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EVALUATING THE PROCESS OF INDIRECT PROCUREMENT VIA AUTOMATION

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ABSTRACT:

This research evaluated the process of indirect procurement using Robotic Process Automation (RPA) in Wärtsilä Finland Oy, targeting operative purchasing activities. The research covered the increasing strategic role of procurement to make organizations more efficient and competitive, especially with digital technologies such as RPA, which computerizes mundane, rule-driven activities for cost savings and higher accuracy. It aimed to identify potential automation-ready tasks and assess their value to increase operatory efficiency.

It undertook a case study approach, combining quant data from internal company systems and qualitative notes based on the researcher's position as an operative purchaser trainee, in the North Europe region. It used the Task-Technology Fit (TTF) and Technology Acceptance Model (TAM) to frame the analysis to measure task appropriateness and user acceptance indirectly in terms of task productivity. Main findings indicated that Intrastat reporting, being a high-number, rule-bound activity that devours 261 hours a year, was the best candidate for automation, followed by purchase change requests. Automation held the potential for remarkable time savings, reduced process cycles, higher accuracy, and improved staff satisfaction by engaging employees in strategy-oriented activities.

It concluded that focused RPA implementation could revolutionize indirect procurement by making it more efficient and streamlined. It recommended that an Intrastat RPA must be developed immediately and that a stage-wise approach to further automation must be undertaken, backed by a Center of Excellence to bring sustainable acceptance. It pointed to a research agenda for further studies to focus on long-term effects and next-generation automation technologies to handle sophisticated activities, and it provided a case template for Wärtsilä to build its competitive differentiation based on digitalization in procurement.

KEYWORDS: Robotic Process Automation (RPA), indirect procurement, operative purchasing, operational efficiency, digital transformation, intrastat reporting.

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Abbreviations

AI= Artificial Intelligence
BI= Behavioural Intention
CoE= Center of Excellence
DSR= Design Science Research
ERP= Enterprise Resource Planning
EU= European Union
FTE= Full-Time Equivalent
GL= General Ledger
GR= Goods Receipt
GR/IR= Goods Receipt/Invoice Receipt
HS Code= Harmonized System Code
MEA= Middle East and Africa
MRO= Maintenance, Repair, and Operations
NEU= North Europe
NLP= Natural Language Processing
OP= Operative Purchaser
P2P= Procure-to-Pay
PEOU= Perceived Ease of Use
PO= Purchase Order
PR= Purchase Requisition
PU= Perceived Usefulness
ROI= Return on Investment
RPA= Robotic Process Automation
SAP= Systems, Applications, and Products in Data Processing
TAM= Technology Acceptance Model
TTF= Task-Technology Fit
Wärtsilä= Wärtsilä Finland Oy (Case Company)
WeBuy= Wärtsilä's in-house e-procurement tool
Xflow= Wärtsilä's invoice processing system
ZMRBR: SAP transaction code for blocked invoices

1 Introduction

This chapter provides a brief overview of the thesis. Firstly, it shows the background of the topic to understand the process of indirect procurement via automation of the company Wartsila in Finland. Then, it focuses on classifying the study gap based on company demands.

1.1 Study Background

The strategic role of procurement has grown over the years, and it is considered a source of competitive advantage (Sitar, 2012). Previously, it was viewed as a basic administration function that lacks potential in value addition (Van Weele & Van Raaji, 2014). But today, most of the organizations consider procurement as a significant aspect of their operation, recognizing its potential to improve performance, lower the cost, and ensure a competitive advantage in the market (Jayaram & Curkovic, 2018).

Procurement procedures are divided into two categories: direct procurement and indirect procurement. Direct procurement involves purchasing goods and services that directly contribute to the final products, whereas indirect procurement focuses on getting goods and services that contribute to the overall operation of the company (Van Weele & Rozemeijer, 2022). Because of its nature, indirect procurement generally involves a large number of low-value purchases that require significant time and effort from different parts of the organization (Bechtel & Patterson, 1997). It has been acknowledged that the dimension of indirect procurement and its strategic importance need to be improved to gain a competitive advantage in the global market (Cox et al.,2005).

Digitalization, often known as e-procurement, is changing the shape of procurement and the whole supply chain (Meier & Stormer, 2012). Digitalization in procurement refers to the use of electronic tools for sourcing and ordering goods and services, which will improve operational efficiency as well as reduce the cost (Bauer & Göbl, 2019). Nowadays,

business partners use digital technology through a private or open communication channel for procurement activities (Meier & Stormer, 2012).

The significance of automation has increased in improving company efficiency as digitalization continues to influence the business environment. The procurement process can be improved by using a variety of technological tools such as Robotic Process Automation (RPA), machine learning, and Artificial Intelligence (AI) (Hofmann et al., 2020). In this paper, I will discuss the significance of RPA by selecting a suitable task for automation and discuss how it will help in improving the operational efficiency in the case company. RPA is becoming popular among businesses that are aiming for improved operational efficiency, precision, and effectiveness, as it not only enhances the business operation but also makes it easier and simpler to streamline the whole process (Lacity & Willcocks, 2015). Its capacity to enhance operational efficiency without making extensive changes to the current IT infrastructure is one of the major reasons for its popularity among modern businesses (Okolie et al., 2022).

The major reason for this thesis topic is my current role as an operative purchaser trainee in the case organization. This hands-on experience gave me valuable insight about the day-to-day work processes and challenges in indirect procurement, especially in operative purchasing. Simultaneously, development in indirect procurement is evolving, and the company is also seeking continuous improvement and development in this area, which makes this relevant for further exploration. The alignment of my work with the company's strategic priorities further reinforced my interest in examining how automation can help optimize processes in indirect procurement. This study delivers the roadmap for introducing a new RPA in operative purchasing.

1.2 Research Gap and Aim

While Robotic Process Automation has grown in usage in shared services, banking, and direct procurement, its applications in indirect procurement and operative purchasing remain underexplored (Flechsig et al., 2022). Most research emphasizes procurement's

strategic role or discusses automation generally, with few providing granular task-level analysis. This thesis uses Task-Technology Fit and Technology Acceptance Model frameworks, but like much existing work, it does not include employee surveys or interviews, limiting direct insights into human adoption. Benefit-cost analyses, including ROI and scalability, are also not fully comprehensive here due to the case focus. The case-company-specificity restricts generalizability, highlighting the need for broader studies. This research partially fills these gaps by identifying automatable operative purchasing tasks at a granular level, assessing their viability in a real-world context, and outlining a practical RPA roadmap to improve efficiency and support digital transformation in indirect procurement.

1.3 Objectives of Study

The primary objective of this research is to identify the potential of automation in the operative purchasing of indirect procurement. It focuses on determining processes that are feasible for automation, such as tasks that are repetitive, rule-based, and have standard processes without exception. This research also aims to evaluate how potential automation can streamline the processes, improve process speed, and enhance operational efficiency. This finding can be useful for the case company while adopting a new RPA in the future.

This study aims to answer the following research questions:

1. Which indirect procurement process will be feasible for automation in order to optimize the operational efficiency?
2. How would the automation maximize the operational efficiency?

1.4 Scope of the study

The study will be focused especially on operating purchasing within the larger context of indirect procurement, which specifies that it will exclude the strategic purchasing tasks such as vendor creation, contract negotiation, and sourcing strategies. Among the wide

array of automation tools, this research will mainly focus on Robotic Process Automation (RPA) and explore its integration with the existing tools used by the case company, such as SAP and Coupa.

1.5 Structure of thesis

The outline detailed above guarantees a coherent sequence from theoretical foundation to empirical finding and practical recommendation. From introduction and literature, through to setting out conceptual and research context, then embarking upon theoretical framework from which analysis is guided, the thesis then clarifies research design and data collection process, deployed in case company's operational purchasing procedures in analysis phase. The conclusion then integrates results, highlighting in particular theoretical contributions and managerial insight, as well as remarking upon possible direction for later research. This sequence then permits research to bridge academic insight and practical utility, so that findings are not only contextually applicable, but broadly informative.

