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ICT in Business and the Public Sector

Analysis of success and failure factors in Robotic Process Automation: A case study

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MASTER'S THESIS

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Abstract

In many organizations, back-office operations may involve many repetitive and monotonous tasks. In recent years, business and academia have shown increased interest in Robotic Process Automation (RPA) as a novel and promising approach to automating such tasks. However, many attempts to implement RPA have reportedly failed to live up to that promise. This thesis investigates the factors that determine the success or failure of an RPA project. First existing literature is reviewed to investigate which factors could play a role and how these factors may influence the success or failure of an RPA implementation project. In addition, a substantial amount of empirical data is gathered from a set of 20 RPA implementation projects, executed at a large asset management organization – Nationale Nederlanden Group (Group NN) which consisted of semi-structured interviews with key personnel involved in these projects. The analysis of the interview data resulted in a set of indicators and factors as a measure of success or failure. Further analysis resulted in a scoring model, assigning each project in the dataset a measure of success or failure, based on a weighted average of the discovered indicators. Success factors that were found include "problem understanding", "process suitability" and proper project preparation in the form of a "feasibility study". In contrast to the high failure rate of RPA projects, reported in previous literature, the scoring model unexpectedly revealed a very low rate of failure of the projects in the dataset. Additional data collection and exploratory analysis of this data were conducted to identify the reasons for this finding. This analysis confirmed the relevance of the factors identified in the explanatory model.

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Chapter 1 : Introduction

1.1. Introduction

The introduction section of this report comprises of background study, problem statement, motivation, aim and objectives, research questions and thesis layout. Section 1.1 is the background study which states the earlier reported facts and details on robotic process automation (RPA). Section 1.2 introduces Nationale-Nederlanden Group and the RPA Team. Section 1.3 presents, the problem statement, and the gaps the research aim to bridge. In section 1.4, motivation, and the purpose of this research to the writer is highlighted. In Section 1.6, aim and the objectives of research are clearly stated and followed by the research questions which are tailored towards the research. Final section addresses the thesis layout which states the structure the research will follow.

1.2. Background

Innovations in technology are driving changes in the global economy (Coccia, 2018). As a result, businesses are required to become more agile and promptly respond to their client's wishes, needs, and demands (Rashid and Ratten, 2021). Furthermore, competitive, and financial constraints compel businesses to become more efficient, prompting them to seek new technologies and processes that will help them save money (Ozili, 2018), increase their productivity and add value to their operations. Robotic process automation (RPA) is one such solution (Fernandez and Aman, 2018).

RPA is a system that uses business logic and human inputs to automate business activities. Users can define robots (or bots) that can simulate their interactions with applications that perform transactions, manipulate data, trigger replies, and communicate with other digital systems using RPA applications (Boulton, 2018). According to the IEE, it is a preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management (Wewerka and Reichert, 2020). While it conjures up images of physical robots roaming around workplaces performing human activities, it really refers to the automation of tasks formerly conducted by humans. In the context of business processes, RPA most commonly refers to configuring software to perform tasks previously performed by people,

such as transferring data from multiple input sources, such as email and spreadsheets, to systems of record, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems (Madakam et al., 2019). Experts have identified the obstacles, hazards, and typical errors in RPA (Willcocks et al., 2018). The most typical error is for businesses to rapidly use RPA in very complicated operations. RPA implementation should begin with low-value jobs. (Willcocks et al., 2018) Another difficulty is the absence of rules regarding robot restrictions. Furthermore, customers are concerned about accuracy and dependability because they believe that robots are taking over all human work and that robots may be easily hacked (Syed et al., 2020).

Nowadays, most enterprise leaders know about the benefits of robotic process automation (RPA) - improved quality, cost savings and a better customer experience, and many others (Kumar, 2018). RPA is a technological application regulated by business logic and structure inputs, tarted at automating business processes (Syed et al., 2020.) It offers software robots (bots) that mimic human behaviour (Doguc, 2020). Van der Aalst et al., 2018 describe RPA as an umbrella term for tools operating on other computer systems' user interfaces like humans. They further noted that it seeks to replace people by automating in an "outside-in" manner. It is a software-based solution for automating rule-based business processes involving structured data, routine tasks, and deterministic outcomes (Aguirre and Rodriguez, 2017).

Hofmann, Samp and Urbach (2019) define RPA as a pre-configured software instance that completes the autonomous execution of various activities, processes, tasks, and transactions in one or more unrelated software systems, utilising predefined activity choreography and business rules to deliver a result or service with human exception management. Generally, the concept of RPA covers multiple diverse tools (Willcocks et al., 2018). These tools are used in the same way that people would on the computer user interfaces of one or more systems that do not have an API (application programming interface) (Van et al., 2018) (Kirchmer and Franz, 2019).

According to Hofmann, Samp and Urbach (2019), RPA primarily aims to replace people by automating activities where cost-efficiency is pursued and where human performance does not add value. Typically, these include routines that are carried out repeatedly and based on certain rules and are prone to human mistakes (Ivančić et al., 2019). RPA procedures are scalable, their deployment is inexpensive and straightforward, and no programming skills are required (Madakam et al., 2019).

Globally, there are about 3 million industrial robots installed and operating at factories in 2021 (IFR, 2021). Further, an increase of about 0.5% was recorded in robot sales in 2021 despite the global pandemic (IFR, 2021). A linear increase has been predicted for the robotic sales globally and this implies that there will be increase in the number of the robots in the world. Thus, evaluating such a system would offer tremendous benefits for the operators and the users (e.g., organizations). Key factors influencing the efficiency of this system are worth of evaluation because having robots installed is easier but sustaining the system is where the bulk of the responsibilities lie. For instance, factors such as lack of understanding of the meaning and application of RPA technologies, a valid fear among employees that their jobs will be threatened by the implementation of these technologies, and insufficient support from management are to be investigated. (Minashkina and Happonen, 2018)

Organizations that have successfully implemented RPA technologies begin with clarifying what their business goals are then seek out the relevant technologies that attend to those needs, while taking adequate considerations of some critical factors (Minashkina and Happonen, 2018). Accordingly, they formulate management strategies to hasten the implementation of RPA technology and invest heavily in educating relevant stakeholders on the value, application, and management of RPA, while also encouraging a shift in the mindset of these stakeholders (Minashkina and Happonen, 2018). Relating this to the case study in this research – Process Management & Innovation (PM&I) Team in Nationale-Nederlanden Group (NN Group), a need to evaluate the performance of the RPA projects and the perceptions of the employees arose. The goal was to collect data from the key personnel working closely with the RPA projects and analyse the factors that may have been responsible for the successful RPA projects and the ones that could be improved on for better performance of the projects.

1.3. Introduction to Nationale-Nederlanden Group

Nationale-Nederlanden Group is an international financial service firm with over 18 million customers and over 15,000 employees around the world (NN Group, 2022). It is active in 19 countries and has a strong presence in Japan and several European countries. The NN group is involved in insurance, banking, and asset management. The NN Group was formed in 2013 and was listed on the Euronext Amsterdam stock exchange in an IPO in 2014 (ING.com, 2013). It was founded in the Netherlands and has been around for 175 years (NN-group.com, 2022).

Nationale-Nederlanden Group is the parent company of Nationale-Nederlanden and Investment Partners. Nationale-Nederlanden is among the largest insurance and asset management firms in the Netherlands. NN Group's headquarter is situated in the Hague. NN Group agreed to acquire Delta Lloyd Group, its competitor, for 2.5 billion Euro, on 23rd December 2016 (Heilbron, 2016). NN offers retirement services, pensions, insurance, investments, and banking to around 18 million customers.

Figure 1 exhibits the overall organization structure of NN group while Figure 2 demonstrates the detailed view of NN Group Finance. Moreover, Figure 3 reveals the comprehensive view of organization structure of Finance Service Centre (FSC).

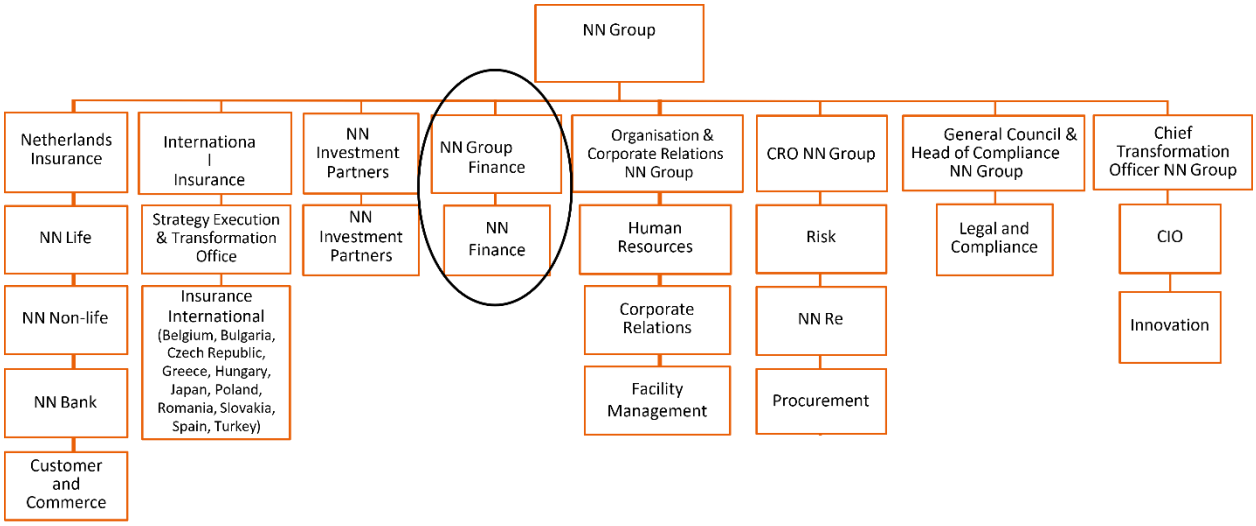

Figure 1: Organization Chart of Group NN

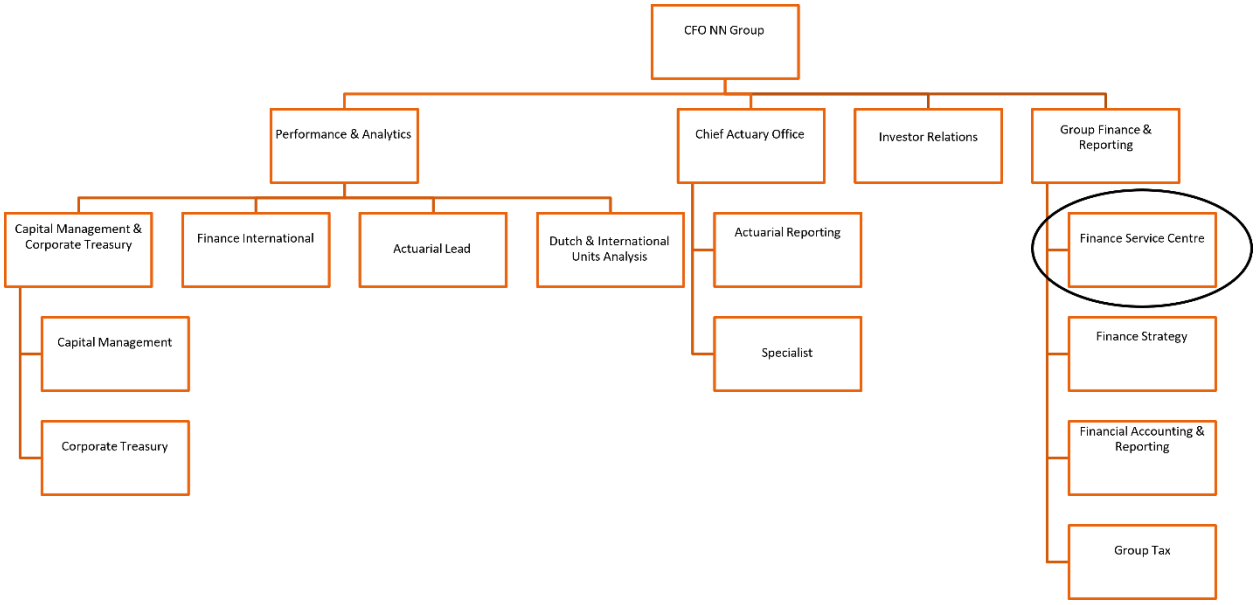

Figure 2: Detailed view of NN Finance

The FSC is responsible for executing back-office tasks for different business units in the NN group, in other words other business units in Group NN outsources activities to FSC. Finance Service Centre consists of five value streams, covering an-end-to-end processes with their own service offering to their customers. Their value stream as follows Finance Operations, Investment Operations, Labiality Accounting and Record to Report and Central service & Innovation.

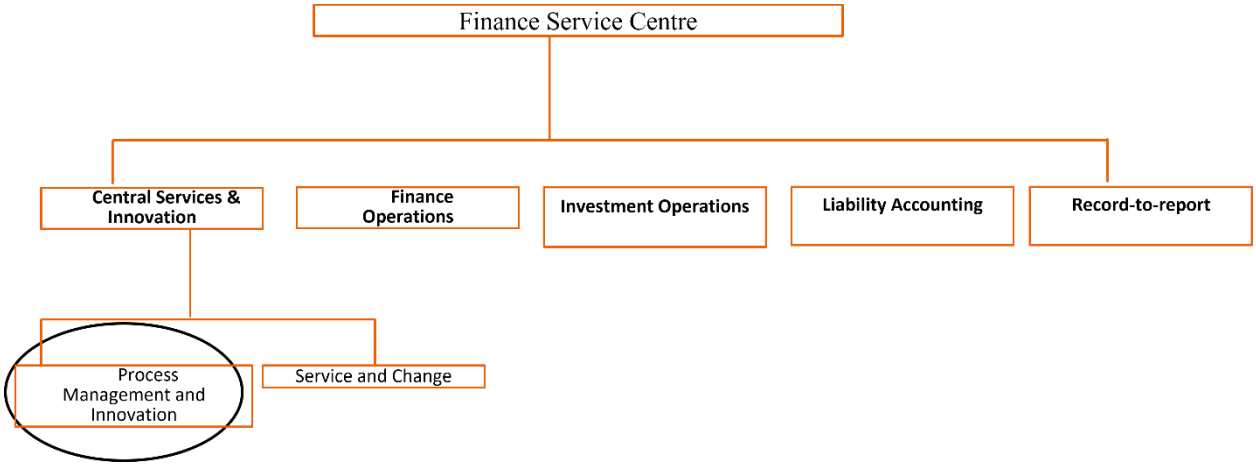

Figure 3: Organization Chart of FSC (Group NN)

The research was conducted within the team Process Management & Innovation (PM&I) which is responsible for process optimization & automation in the Finance Service Centre (FSC). PMI team is a department on FSC while FSC is a department on the Group Finance and Reporting

Department. PM&I team is responsible for delivering process analysis and RPA. Additionally, team targets to continuously improves their services. PM& I team has an allocated budget of total of 2.3 million euros per year. Out of this 2/3 of the budget will be spent for RPA related matters this includes RPA related licenses and infrastructure, salaries for team and transportation costs for the employees etc.

The PM&I team is a structural team, not a project team therefore they develop/analyze piece by piece or process by process and chopping up processes into smaller pieces as this is more efficient. Scrum/Agile is used as the way of working to achieve operational excellence. As the team is following scrum methodology, they built RPA project in smaller components first and then expands the scope for other business units. Moreover, PM&I assists Business & Functional Units of NN Group such as HR and Business Units (NN Bank, NN Life, NN Non-life) with RPA.

