RPA solves the Agent error problem that was a major risk for regulations and compliance."	BA: "The process falls under highly regulated rules and employee errors was a risk that violated compliance. The Bots work accurately which corrected the problem."	**DR:** "The automation completely removed the human error issue. So, the business no longer has compliance and regulation violation issues."	**TLB:** "We saw errors when Agents worked the accounts which was a major risk for compliance if the errors were not caught by audit. But because the bots work correctly without mistakes I don't worry

	Themes	Participant responses	Participant responses	Participant responses	Participant responses	Participant responses
4	Improved quality of the process	**BA:** "The Robotic Process Automation optimized the process by identifying the gaps and solving them. This was an additional risk that they avoided which added to the efficiency of the process and increased its quality."	**MB:** "Another benefit of the RPA automation was the optimizations. I was somewhat embarrassed about the gaps we had and that we went so long without their identification. But RPA again came to the rescue and the resolution of the identification of the gaps and all the other benefits of the automation and optimization improved the quality and efficiency"	**PMB:** "We now have an optimized and robust process. The RPA team went beyond just automation. They found hidden issues, brought them to the process owners attention and the issues were resolve, which further reduced risk and efficiency."	**DR:** "We found gaps during the analysis and brought it to their attention and fixed the gaps which further optimized the process."	**TLB:** "The complexity of the process and regulations were the reason my team was not aware of the gaps. Here again the efficiency of the RPA team and process optimization skills identified the gaps and we included them in both requirements. So, the gaps were filled."

	Themes	Participant responses	Participant responses	Participant responses	Participant responses	Participant responses
5	Improved team productivity	**TLB:** "We are now more productive, generate more collections and have a low risk of being out of compliance, so we have increased productive with the automation."	**MB:** "I am also very pleased to say that the RPA automation has helped my team increase productivity. We have reduced headcount by 48. Collection dollars have also increased because, we now have more right party contacts with the remainder 7 employees."	**PMB:** "Productivity is up for the team because they make more calls, reach more customer which has led to an increase in collection dollars, with a much smaller team. The main reason of the team is to make collections for delinquent accounts and the team now focuses effort on that. So, the automation has significantly increased the team productivity."	**DR:** "The business reported that because of our automation their productivity went up."	**PAE:** "Productivity increased overall because they now have 7 employees making more calls and collections than 55 Agents, because the Bots now do the majority of the work."

	Themes	Participant responses	Participant responses	Participant responses	Participant responses	Participant responses
6	Improved employee moral	**MB:** The morale on the team was low as the batches of Agents were informed that they would no longer be needed. However, many were reassigned to other tasks and teams by HR and packages were offered to others. For the remainder 7, morale actually went up later because they were assured of their jobs, were no longer required to do the tedious account reviews and got more incentives because	**PMB:** "I understand that the morale of the Agents was low when they found that they may lose their jobs, which was natural. HR took care of informing the Agents and some moved to other departments. However, the morale of the 7 employees left is up because they were assured of their positions and got incentives and now appreciate the bots."	**TLB:** "After we concluded the employee reduction, the employee morale went back up due to positive compensation changes and assurance that the reduction was complete."	**PAE:** "However, the morale of the employees is good now according to the business manager, because the 7 employees will be kept and now have new incentives because of the increased productivity."	**BA:** "Employee morale was bad due to the FTE reduction but has since changed for the better since the conclusion of the employee eliminations."
7	Improved customer service	**MB:** "My employees can now call customers for collections much sooner and faster because the bot already reviewed the accounts. So this was a major win and success for us"	**PMB:** "The main reason of the team is to make collections for delinquent accounts and the team now focuses effort on that. "	**TLB:** "The division of tasks between the RPA bots and the employees is perfect. The bots now do the time consuming and difficult account reviews and identifies accounts to be called for collections, while the Agents are dedicated to making collections."	**DR:** "..the collaboration of the RPA bots doing the account reviews and decision making on accounts helps the Agents to focus on calls which increased productivity and efficiency"	

	Themes	Participant responses	Participant responses	Participant responses	Participant responses	Participant responses
8	**Bot maintenance**	**PAE:** "This process was at the high end of automation and requires more maintenance and time by the RPA team.	**DR:** "Because the process is complicated with very high daily volumes, the bot has to be closely monitored by the controller and this takes up a lot of time and effort."	**BA:** "There was a concern on the time and cost of maintaining the bot."	**DR:** "The challenge I see is the maintenance of the bots. For example if they want to make updates or changes to the code, it can impact the current code."	**BA:** "There was a concern on the time and cost of maintaining the bot.
9	**Bot availability and fixes**	**PMB:** "We now have an optimized and robust process. The RPA team went beyond just automation. They found hidden issues, brought them to the process owners attention and the issues were resolve, which further reduced risk and efficiency."	**DR:** "The RPA team doesn't only focus on the automation of a process, we also ensure to optimize it when possible. We found gaps during the analysis and brought it to their attention and fixed the gaps which further optimized the process."	**PAE:** "RPA found gaps, which was not unusual because we analyze all automations for gap and optimization opportunities. So the gaps found were fixed and coded for the bots."	**MB:** "Yes those were my main concerns. However, your RPA team as assured me that you have back up bots that can kick in if the main one fails. We also haven't seen any delays that were not resolved shortly afterwards"	**PMB:** " There are back up bots should the main bot become defective and from my understanding, there hasn't been any delays that impacted the daily bot runs"

8.5 Document from my organization showing that the RPA implementation in my study saves $2.6 million yearly etc.

These are excerpts from a presentation document my Director made in A major Bank in the U.S. Townhall meeting in the 3rd quarter of 2022, with the CEO of the organization present along with the majority of employees at A major Bank in the U.S. watching either in person or remotely live.

1. Introduction slide of presentation

2. Slide showing the use case in my study (Outbound Futures Dialing process) RPA implementation saves the organization $2.6 million dollars yearly, increased processing time and enabling employee to focus on collections

3. Slide showing RPA (my team) has 57 automations in place saving $17 million yearly