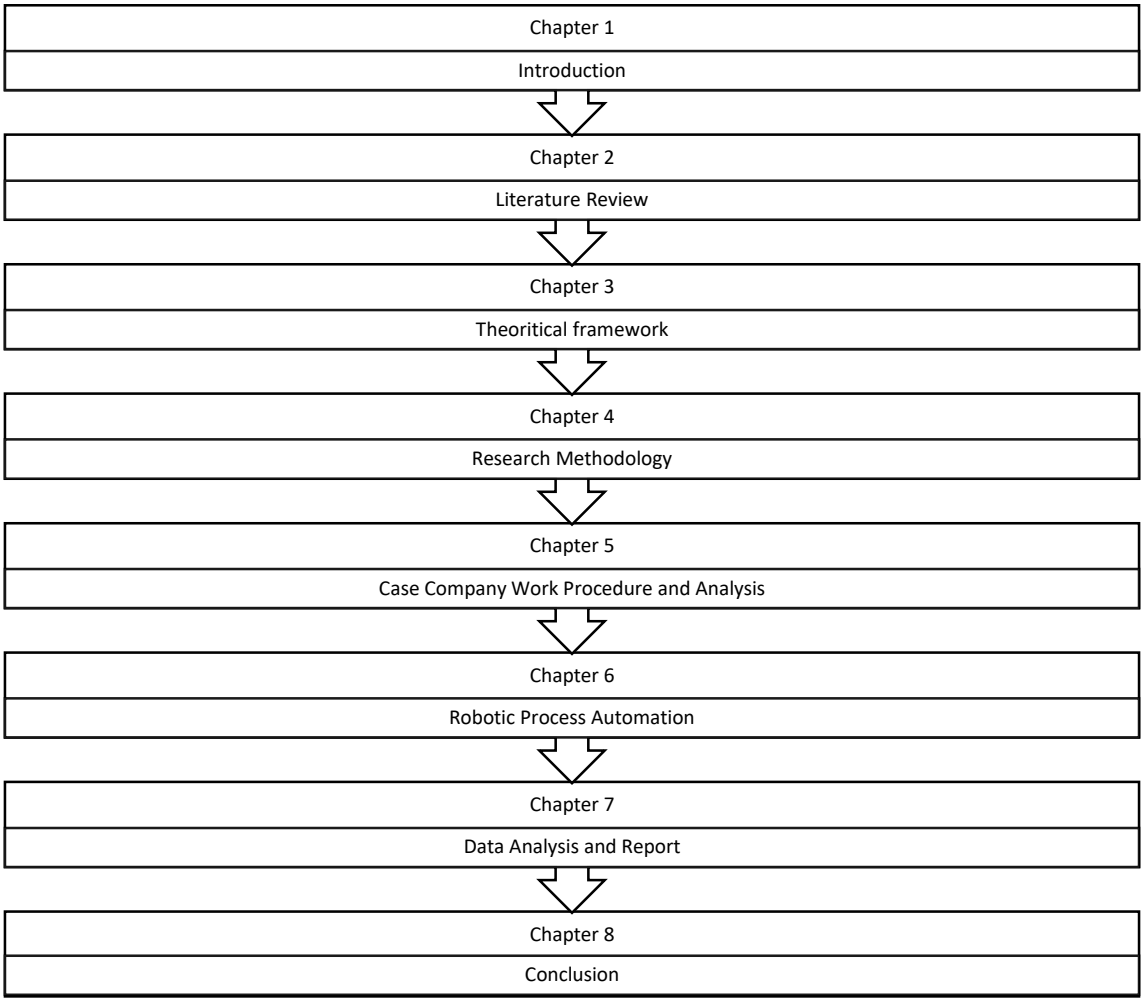

Figure 1. Study Structure.

2 Literature Review

2.1 A Lean Approach to Robotic Process Automation in Banking

In their article "*A Lean Approach to Robotic Process Automation in Banking*", Mamede et al. (2023) describe Robotic Process Automation (RPA) as a software-driven method for automating repetitive and rules-based digital tasks. They explain that these robots emulate human interactions with information systems, performing routine activities faster and more reliably than manual processing (Mamede et al., 2023). RPA is attractive to organizations because it delivers quick results without requiring costly modifications to legacy systems (Lacity & Willcocks, 2016). However, the authors argue that in many cases RPA is applied as a short-term fix, which limits its long-term organizational benefits when it is not combined with structured process optimization.

Interpreting this research in the larger Industry 4.0 framework, Mamede et al. (2023) note that while RPA solves for short-term inefficiencies itself, its full promise is only when combined with principles of lean management. Lean is based on Japanese production traditions and focuses on elimination of waste, flow in processes, and continuous improvement (Womack & Jones, 1996). When RPA is combined with lean thinking in what is called "Lean RPA" organizations can graduate from simply automating inefficiency and redesign their processes for sustainability, scalability, and value creation for customers.
The authors evaluated this Lean RPA framework through a Design Science Research (DSR) approach in a Portuguese private bank. Three processes DMIF form fulfillment, password request handling, and account opening were tested. Their findings showed Lean RPA achieved greater efficiency gains compared to traditional RPA, specifically by reducing full-time equivalent (FTE) requirements, reducing redundant activity, and improving flow within a process. The comparison between tools showed UiPath as a cheap and user-friendly option for most organizations but best for environments with a need for increased security and robustness, for example, Blue Prism. These empirical conclusions reinforce the authors' fundamental contention that RPA works best when it is accompanied by lean thinking.

Synthesizing across this literature, Lean RPA emerges as a strategic enabler for sustainable digital transformation. Rather than reproducing inefficient workflows, Lean RPA allows for both automation and organizational improvement, prepping businesses for digital age competitive success. For indirect procurement and other areas, such integration promises less transactional wastage, better supplier management, and alignment of automation initiatives with strategic business goals. But research confesses its limitations: its framework needs to be tested in a variety of industries and would benefit from integration with complementary methods like Six Sigma in hopes of documenting quality gains.

2.2 RPA as a Challenge Beyond Technology: Self-Learning and Attitude Needed for Successful RPA Implementation in the Workplace

In their research paper “RPA as a Challenge Beyond Technology: Self-Learning and Attitude Needed for Successful RPA Implementation in the Workplace” Gómez Gandía et al. (2024) portrait’s robotic process automation (RPA) not just as the technical breakthrough but also as a socio-technical challenge that calls for the self-learning, promoting optimistic attitudes among employees, and repeated training to be implemented efficiently. They claim that automation diminishes the workload, enhances productivity, and promotes efficiency (Gómez Gandía et al., 2024). RPA success is not imminent but instead it depends on employees’ skills to assimilate technology as a complement and not as a threat (Gómez Gandía et al., 2024). This serves to reinforce their argument that digital transformation is not only about adopting the technology but also about human adaptation to the technology too.

Their questionnaire of 103 participants, taken by authors, reveals that workers with intermediate education experience a higher sense of threat by automation when compared to higher-educated workers. But training workers properly, workers understand that “robots replace workers during routine activity, and they will have creative and competent activity” (Gómez Gandía et al., 2024). The research bolsters previous studies that automation augments human ability and does not replace (Wilson & Daugherty, 2018).

The research also validates that automation can enhance the quality of the service to the customer by ensuring a “symbiosis between employee and process automation” (Gómez Gandía et al., 2024).

They identify three key conditions for sustainable RPA adoption the first one is tailor-made training to respond to workers’ heterogeneous educational backgrounds, second is to focus on reducing error and enhancing efficiency, and the third is that open communication to buffer perceptions of threat (Gómez Gandía et al., 2024). Their verdict is straightforward: training and favorable attitudes are key drivers of RPA integration success, seconding previous demands for ongoing digital upskilling within industry settings. One of this study's advantages is that it moderately addresses both opportunities and risks. Although automation promises to be efficient and innovative, anxieties over losing their jobs and threats to their sense of identity continue to be daunting inhibitors. As the authors warn, “automation must be well communicated to employees to avoid rejection” (Gómez Gandía et al., 2024). Their data proves that with proper training, workers respond favorably to RPA and even embrace its ability to eliminate mundane work. In summation, Gómez Gandía et al. (2024) make a helpful addition by including human-focused viewpoints to the RPA discussion. Their research validates that digital transformation can't be achieved by technology alone, it's a move toward empowering the workforce, organizational learning, and cultural evolution. For my master’s research, this article drives home the necessity to conceptualize automation not only as efficiency-oriented, but rather as an evolving collaboration between machine and man.

2.3 Robotic Process Automation: The Next Transformation Lever for Shared Services

In their working paper *"Robotic Process Automation: The Next Transformation Lever for Shared Services",* Mary Lacity and Leslie Willcocks take stock of how Robotic Process Automation (RPA) is reshaping shared service organizations. RPA is described by Lacity and Willcocks as the sixth major transformation lever in a sequence including centralization, standardization, optimization, relocation, and ERP-enabled technologies (Lacity & Willcocks, 2016). Based on their case studies in sectors such as healthcare and insurance, RPA is highlighted by Lacity and Willcocks as possessing its capacity for automating "swivel chair" processes that is, information shuffling between systems coupled with cost reduction, scalability, enhanced compliance, increased service delivery speed, and enhanced employee satisfaction.