PM&I has two main areas:

- Intelligent Process Automation - Focuses on Process Automation for Finance Team and functional units of NN Group. RPA is used in order to automate and increase efficiencies in the FSC Value Streams and in processes.
- Process Management & Improvement - Focuses on helping the FSC Value Streams and teams towards continuous improvement. The team coaches and facilitate all kinds of workshops and trainings in Lean & Operational Excellence.

1.4. Problem Statement

Robotic Process Automation is a software-based automation technology that can imitate human behaviour for repetitive and non-value-added tasks such as pasting, copying, tipping, merging, extracting, and moving data from one system to another. Its primary gains include increasing process speed, cost reduction, productivity improvement and error minimisation (Aguirre and Rodriguez, 2017).

The RPA technology has been adopted by many top companies, with many more expected to employ the technology in the coming years. The companies that have employed the technology in their business processes have recorded outstanding immediate results around a year of implementation, with successes recorded in reduction of their expenses, increase in the

accuracy of their processes, improvement in compliance, efficiency in management of time and flexibility. While the success rate is high among companies that have employed the RPA technology, there is a dismal number of companies that have tapped into it, to derive the value embedded. (Huang F and Vasarhelyi, M.A, 2019)

Notably, RPA is a relatively new technology. Interestingly, there are numerous empirical investigations on the subject matter. Nevertheless, it is hard to have in-depth knowledge about its academic perspective in terms of its trends, state, and application. Thus, it becomes imperative to conduct a study of this nature to attempt to bridge this gap.

RPA is a technology that offers numerous advantages to businesses, yet there are occasions when it fails to deliver. An EY study conducted in 2016 reveals that 30% to 50% of initial RPA projects fail therefore it is vital that organizations understand how, when, and where to use RPA in business processes. Moreover, according to a survey from ABBYY, 38% of executives say RPA projects fail due to high complexity processes and 3/10 projects fail due to not having sufficient understanding of the process and underlying automation tools. Nevertheless, 6/10 RPA project leaders stated that a comprehensive grasp of the processes being automated was critical to their success. (Torres R, 2020) The RPA's market share is expected to grow by 20-30 percent per year, over the next several years, reaching US$2.46 billion in 2022 and US$3.97 billion in 2025 therefore it is important to understand how well RPA can be implemented. (Grand View Research, 2019). Moreover, this study will determine why certain projects fail and why some succeed. Accordingly, real-life RPA projects will be analysed, and the investigation would be on how successfully RPA strategy has been implemented within Group Nationale-Nederlanden, (Group NN) what factors should be focused on to succeed. The analysis would take place from where the business problems were defined to the end process to understand whether the implementation of RPA achieved the defined goal.

1.5. Motivation

The motivation for this research stems from the curiosity to identify the success and failure factors of the RPA projects in PM&I team in NN Group. Furthermore PM&I team is hoping to expand their RPA projects hence would like to find out which factors they should give more attention and the ones that can be modified to increase project performance. As earlier stated, the statistics of the industrial robots globally increases linearly (IFR, 2021) and this implies that more of this system are pervading industrial activities and hence changing operational

techniques of industries. Hence, this research aims to identify factors that can determine the success and failure of robots and a case study of NN Group is examined. The beauty of this research is that the approaches inculcated could be applied (with little modification) to other industries. To remain competitive in their sector, firms must be adaptable in their development operations due to the ongoing trend of digitalization.

Moreover, competitiveness necessitates efficiency in a variety of procedures. Furthermore, companies are being forced to determine ways to digitalize asset management operations (Kortelainen et al., 2019), to consider outsourcing partners such as partners to automate their physical asset handling activities (Minashkina and Happonen, 2018), and rethink their business elements to fit modern digital data-based economies and platform solutions (Metso et al. 2020). Moreover, RPA allows individuals to be reassigned to duties that add more value to the organisation (Ivančić et al., 2019). RPA can also be utilised with other developing technologies like data analysis, data mining and artificial intelligence (Ivančić et al., 2019). These considerations triggered the author to undertake this project, as he seeks to explore the concept of RPA exhaustively to comprehend its capabilities fully. Although NN Group's use of RPA in their project is used as a case study, the author believes that the findings of this study can help the NN Group maximize the benefits of the technology. In addition, other similar corporations can adopt the findings of the report to improve their operations.

1.6. Scope

This research's scope includes RPA projects in NN Group by PM&I Team. Thus, this report will not consider RPA projects in other firms. Accordingly, it will only focus on RPA, its life cycle, and the NN Group's approach to undertaking projects. It will also study the factors used to determine the success or failure of RPA projects in NN Group. It will not discuss technologies related to RPA.

1.7. Aim and Objectives

This study aims to identify the factors that influence the success and failure of Robotic Process Automation (RPA) projects in NN Group implemented by the PM&I team. The following are the objectives identified to achieve the aim of this study:

1. To understand the RPA life cycle and approach adopted by PM&I Team when undertaking the projects.
2. To identify the features of good candidate processes.
3. To identify the indicators and explanatory factors of RPA projects in PM&I Team.
4. To develop a scoring system to measure the degree of success of a RPA project in PM&I Team.
5. To develop a model that can be used to explain a success or failure of a RPA project in PM&I Team.

1.8. Research Questions

The key research question for this study is "*What explanatory factors can explain the success and failure of Robotic Process Automation projects in Group NN*?"

The sub research questions that were used to achieve the objectives of this study is provided below:

Table 1: Sub Research Questions

Question Type	Sub Research Questions
General Questions	1. What is the RPA lifecycle approach? 2. What is the process suitability for RPA? 3. How can the success or failure of an RPA project be measured? 4. Which prominent factors may influence success and failure of RPA project?
Group NN specific questions	5. How can a successful RPA project be identified in Group NN? (Definition of Success) 6. What are the indicators that PM&I team can consider of successful or failed RPA projects? 7. What are the explanatory factors of an RPA project within PM&I team? 8. What is the RPA lifecycle approach that PM&I team uses in undertaking the RPA projects?

1.9. Thesis layout

The thesis is structured as follows. In the second chapter, the methodology inculcated in the study will be stated. Chapter three will discuss the information obtained from the literature review. Furthermore, the fourth chapter is the data analysis and findings from the research. The fifth chapter will compare existing literature against interview findings. The sixth chapter is the conclusion, recommendation, future work, and limitation to the research.

Chapter 2 : Methodology

2.1. Introduction

In this chapter, the research method, research strategy is discussed, and a high-level overview of the data collection and analysis approach is described in detail. 2.1 gives an overview of background information on methodology; 2.2 presents the research method inculcated; 2.3 is the research strategy; 2.4 talks about the data collection; 2.5 presents the data analysis approaches; and 2.6 summarizes the chapter.

2.2. Research Method

This research mainly aimed to investigate and identify the factors that influenced the success or failure of Robotic Process Automation (RPA) projects in NN Group. Primary and secondary data are used in this study to achieve the aim and objectives. Primary data simply refer to the data obtained directly by the researcher through experiments, surveys, interviews among others (Kabir, 2016). In other words, they are obtained from the original source such as participants responses to a survey or an interview. In this research, the primary data is obtained from interviews with the appropriate participants in NN Group and the secondary data is obtained from the literature reviews. Most importantly, the study's aim and target population should be determined before a data collection source is selected (Garg, 2016). The data obtained from the literature-review and the data derived from the thematic analysis of the interview will be juxtaposed with the aim to study the key factors that determine success/failure of RPA. The juxtaposition will be done by inferring the closeness in the factors derived from the literature-review and the factors obtained from the thematic analysis of the interview data.

This study adopts the interpretivism research philosophy since it presents an opportunity to do an in-depth study. It is premised on the comprehensive understanding of human nature and the varying role of the human as social actors. Thus, it helps in interpreting the social roles of other individuals in line with the researcher's perspective (Rowlands, 2005), as the research and the reality cannot be separated (Žukauskas et al., 2018).

This study is based on case study of NN Group. A case study is a research approach and empirical investigation that analyses a phenomenon in its natural environment. Therefore, it will be qualitative and exploratory since it only focuses on certain case and aims to comprehend

the specific case study. Exploratory research is a research method which is used to study a subject that is not well defined. It is carried out to gain a better knowledge of the current situation, and it is also known as the grounded theory method since it is used to address the questions of what, why, and how. Interviews, observations, and surveys are primary exploratory research methods while the literature review is the most common secondary research method. However, no survey or questionnaire was used as a tool of data collection in this research rather literature review and interviews were used to collect data

2.3. Research strategy

Strategy in research refers to an overall plan employed by a researcher to systematically investigate the subject matter for the research and provide answers to the research questions. It guides an investigator in planning, executing, and monitoring the investigation (Johannesson and Perjons, 2014). Different research strategies exist. As a result, a researcher needs to determine the appropriate one for his or her study. The choice depends on the study's objectives and attributes.

The ***literature review method*** refers to the technique of gathering data/knowledge about a subject matter (Snyder, 2019). With this method, an overview of a subject matter can be obtained through rigorous data cleaning such as selection of the journals that are most relevant to the subject matter (Snyder, 2019). Because this current research aims at identifying factors that determine the success and failure of RPA project, the researcher thought it wise to first engage in literature-review with the goal to have knowledge of the likely factors that determine the success and failure of RPA projects. Of course, this is original research, and it is meant to be unique, thus, the results will be different from the literatures but the similarity in the results will of course, be stated.

The ***interview research method*** involved of asking questions via video calls. This method was adopted as it makes it possible for the researcher to obtain in-depth information from the respondent. Moreover, clarifications and explanations can be made using this method. Additionally, it enables the interviewer to have full control over the respondents' environment (Ryan et al., 2009).

In terms of data availability, the writer obtained them from the Business Analyst Internship at NN Group in a team (PM&I team) that performs task related to RPA. Interviews with representatives of FSC team will be primary target and while observations and documentations

within in the PM&I team will be noted. The literature reviews aim to learn about prior research into RPA business initiatives and what has been determined to be crucial in their implementation in the business sector. Different aspects will be used to construct a concept about the performance of robotic process automation. Literature review will present theories such as RPA life cycle, RPA suitability, and influencing factors of success and failure.

Figure 4: Sequence of the research method

2.4. Data collection

PM&I team has developed over 90 bots for different business units in NN Group. The research was conducted within the team Process Management & Innovation (PM&I) which is responsible for process optimization & automation in the Finance Service Centre (FSC). RPA projects developed by the PM&I team to different business units in NN Group will be the selection criteria. To analyse RPA projects done by PM&I team 20 interviews will be organized. Interviewees will be experts that have experience of implementing RPA projects such as business analysts (BA), RPA developers (DE) or process owners (PO)/Subject Matter Experts (SMEs). RPA projects will be selected based on random selection, from ServiceNow's database therefore respective interviewee will be based on the SME or developer or Business Analyst that has been listed in ServiceNow. Service Now is IT service management tool used in with NN. It supports ticket management such as related incidents, changes and requests, knowledge articles much more. It is like a database therefore contains information about RPA projects that PM&I team has developed. Moreover, interviews for some RPA projects will be done from a different perspective such as from BA or DE, or the SME. This means certain RPA projects or bots may have been responded by more than one interviewee and this was decided on a random basis. In total 20 interviews will be conducted to have an understanding on the RPA projects done by PM&I Team. Below Table (2) represents the information about interviewees, bot name and relevant department.

Table 2: List of Robots/Bots with their respective Department and Interviewee Role.

Deparment	Robot/Bot Name	Interviewee Role
Career Centre	Fixed Price	SME/Process Owner
Central Services & Innovation	Password Changer	Developer
Central Services & Innovation	Reconcile Account	Developer
CIO Office	Clarity Month-End Liabilities	SME/Process Owner
Finance Accounting	MJE FAR NN Bank	SME/Process Owner
Finance Accounting and Reporting	Intercompany Reports Generation Unattended FA	SME/Process Owner
Finance Operations	WKR Sampling	SME/Process Owner
Finance Operations	Requisition to PO	Business Analyst
Finance Operations	WKR Sampling	Business Analyst
Group Finance & Reporting	CoE Error Screenshot Purge	Team Lead
Group IT	Clarity Resource Management	SME/Process Owner
HR Shared Services	Workday Inflow Internals	SME/Process Owner
In- en Excasso	Uitbettalen Credits	Developer
In- en Excasso	Brokerage Administration	SME/Process Owner
Investment Risk	Money Market Limit	SME/Process Owner
Record-to-Report	Amber Retrieve	SME/Process Owner
Record-to-Report	SAP DCM Style Setting - Format	SME/Process Owner
Record-to-Report	Amber Retrieve	Developer
Record-to-Report	MJE PSI	Developer
Talent Acquisition B	HR Transfer	Developer

2.5. Data Analysis

In this section the method used to analyse the data obtained from the interview is stated and the data obtained from the literature review. The interview data is analysed using thematic methods. The thematic analysis primarily identifies, assesses, and interprets meanings by exploring the trends of the qualitative research data (Braun et al., 2021). Hence, it is performed using the following six stages (Terry et al., 2017):

- *Familiarisation stage:* This is the first task that the researcher carries out. Here, the researcher takes the initial notes to gain insights into the data.
- *Coding stage:* This stage uses phrases or sentences to group what has been found in the journal.
- *Theme-generation stage:* In this stage, the coding is converted into themes to compare the journal findings.
- *Reviewing themes stage:* This stage involves comparing the themes to fully understand them.
- *Defining and naming themes stage:* This stage involves the final categorisation related to the research questions.
- *Writing stage:* Here, the discoveries for every research question of this project is written down.

Figure 5 : Thematic Analysis Process

Thematic analysis involves the use of "interview extract," "codes," and "themes." "Interview extract" is simply a summary of a conversation with any of the participants which is normally shorter. "Codes" are simply (if possible) a single word to encapsulate the content of the interview extract. Lastly, "themes" are categorical words used to group the "codes." (Terry et al., 2017) All these categories are used to create a table and the information are supplied. Tables will be used to show the indicators and factors derived from the interview analysis and their definitions. Additionally, the level of their importance in percentage will also be included. The level of importance of the factors will be determined by extracting the frequency of each of the factor in the conversation. A fixed total word count will be assumed for all the conversations so that a reliable and non-bias result is obtained for the indicators and factors. The importance in percentage will be calculated by frequency-percentage - Equation 1. The ranking will be done by the percentage importance.

2.5.1. Familiarization stage

In the familiarization stage, the conversations with the participants will be studied by the researcher one after the other. This will be done like three to five times as this is the foundational stage in the thematic analysis. Glancing through the documents will not yield a good result in the other stages. Thus, the reason for going through the conversations several

times. While the reading is done, jottings are made to track the flow of the content of the conversation.

2.5.2. Coding Stage

In the coding stage, the conversations are summarized per questions and the summaries are ensured that they convey the intent of the speaker. This stage will be easier to be done if the necessary details are jotted down during the familiarization stage. (Terry et al., 2017) In the coding stage of the thematic analysis, the content of the interview extracts was summarized into a simplified sentence which gives the reader an insight to the view of the participants to the subject matter.

2.5.3. Theme-generation method

According to Braun (2012) theme of a thematic method is derived from the consistency of a pattern in a conversation such as interview. In the theme-generation stage, the codes were further simplified to a more precise (nearest) meaning to the participants response. In this research, the themes were formed based on the content of the codes. As this work aims to present new precise factors that can be used to easily examine the success or failure of RPA projects, the nearest meaning is used compared to the "sentences" used in the literature. However, the meaning is ensured to convey the codes context and the juxtaposition with the literature review are done easily. The thematic results from the familiarization stage, coding stage, and theme-generation stage are reviewed over several times and the necessary modifications are done before writing stage begins.