Lacity and Willcocks not only view RPA as a technology augmentation but more specifically a strategic organizational change enablement. Very different from traditional automation, RPA is noted for its simplicity in configuration, non-intrusive capability, and enterprise-wide security (Lacity & Willcocks, 2016). RPA implementation is prescribed by research as requiring executive support, proper governance mechanisms, and workforce reshuffling for its full advantages to take effect. As stated by authors, RPA optimizes not only operations costs but also gears organizations towards success in a more digitally competitive environment.

The paper significantly enriches scholarly and practical discussion by grounding its observations in real-case experience, making it a useful guide for would-be implementers. Its strength is in revealing hard outcomes such as FTE cost savings, productivity improvements, and quality improvements. Its greatest limitation is its reliance on early implementers, which may limit its generalizability; in their own estimation, even authors caution about "RPA washing" describing legacy automation solutions as RPA. Nevertheless, the paper provides an even-handed, evidence-informed judgment on RPA's transformative capability.

It positions RPA as a component in broader digital transformation strategies in shared services. When combined with other service automation and change management literature, it is evident that RPA's actual worth is not merely in cutting costs but in providing new service delivery scenarios, increased employee enthusiasm, and organisational agility. Lacity and Willcocks (2016) thus carry forward the insight that automation must be combined strategically—in governance, leadership, and talent redesign to produce sustainable effects.

Synthesis of Literature and Identification of the Research Gap

The literature reviewed in this research identifies the types of tasks most suitable for automation and highlights RPA's potential. Across multiple studies, routine, rules-based, and high-volume tasks such as data entry, form filling, password management, invoice processing, and information transfer between systems are repeatedly cited as the most feasible RPA candidates (Mamede et al., 2023). So, in practical terms these tasks required minimum human input and assessment, and these tasks highly rely on structured digital assessment and standardized workflow. The processes demanding human discretion, creativity, negotiation or problem-solving abilities are less feasible but also the use of RPA and automations can have a huge benefit by reducing human time and effort and supporting decision-making processes. The literature also suggests how to implement RPA effectively analyzing from a methodological standpoint.

While Mamede et al. (2023) focused on removing inefficiencies before automation, ensuring processes are streamlined and adding value with Lean analysis. Lacity and Willcocks (2016) highlight the importance of executive sponsorship, clear governance, and workforce redesign to sustain RPA initiatives. Gómez Gandía et al. (2024) focused the transparent communication with the employee and continuously preparing and teaching them will push the workplace towards success. As a gist these literatures suggest that at the beginning RPA should be used in basic and repetitive tasks that are easily learnt

and cope up by employees and gradually aligning it with strategic approach and expanding into solving the complex workplace functions. Collectively, these studies recommend a phased, human-centric, and strategically aligned approach to RPA by beginning with simple, repetitive tasks and gradually expanding to more complex ones as user confidence and organizational maturity grow. For this thesis, these insights imply that when exploring automation opportunities within operative purchasing and indirect procurement, attention should focus first on repetitive administrative tasks such as purchase order entry, invoice matching, and supplier data updates. These are technically feasible, low-risk, and align with Lean RPA principles. At the same time, employee training, change management, and clear process governance must be incorporated to ensure acceptance and long-term success.

The reviewed literature establishes a clear foundation for this thesis. Mamede et al. (2023) provides the technical methodology, demonstrating that RPA's highest value is realized when integrated with process improvement principles like Lean. Lacity and Willcocks (2016) reinforce this from a strategic organizational perspective, positioning RPA as a key lever for transformation in service functions. Crucially, Gómez Gandía et al. (2024) shift the focus to the human element, arguing that technological success is contingent on user acceptance and adaptation.

However, a gap exists in the application of these combined insights—technical feasibility, strategic value, and human factors to the specific context of operative purchasing within indirect procurement. Most research discusses procurement strategy or automation in general terms, lacking a granular, task-level analysis. This study seeks to fill this gap by applying the integrated TTF-TAM framework to identify automatable tasks within a real-world corporate setting, thereby providing a structured roadmap that acknowledges both the technical and human dimensions of digital transformation.

3 Theoretical Framework

This research is founded upon two complementary theoretical frameworks fortifying a lens for viewing adoption and effectiveness in Robotic Process Automation (RPA) in indirect procurement: the Technology Acceptance Model (TAM) and the Task-Technology Fit (TTF) model. These frameworks together offer an overarching view that encompasses not only human elements influencing technology adoption, as well as automation's effectiveness in specific tasks that are defined by automation's operational characteristics of technology but is suitable for a detailed description of how procurement procedures could be streamlined by RPA.

3.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), is one of the most well-known and frequently used models to forecast and account for user acceptance of information systems and new technology. The model proposes that two beliefs in particular, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), dominate in shaping a user's Behavioral Intention (BI) to utilize a system, which manifests as actual System Use (Davis, 1989; Venkatesh & Davis, 2000).

Perceived Usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). PU in our research is defined as the belief of the operative buyer that RPA will allow him or her to work faster in completing tasks, reduce errors, free time from performing routine work, and, in general, increase their effectiveness and efficiency.

Perceived Ease of Use (PEOU) is "the degree to which an individual perceives that use of a particular system would require minimal mental effort" (Davis, 1989, p. 320). For RPA, this is how simple it is for buyers to interact with automation of processes, understand robot-generated notices, and trust automation without much additional mental effort or direction.

Behavioral Intention (BI) and Actual Use are indicators of operative buyers' behavior to rely and utilize the RPA solutions in their daily work life, changing from manual intervention to computerized action.

The successful implementation of RPA is a technical as well as a human challenge (Gómez Gandía et al., 2024). Even a most optimally designed robot will not yield value if its end-users – operative buyers, authorizers of costs, and requesters – do not accept and trust it (Venkatesh et al., 2003). TAM provides a framework to investigate observation data to understand stakeholders' perceptions. Through its application, this research is able to identify potential adoption barriers and provide input to those of those management approaches necessary to a successful implementation of RPA, as detailed in its chapter of recommendations.

3.2 Task-Technology Fit Model

While TAM focuses on the user, the Task-Technology Fit approach, adopted by Goodhue and Thompson (1995), centers on how suitably technology's potential fits tasks' needs that the technology is meant to augment. The underlying contention of TTF is that technology would bring no positive impact upon performance when not suitably aligned to tasks it is meant to augment (Goodhue & Thompson, 1995). That is, technology must fit the task (Goodhue & Thompson, 1995).

The model describes key characteristics of tasks and technologies:

Task Characteristics: List characteristics such as complexity of the work, uncertainty, interdependence, and degree of structure (e.g., repetitive, rule-based versus judgment-intensive).

Attributes of Technology: Comprise elements from functionality, usability, reliability, to integration potential.

Task-Technology Fit: This is how well technology supports a user in doing their portfolio of work. The fit is strong when there is congruence between technology’s functionality and a task's requirements (Zigurs & Buckland, 1998).

The TTF framework is our underlying theoretical tool for picking and choosing which operative buying tasks are automatable. This work applies TTF directly by considering tasks in terms of their attributes (e.g., volume, repetitiveness, rule-centricity, standardization, exception levels—to be explained in Section 4.1), judging how well those attributes complement those of RPA (e.g., 24-hour, 7-day rule enforcement, accuracy, speed), and reflecting upon how well those complementarity relations align. For instance, analysis of Intrastat reporting (a high-volume, repetitive, rule-centric process) demonstrates a strong compatibility of a task and a technology and is, therefore, an optimal candidate for automation by means of RPA. Conversely, tasks where strong coordination and subjective judgment are required (e.g., processing complex invoice inaccuracies) have a poor compatibility and are not very suitable for full automation. The TTF framework is applied to give a theoretical account of process choice for our proposed roadmap of RPA.

3.3 Integrated TTF-TAM Framework

Independently, TAM and TTF are accountable for different aspects of technology implementation (Dishaw & Strong, 1999; Klopping & McKinney, 2004). However, these frameworks are extremely complementary (Dishaw & Strong, 1999; Klopping & McKinney, 2004). A technology could possess an excellent task-technology fit, however, if users are opposed to it, then it is not going to be utilized effectively. On the other hand, a technology could be straightforward and beneficial in users' view, however, if it is not an excellent fit in work, then it is not going to facilitate work performance.

The conceptual diagram encompasses the data-driven research approach. The predominant channel, headed by the Task-Technology Fit (TTF) model, begins from a scrutiny of Task Characteristics (e.g., volume, repetitiveness) against the Capacities of RPA to determine technical feasibility. This filtering evaluation determines high-fit tasks suitable for automation. For such automatable tasks, research quantitatively measures their Performance Metrics their time savings, reduction in error, and increase in efficiency—upon implementation. These quant results yield objective, observable indicators to indirectly suggest technology's Perceived Usefulness, a foundational construct from TAM. The

model illustrates how research determines utility not based on subjective user judgment but based on empirical confirmation of better performance, a fit straight out of Quantitative and Observational Methodology.

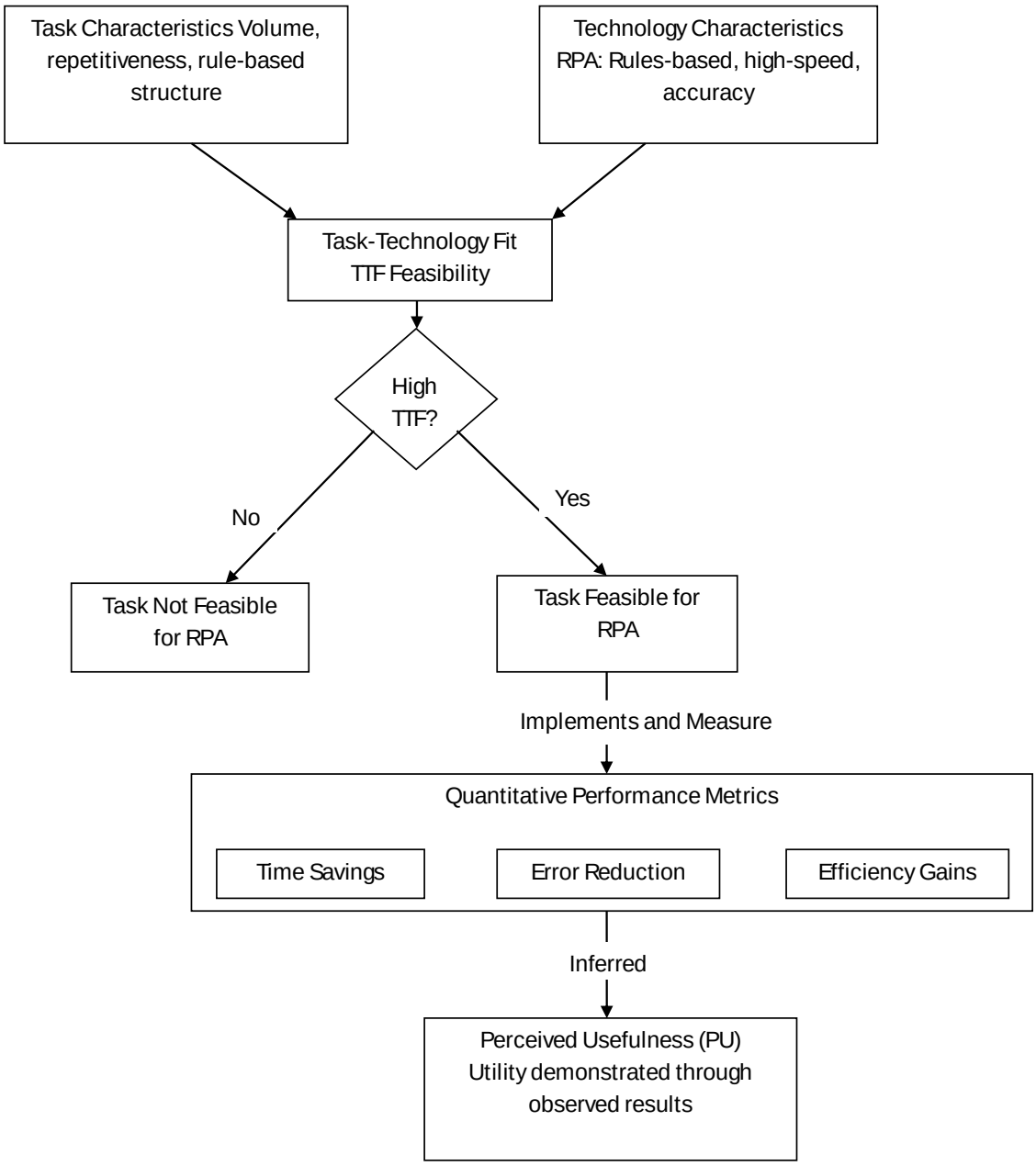

Figure 2. Theoretical Framework of the research.

This work integrated both models in order to develop a complete system, depicted in Figure 2.

TTF as a Precursor: Initally, feasibility of automation is determined based on Task-Technology Fit. This will identify what tasks will be automated (PO change requests in budget increments, Intrastat data entry, etc.).

TAM as an Enabler: Finally, automation deployment is effective only if users embrace it, as described by TAM. TAM predicts and takes into consideration how users will react to new automation procedures.

Given the quantitative and observational nature of this research, formal interviews and user surveys are absent from this work, so its theoretical foundation relies mainly on the Task-Technology Fit (TTF) model in order to impartially identify and evaluate processes suitable for automation. TTF provides the appropriate filter in evaluating properties of tasks, volume, repetitiveness, and rule-based nature from the abilities of Robotic Process Automation, to evaluate feasibility. The Perceived Usefulness of TAM is used specifically as a complement, indirectly, in this technical evaluation. This is not derived from user surveys, but rather from observable outcomes such as time savings, error reduction, and increase in efficiency, measured in the data analysis. This then enables the research to account, without direct subjective user input, for the essential human factor of utility the efficacy of automation's ability to enhance performance.

4 Research Methodology

4.1 Research Philosophy

The research philosophy is rooted in pragmatism, emphasizing practical problem-solving within Wärtsilä's context. Ontologically, it recognizes reality as socially constructed (Lincoln et al., 1985). It adopts a participatory approach, where knowledge is co-created through the researcher's involvement (Reason & Bradbury, 2013). This approach acknowledges values, power dynamics, and ethics (Herr & Anderson, 2015). Methodologically, it allows flexibility, combining quantitative and qualitative methods for context-sensitive insights.

4.2 Research Approach and Strategy

This study employs a primarily quantitative approach, supplemented by qualitative observations, to provide a comprehensive analysis. The strategy is a case study with elements of action research, suitable for analyzing real-world organizational processes (Kemmis et al., 2014). The quantitative component uses data-driven analysis for task volumes and times. The qualitative component relies on workplace observations for context, without full participatory cycles or interventions due to the study's analytical focus.

4.3 Research Design

This research primarily utilizes quantitative methods, with qualitative elements. Data-driven process analysis uses real data to examine trends and problems. In this study, it analyzes operative purchasing tasks' nature and complexity for automation feasibility. The case study method provides deep contextual understanding (Eriksson & Kovalainen, 2008). Elements of action research are incorporated through the researcher's trainee role, using observations where system data are unavailable, followed by interpretation and reasoning.

Case study research method is used to understand the specific context and analyze it deeply to understand the complexity of real problems and give insight in the practical field (Kovaleinen & Eriksson, 2008). Action Research, commonly known as Participatory Action Research, has also been used in this study. This method utilized participatory action to change or improve the specific condition (Kovaleinen & Eriksson, 2008). While doing this study, the researcher is working as an Operative purchaser, Trainee in the case company so this approach has been used where the real time data were not available in the internal reports. The researcher uses observation methods to collect some of the data which is followed by interpretation and logical reasoning.

4.4 Data Collection

Primary data were collected from the company's internal reports, ERP, and Coupa. Data related to the volume of task, trends of task, and time taken to complete the task performed over a specific timeframe were extracted from the internal reports. Manual observation method was used in cases where data were not available in internal systems. As the researcher was working in the same company, it was easier to collect the data.

5 Case Company Work Procedure and Analysis

5.1 Indirect Procurement

Indirect procurement is defined as the purchasing of goods or services that do not relate directly to the company's final product (Cox et al., 2005; Xideas & Moschuris, 1998). It includes the purchase of goods and services needed to support the continuous operation of the business (Monczka et. al, 2020). Office supplies, maintenance costs, and travel costs are examples of indirect costs. According to Kapoor and Gupta (1997), indirect purchasing costs can be grouped into five broad categories of functions: technology, advertising and marketing, human resources, industry-specific costs, and general overhead. The overhead category includes typical purchases such as office supplies, facility maintenance, security services, furniture, insurance, entertainment, and travel. Industry-specific refers to products or services fitted to a particular industry, e.g., collection services in the finance sector, store fixtures in retailing, or protective equipment in manufacturing.