2.5.4. Factor-generation method (*Reviewing themes stage & defining and naming themes stage)*

In the factor-generation method, fundamental factors, and attributes of RPA in the NN were deduced from the participants responses. This was inferred based on the contents of the interview extracts, codes, and themes. In some cases, themes and factors end up with the same expression and this is valid for the themes that already self-explanatory such as *Flexibility* is *Flexibility.*

2.5.5. Writing stage

The writing stage simply refers to the interpretation stage of the findings in the thematic table. This involves the explanation of the data extracted from the interview. The interpretation will be done by the indicators and the exploratory factors deduced from the interview extracts.

Herm et al. (2020) developed a consolidated framework for implementing RPA project. Their approach is like what is applied in this current research as they analysed 23 case studies of RPA in conjunction with the interviews with the experts in the field. Primarily, they applied design science research on the data obtained from the literature to develop the framework and then used the interview data to validate and refine the model developed for the implementation of RPA. Design science research can be defined as a qualitative research methodology whereby the focus is on the object of the study and considered as the design process. In other words, the object is studied intimately to derive the knowledge of the design process artefact and the artefact itself. This method is suitable if the researcher has access to the object of research and has knowledge about the object of study. In this research, we have only based our research on the interview data obtained from the experts and the researcher has little knowledge of RPA operation. Hence, this methodology is not suitable for the current research. Thus, thematic analysis is inculcated.

Another viable methodology is Ground Theory (GT). Grounded theory was first proposed by Sociologist Barney Glaser and Anselm Strauss in 1967. This method was developed to solve some challenges inherent in traditional qualitative research approach such as creating hypothesis then carrying out analysis to validate the hypothesis (Dey, 2004). Grounded theory (GT) involves the study of a particular phenomenon or process using a real-world data which can lead to discovery of novel theory (Oktay, 2012). Data collection and analysis occurs in iteration such that in the case of interview, excerpts from the interview are broken down into open codes until saturation stage is reached. Saturation such that no new insight is derived from the codes (Oktay, 2012). This methodology is suitable if we are analysing a single RPA project whereby iterations reveal detailed information about the system. Thus, we have not selected this methodology because we are analysing divers' kinds of RPA in NN Group.

2.6. Summary

In this section, the methodology inculcated in this research has been stated. Data is collected from the literature review and interview. Suitable participants in the case study were interviewed and the data is analysed thematically. Thematic analysis comprises of interview extracts, codes, and themes. Thematic analysis involves the use of "interview extract," "codes," and "themes." "Interview extract" is simply a summary of a conversation with any of the participants which is normally shorter. "Codes" are simply (if possible) a single word to encapsulate the content of the interview extract. Lastly, "themes" are categorical words used

to group the “codes.” All these categories are used to generate a table. Indicators and factors from the interview analysis will be shown in tables with definitions and their percentage relevance will also be given. Each factor or indicators’ importance will be assessed by their frequency in the dialogue and ranking will be by percentage importance.

Chapter 3 : Literature Review

3.1. Introduction

In this chapter the information obtained from the earlier works on the subject matter is presented and the general research questions will be answered. General research questions in the sense that basic information such as the RPA lifecycle, suitability and key performance indicators and factors (according to literature) will be discussed. Later in chapter 4 the relevance of these indicators and factors to the case-study of this research will be evaluated and how the current research agrees with them. In the first section (3.1), overview on lifecycle of RPA will be presented. In the second section (3.2), the process suitability for RPA projects will be discussed. In the third section (3.3), key performance indicators (KPI) of RPA projects based on the literatures are highlighted, (3.4) states the factors influencing success and failure of RPA projects. Final section presents the summary of the chapter.

3.2. Lifecycle of RPA

The main goal of deploying robotic process automation (RPA) in a business operation is to nullify the weaknesses attached to repetitive and manual processes (Stasevych et al., 2020). As a kind of software development, robotic process automation follows a standard organized procedure for solution delivery, similar to that of any other type of product development (Stasevych et al., 2020). It is the framework of how automation is given and implemented that is referred to as the RPA lifecycle (Sigurðardóttir, 2018).

Robotic process automation follows a standard organized procedure for solution delivery, similar to that of any other type of product development (Sigurðardóttir, 2018). It comprises of each and every step that a bot goes through, starting with identifying a business process or job to automate and continuing with its deployment as a bot in production and ongoing monitoring (Jimenez-Ramirez et al., 2019). It offers a framework for process automation in order to guarantee that the bot is developed to meet the needs of the process automation framework (Wewerka and Reichert, 2020). It also provides a segmented approach to guarantee that each step of RPA delivery can be evaluated and modified in order to improve execution and overall performance (Sallet, 2021).

The RPA lifecycle follows from analysis, bot development, testing, then ends with the implementation and maintenance. The analysis phase involves the business team and the RPA

architect collaborating to understand a business process in order to design RPA solutions (Dey and Das, 2019). The bot development phase involves the RPA developer working on the need in their environment (Razak, 2021). The testing process is handled by a separate testing team in some organizations, whilst others have a specialized testing team that conducts quality assurance (QA) (Kyheröinen, 2018; Enríquez, et al., 2020). The Implementation and maintenance covers the deployment of the developed bot which is ready for distribution and it enters the maintenance phase (Flechsig et al., 2019).

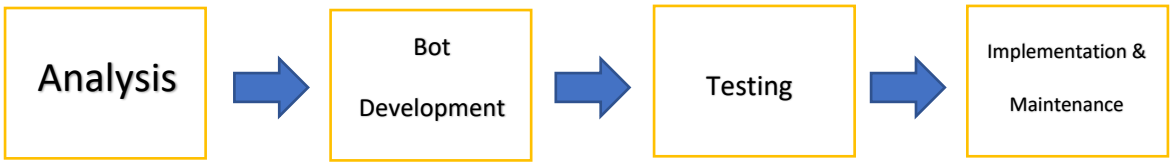

Figure 6: RPA lifecycle

3.3. Process Suitability for RPA projects

Overall, RPA offers the tools, including software and platforms, necessary to automate rule-based, logical processes using well-defined and structured data, with a predictable set of output values. Furthermore, the jobs are often monotonous and less enjoyable to do by hand (Wellmann et al., 2020) and such jobs referred to as "swivel chair" tasks since they involve shifting inputs from one side of the computer to the other side of the computer without much thought (Soybir et al., 2021). RPA simply interacts with systems in the same way that a person would do. Although the robot should surpass humans in terms of quality, time and cost if given the right method and working logic, it is unlikely that this would happen (Wellmann et al., 2020). When robots are used in processes the purpose is not only to aid people in the process, instead RPA should be utilized to completely replace people in situations where it is appropriate (Rötzel et al., 2021). This is comparable to other tools, such as Excel sheets, which is a tool to aid users in doing various computations needing the presence of a person. (Rechberger and Oppl, 2021). The robot does not directly write into a database, but rather utilizes the presentation layer of a program, and it only has access to systems at the user-interface-level, much as a person would. (Hofmann et al., 2021). It is simple to keep track of every activity a robot does and the danger of non-compliance is negligible (Flechsig, 2019). However, some authors have suggested that these technologies should be combined n business practice to get the best business value, rather than separately. Particularly, RPA can be used as a complement to those other forms automation to complete some goals (Ivančić et al., 2019).

As soon as an organization decides to use RPA in its operations, they must decide on the automation pipeline. Choosing the correct process pipeline is critical since it determines how much advantage RPA can provide (Wellmann et al., 2007). However, identifying processes or tasks may be simple, but the deeper understanding of how an organization can leverage RPA in the whole enterprise as well as create a platform of organizational transformation is quite a challenge (Bruno et al. 2017). Robots, like any other automation and programming, need specific rules to follow (Wanner et al., 2019), which essentially eliminates non-rule-based processes from consideration as RPA candidates (or any other automation). High transaction volume, high degree of standardization, well defined implicit logic, and high maturity are the characteristics that (Wanner et al., 2019; Wellmann et al., 2020) designate as the best-suited target processes for automation. As an addition to this list, Wellmann et al., (2020) point out that repeated jobs are good candidates since repetition is often a source of human mistake. However, complex processes that require compound steps and the control of many variables are harder to automate. Also, highly integrated processes that are well coupled and not easily detachable from other processes are also harder to automate.

Hence processes that suitable for RPA should contain these characteristics: (Syed R et al.,2020)

- *Highly rule-based*: Business rules must be used to explain the decision logic. Every situation in RPA requires a clear, predetermined rule.
- *Less complex processes*: Manual processes should be simple to develop bots effectively. As process complexity promotes robot complexity.
- *Easy to accomplish and impactful*: actions completed within procedures with the greatest effect and the easiest delivery (quick and inexpensive to deploy RPA). Calculating existing manual expenses can help identify and emphasize the commercial benefit of RPA.
- *High volume*: The advantages of using software bots in an organization may be maximized if transaction volumes are significant.
- *Maturity of the process*: Tasks that have been in place for a long time, are steady, and individuals understand what is going on are considered mature.
- *Structured and digitized input*: All data input must be digital and structured.
- *Standardised*: how well process execution sticks to a predetermined route and process that have a greater level of standardization.
- *Less exception management*: Process automation, testing, and optimization will be delayed or cancelled if RPA-targeted procedures must cope with exceptional behaviours.

- *Highly repetitive*: Automating activities that are ‘repeatable enough' can assist increase ROI.
- *Well-documented*: When procedures are well-understood, bot development and testing take less time. Accurate and detailed process descriptions are vital.

(Syed R et al.,2020).

3.4. Key performance indicators of RPA projects

RPA (robotic process automation) activities must be measured to ensure their success without failure. The following key performance indicators (KPIs) were identified as being critical to realizing the full potential of RPA adoption (König et al., 2020). Key performance indicators can be considered as indicators that measure the success or failure of RPA project.

Total Automated Process

Total automated process involves the number of the automation the robots are required to perform for a certain task to be completed. This is one of the metrics that can be used to measure the application of RPA and to determine the possibilities and prioritization of RPA implementation (Wellmann et al., 2020).

Velocity

The average time it takes for an automated process to complete its execution is referred to as its velocity. Because it measures the time and money savings associated with having a bot do the task more quickly than a person, this RPA statistic is widely used (Jeeva Padmini et al., 2021). For instance, velocity is defined as displacement over time taken and the change in velocity induces acceleration or deceleration. So, the time taken by the robots to complete a task is compared with that of the human; so also, the expenses. Therefore, the differences are inferred (Jeeva Padmini et al., 2021).

Utilization

Utilization refers to the usefulness of a robot and an intend purpose of implementing the system (Munawar, 2021). With accurate stated utilization of a robot, the right robot can be implemented for the right purpose. For instance, the case study in this research has many sections and the RPA project requirements differ by the sections, thus, the utilization is defined

Accuracy

Accuracy is a term that relates to the frequency with which an automated procedure is conducted without mistakes. This number reflects if our automations provide an additional critical RPA selling point: enhanced output quality of the process, resulting in fewer mistakes than manual execution (Kommera, 2019).

Expected Business Value

The Expected Business Value (EBV) measure is an RPA statistic that effectively consolidates all the other key performance indicators (KPIs). Essentially, Expected Business Value is the total of all cost savings achieved as a result of greater velocity, utilization, and enhanced accuracy multiplied by the cost of each FTE over a particular period of time. This results into a net present value (Dey and Das, 2019).

Brake-Fix Cycles

According to Eulerich et al. (2021), Break-Fix Cycles are a measure of how many times an automated process breaks down and needs maintenance to be performed. Bots that fail have a direct influence on the return on investment (ROI) of robotic process automation; since the bot is out of production and not functioning, it is not decreasing costs or contributing to greater operational efficiency.

Break-Fix Person Hours

Break-Fix Person Hours is a metric that helps automation teams assess how long it takes to fix a bot that has malfunctioned. This automation statistic represents the amount of manual work (measured in FTE hours) that has been put towards repairing the bot (Jeeva Padmini et al., 2021).

Break Root Causes

This measure is concerned with determining and monitoring the reasons why bots fail in the first place. It equips you with the capacity to detect holes in our automation approach that hinder our ability to scale, as well as to maximize our RPA uptime for maximum returns (König et al., 2020).

Average Automation Uptime

Automation uptime, also known as bot availability, is the percentage of time that our automated operations are available to be conducted when they are scheduled. All bots and automated processes begin with a maximum of 100 percent Automation Uptime to ensure that they run smoothly (Wellmann et al., 2020). As they are taken out of production due to mistakes or because they are malfunctioning and need repair, uptime begins to decline as well.

The Average Automation Uptime metric provides an indicator of how often our bots are accessible to do the tasks for which they were created. Unlike utilization, this is a gauge of a bot's capacity to always contribute to the anticipated business value, as opposed to only when it is needed.

Business Value Lost in Downtime

The amount of business value lost because of downtime demonstrates how detrimental our Break-Fix Cycles are to the RPA program. Amount of downtime measured is subtracted from the yearly estimated business value in order to calculate this statistic (SHOJAI, 2017).

3.5. Success and failure factors of RPA projects

In this section, the factors capable of dictating the success or failure of RPA projects as derived from the literature review are presented.

Task of identifying the business issue, problems, hurdles, make working days more difficult. Once the problem has been discovered, the organization may investigate possible solutions, with RPA being one of them. During the discovery phase of an RPA endeavour, the senior management team and project managers should produce a strategic plan to define a clear RPA vision and set short-term and long-term RPA implementation targets. (Lok, 2021) In addition to the goal-setting process, a cost-benefit analysis should be undertaken, as well as various kinds of risk and contingency planning. Moreover, the project schedule, continual improvement, and scaling must be considered as part of the company strategy and vision (Lok, 2021). Top management assistance is seen as crucial, particularly in supporting responsibilities such as resource provision, change management, communication, and provision of resources. To build an RPA team, set up the IT infrastructure, and acquire software licenses, the RPA project requires significant human and financial resources. Therefore, top management's

permission and commitment for steady financing is critical. However, funding for RPA development is not a one-time requirement. It also needed ongoing investment. (Lok, 2021) During the planning phase, the organization's IT staff plays numerous responsibilities in RPA development, including software negotiation, evaluating the RPA software to fulfil the needs of governance policies, and creating a business case. During the development phase, the IT team set up an RPA test environment for development and UAT, built the RPA network infrastructure, manages the RPA system's governance and security, and provides IT support. Change management is also important due to scepticism about the installation of new technology, particularly among individuals who have had a poor experience with previous technological implementations (Lok, 2021). As a result, they have taken a cautious approach to new technology or have adopted it reluctantly. Monitoring and security under governance are critical to the success of RPA adoption. They might discover IT infrastructure flaws and put risk under control. External hazards connected to violating intranet security may pose a financial or reputational harm. They include RPA platform, IT infrastructure, and data storage requirements for software robot operations to comply with government regulations. Furthermore, software robots need continual monitoring and maintenance since they are prone to failure owing to changes or upgrades in IT systems (Lok, 2021). The success of RPA implementation also depends on quality assurance. A person should always track and analyse quality control methods. Routine quality checks would boost RPA's dependability and alleviate user scepticism about RPA's capacity. Furthermore, because RPA may operate autonomously, there is a possibility of malfunction. Inspection of error logs and management information reports on a regular basis will guarantee proper functionality and procedure adherence. The source of unexpected errors might be identified (Lok, 2021).

3.5.1 Success Factors

With the increasing number of applications in the industry, robotic process automation (RPA) is on the increase in the world of business. The technology promises to automate repetitive, manual operations across the organization, from the IT help desk to human resources, hence improving productivity while decreasing costs (Sigurðardóttir, 2018). However, as robotic process automation (RPA) continues to ascend the hype-cycle curve, it is easy to forget that the technology is not a magic wand that can be waved to generate unprecedented amounts of cost savings. While business and IT executives may be tempted to get into RPA initiatives right away, the initial few actions you take are important to the project's overall success. The

following are five critical variables that, if considered throughout the design and execution of an RPA project, will significantly boost the likelihood of a successful conclusion (Flechsig et al., 2021).

- ✓ **Understand the Problem**

When reviewing a proposed RPA application, be certain that you grasp the genuine issue that the organization is attempting to tackle with the application. What we have come to anticipate from automation. Increasing efficiency, and hence productivity, or repurposing our staff to do higher-value tasks? This is the question. Is there a direct advantage in terms of cost savings? If the answer is yes, then consider the return on investment and the time it will take to break even.

- ✓ **Target the low-hanging fruit first**

Resist the temptation to advance at breakneck speed; instead, start slowly and manage everyone's expectations. Everyone is rushing to implement RPA, but it would be wise to start with the processes that are the most standard, stable, and repeatable, and then go on to the more complicated ones later. The alternative is to get entangled in a complex project, fail, and have the company complain that RPA does not work. Even if initial acceptance is gradual, it will help to establish confidence in and trust in robotic process automation (RPA) technology (Jiménez-Ramírez et al., 2020).

- ✓ **Conduct a feasibility analysis**

Technology is unavoidable, but only when there has been a track record of success and long-term stability. Any technology or platform that is in the early stages of adoption and maturity should be mapped to business requirements in order to ensure that it is appropriate for its intended purpose. To increase the likelihood of success, we must submit our prospective project to a feasibility analysis—both from a technical and commercial standpoint—from the beginning (Kyheröinen, 2018). Without early engagement with IT and completion of this process, our business may wind up with a candidate project that is forced into a program and will not reap the advantages that were anticipated.

- ✓ **Follow the SITO rule**

An RPA program may provide a unique chance for everyone involved to take a step back and examine the process for refinement by putting it through the SITO processes of simplify, improve, transform, and optimize (SITO). This is a process of re-evaluating the already identified details about the RPA and the operation to be substituted for. This can make a process simpler, which means it will be less complicated to manage in the future and if you can make improvements to the present one, even better. Possibly, it can be transformed to include digital aspects, resulting in a better client experience, higher quality, and more efficiency. Take advantage of this as a chance to improve processes, since an optimized process may result in more results being achieved. This should be done before feeding the candidate project into the RPA engine (Kyheröinen, 2018).

- ✓ **No 'one size fits all'**

According to Kommera, (2019) Automation is still in its early stages, and the market is swamped with several platforms, tools, and point solutions that are all somewhat different from one another. Furthermore, since none of the products is comprehensive, there is no one solution that can be applied to all cases. All the tools are still in the early stages of development, and a product that is appropriate for one business usage may not be appropriate for another—so make your plans appropriately.

- ✓ **Process Suitability**

According Viehhauser and Doerr (2021) process suitability of a system can be defined as the ability of the system to solve the need of an operation targeted to be replaced with automation. Process suitability is an explanatory factor that is closely related to the other factors. Most especially, it is a function of understanding the problem to be solved. This is an important factor in that failure to identify the suitability of a process for RPA would inevitably render the project failed. Section 3.2 discussed process suitability in greater detail.

- ✓ **Complexity of RPA**

The timescales for RPA deployment or automation are highly dependent on the tasks involved. Basically, what you need to do in order to provide a client with an estimate is look at the project

and attempt to categorize it into three basic categories: low complexity, medium complexity, and high complexity projects, among others (Wanner *et al.*, 2019a).

Rather, projects with little complexity are those that do not need many processes and do not have many applications in their scope. It is merely a matter of copying text and changing data in a basic manner; there are not many options to make. Those tasks may take anywhere from three to four weeks to complete (Soybir *et al.*, 2021). Naturally, it is possible to have it completed in less time, but when considering the complexity of a project that includes the analysis phase, the creation of well documentation, ensuring that the developers have enough time to ask the right questions, testing the robot in a very robust manner, ensuring that it will work exactly as expected in the production environment, and finally, a small training session for the team, three weeks is a reasonable timeframe (Huang, 2019). Overall, it will take around three weeks to complete all the phases in the procedure. Of course, it might be dependent on the firm in question. For individuals who are currently creating within bots, this can be lowered a little, but don't expect to see projects that take less than two weeks and are completed in an acceptable way on a regular basis (Schmitz, 2019).

There are also projects of medium difficulty, which are a little more complicated than the projects of low complexity (Jovanović, 2019). As a result, developers will need to create a lot more fail-safe methods for the robot to function, which may take anywhere between three and five weeks depending on the number of apps involved and how well react to the robot. As can imagine, sometime between this period of time and now, we'll be able to produce a robot that's genuinely capable of performing admirably in the manufacturing environment (Wildmann, 2014).

Finally, when it comes to the third group, which is comprised of complicated projects, there is no set restriction in place. What could have been seen in the industry is that robots that need more than 10 weeks of development, for example, are more sophisticated and may not be suitable for RPA (Wanner, 2019b). At the outset of any project, it is critical to consider if robotic process automation (RPA) is the best answer in terms of the technology that will be used. It is best to avoid RPA initiatives that take more than 10 weeks to complete since this time frame is often associated with the issue of excessive complexity in projects (Lamberton, 2017). Furthermore, high complexity often brings together many applications in which the robots are used. As a result, the automation's weak areas are becoming more apparent (Leshob, 2018). Even if we are capable of completing a project in 12 weeks, may anticipate that things

will go wrong in the future (Wanner *et al.*, 2019b). Of course, deliver it and complete the task, but further issues may arise during the post-production stage, when the robot is operational and performing its functions. Consider the possibility that any modification in any of those applications may have an influence on the architecture, necessitating our stopping the robot and working on it. As a result, when the project's complexity is considerable, it is very necessary to pay close attention to every detail (Hofmann *et al.*, 2020).

3.5.2 Failure factors

Robots provide financial advantages and assist in enhancing the pace and quality of service delivery. Where the robotic process automation is successful, some of these are some features that are observable within such organizations. First, there is increased productivity as robots help the overall productivity across the process, as quantified using key performance indicators (KPIs) (Stasevych et al., 2020). Second, the firm can be guaranteed consistent better quality in the works done by robots as the same patterns are followed each time the procedure is completed (Carmo, 2020). Third, the organization records faster speed as bots may execute a task with a 90 percent reduction in the total time required (Marciniak and Stanislawski, 2017), resulting in shorter turnaround times for customers (Fernandez et al., 2020). Finally, there is zero error recorded as bots do not experience weariness while doing the same activities again and over (Fernandez et al., 2020). They thus maintain the same level of efficiency throughout their working lives.

On the flip side, according to research, first RPA programs in firms fail in a proportion ranging from 30 to 50 percent (Fernandez et al., 2020). Though RPA is renowned for its simplicity, automation software implementations are not without obstacles. Lacking an appropriate RPA strategy, will lead to costly and failing initiatives (Fernandez et al., 2020). Some of the observable features of a failed RPA include first, Governance Issues, particularly where sufficient resources in the effective management and monitoring of the program is not available (Al Balushi and Goel, 2019). Also, second, the choice of automation candidate by the organization selects the incorrect automation candidate (Dey and Das, 2019). As a result, the bot may have a significant influence on a whole function rather than only tweaking chores at a single individual's computer. Third, there may be system challenges as the management of bot and other digital employees in may be malfunctioning. The misconception is that once the robot is deployed, the task is done, and it will operate independently with no supervision (Al Balushi and Goel, 2019). Finally, the simplicity of bot construction and deployment may be deceiving.

While creating a bot seems straightforward enough, without the proper technology and methodology, the bot is more likely to cause problems and add effort than just doing the operation manually. (Flechsig et al., 2021)

Generally, the failure of robotic process automation may be linked to either one or a combination of these factors. They include:

Forgetting business-IT collaboration A successful RPA strategy must be driven by the business rather than by IT and which is common factor for all successful RPA implementations. IT should only be a supporting tool moreover it is important that the business incorporate all business functions such as IT security, IT infrastructure, HR functions, finance, compliance teams etc. to fully integrate the virtual workforce. To effectively manage RPA programs, make crucial decisions, and remove roadblocks, IT and business must work together. Businesses often overlook that RPA will ultimately establish a virtual workforce that enables them to task robots throughout the whole corporation. IT is not responsible for managing the current agent workforce or a virtual one. Establishing a business-owned RPA Center of Excellence (CoE) also decreases dependency on an overburdened IT staff. As a result, business led CoEs allow companies to prioritize which jobs to assign to virtual workers and which to automate. (Deckard, 2019)

Lack of clarity in the selected RPA business case Inappropriate selection of the candidate process is typically one of the root causes. Organizations, who are rushing into RPA implementations tend to depend on IT, hence long-term strategic RPA advantages are generally misaligned. Business and IT should collaborate to clearly articulate the business case, identify the organization's true motivations for RPA adoption, and establish use cases with measurable outputs and KPIs. (Rutaganda, et al. 2017)

Long-term RPA roadmap is not present Most early adopters of RPA, have no experience therefore leading to taking impulsive decisions. Successful RPA organization functions with a strategic vision achieved within a framework of an RPA centre of excellence and a solid governance structure. It is essential to consider, once the human invention has been substituted, workforce should be allocated to handling exceptions and monitoring of the bots (Rutaganda et al. 2017).

Delivering RPA benefits on shifting sands Organizations on a transformative path where workforce, business processes, and underlying tools and technology are continually changing is not appropriate to deliver RPA benefits (Rutaganda L, et al. 2017).

Focusing on incorrect processes A common mistake that organization do is, targeting RPA at a high complex process which leads to consequences such as high automation costs additionally waste of effort. It is vital to perform a cost benefit analysis to identify the optimal portfolio of processes. (Lamberton, et al. 2017)

Incorrect delivery methodology Companies frequently attempt to apply an over-engineered software delivery process to RPA, resulting in lengthy delivery delays. Using agile delivery approach results in better delivery and with the correct methodologies, RPA solutions can be released into production every 2-4 weeks. (Lamberton, et al. 2017).

Automating in a non-efficient way Often, corporations aim to completely automate a process, that leads to increased costs or delays. However, since many processes start with a meeting or need many client engagements, existing RPA solutions cannot automate them entirely. Initially, RPA should be seen as the ultimate "helper", doing simple tasks in a process, and allowing people to accomplish more. Automating 70% of a process and leaving 30% to employees is a decent start, as it is always feasible to revisit the procedure and enhance it afterwards. (Deckard, 2019)

Not monitoring after processes are automated Not thinking about how to bring processes online and who oversees the robot workforce might postpone go-live and benefits delivery. A business-led RPA CoE is the greatest method to manage and enhance a virtual workforce. Hence the CoE processes need to be in place, IT governance approved, and personnel trained to operate robots and continue to enhance processes. (Lamberton, et al. 2017).

Not treating RPA as a change program, RPA frequently involves automating sub-processes and consequently humans are still engaged in the rest of a process. Therefore, unless re-organization and FTE-release of capacity occurs, then agents "drift off" and decide to execute other job – which is frequently giving a better service as they now have more time. (Lamberton, et al. 2017).

More than one of the concerns described above is commonly present, causing a considerable **multiplier effect**. Which is typical and may lead to loss of confidence in RPA and projects halting. (Lamberton, et al. 2017).

3.6. Summary

This chapter is summarized as follows. Sub-research questions 1 to 4 have been answered in this chapter. The RPA lifecycle follows from analysis, bot development, testing, then ends with the implementation and maintenance. In other words, a group of experts gathers to analyse the objectives of the project and the requirements that is, to understand the problem to be solved and how to solve it. This answers first question What is the RPA lifecycle approach?

Second section of this chapter presented process suitability which answers the second question What is the process suitability for RPA? Suitability of RPA involves the automating repetitive and autonomous operations. Therefore, rule-based, logical processes, well-defined and structured data, with a predictable set of output values are required.

Lastly, to ensure that RPA are monitored key indicators are identified which answers the third question. How can the success or failure of an RPA project be measured?

Figure 7 summarizes the success factors and figure 8 summarizes the failure factors of RPA. It is essential to keep in mind that variables of success and failure are diametrically opposed to one another. This section answers the Which prominent factors may influence success and failure of RPA project?

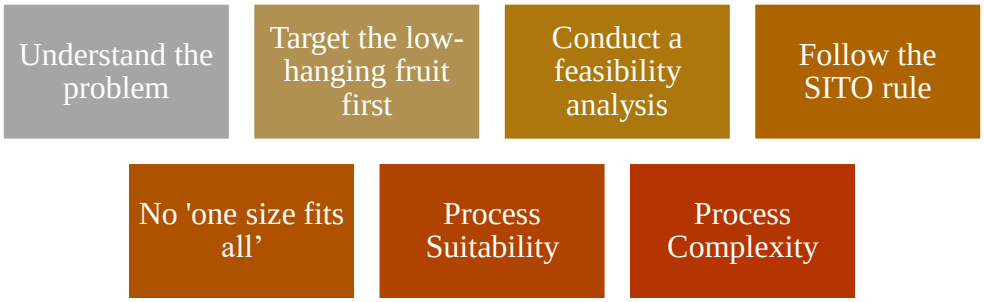

Figure 7: Success factors of RPA

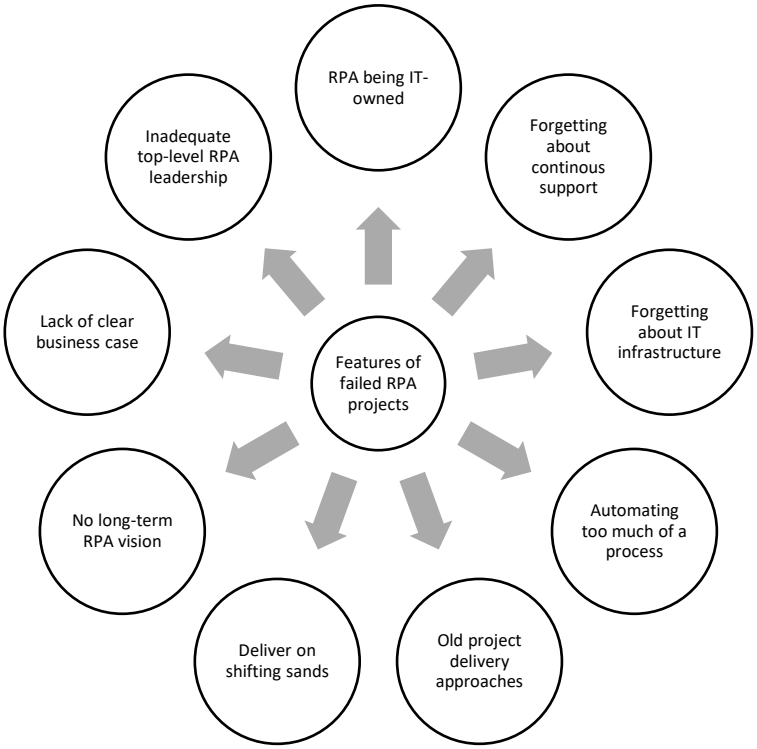

Figure 8: Failure factors of RPA Projects

Chapter 4 : Data analysis and Findings

4.1 Introduction

In this chapter, the data obtained from the case study are analysed and the results are discussed. The data analysis and findings are presented, and it involves the use of thematic analytic approach to deductively identify the key indicators of a successful/failed RPA project. In this chapter and subsequent chapters, the research questions related to Group NN will be conclusively answered. Section 4.2 presents information on the data collection, Section 4.3 recalls about data analysis and present results obtained from the interview analysis, Section 4.3 presents second phase of information collected on this research; and 4.5 is the summary of the chapter.

4.2 Data Collection

As stated in Chapter 2 – 2.5 Data Collection interviews were conducted to collect data about RPA projects in Group NN implemented by PM&I team. To analyse RPA projects 20 interviews were organized. Interviews consisted of semi structured questions and the purpose of the interviews was to identify about the process of RPA implementation and success or failure of RPA projects in the PM&I team at Group NN.