Despite its comparatively low proportion of total spending, recently, many companies and scholars have realized the cost-reduction potential linked with indirect spending. Although direct spending accounts for the majority share of a company's purchase value, it is indirect spending that constitutes most of an organization's purchasing transactions (Barry et al., 1996; Cox et al., 2005). This is regarded as a form of "soft" saving, characterized by less internal processing time rather than economic saving in terms of a lower purchase price (Porter, 1999). Therefore, an improved indirect procurement strategy would result in significant time and organizational resource efficiencies.

According to Israel and Curkovic (2020), "Proper management of indirect spending allows for sustainable competitive advantages and reduced costs." It has been observed that obtaining strong support from management and active engagement from procurement professionals in the handling of indirect procurement provides a more strategically

solid foundation for procurement operations, which subsequently enhances organizational profitability and sustainability (Haake & Seuring, 2009).

There are two major departments within indirect procurement, which are Strategic purchasing and Operative purchasing. In this study, we mainly focus on operative purchasing within indirect procurement.

5.1.1 Strategic purchasing

Strategic purchasing is a long-term, systematic method of procurement that involves supplier relationship management, market and spend analysis, and the negotiation of contracts that aid in organizational competitiveness and resilience (van Weele, 2018). According to Monczka et al. (2015), strategic purchasing allows companies to go beyond transactional buying through collaborative partnerships with suppliers, creating innovation, improving quality, and enabling mutual performance improvements.

5.1.2 Operative purchasing

Operative purchasing, also referred to as transactional purchasing, includes routine, day-to-day tasks involved in the purchasing of goods and services for the organization. It focuses primarily on the execution phase of the procurement process, including actions such as processing purchase requisitions, creating purchase orders, and resolving invoice discrepancies (Lysons & Farrington, 2020). According to van Weele (2018), operative purchasing plays a critical role in facilitating the continuity of goods and service flows in an organization by transforming purchasing strategies into practice and managing related documentation.

5.2 Operative Purchasing in Wärtsilä

Operative purchasers serve as intermediaries between internal stakeholders and external suppliers. Their main objective is to ensure that all procurement activities comply

with company policies, contractual frameworks, and financial standards while supporting operational efficiency and minimizing administrative burden.

The operative purchasing process begins when the end-user identifies the need for an item or service. Once the need has been identified, the purchasing process is initiated via Webuy Coupa, which is the primary platform for the procurement process. The user can create the requisition by providing details such as item or service, quantity, price, needed by date, and cost allocation.

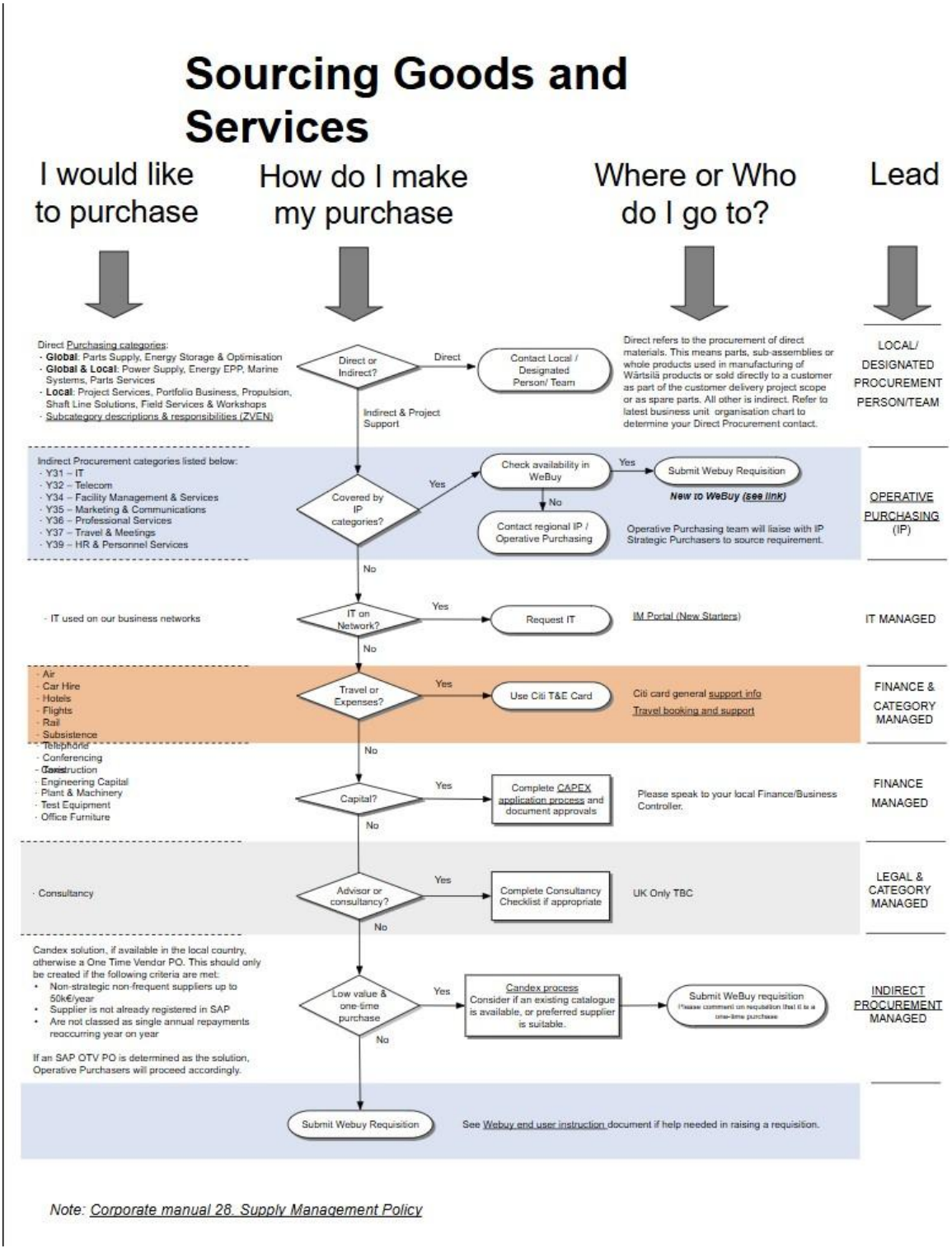

Figure 3. Sourcing goods and services (Wärtsilä, 2024).

5.3 Digitalization Processes within operative purchasing

5.3.1 WeBuy

WeBuy is an in-house e-procurement tool, used only for indirect buying, i.e., consulting services or office equipment. The process begins with an end-user, who is a product user or a budget owner, submitting a request. The end user has the option of shopping from integrated catalogs of suppliers who have pre-established prices in place or entering an open order. The request automatically gets converted into a purchase requisition (PR), which is then routed into an automated approval chain, whose size is based upon the value of the order.

The process is powered by Coupa software, managing the entire procurement process, and is embedded in SAP used by Wärtsilä. Buyers monitor day-to-day work by reviewing and verifying PRs for accuracy before release for approval. When fully approved, a purchase order is automatically created and forwarded to a supplier. The cycle is only completed when a mandatory "goods receipt" is completed by a WeBuy end-user, confirming receipt, a step required before payment of a supplier's invoice.

5.3.2 Coupa

In Coupa, the end-user has multiple methods available for fulfilling their requirements:

5.3.2.1 Catalog Orders

Users can access required products or services within pre-set catalogs that are available in Coupa. These catalogs are managed and updated periodically by the strategic purchasers (Coupa, 2023). Catalog items are typically linked with pre-set contracts, so there is uniformity with price and compliance with procurement policies.

5.3.2.2 Punch-out Orders

Coupa also provides punch-out catalogs, which take the users to the supplier's external e-commerce website integrated with Coupa. There, the users get permission to browse more products directly from the supplier's platform. The selected products are then imported into Coupa for order creation and processing.

5.3.2.3 Free form requisition

If the product or service is not available in the catalog or punch-out, users can create a free-form requisition. In this case, they determine what product or service is needed and select a contracted supplier from the available list. In case there isn't a contracted supplier, the users can choose a non-contracted supplier, which will be procured by the operative purchaser.

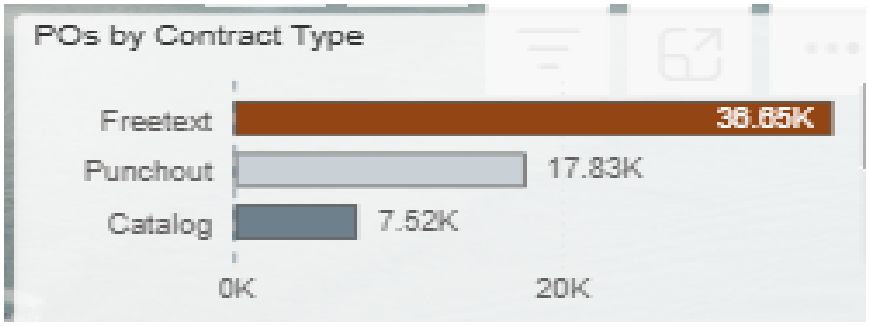

Figure 4. Types of Purchase Order.

Among the total number of purchase orders in Year 2024, the majority of the purchase orders were free-text purchase orders, which constitute 58.93% of total purchase orders, whereas punch out orders constitute 28.89 % of total purchase orders, and catalog purchase order consists of 12.18% of total purchase orders.

5.3.3 SAP

SAP is a world leader in enterprise resource planning software, providing a integrated system that draws core business processes like finance, procurement, and supply chain together (SAP, 2023). Part of its financial component is its General Ledger, or GL, which

is structured through a chart of accounts and interfaces with other programs in order to have appropriate financial tracking of acquisitions.

SAP is used on a daily basis in handling invoices and issuing purchase orders (POs) in Wärtsilä procurement. The processing of invoices is done through specific transaction codes, where buyers need to see and release them for payment, a step in the PO-to-pay process. Creating POs in SAP for one-time suppliers is very inefficient and risky as it includes a laborious manual verification of bank details. This is, however, being optimized through a third party.

5.3.4 Candex

Candex is a third-party procurement solution that enables purchases without onboarding the supplier. Vendor receives the purchase order through Candex, and they can invoice Candex accordingly (Candex, 2025). There are two options within Candex, which are the buyer-funded model and the seller-funded model (Candex, 2025). In the seller-funded model, the supplier will pay the 3% transaction fee, and when they choose this model, the payment term will be just 17 days, whereas in buyer buyer-funded model, the company itself bears the 3 % transaction fee, where the payment term will be higher. So, OP should approach the supplier about Candex with both options and let them choose the best one that fits them.

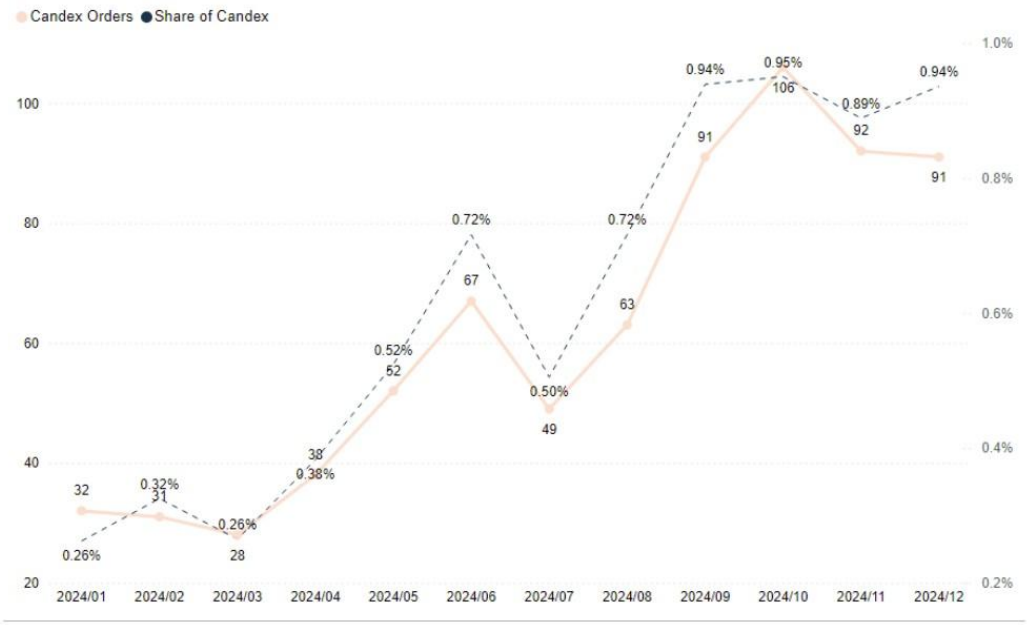

Figure 5. Candex Chart.

Above chart shows the increasing trend for the use of Candex, which was highest in the month of October.

In case the supplier does not accept Candex and the value of the goods or services is relatively low, a one-time vendor can be used, which allows for creating a purchase order for one time without onboarding them. OP can create a one-time vendor in SAP with a maximum value of 5000 euros. However, if the value is high, they might consider using a corporate card for the payment if it is allowed in their department. If none of the above option works, then the last option is to onboard the supplier, which should be handed over to the strategic purchaser.

5.4 Key Responsibilities of Operative Purchasers in Indirect Procurement

A detailed overview of the responsibilities of the operative purchasers are as follows:

5.4.1 Verifying and approving a purchase requisition

Purchase requisitions are the major task in operative purchasing. It includes reviewing the data submitted by the requester to confirm their comprehensiveness, precision, and adherence before it converts to the purchase order. Major stakeholders involved in this step are the end user, operative purchaser, strategic purchaser, and cost approver.
End user creates the purchase requisition and submits it with the supporting documents. Then, the operative purchaser needs to verify the details in the requisition, which are as follows:

5.4.1.1 Verifying the order type

Validation and selecting the appropriate order types based on the nature of the transaction are crucial responsibilities in operational purchasing. When purchasing tangible goods, those that can be physically delivered and counted standard buy orders must be used. These orders must state the number of items purchased along with a price per unit. This makes it feasible to track inventories, manage goods receipts appropriately, and properly settle invoices.

A framework order should be used in place of discrete units when services or intangible deliverables are provided. The whole value of the services should be listed in the order instead of the quantity priced by unit, for which the projected value will be paid. As a result, it enables accurate budgeting, validates service entries, and complies with contract requirements. For framework order, OP should also check the validity end period as it should be before the need-by date.

5.4.1.2 Offer attachment

A valid supplier offers acts as the basis to support the pricing of requested goods or services. The supplier issues the offer, which contains precise details about requested specifications, including product or service details, quantity of the product, delivery terms, and pricing information. It also includes all applicable taxes and shipping costs. The offer provides transparent pricing while ensuring cost-effectiveness and compliance with the

procurement policy. If the offer is not attached to the requisition, the purchaser asks the requester to attach the offer. If the requester is unsure about the price, then the purchaser will request the quotation from the supplier. They should also contact the supplier when the offer lacks essential information or fails to match the request before proceeding with the purchase.

5.4.1.3 Ensuring the correct payment term

OP ensures that the payment terms used in the requisition are in accordance with the framework agreement with our company. Often, the payment terms are mentioned in the supplier's offer letter. If they do not match the agreed terms, OP should request the supplier for a revised quotation reflecting the payment terms agreed upon.

5.4.1.4 Commodity Code and GL account

Expenditure items must be properly classified through the correct commodity codes and GL accounts. The GL account selected should reflect the type of goods or services being purchased. Incorrect coding can lead to misstated financial reporting, so it’s OP’s task to ensure that the correct commodity code and GL account are selected.

5.4.2 Managing requisitions for non-boarded suppliers

If a requester wants to purchase goods or services from a supplier that is not available in the portal, then OP should proceed through the following steps:

5.4.2.1 Double-check with the existing supplier

The first step is to double-check whether any of the existing suppliers can provide the required product or service. If so, OP should proceed with the existing supplier.

5.4.2.2 If the requester has identified the preferred supplier

If none of our suppliers offer the needed goods or services, but the requester already knows which supplier to use and has a valid quotation, OP can ask the supplier to use the third-party vendor, Candex, for invoicing.
If there isn't any error, the requisition will be self-approved if the value of the requisition is under 300 euros. If the value of the requisition is above 300 euros, it will be routed towards the approval flow, starting with the operative purchaser, followed by the strategic purchaser or cost approvers, depending on the cost center limit. Once approved, requisitions are automatically converted into purchase orders and sent to suppliers by different means of transmission, such as CXML or email. In certain cases, they are transmitted through a transmission center, which will be sent to the identified suppliers in their respective formats.

5.4.3 Handling Purchase Order

5.4.3.1 PO Change Request

The change request is created to modify the details in the purchase order, such as price, quantity, cost allocation, or other elements. Change requests are created by the end user or the operative purchaser. The main stakeholders involved in this process are the requester, the operative purchaser, and the cost approver. There are several reasons for a change request. Common reasons for the change request and OP's task related to those change requests are:

5.4.3.2 Budget increment

Change request for budget increments is mostly triggered by the robot when the invoice is approved by the user in Xflow, but there is insufficient budget in the purchase order. It is also initiated by the users themselves when they want to increase the budget according to the estimated budget. OP's task is to verify the amount with the invoices

posted or supporting documents and edit the details if needed. For example, If the change request covers the expense for the current month and it is a recurring expense, then OP edits the change request and reflects the total estimated budget till the validity end period of the purchase order.