The interviews questions were formed firstly to have an understanding about the interviewee's background/experience and about their responsibilities. Then it is focused on understanding and evaluating the processes undertaken by RPA in the selected department before and after automation. The interviewee would describe the manual steps of the process and which steps of the manual process were automated. Furthermore, interview questions will investigate the complexity of the process, business goals of the automation, information about stakeholders, and duration of the automation project. A question was included to discover whether the interviewee thinks the automation was a success or not and what kind of obstacles were faced during the automation process to understand whether there are aspects which should be focused to improve projects in the future. Moreover, the interviewee will be inquired about the business case and the discussion which took place during the business case session as it has been that highlighted in literature that identifying the right processes to implement is an important aspect of implementing RPA. Below Table (3) presents the interview questions that were formulated to understand RPA implementation in Group NN.

Table 3 : Interviews

1.	How long have you worked at NN and what is your position/role?
2.	Can you describe the ___ process before automation and after automation?
3.	Can you define and rate the complexity of the process before automation? (1-10)
4.	Can you rate the complexity of the process before automation? (1-10)
5.	Who initiated the automation to take place?
6.	What was business goal to be achieved with automation of this process?
7.	What was considered during the intake session before automating the process?
8.	Who are the relevant project stakeholders/parties that benefits from the automation?
9.	What is your role in the project?
10.	What kind of automation method was used? How was the process automated?
11.	When did the project start and when did it end?
12.	What obstacles were faced during automation and how were they managed?
13.	Was the automation success in your opinion, what made it successful/if not why?
14.	From scale of 1- 10 how would you rate the success of the automation?
15.	Was there a project evaluation?
16.	What would you have done better in this project?

4.3 Data analysis

Twenty employees were selected from different departments, as shown in table 2, to take part in the interviews. Each of the participants was called via video call, the questions were read to them one after the other, and they responded accordingly. The conversation was transcribed, and thematic analysis was used to analyse the interview questions. Explanation of how the thematic analysis was conducted can be referred at Chapter 2 – 2.5 Data Analysis.

4.3.1 Definitions of success or failure of RPA project in the context of Group NN

The response of the participants to the question below were summarized and the results are shown in Figure 9. The raw data from which the results below were obtained can be found in the appendix.

Interview Question: Was the automation success in your opinion, what made it successful/if not why?

Figure 9 : Key phrases of success or failure based on interviews

Given that there were 20 interviews, there were 20 replies to the interview question stated above. Figure 9 is the summary of the key phrases derived from interviews because several interviewees provided similar responses, fourteen different key phrases were extracted. The blue boxes indicate interviewers' definitions of success. The red box indicated of unsuccessful project. In the sections to follow, these phrases will be merged to form a measure of success/failure.

4.3.2 RPA indicators

The whole conversation with the participants were analysed thematically with the aim to identify key information to infer the indicators of success or failure RPA projects in the NN Group. Table 5 shows the results of the analysis.

Table 4 shows the summary of the responses of the participants to the variety of interview questions. The familiarization stage of thematic analysis was done by reading through all the 20 transcribed text documents to have an insight of the content of the conversation. A trend of similar responses was identified, and a general interview extract was used as shown in Table 6. Of course, the participants are experienced employees of NN Group, and this implies that their judgement was taken to be valid and reliable.

Table 4: Overall Thematic analysis from the interview data.

S/N	Interview extracts	Codes	Themes	Indicators
1	"33 years… 24 years… 25 years… 16 years… 3 years"	Experienced participants	Experienced participants	Experienced participants

2	"…Well, if I compared to before we had robots, well, it takes way more time…" "Robot, take about one minute, one or two minutes…"	RPA nullifies the time-consuming nature of manual report process	Less laborious	Speed
3	"…when people are doing things by hand and mistakes can happen, with robots that should not happen…" "Less time and less mistakes…"	RPA nullifies the human error in documentation	Error-prone	Accuracy
4	"I think to process it faster and cheaper." "…first three people and now one, people."	RPA provides fast and cheaper operation	Speed and cost	Speed and cost
5	"…the change can be easily executed." "Every time something happens if it has an impact, well, we can still change it."	RPA is flexible	Flexibility	Flexibility
6	"It's more of a layout's kind of stuff..."	RPA layout of the system is easily modified.	Layout	Layout
8	"Once every two weeks, we have a meeting about robots that we own. So that is more like an ongoing process."	RPA is constantly evaluated and monitored.	Monitoring	Monitoring
9	"It was a long time, it took months. I think it took half a year before the robot was working…"	Implementation of RPA cost much time	RPA execution took about 1 year before	Project execution timeframe

	It was an easy process but cost so much time and it was not worth it.		steady operation.	
10	"Sometimes, but mostly there's a technical reason."	Technical issue	Technical issue	Technicality

Table 5 shows the ranking of the indicators based on their frequency in the conversations by each of the RPA. Below the table definitions of the indicators has been explained.

Table 5: Indicators' frequency and percentage table.

Indicators	Key words	Frequency	Percentage (%)	Ranking
Accuracy	Error, mistakes, accuracy	25	10	1st
Speed	Fast, time, speed	23	9.2	2nd
Flexibility	Change, problem	21	8.4	3rd
Cost-reduction	Cheap, cost	12	4.8	4th
Technicality	Technical, errors	10	4	5th
Layout	UI	9	3.6	6th
Project execution timeframe	Time, delay	9	3.6	6th
Monitoring	Meeting, schedule, evaluation	7	2.8	7th

- ✓ *Cost reduction* - a successful RPA project must have records of significant reduction in operational cost. Cost reduction is also associated with reduction in cost of labour. Many manual processes require more labour to complete the task. So, the deployment of RPA should of course reduce the number of labour and consequently reduction of the cost.
- ✓ *Speed*: implementation of RPA should result in faster operational speed. Operational speed for a successful RPA project should be faster than the conventional methods. Speed is also associated with operational time which means the time within which certain operations carried out with RPA should have a significant difference when compared with the conventional methods.
- ✓ *Accuracy:* Implementation of RPA should result in significant reduction in operational errors. Errors are what occur on frequent basis in the conventional methods as reported by the participants in the interview. Therefore, for an RPA to be considered successful then it must solve this problem.

- ✓ *Layout* – This means the complexity of the system's layout. RPA must have a friendly user interface.
- ✓ *Flexibility* – Means ease of system modification in the system therefore a successful RPA should be flexible in terms of changes observed upon evaluation.
- ✓ *Monitoring* – Bots should be constantly observed after RPA has been implemented and hiccups should be monitored.
- ✓ *Project execution timeframe* – The timeframe it has taken to implement the RPA project.
- ✓ *Technicality* –Hiccup occurrence, which means errors which occur after implantation of robot.

The frequency table above (Table 5) was generated by the following steps:

- Familiarisation method to have an insight of the key words to search for in the document.
- Document the key words to search for each of the factors.
- Use the MS-Word "Find" feature to search for the factors frequency by entering the key words (Figure 11).
- Filter the results by reading through each sentence to identify sentences related to the factor searching for.
- Count the frequency for each of the key words results in each of the conversation then add up the results.
- Assume a fixed total word count for each of the conversation – a total word count of 250 was assumed for each of the conversation.
- Calculate the importance percentage by the equation (1) below:

$$\boldsymbol{Factors}\ (\%) = \frac{\boldsymbol{Factors\ frequency}}{\boldsymbol{Total\ word\ count}} \times \mathbf{100}\%$$

Equation 1 : Frequency Calculation

Figure 10 shows the screenshot of the number of cases of speed related factor conversation in the document. Each of the conversation was scrutinized and the related conversations to the factor of concern were selected. This was done for all the factors and their frequency and percentage was documented.

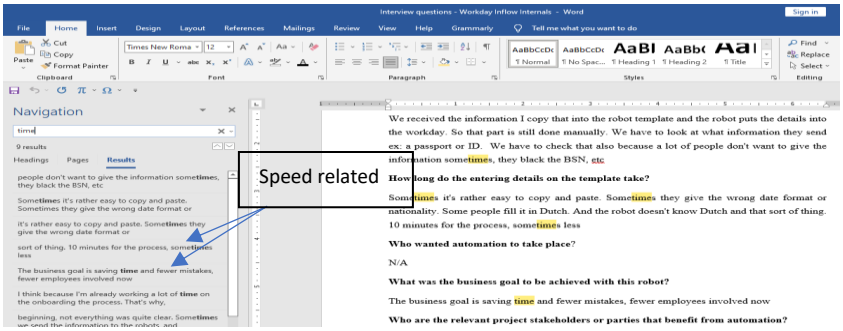

Figure 10: Speed factor frequency count using the word "time."

4.3.3 Scoring Model to measure success rate of an RPA project

In this research the RPA projects of NN Group have been identified successful or failed by analysing the definition of successful/failed project as defined by the participants. In table *6* the projects evaluated in this research are presented followed by the responses of the participants to the question: **Was the automation success in your opinion, what made it successful/if not why?** The main response was extracted and put in the column 'Participants' responses.' The successful and unsuccessful projects were extracted and the corresponding key indicators or weaknesses. The indicators were deduced thematically from the conversation by associating the sentences with a nearest meaning. In the last column, success score was attached to each of the project and the score was determined as thus:

1. If the project was successful (S) and with four and above indicators (4I) then it has 1.0 score.
2. If the project was successful (S) and with three indicators (3I) then it has 0.9 score
3. If the project was successful (S) and with two indicators (2I) then it has 0.8 score
4. If the project was successful (S) and with only one indicator (1I) then it has 0.7 score
5. If the project was successful and with no apparent indicator (0I) then it has 0.6 score
6. If the project was successful (S) and with only one drawback (1D) then it has 0.5 score
7. If the project was successful (S) and with two drawbacks (2D) then it has 0.4 score
8. If the project was successful (S) and with three or more drawbacks (3D) then it has 0.3 score
9. If the project was apparently disapproved (D) but still in use (1I) then it has 0.2 score
10. If the project was unsuccessful (U) but in the process of restoration (R) then it has 0.1 score
11. If the project was unsuccessful (U) and the manual process is still in use, then it has 0 score

Table 6: Responses to the question: "would you say that the automation was a success and if so, why?"

S/N	Project	Participants' responses	Success/failure indicators	Success score
1.	Amber Retrieve	Definitely. During the closing, because here, we must deal with every day for about two weeks, and by doing so, we make sure that PSI and Amber are the same for the cost. Yeah, and, and that is the basis for all costs process. So yeah, it is a big, big success.	Big success, huge success, very successful Indicators: 1. Cost reduction 2. Faster operational speed 3. Accuracy	0.9
2.	brokerage administrations (negative)	It was not a success. It was a terrible mistake. Afterward, now we are working with it because it is there. Normally, it will take 40 hours to make this, but it was hundreds, hundreds, hundreds of hours, it was terrible. It is so it is not worth it. It was a terrible project. That is why I did not want another robot anymore. If I knew, and if I knew this before, we would not start. In the beginning, we were given false promises.	Failed RPA Terrible, mistake, false promises Indicators: 1. Insignificant increase in operational time 2. Project execution timeframe	0.2
3.	Clarity Month End	Success, because it takes us fewer hours now and more time to do other things	Successful, fewer hours Indicators: 1. Reduction in operation time 2. Higher speed 3. Cost reduction	0.9

4.	Clarity resource management	It is a success because it is what I say, first three people and now one, people.	Successful, Indicators: 1. Reduction in cost of labour 2. Accuracy	0.7
5.	HR Transfer	I would say it is a success. In the case of the previous UI, it was perfectly fine. But in the case of the new UI, we are still getting used to it because even the SME side does not have much knowledge on how the new UI works.	Successful Weakness: 1. Layout	0.5
6.	Intercompany Reports Generation Unattended FA	It saves me about 2 or 3 hours every month. So, it was successful because it saved time.	Successful Indicator: 1. Reduction in operation time; faster speed	0.7
7.	Manual Journal Entry 2	Yeah, it was a huge success, because first, even with the first release, it already saved a lot of time, effort on the business side.	Huge success Indicators: 1. Reduction in operation time; faster speed 2. Reduction in cost of labour	0.8
8.	MJE Far NN bank	Yes. I think because it works, what we want to do, first, so we want to save time, and we want to make less error.	Successful Indicators: 1. Reduction in operation time; faster speed 2. higher accuracy	0.8
9.	MJE PSI	Yes, I would say yes, the automation was a huge success. Because the robot has been running from 2017, I guess, until now and it is	Huge success Indicators: 1. Reduction in operation time	0.8

		processing 1000s of records every year. It is saving a lot of hours for the financial accounting team.		
10.	Reconcile Account	Yeah, I would say it is a success because in the end, we have achieved what we expected. So, now, the dependency has been reduced, the report is readily available, and the robot is successfully running every day.	Successful Indicators: 1. Faster operation; improved speed 2. Accuracy 3. Flexibility	0.9
11.	Requisition to PO	Yeah, I would say it is successful because we have very few incidents. It is working quite well.	Successful Indicators: 1. Faster speed 2. Accuracy	0.8
12.	Robot Fixed Price	Yeah, very much. We are still using it. I think we are already using it for three years. It is also not a very big or complicated process.	Very successful Indicators: 1. Layout	0.9
13.	Robot Money Market Limit	I think it is a success because it is running well. I think the first two years were quite some hiccups but now it is going smoothly.	Successful Weakness: 1. Technicality	0.5
14.	SAP DCM	Because we are not doing it manually anymore. So, we run the robot, 90% of the run, were successful.	Successful Indicators: 1. Speed and Time	0.7
15.	Uitbetalen Credits	Yeah, automation was a success because the team size who was in NN life doing all	Successful Indicators: 1. Speed and Time	0.7

		these steps manually has now been reduced.		
16.	WKR Sampling	Yeah, I think it was a good success because we have a good example of cooperation between RPA and other external applications	Good successful Indicators: 1. Faster speed 2. Accuracy	0.9
17.	Workday Inflow Internals	It's a success because new colleagues are going into the process easily and it's easier to give clear instructions on what they must do now, less time now	Successful Indicators: 1. Reduction in operation time	0.8
18.	Coe Error Screensho Purge	Doing the job that it was built for.	Successful 1. Speed 2. Accuracy	0.6
19.	NAW	The automation was a great success. The SMEs are still happy with it, even if it was deployed in 2019 Jan more than two years it has been running.	Great success 1. Accuracy	0.6
20.	password change	I would say it is quite successful because it's 98% automated already, and it saves us a very big amount of time.	Quite successful Indicators: 1. Reduction in operation time	0.8

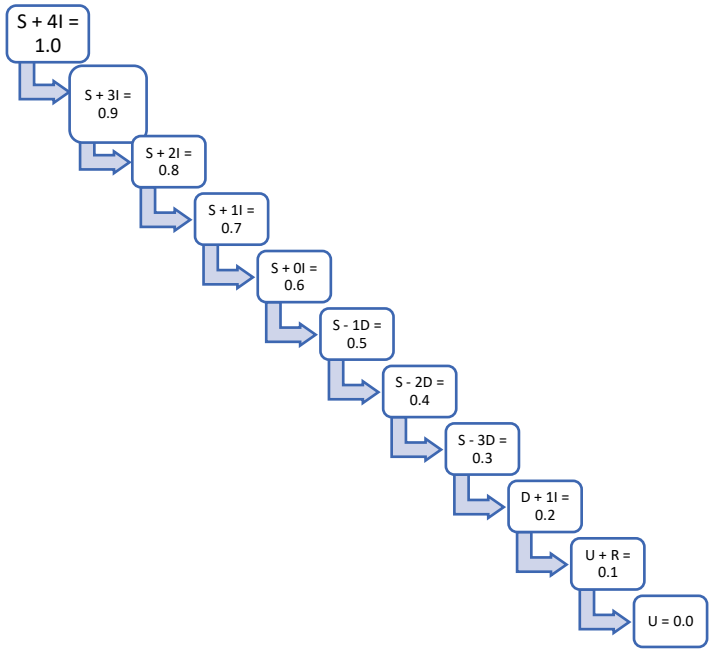

Figure 11: RPA projects success and failure measurement model.

Figure 11 shows the breakdown of the classification of the scoring of a successful RPA project. This was used as the measurement in the Table 7 out of the which the grouping was inferred.

Table 7: RPA Success and failure scoring model

Degree of success

Degree of failure

Score	Measurement	Group
1.0	• S + 4I = 1.0	Excellently successful
0.9	• S + 3I = 0.9	
0.8	• S + 2I = 0.6	Very successful
0.7	• S + 1I = 0.7	
0.6	• S + 0I = 0.6	Successful
0.5	• S - 1D = 0.5	
0.4	• S - 2D = 0.4	Failed G2
0.3	• S - 3D = 0.3	
0.2	• D + 1I = 0.2	Failed G1
0.1	• U + R = 0.1	
0.0	• U = 0.0	

Table 7 shows the model developed for the classification of RPA project in NN Group.

Where S = Successful

I = Indicator

D = Drawback

U = Unsuccessful

R = Restoration

G = Grade

The model has three main features 'Score' 'Measurement' and 'Group.' An RPA project is successful if it has its score within 0.5 – 1.0. Moreso, the degree of the success is also specified. Similarly, an RPA project is considered to have failed if the score falls within 0.0 – 0.4. This model can be used to verify if an RPA project was successful or failed by supplying the details of the project into the formulas in the 'Measurement' column. Having applied this model on the current data, it has been observed that all investigated RPA projects of NN Group were successful except one as shown in Figure 12.

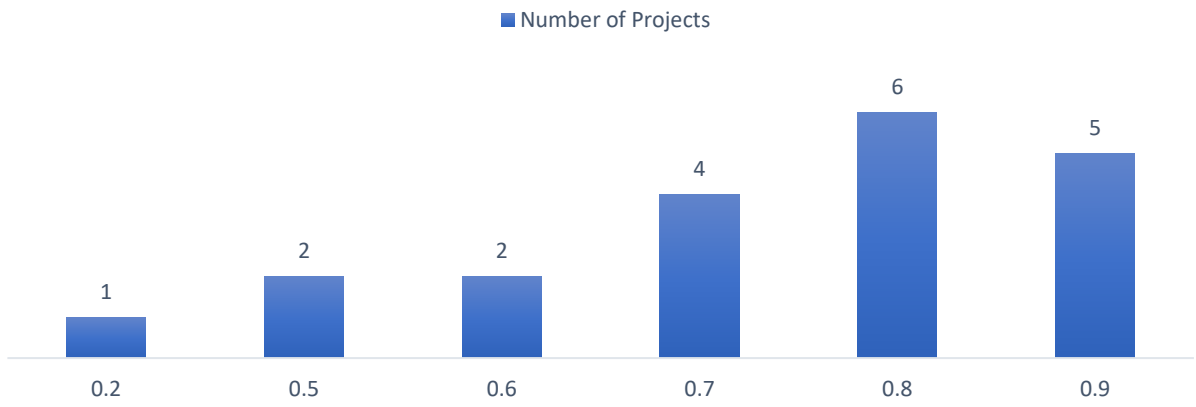

Figure 12: Number of projects based on the success score

Above bar graph represents the number of projects belonging to each score group. Having applied model in Table 7 to the case study of this research, it was observed that all investigated projects except one ('Brokerage Administrations') were successful. When considering the scores within 0.7 and 0.9 inclusive, already 15 out of the 20 NN Group RPA project were "Very" and "Excellently" successful. However, it is important to mention that, even though most of bots were successful, during the implementation process some bots/robots faced obstacles which were identified during the interviews.

4.3.4 RPA explanatory factors

Table 8 presents the explanatory factors of the successful and failed RPA projects that were deduced from the thematic analysis of the interview data. The estimation of the frequency and importance percentage follow the same procedure as that of the indicators. Below the table each factor has been explained in detail.

Table 8: Explanatory factors statistics.

Explanatory Factors	**Frequency**	**Percentage (%)**	**Ranking**
Problem understanding	32	25%	1st
Process suitability	26	20%	2nd
Feasibility analysis	21	16%	3rd
Lifecycle	20	15%	4th
Targeting low-hanging fruits	18	14%	5th
System flexibility	11	8%	6th
Complexity	2	2%	7th
Total	**130**	**100%**	

Problem understanding: This can be defined as the result of a process of gathering information on RPA project prior to implementation. It is abroad process in out of which many other factors are identified (Martínez-Rojas et al., 2020). For instance, problem understanding could be the result of gathering information on the manual process and robot solution to be used. Therefore, when a new RPA project is to be developed: (1) be certain that you grasp the genuine issue that the RPA is going to solve; (2) zoom out the problem by identifying every little process involved in the problem.

Feasibility analysis: This factor helps in revealing the estimated cost and benefits of a project which consequently identifies the project viable or otherwise. The main question would be: how feasible is this RPA project for this operation? This involves carrying out evaluation and the historical records of the RPA in comparison with the current project prospects. Of course, RPA differs in characteristics and operation therefore this must be done per each of the RPA. Any technology or platform that is in the early stages of adoption and maturity should be mapped to business requirements to ensure that it is appropriate for its intended purpose. Speed and accuracy can be an indicator of this factor such as the RPA being feasible to achieve faster operational speed and accuracy which consequently earns the organization an enhanced productivity.

Low hanging fruits: this refers to the rule that processes with the simplest operation be given priority as this enables advancement of the technology easier (Jiménez-Ramírez et al., 2020)

System flexibility: System flexibility refers to the design of the RPA enabling easy modification such as the upgrading or downgrading operation which may be a result of ever evolving technology. This could be like changing the code of the robot should be easy. Change of personnel should not alter the operation of RPA significantly. The development of RPA must give room for easy modifications.

Process Complexity: Complexity of the manual process can be identified by considering the several factors such as the time taken to execute a task, the frequency of human intervention, the number of tasks to be executed, any exceptions, and number of applications involved. The primary aim of this factor is identifying the most complicated aspect of a process which may help in the design and structure of an RPA to prevent the occurrence of irregular breakdown of the system.

Process suitability: Process suitability can be defined as the certain properties of processes that correlate with the RPA functionalities such as the manual operation to be replaced with automation (Wellmann et al., 2020). A process for RPA is suitable when the manual process is highly rule-based, has a high number of operations, is a stable process, and the process steps are repetitive, as previously mentioned in Section Chapter 3.3. The emphasis is on RPA since failure to adequately analyse this component may result in an inadequate alignment of RPA features and manual operation processes.

Lifecyle: This is an ordered implementation of processes involved in the RPA deployment that may lead to the successful implementation of an RPA. In other words, the project implementation should have a predefined process orderliness.

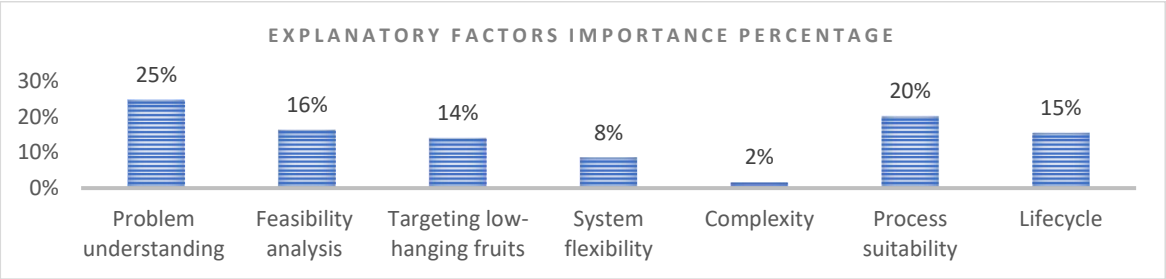

Figure 13: Explanatory factors importance percentage.

From Table 8 and Figure 13, the importance percentage of the exploratory factors can be seen, and they show that 'problem understanding' has the highest percentage followed by the 'process suitability.' By the application of these explanatory factors, there is higher probability of achieving similar results to the case study in this research. Notably, NN Group achieved 95% success rate in their RPA projects contrary to the results obtained from the literature which states that 50% of RPA project implemented fails.

Figure 14 is the model derived from the results obtained from the thematic analysis of the interview data. The model followed the Ishikawa Diagram format in which the cause and effect are depicted. With the model above, a new RPA in Group NN can be evaluated prior its implementation which therefore may prevent loss of resources and energy.

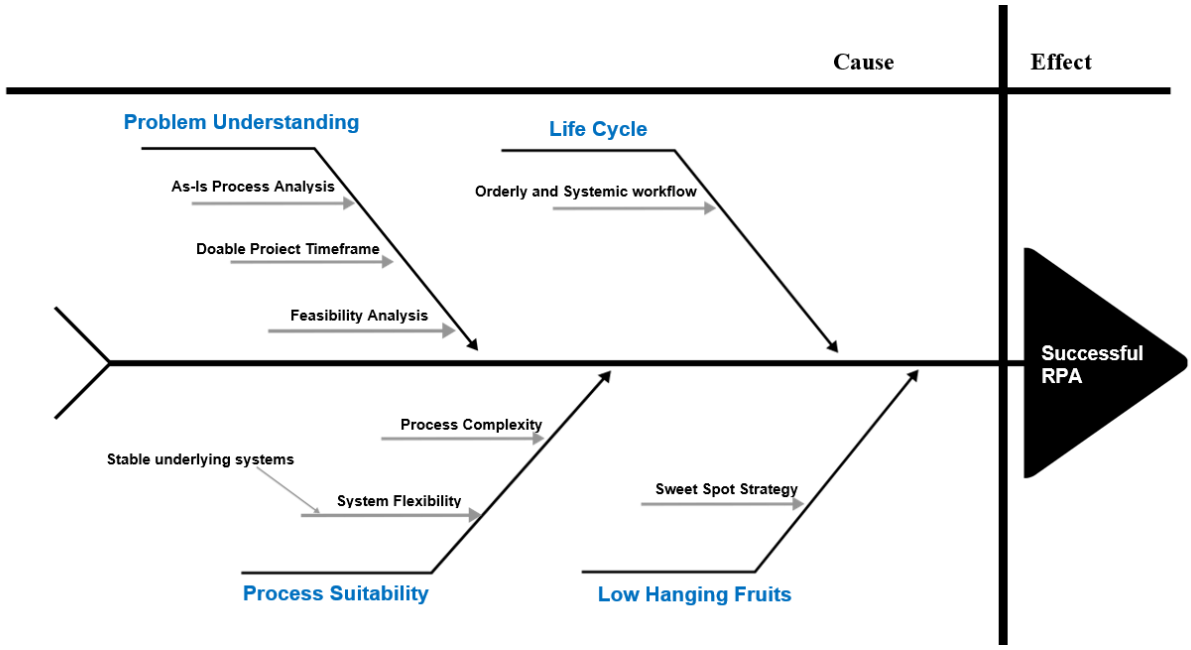

Figure 14 : Cause and Effect diagram derived from explanatory factors

The cause-and-effect diagram presents the explanatory factors of success in Group NN which was derived from the interview analysis.

- As discovered earlier through interview analysis, problem understanding is an important factor in implementing RPA. Well documented as-is process analysis causes good problem understanding since it documents each step of the chosen process, consequently causing precise documentation of a comprehensive RPA solution. Therefore, possessing in-depth **Problem Understanding** about the problem to be solved using RPA has a **positive** influence on success.

- It is crucial to estimate a feasible project timeline, as this will prompt assist to examine the implementation's viability in greater depth. Lack of understanding the problem's scope can lead to establishing unrealistic project timelines.
- Feasibility analysis, which analyses the project's viability and all the benefits that RPA will provide causes a good problem understanding. Performing a well-structured **Feasibility Analysis** influences the RPA projects **positively** as the relevant parties will evaluate the process prior to the automation for viability of the automation. *Refer to life cycle followed by PM&I team which states about their structured feasibility analysis.*
- Process suitability is another crucial factor in RPA success. Determining if a process is suitable for RP automation is contingent upon evaluating the process's complexity. Having high **Process suitability** has a **positive** influence on RPA as more suitable a process is, higher the success rate and low **Process Complexity** influences RPA **positively** as it leads to higher chance of success. Refer to complexity section in Chapter 3 to understand more about different level of complexity.
- System flexibility contributes to process suitability given that it is essential that the algorithm of a bot should be easily modifiable during maintenance or when an error arises, or when another developer wishes to modify the bot's code. Stable underlying system promotes system flexibility by reducing the frequency and likelihood of modifications to the system's code. Having high **System flexibility** influences the RPA projects **positively** as changes to the codes/algorithms can be done promptly.
- Having an orderly and systematic workflow causes a well-structured life cycle, which is another factor contributing to RPA's success. Having a well-structured **Lifecycle** had a **positive** influence on RPA as it leads to methodical flow.
- Having a strategy where processes are sorted out on matrix like structure based on complexity which is called sweet spot within the PM&I team. (Refer to Chapter 4.4.1) Processes that fall under sweet spot leads to the selection of low-hanging fruit, resulting in successful RPA implementations due to the ease of automation implementation. **Targeting low-hanging fruits** has a **positive** influence because when automation is easier to implement it has a higher probability of success.

Table 9 highlights explanatory factors surfaced from each interview/project.

Table 9 : Explanatory factors on each project

Project	Explanatory factors
Amber Retrieve	-Problem understanding -low-hanging fruits -Process suitability -System flexibility -Prior feasibility analysis
Brokerage administrations (negative)	-High-hanging fruits -Complexity -Process suitability
Clarity Month End	-Problem understanding -Prior feasibility analysis -Process suitability
Clarity resource management	-Process suitability -Problem understanding
HR Transfer	-Prior feasibility analysis -Process Complexity -Process suitability -System flexibility
Intercompany Reports Generation Unattended FA	-System flexibility -Process suitability
Manual Journal Entry 2	-Problem understanding -Process suitability
MJE Far NN bank	-Problem understanding -Low hanging fruits
MJE PSI	-Process suitability -Feasibility analysis -Problem understanding
Reconcile Account	-Problem understanding -Feasibility analysis -System flexibility -Process suitability
Requisition to PO	-Low hanging fruits

	-Process Complexity -Prior feasibility analysis
Robot Fixed Price	-Prior feasibility analysis -feasibility analysis -System flexibility
Robot Money Market Limit	-Problem understanding -Process suitability
SAP DCM	-Problem understanding -System flexibility -Process suitability
Uitbetalen Credits	-Prior feasibility analysis -Problem understanding -Process suitability
WKR Sampling	-Prior feasibility analysis -System flexibility -Problem understanding
Workday Inflow Internals	-Problem understanding -Process suitability -System flexibility
Coe Error Screenshot Purge	-Problem understanding -Prior feasibility analysis
NAW	-Problem understanding -Process suitability -System flexibility
Password change	-Process suitability -Prior feasibility analysis -Problem understanding -System flexibility -Low hanging fruits

4.4 Data Analysis – Part 2

In this section, we describe a second round of data collection and analysis, after analysing the set of projects as described in the previous section. The scoring model that resulted from that

first analysis indicated a high success rate of the robot's implementation in the dataset and very few examples of failed projects. To increase understanding of factors that could lead to failure, additional research was conducted. This included collection of additional data, of failed projects, and analysis of that data. Moreover, the high success rate found in the dataset seemed to contradict results from several scientific studies on the success or failure of RPA projects (EY, 2016) To understand the reasons for this contradiction, additional data collection and analysis was conducted.