For a standard purchase order, a change request is made to match the price with the invoice or order confirmation. When OP receives the order confirmation or invoice from the supplier and notices a price variance from the quoted price, they investigate the issue with the supplier. They may accept the price change if there is a valid reason, such as the original quotation being invalid when ordering the goods and the price was updated afterwards. Another valid reason could be a catalog product's price change that was informed, but it has not been updated in the system. In such cases, either the OP or the end user creates a change request to match the price. Then, it is reviewed and approved by another operative purchaser, followed by the approval of the cost approver.

5.4.3.3 Addition of new products or services

The user may request a change for the addition of a new product or service line. OP's task is to request justification for the addition of products or services, as well as supporting documents such as a quotation, before they approve the request. Once all information is verified, OP approves the change request. Once it is approved by all approvers, OP sends the revised purchase order to the supplier.

5.4.3.4 Account allocation change

When there is a change request for modifying the cost allocation, OP should verify if invoices have been booked to the original cost allocation or not against the purchase order. If the invoice has been booked to that PO for the original cost, then the cost should be split between the original cost and the new cost center. OP should create a new line with a new cost allocation with the remaining budget, reduce the budget from the existing line, and make sure that the budget is enough for the invoices already posted in the

original line. So, OP's task is to ensure that it is integrated into the SAP smoothly and there won't be any disruptions in future entries.

5.4.3.5 Other PO information changes

In addition, OP handles other change requests, such as changes in order quantity, product replacement, correction of the delivery address, changing the contact person, and modification of the purchase order validity period. OP carefully reviews the request and manages it accordingly. They will manage timely communication with the stakeholders and align with them.

5.4.3.6 Purchase order unsent

A purchase order goes to the unsent list when there is a transmission failure and it does not reach the intended recipient. Transmission failure may occur due to an error in the system, an incorrect email address, a missing email address, or other technical errors. It is important to monitor it regularly and send it to the correct supplier email address so that the purchasing process won't be delayed. In some exceptional cases, a purchase order should be sent to the end user instead of the supplier if further internal validation or confirmation is required before proceeding.

A revised purchase order may be occasionally found in the unsent list if the previously sent purchase order has encountered a transmission failure. Sending all revised POs to suppliers is not required; the revisions are internal and do not affect the supplier, such as a budget increase or accounting correction, the supplier does not need to be informed. However, if the revision affects goods or services (for example, changes in quantity, description, or price), then the amended PO must be sent out to the supplier. It is the responsibility of the operative purchaser to monitor the unsent list and send it to the respective stakeholders so that it won't cause a delay in the procurement process.

5.4.3.7 Integration Errors

Sometimes, a purchase order may not be reflected in SAP because of integration issues. There may be different reasons for the error, such as the use of a GL account that is not valid for a particular company code, the use of a delivery address that is not registered in the system, or a percentage of budget allocation that does not sum up to 100 %. Additionally, there may be other reasons for the integration errors. These issues prevent the PO from being integrated into SAP, thereby requiring manual intervention. The operative purchaser should investigate such errors to detect the root cause and take necessary actions to resolve the issue.

5.4.3.8 Soft closing of the Purchase order

The operative purchaser should execute the closing of the purchase order at the request of the end-user or cost owner. Before closing the purchase order, they should ensure that the related transaction has been completed and further invoices are not expected.

5.4.3.9 Order confirmation

The order confirmation number along with the expected delivery date must be entered into the Purchase Order after receiving the email order confirmation from the supplier. The confirmation email should be attached to the purchase order as a reference. Some region use RPA to attach the order confirmation to SAP while some regions still attach the order confirmation email to Webuy PO manually.

5.4.4 Invoice handling

5.4.4.1 Xflow Invoices

Error-free invoices do not come in the operative purchaser's work list. They are automatically processed, whereas Invoices with discrepancies or issues will be routed to the pur-

chaser’s task list for manual review and resolution. Common causes of invoice discrepancies include payment term mismatches between the invoice and purchase order, price mismatches, end user not being found by the RPA, and errors in invoice booking.

Operative purchaser also acts as a bridge between the end user and accounts payable in resolving these issues. If the invoice price or payment terms do not match the purchaser's order, the purchaser needs to confirm with supporting documents such as a quotation or contract agreement. If it doesn’t match with the supporting document as well, then it should be contacted with the supplier to resolve the issue. If the system can’t identify the end user to send the invoice for approval, the operative purchaser should send the invoice to the correct person manually. The operative purchaser should also verify that the invoice booked against the purchase order is within the validity period. If not, they should either extend the validity period or ask the user to create a new purchase order according to the need for the service.

5.4.4.2 ZMRBR

Operative purchasers should also check ZMRBR transactions where the invoice gets blocked due to various reasons, even after being released from Xflow. The major reason for invoice block in ZMRBR is budget issue and missing goods receipt in the standard purchase order. OP should allow the robot to trigger the change request, but in some cases, OP needs to initiate the change request manually if robots fail to do so. OP should follow up with the approver if the request is stuck in the approval flow. Additionally, invoices get stuck in ZMRBR due to a missing goods receipt. In that case, if the payment due date is approaching, OP needs to confirm with the end user whether the goods have been received or not. If received, they should ask the end user to make the goods receipt and provide support if needed, but if they haven’t received the goods, then further investigation should be conducted.

5.4.5 Intrastat Reporting

Intrastat reporting is an EU statistical requirement that enforces companies to report the flow of goods from one EU member state to another. It is a mechanism to collect trade data on intra-EU trade, following the abolition of customs declarations for intra-EU trade (Eurostat, 2023).

Operative purchaser enables valid and timely Intrastat reporting, especially when goods are being purchased from suppliers based in other EU nations. Their role is to gather and input specific information on every purchase order line that entails cross-border transactions.

The data which are required for Intrastat reporting are as follows:

5.4.5.1 Harmonized System Code

It is an international standardized system of names and numbers for classifying products that are traded. The operative purchaser has to make sure the right HS code is assigned to every item since it identifies the product category for statistical and customs reasons. In certain instances, suppliers provide the necessary information, like HS codes and net weight, on the invoice itself. If this is not given, the operative buyer takes the information from a prior purchase order, if the same product has been ordered previously. In the absence of any historical information, the operative buyer performs an online search to find the correct code. After finding an appropriate code, it is confirmed with the active code list available in the SAP to check whether it is valid for the country involved. If the code is invalid, the operative buyer searches for related product terms within the list of valid codes for that country.

5.4.5.2 Net weight

The net weight of the product is usually provided by the supplier on the invoice. If it is not mentioned in the invoice, the operative purchasers search for the information on the supplier's website or other credible online sources. If they do not find the information through their websites, then they contact the supplier directly and request the information required.

5.4.5.3 Country of origin

The country of origin is normally indicated on the invoice of the supplier. When it is not specifically stated, the operative purchaser usually considers the country of origin as the same country where the supplier is located.

After gathering and verifying all the required information, the operative buyer organizes the information into a standard Excel template. The template provides detailed entries for all applicable purchase order lines and aligns with the company's reporting standards. The file is then sent to the Master Data team, who update the material master records in the SAP system. They will update the data, which will then be available for intrastat reporting.

5.4.6 Email Handling

Operative purchaser acts as a supporting role for the procurement process as they also provide necessary guidance to the stakeholders involved, including the end user, supplier, accounts payable, and cost owners. Different kinds of requests and inquiries come through email from internal stakeholders and external suppliers. These may request clarifications about purchase requisitions, orders, delivery schedules, invoices, or changes in requirements. Operative purchaser helps to resolve issues concerning the purchase order and invoices by coordinating with the related parties. OPs also get notifications generated by robots that need their attention. So, it is their responsibility to handle those notifications and take corrective actions.

6 Robotic Process Automation (RPA)

Robotic Process Automation (RPA) is a technology designed to improve business efficiency that uses software-based agents, commonly referred to as “bots”, to carry out standardized, repetitive tasks by imitating human interactions with the system. These RPA works as a virtual assistant and can log into applications, initiate workflows, and transfer information between systems, essentially mirroring human work. Machine learning and artificial intelligence can be used in complex problems, but the functionality of RPA is not based on adaptive learning or judgments and can perform only those tasks that are taught beforehand (Asatiani & Penttinen, 2016).