As the success rate is high in projects developed by PM&I team, then the curiosity to identify the indicators and the explanatory factors made the research further interesting. One explanation for the high success could be the PM&I team does not develop process that are highly complex. When asked why this was, it was revealed that the PM&I team concentrates on low-risk processes to provide their customers with the maximum benefits as well to avoid missteps during development. In 2017, when the team was initially created, the PM&I utilized Figure 15 to determine which processes would be the most effective to automate.

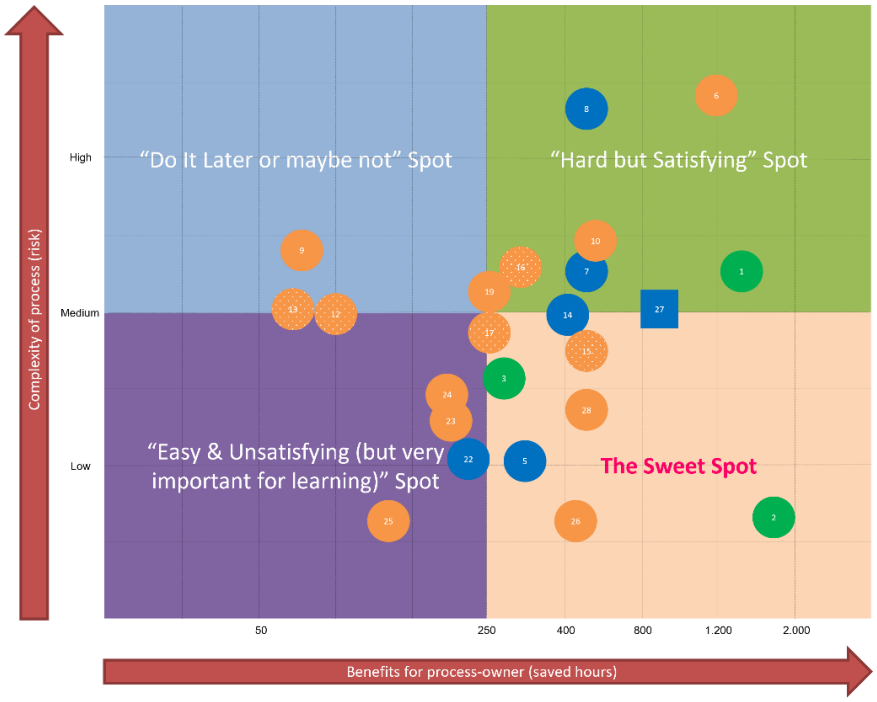

Figure 15 : Plot model used by NN group

The following plot model (Figure 15) was used by PM&I team to identify which processes provides the best output and model was introduced by a consultant in Cognizant together with a steering committee in Group NN. The categories "*Do it Later or Maybe not*", "*Hard but Satisfying*", "*Easy & Unsatisfying*" and "*Sweet Spot*" were decided by the steering committee in Group NN. Together with the PM&I team, they plotted the processes relatively to each other

on the quadrants. PM&I team's focus was on processes that fell on sweet spot quadrant as it delivers the most value and is less complex. Complexity of a process was based on number of decisions in a process, amounts of applications used, amounts of controls and data (privacy and/or financial data) involved. Higher the complexity, the higher the risk of failure. Based on the plotting PM&I team decided to focus on less complex processes which can be supported up research of Syed R et al.,2020 that fewer complex processes are suitable for RPA implementation. The plot model provided a great start to the PM&I team with the RPA implementation as it provided them insights on what processes to focus on to achieve the maximum results. Moreover, it provided them a successful leaning to journey to identify which processes are suitable for automation.

In form of reliability and validity test of the data, the years of experience of the participants have been taken to test for the reliability and validity of the data. Below shows some of the responses of the participants: *"I'm working for 33 years, and my role is a senior intermediary administration…" "I'm working 24 years now for NN and my role, for now, is functional management for clarity…"* About 90% of the participants have spent 10 years and above working at NN Group and this suggests that they have long history of the operation in their department. Interestingly, some of them have worked in more than two departments, in other words, they have experience across the departments which is a good measure of their response reliability. From this it can be concluded that the data obtained from the NN Group is a good practical experiment to evaluate the indicators and measurements of a successful and failed RPA project. This agrees with the results obtained from the analysis where the main data was analysed and the key indicators and measurement of a successful or failed RPA were identified. However, having a substantial higher ratio of the successful RPA projects hindered the thorough analysis of the failed project as only one of the projects failed in the case study analysed. Hence, analysing a more distributed (mixed) projects in terms of their status (successful and failed) would shed more light on the indicators and measurement of RPA projects.

The use of RPA differs based on different organizations. It can be identified that, the life cycle PM&I team follows is one of factors that allowed them to succeed, which is further explained in the next section.

4.4.1 Life Cycle of RPA followed by the PM&I team in Group NN

It must be established that life cycle is one of the key explanatory factors of a successful or failed RPA project.

In the context of PM&I Team, they begin by giving roadshows to interested FSC team members on implemented projects. Consequently, most teams have the chance to reach out to the PM&I team with their process-related concerns and the team is well-known for RPA in the FSC group. Prior to automating a process, the team conducts many sessions of comprehensive process analysis. The owner of the manual process is questioned with a series of predefined questions to gather critical information about the process. This is done using an intake form which helps the team to get a full grasp of the manual process from beginning to end. One of important steps that aids the understanding of the manual process is the intake session and as-is requirement session. The business analyst is responsible for all the documentation and data collection. As-is requirement document is a document where you state every step of the manual process. The intake form includes sections defining the process's objective, a high-level description of the process, the process's ownership, a business case, a feasibility study, and an analysis of the company's effect. One of the most crucial considerations is whether the procedure will change during the next nine months. To ensure the robot's stability for the next nine months, it is crucial that the process remains unchanged. Business case consists of information on the manual process such as frequency of process, volume of process, cycle time of the process per month, happy flow testing percentage, hours saved per year and other benefits that can be achieved via automation. Feasibility analysis checks what application are involved, details about testing environment, involvement with access to Citrix applications (Virtual workplace), schedule of the robot, performance requirement of the robots and complexity of the process.

Business Impact analysis collect information about 4 aspects.

- *Financial reporting risk* – Checks whether the process a financial reporting risk related process
- *Sensitive personal data* – Checks whether the process contain photos, racial/ethnic origin etc,
- *Personal data* – Checks for any personal data being processed, information about customers, agent, suppliers etc

- *Impact of Errors* – Checks whether if incorrect business decisions can be made as a result of errors.
- *Recovery time objective* – Checks what is the target duration of time and a service level within which the robot must be restored after a disaster/disruption.

After the above-mentioned stages, to-be requirements session commences, the business analyst and developer lead this session. Every stage of how the manual process will be automated is detailed in the to-be requirements document. Therefore, when constructing the bot, the developer reads the manual process stages and to-be process steps, which aids the developer in better understanding of the process.

Testing is conducted in cooperation with the business analyst, developer, and subject matter expert (SME). During the testing session, they go through the prepared test cases. If the testing phase is successful, the robot goes live. Following that, the bot must be constantly monitored.

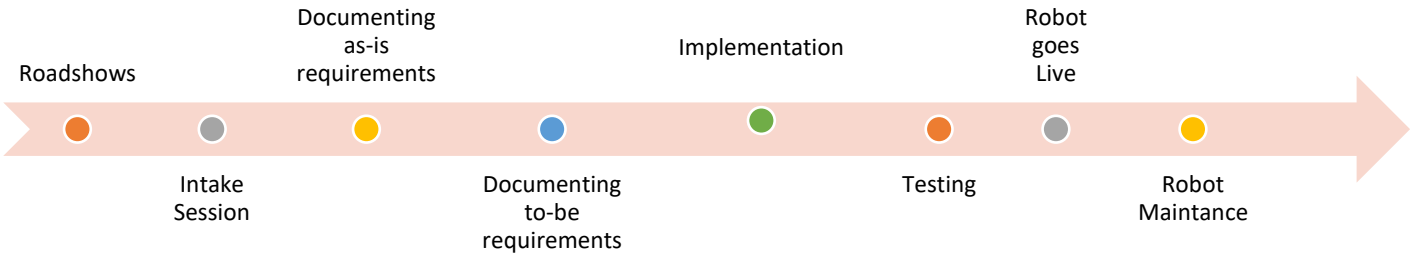

Figure 16 : Lifecycle approach by PM&I Team

During the first phase of data analysis factors the most important factors were *Problem understanding, Process Suitability and Feasibility analysis.* However, after the second phase of data analysis this has been adjust slightly. It has been noted that factors such complexity, following a specific life cycle and feasibility analysis including problem understanding are major explanatory factors of success in PM&I at Group NN.

4.4.2 Exploratory analysis of the failed RPA Project of NN Group

In the ***In-en Excasso*** department of NN Group Brokerage Administration Bot has been rendered ineffective by one of the participants. When the participant was asked the following questions: **Can you define the complexity of the process before automation?** The participant replied, *"Very easy process"* From this it can be deduced that the operation that bot was substituted for was not a very complex operation and it seems the robots in the section was implemented in a non-efficient way thereby resulting into technical issues. Additionally, *"We thought a robot is doing it very quickly, I thought the robot needed five seconds in the process done because robots are working very fast. But then, when we saw it working, it was very slow. The same as we do it manually.* From the

responses, it can be inferred that probably a wrong methodology was used for this robot or the process in the department requires no robot's assistance. However, the case maybe all these boils down to the "lack of clarity in the selected business area" which is a clear indicator of insufficient problem understanding and hence it is recommended that the feasibility study is done for each of the department separately and no generalization opinion is accepted when implementing RPA project. *The robots do all the manual things in the same with the same speed"* suggests that not all the departments of NN Group needs a robot to carry out their tasks.

In addition, although not as severe as that of the Brokerage Administration, the Robot Morning Market Limit also reported some challenges with the RPA. When the participant was asked: **Was the automation successful in your opinion/if not why/What made it successful?** The response was that *"I think it is a success because it's running really well. I think the first two years were quite some hiccups but now it is going smoothly. There are meetings every month to talk about what is happening, what could be improved."* It can be inferred from this response that there some challenges when the RPA started working at the department and this can be attributed to the human-error as the same participant rated the RPA success 8 stating that *"Two incidents in the last month - Bloomberg plugin didn't run properly due to license issues, some inputs were not at the right place, so robot had to pick it up later.*" Probably while still understanding the operational processes of the robot the users tend to forget some essential services required by the robot thereby resulting in hiccups issues as stated by the participant. That is, it was not the robot issue per say but error on the part of the operational personnel. This can still be associated to the lack of sufficient problem understanding and incomplete identification of the suitability of the process for the robot. However, recurring evaluations seem to have assisted tremendously to identify the actual issues and therefore the solutions.

4.5 Summary

From the interview analysis using thematic methods, some key indicators and explanatory factors have been identified that can be used to describe the success or failure of RPA. Below discusses the answers to research questions presented in Chapter 2.

There were several phrases that were used by respondents in Group NN. A scoring model was developed to concisely evaluate an RPA project prior to its implementation which of course would significantly minimize the likelihood of the project being a failure. The model consists of the Cause' and 'Effects.' The scoring model was developed for the classification of a

successful RPA project which could assist in improving projects with lower score. With this model an RPA project can be classified as “Excellently successful” “Very Successful” “Successful” “Failed G2” “Failed G1.” This is very useful in determining the successful level of an RPA project to know the project in need of further modification. This answers the research question five (5) How can a successful RPA project be identified in Group NN?

Eight indicators of a successful/failed RPA have been identified in this research and the most recurring are accuracy, speed, flexibility, and cost reduction. The presence of these indicators in an RPA of NN Group rendered the RPA successful and otherwise renders the project failed. This answers the research question six (6): What are the indicators that PM&I team can consider of successful or failed RPA projects?

In addition, seven explanatory factors of a successful RPA in NN Group were emerged through the interview analysis. Most recuring factors were problem understanding, feasibility analysis, and process suitability. However, during the second phase of analysis it was discovered importance of above factors was slightly changed. Major factors can also be process complexity, lifecycle, problem understanding and feasibility analysis. This answers the research question seven (7) What are the explanatory factors of an RPA project within NN Group team?

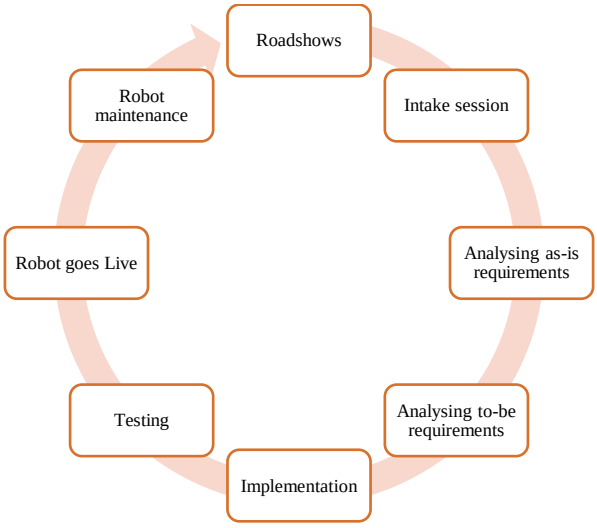

Figure 17 : Life cycle of RPA projects in PM&I team

Figure 17 depicts the lifecycle approach that PM&I team uses in undertaking the RPA projects and it provides answers to the research question eight (8): What is the lifecycle approach that PM&I team uses in undertaking the RPA projects?

Chapter 5 : Discussion

5.1. Introduction

In this chapter the results from the case study, described in chapter 4, are compared to the results from related work found in the scientific literature discussed in chapter 3. Section 5.1 presents the discussion of the results of data analysis against literature obtained in Chapter 3, and Section 5.2 provides the summary of the chapter.

5.2. Comparative analysis against the existing literature

- Problem understanding: According to Martinez-Rojas et al., (2020), understanding a problem to be solved is the first step toward RPA implementation and failure to have this defined may lead to a failed RPA project. When working on understanding the problem many other factors capable of contributing are also identified along the line. For example: A properly conducted feasibility study leads to a better problem understanding. Moreover, it has been observed that problem understanding is an important component in PM&I team's life cycle, and this can be held responsible for success percentage (95%) that the team achieved. As noted earlier according to a EY study, 30% to 50 % of first RPA programs fail (EY, 2016). Likewise, according to a study conducted by ABBYY, 3 out of 10 RPA projects fail due to insufficient knowledge of the process, (Torres R, 2020) this might equally be interpreted as insufficient problem understanding. From Figure 14 it can be seen that 'Problem Understanding' has the highest percentage (18%) and this suggests that the PM&I team had an excellent way of processing the problems. Therefore, the factor problem understanding which emerged from interview analysis agrees with literature.

- Feasibility analysis: Feasibility analysis was another factor surfaced from the interview analysis. This is another factor with proximity to problem understanding in that after identifying the problem to be solved by RPA. To increase the likelihood of success, we must submit our prospective project to a feasibility analysis—both from a technical and commercial standpoint—from the beginning (Kyheröinen, 2018). Without early engagement with IT and completion of this process, business may wind up with a candidate project that is forced into a program and will not reap the advantages that were anticipated. From the findings obtained from the data analysis, there was a clear picture of feasibility analysis prior to the RPA implementation. Literature also indicated; the factor feasibility study is essential for success.

- Process suitability: According to Wanner et al. (2019) process suitability involves the correlation of the system requirement with the project's objectives. In other words, the process suitability refers to the suitability of a process for RPA operation (Wanner et al., 2019). There could be a severe problem to the operation of an RPA if this factor is not carefully considered at the embryo-stage of the RPA. This factor is a follow up of 'problem understanding' in that it sheds more light to the problem to be solved by the RPA and how it would be solved (Wanner et al., 2019). This seems to be responsible largely for the failed RPA project of Brokerage Administrations whereby the error of hasty generalization was committed – the system suitability of the other project was applied and therefore there was no correlation between the project objectives and the system requirements. It can be inferred that process suitability was taken into in the implementation of RPA in NN Group because only set of departments were selected for RPA based on their operations suitability. Process suitability played a significant part in the success of Group NN RPA projects, and the literature also indicates that process suitability was a crucial factor of RPA success.

- Target the low-hanging fruits: According to the literature, this means resist the need to go quickly; start gradually and moderate expectations. Everyone is rushing to deploy RPA, but it would be good to start with the most conventional, stable, and repetitive processes first. The alternative is to become stuck in a big project, fail, and have the organization complain about RPA. Even if early acceptance is slow, it will build confidence in RPA technology. (Jiménez-Ramírez et al., 2020). From the results obtained in the chapter 4 of this research it can be deduced that the NN Group pretty much followed this factor in the implementation of the RPA therefore this factor agrees with the literature.

- System flexibility: According to the literature-review, "Break-Fix Person Hours" means the time it takes for a malfunctioning RPA project to be restored. Some participants declared that it there is usually swift action to restore the system back to normal and this can be achieved within two hours. Therefore, RPA projects are flexible, and their "Break-Fix Person Hours" is little, thus, the project is considered successful in terms of flexibility. Notice that system flexibility is one of the explanatory factors exclusive to NN Group RPA and this was not specifically mentioned in the literature. Moreover, it is an interesting factor to be considered in RPA implementation because flexibility plays a key role in technology such as RPA.

- Process Complexity This factor is closely related with process suitability and surfaced from the interview analysis. Process complexity plays a major role in success of RPA as highly complex process is not suitable for RPA. This factor has been also identified as the factors that were found in the literature review.

- Life-cycle RPA lifecycle is the structure of how automation is offered and executed. Robotic process automation follows a consistent, organized procedure for solution delivery, comparable to other types of product development. It includes every step a bot takes, from identifying a business process or job to automate to its deployment in production and continual monitoring. (Sigurðardóttir, 2018) (Stasevych et al., 2020) This factor was not listed in the literature as a factor that significantly affects success, nevertheless it was determined through the analysis of the interviews that it played a significant impact in success of RPA. However, it was not explicitly mentioned in literature that life cycle of RPA plays a role in success.

- Follow the SITO rule: SITO: stands for Simplify, Improve, Transform, and Optimize. In other words, it is an order of stages in the implementation of RPA. An RPA program may provide a unique chance for everyone involved to take a step back and examine the process for refinement by putting it through the SITO processes of simplify, improve, transform, and optimize (SITO) (Kyheröinen, 2018). According to the data analysed in this research, no explicit application of this rule in the RPA projects of NN Group but the factor was discovered in literature as a factor attributing to success.

- No 'one size fits all': According to Kommera, (2019) RPA automation is in its early phases, and the industry is full of platforms, tools, and point solutions. Since none of the products is comprehensive, there is no one solution for all organizations. All the tools are still in development, and a product that works for one firm may not work for another therefore plan accordingly is extremely crucial. This a factor that must be considered during the problem understanding whether the chosen RPA vendor matches the requirements of the chosen project. This factor was indicated in literature however it can be extrapolated from the interview analysis results that this factor was not present throughout the interviews because PM&I uses one vendor for RPA projects which is UI path.

- It should be noted that failure factors mentioned in Chapter 3.5.2 can be categorised as follows. Therefore, can be named as opposite of success factors. Figure 18 presents the categorization.

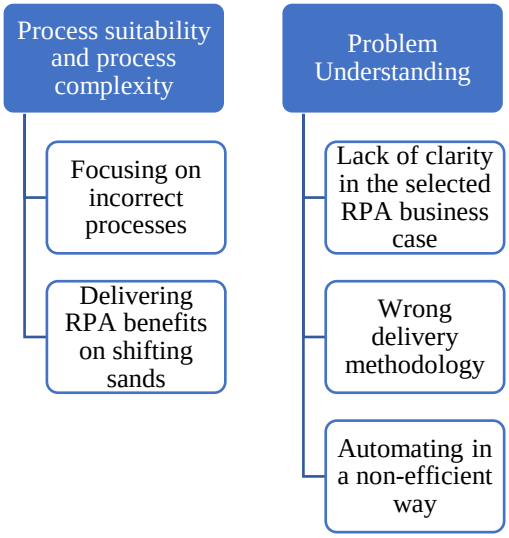

Figure 18 : Categorization of Failure Factors

- Meanwhile factors "Long-term RPA roadmap is not present", "Forgetting business-IT collaboration" and "Not monitoring after processes are automated" were not discovered as explanatory factors via interview analysis but present literature. However, these factors are crucial factors which should be considered in a strategy level before RPA is introduced into the organisation/department.

5.3. Summary

In this chapter, agreement from both the literature and the data from the case study has been found. However, exclusive information to the case study were also identified and this includes some exploratory factor that affect the implementation of RPA projects in NN Group. These factors are interconnected and the failure to consider one places a demarcation to other factors and consequently heading the project to failure status. It is necessary to keep in mind that sometimes success and failure factors are diametrically opposed.

RPA is a great tool that can tremendously improve the operation and productivity of an organization if strategically implemented. It could end up as a failed project if first and the most sensitive step – understanding the problem to be solved – is not adequately identified. Therefore, 'problem understanding' emerging the first on the list agree with the earlier works which have established it as the first step towards achieving a successful RPA. Even though

‘system flexibility’ occupies the 6th position it is a vital factor because the rate at which technology evolves is fast and RPA project must be flexible such as requiring minimum time for changes to prevent a drop in ROI of the organization (EPSoft, 2021). Notably, out of the seven (7) factors identified from the literature only two – SITO rule and no ‘one size fits all’ – were not found in the NN Group RPA projects. While system flexibility and following a structured life cycle was not mentioned in the literature. SITO rule is more related to the project re-evaluation while no ’one size fits all’ was taken care by using one vendor for the NN Group – UI path. Most importantly, it has been observed that the NN Group RPA projects were highly successfully – an exception to what was observed in the literature – and the success can be attributed to the systematic implementation of the life cycle of RPA, comprehensive understanding of the problem, feasibility study and focusing on low complex processes.

Chapter 6 : Conclusion and recommendation

6.1. Introduction

This chapter provides concluding remarks of the thesis, recommendations to the PM&I team and limitations faced during the research.

6.2. Conclusion and outlook

This research explores the key indicators and explanatory factors related to the success or failure of RPA projects. In the first approach to the research, literature review was conducted to identify the factors that have been reported by earlier studies. The identification of relevant papers was done by filtration such as the title of the papers relating to the present study, year of publication which was 5 years old and the key words. Using these conditions relevant papers were identified.

The literature review was used to answer the general research questions: (Questions 1 to 4) while questions: (Questions 5 to 8) related to the case study – NN Group were answered through interview analysis. This implies that all the research questions for this research have been answered and hence the objectives were achieved.

The research is focused on the RPA projects in PM&I team at NN Group, and the goal was to identify the indicators that the PM&I Team considers for successful RPA projects and explanatory factors team focuses on to achieve success. The indicators and explanatory factors that determine the success or failure of RPA project was identified through the interview analysis was discussed in chapter 4. Indicators were accuracy, speed, flexibility, cost-reduction, technicality, layout, project execution timeframe and monitoring. Using these indicators, a scoring model was developed to grade the success of RPA projects. Explanatory factors were problem understanding, process suitability, feasibility analysis, lifecycle, targeting low-hanging fruits, system flexibility and complexity. The cause-and-effect diagram represented the explanatory factors and causes of each factor. It has been discovered that a number of explanatory elements are interdependent in the sense that initiating one necessitates initiating the other. It has been noted that if the problem understanding is overseen successfully throughout the implementation of RPA, the project is more likely to succeed. According to Martinez-Rojas et al., (2020), Understanding a problem to be solved is the first step in RPA implementation, and failure to do so may result in a failed RPA project. When working on “understanding the problem” many other factors capable of contributing to the success/failure

of RPA are also identified along the line. Moreover, all the projects in NN Group conducted a thorough analysis on the problem to be solved however some projects failed on factors such as identifying the process suitability or complexity. These have been identified as few of explanatory factors for the failed RPA project of NN Group. *"It was not a success. It was a terrible mistake. Afterward, now we are working with it because it is there. Normally, it will take 40 hours to make this, but it was hundreds, hundreds, hundreds of hours, it was terrible. It is so it is not worth it. It was a terrible project. That is why I did not want another robot anymore. If I knew this before, we would not start. In the beginning, we were given false promises."* From this response it can be deduced that the participants shunned the proposal for another RPA.

Complexity has been identified also has a consequence of process suitability and selecting process which fell on sweet spot led to the execution of low hanging fruits. When a structured life cycle is designed and followed through the RPA implementation there is high tendency of identifying processes to be designed with flexibility whereby the changes can be executed if an approach does not work. Knowing this would enable the RPA developers to have a clearer picture of the timeframe of the project. Most of the changes would be included in the planning which therefore may help in having a viable implementation of SITO rule.

NN Group and one of the leading insurance and asset management companies in the Netherlands appeared to be in possession of successful RPA projects as identified from this research. This was based on the findings from this research which revealed that among explanatory factors that have been identified from the literature review, a substantial number of them are already existing in the RPA project of NN Group. However, some weaknesses of RPA project of NN Group were stated by the participants during the interviews. The participants are experienced NN Group employees; thus their judgment is valid and credible. The following recommendations are derived from the findings, and they have potential to greatly improve the RPA project of NN Group.

1. Follow the structured life cycle of RPA implementation. This varies by organization however, the lifecycle of NN Group seems to have a higher likelihood of rendering an RPA successful as the results in this research have shown.
2. From the interview with some of the participants showed their view to the complexity in terms of the RPA layout of NN Group probably being not user friendly enough. One of the participants responded that they needed to reach out to the robotics team before most of the

challenges are resolved whereas they were most times layout related issues. However, this could be a result of the type of robot that the participants work with which is of course a function of requirements. This still boils down to insufficient problem understanding. Therefore, it is necessary to perform a thorough problem understanding, process suitability, and feasibility study to overcome such obstacles.

3. As PM&I team have developed many RPA projects and investigated projects were successful, it can be assumed that the team have understood RPA appropriately and may be in a matured state. It must be noted that focusing 'low hanging fruits *(sweet spot)* approach can significantly reduce the benefits that RPA has to offer. Here it is, low hanging fruits implies relatively lesser effort. In other words, we can achieve a more advanced benefits only if we would increase our efforts in developing RPA that is more above just focusing on 'low hanging fruits.' Therefore, it is highly recommended that the PM&I team extends the application of RPA with a bit more of complexity *(process that are on hard but satisfying quadrant) to* achieve a greater benefit.

6.3. Future work and Limitations

Interviews was one of the methods used to collect data from Group NN. In the future, a survey questionnaire could be added to obtain a set of structured quantitative data which of course would reveal deeper dimensions of the factors responsible for the success or failure of RPA projects in NN Group. Errors associated with thematic analysis can be overcome by developing a multichoice survey questionnaire. Hence the interviews could have been more explicit if the participants were allowed to pick from multiple choice options. That is, the parts or sections of automation could have been investigated and this would further expose the strengths and weaknesses of robots at NN Group thereby making the data more robust for analysis. Then a more concise analysis could be done to extract a more detailed result.

Moreover research could be expanded into other organisations to see the influence of different technologies.

Conduct more interviews with individuals such as BAs, DEs and SMEs on each project. Include more variety of departments which may produce more data variations to analyse success and failure.

6.4. Summary

Consider an organization that employs 5 people to complete a work that might be done by one bot. Although RPA deployment may cost more than personnel salaries combined, the expense is recouped subsequently. RPA will eliminate other poor human performance attributes. Thus, RPA looks to have more cost benefits than manual operations, and therefore, many businesses, such as NN Group, strive to implement RPA in their operations. Consequently, understanding the problem, system suitability and complexity can open doors for other accompanying explanatory factors which can either render an RPA project successful or failed. Thus, the results obtained from this research has prompted a need for analysis RPA to infer key information that could further strengthen the relevance and benefits derived from RPA before and after the implementation.

Furthermore, in this section, key finding of the research has been highlighted, three recommendations were offered to the PM&I team, how the research can be improved in the future was stated. In the research two approaches have been adopted to identify the factors and indicators that determine the success or failure of RPA projects in NN Group, namely: literature review and thematic analysis on the interview data.

It is important note that all four objectives of the research has been achieved which were *To understand the RPA life cycle and approach adopted by Group NN in undertaking the projects, To identify the features of good candidate processes, To identify the RPA successful and failure indicators and explanatory factors using RPA projects of NN Group, To develop a scoring system to measure the degree of success of an RPA project in Group NN, and To develop a model that can be used to explain a success or failure of a RPA project in Group NN*. Moreover, it has been observed that many of the explanatory factors depend on each other. For instance, if a good feasibility analysis is performed, the chances of in-depth problem understanding is higher therefore higher likelihood of the project being successful.

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Chapter 8 Appendix

Appendix includes raw responses of the interview question *Was the automation success in your opinion, what made it successful/if not why?* as it was specifically used to answer the research questions number 5. (How can a successful RPA project be identified in Group NN?)

Would you say that the automation was a success and if so, why?

1. Definitely. During the closing, because here, we must deal with every day for about two weeks, and by doing so, we make sure that PSI and Amber are the same for the cost. Yeah, and, and that is the basis for all costs process. So yeah, it is a big, big success.
2. It was not a success. It was a terrible mistake. Afterward, now we are working with it because it's there. Normally, it will take 40 hours to make this, but it was hundreds, hundreds, hundreds of hours, it was terrible. It is so it's not worth it. It was a terrible project. That is why I did not want another robot anymore. If I knew, we would not start. In the beginning, we were given false promises.
3. Success, because it takes us fewer hours now and more time to do other things
4. It is a success because it is what I say, first three people and now one, people.
5. I would say it is a success. In the case of the previous UI, it was perfectly fine. But in the case of the new UI, we are still getting used to it because even the SME side does not have much knowledge on how the new UI works.
6. It saves me about 2 or 3 hours every month. So, it was successful because it saved time.
7. Yeah, it was a huge success, because first, even with the first release, it already saved a lot of time, effort on the business side.
8. Yes. I think because it works, what we want to do, first, so we want to save time, and we want to make less error.
9. Yes, I would say yes, the automation was a huge success. Because the robot has been running from 2017, I guess, until now and it is processing 1000s of records every year. It's saving a lot of hours for the financial accounting team.
10. Yeah, I would say it is a success because in the end, we have achieved what we expected. So, now, the dependency has been reduced, the report is readily available, and the robot is successfully running every day.
11. Yeah, I would say it is successful because we have very few incidents. It is working quite well.
12. Yeah, very much. We are still using it. I think we are already using it for three years. It is also not a very big or complicated process.
13. I think it is a success because it is running well. I think the first two years were quite some hiccups but now it is going smoothly.

14. Because we are not doing it manually anymore. So, we run the robot, 90% of the run, were successful.
15. Yeah, automation was a success because the team size who was in NN life doing all these steps manually has now been reduced.
16. Yeah, I think it was a good success because we have a good example of cooperation between RPA and other external applications
17. It is a success because new colleagues are going into the process easily and it's easier to give clear instructions on what they must do now, less time now
18. Doing the job that it was built for.
19. The automation was a great success. The SMEs are still happy with it, even if it was deployed in 2019 Jan more than two years it has been running.
20. I would say it is quite successful because it is 98% automated already, and it saves us a very big amount of time.