RPA helps to improve the efficiency of workflow of the company through automation of repetitive processes (Lacity, Willcocks, & Craig, 2015). RPA functions at its best when it follows a set of processes that are repetitive in nature and do not involve cognitive judgments. Manual intervention is needed for exceptional cases and supervision, as RPA alone cannot handle the whole process when it involves subjective interpretation and complex data formats (UiPath, 2023).

RPA tools imitate human interaction at the user interface level, engaging with a variety of applications as a human would, which makes them useful across many sectors and software environments (Hofmann, Samp, & Urbach, 2020). RPA can streamline full end-to-end processes or sub-processes depending on the underlying steps and complexity of tasks (Asatiani & Penttinen, 2016). Thus, RPA functions as a digital assistant by supporting employees by relieving them from the monotonous activities so they can focus on higher-value, strategic work (Lacity, Willcocks & Craig, 2015).

6.1 RPA Suitability Characteristics

The major characteristics of the task for RPA suitability are high volume, repetitive, and maturity (Lacity et al., 2015). Rule-based tasks that do not require judgment and follow

a set of procedures are suitable for automation. Another significant feature for automation is process maturity, which is subject to minimal change and is easy to predict. It will make the automation more beneficial.

High-volume processes are tasks performed frequently by multiple people. These types of tasks are suitable for automation because they represent the largest possible benefit and return on investment (ROI) (Lacity et al., 2015).There are some factors that identify a process for suitability for automation. For processes that have exceptions, their automation may take longer than performing the task itself. In addition, the automation may be more likely to fail and need to be updated (Jovanović et al., 2018). Therefore, a process that has a few exceptions for process steps is easier to automate, develop, monitor, and maintain with Robotic Process Automation(Costa et al., 2022).

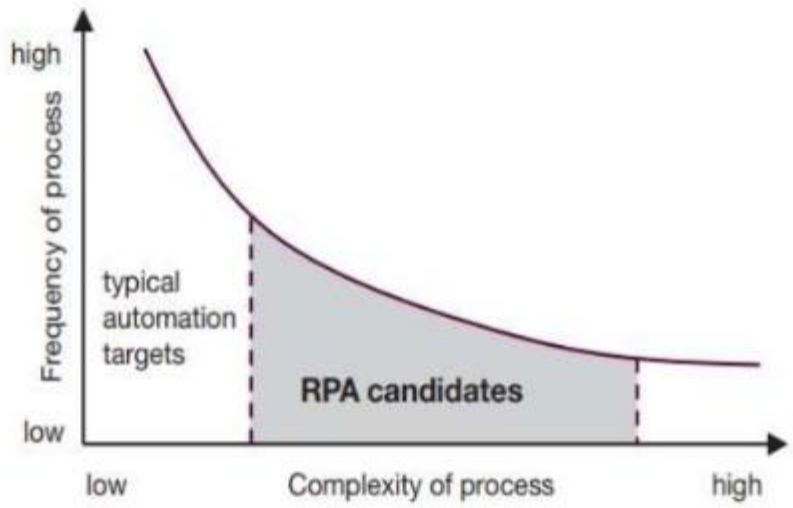

Figure 6. RPA candidates (Adopted from Jovanović et al., 2018).

According to the figure, the suitability of RPA is highly dependent on the frequency of processes and its complexity. RPA candidates' tasks are those that have a high frequency of process, and the complexity of the process is low. Optimal RPA candidate zone lies between high-frequency processes and low-to-medium complex processes, which are rule-based, repetitive tasks and require minimal manual intervention.

6.2 Existing RPAs in Operative Purchasing

Digitalization is an important factor in Wärtsilä's strategic vision, which aims to transform the traditional processes and drive innovation across all global functions. Wärtsilä has adopted RPA in all of its business functions, which reflects the commitment of the company to maximizing operational efficiency and continuous improvement of the company. However, the extent of its implementation varies among different functional areas.
Operative Purchasing is already utilizing several RPAs that have significantly benefited from reducing manual workload, eliminating human errors, and enhancing the overall process efficiency.

6.2.1 ZMRBR Alerts RPA

This robot focuses on invoices associated with ZMRBR transactions and identifies mismatches between the invoice quantity and the received goods, reminding the end-user to complete the goods receipt. This RPA runs 3 days a week. This robot periodically scans for standard PO invoices from ZMBBR that have a missing GR and sends a reminder email to the responsible end user requesting to make a goods receipt. It also notifies the discrepancy to the operative purchaser in case escalation or further investigation is needed. Along with the reminder email, this robot compiles and sends a list of GR/IR discrepancies to the operative purchaser, which will assist in subsequent analysis and resolve the issues that cannot be automated.

This robot has substantially streamlined the GR/IR follow-up process by cutting down manual tracking operations and enabling prompt communication among stakeholders. It helps improve data accuracy, which fosters faster invoice processing, which ultimately results in improving the efficiency of the procurement process.

6.2.2 Auto GR Creation RPA

This RPA is an extension of ZMRBR Alert RPA that was designed to post Goods Receipt (GR) delays for low-value purchases, especially Catalog and Punch-out purchase orders. When the item lines are below €300 and the end-user has yet to post the GR even after five automated reminder emails, this RPA posts the GR in SAP automatically. This rule-based automation eliminates the low-value, low-risk transactions without imposing any additional effort. It auto-clears ZMRBR's GR/IR differences, hence taking a significant workload away from operative buyers and leading to overall efficiency improvement. This financial threshold offers a protection feature that limits the automation to only non-critical purchasing in addition to financial authority and precision. This RPA also runs 3 days a week after ZMRBR Alert RPA.

6.2.3 Framework Order Invoice RPA

This RPA helps in handling framework order invoices by sending the invoices to the respective end users for approval and releasing them based on the response of the user. This robot also carries the logic to identify the budget availability, validity period, as well as currency deviation. Exceptionally, it couldn’t forward the invoice to the user or their supervisor if they do not have access to the Xflow system. The majority of the invoice processing is handled by this robot, resulting in manual handling of only 35 % of total invoices in the year 2024. It also improves compliance by checking important factors such as budget and validity period before the end user’s approval.

6.2.4 Order confirmation attachment RPA

This RPA helps in handling order confirmation as it attaches the order confirmation document directly to SAP. When the supplier sends an order confirmation to the operative purchaser’s email, they forward the email to the RPA, and the robot extracts the attachment and attaches the document to the relevant purchase order. This automation helps

to reduce the manual effort in handling order confirmation and also improves the overall efficiency by reducing human error.

6.2.5 Purchase Order Soft Close RPA

This RPA provides a powerful solution to automate PO soft closing in a mass level. While the Excel file is forwarded to the robot email, it will extract the purchase order number and check the status of the purchase order. If it indicates that the PO is not active anymore, it will be eligible for soft closing, and the RPA will change the status to soft closed. It will generate a report of actions mentioning success and failure, which will help operative purchasers to investigate in the failure cases.

6.2.6 Purchase Order Name Update RPA

A purchase order would require follow-up by the end user, such as approving the invoice, making changes in the PO. However, due to reassignment of employees, work readjustment, the responsibility of the POs may need to be transferred to a different employee. Manual handling of this task will be time-consuming, so this robot helps to relocate the POs to the responsible user by changing the delivery address field in SAP and the ship-to user field in Webuy. This RPA helps to reduce manual processing time as well as minimize human error, which ultimately improves the efficiency of the procurement process.

6.2.7 Purchase Order Change Requests RPA

This RPA is an improvised version of the ZMRBR alert RPA, which mainly focuses on framework orders that have budget issues. When the budget of the purchase order does not cover the invoice amount, but the invoice is approved by the user and released, this RPA will pick up the case and submit a PO change request to cover the invoice amount. This automation reduces manual intervention and improves the efficiency in invoice handling.

6.3 Benefits of RPA

Technology is evolving rapidly, and the use of advanced technologies such as RPA will provide a competitive advantage to businesses. RPA can perform rule-based and repetitive tasks so human resources can be utilized for problem-solving and higher-value strategic tasks, which will save time as well as reduce the cost (Lacity et al., 2015a). RPA efficiently executes tasks, allowing it to work faster as it can work 24/7 without breaks or holidays (Willcocks, Lacity, & Craig, 2015). Using RPA helps to find the bottleneck in the processes, as their actions are reported, and they also create reports (Doguc, 2020). RPA also performs tasks more accurately than humans, which speeds up processes, increases overall productivity and accuracy, and reduces costs (Doguc, 2020).

Another benefit of RPA is that it is easy to configure. Core programming skill is not needed to execute the RPA, and it can be learned in a few weeks, so it helps to achieve high ROI quickly (van der Aalst, Bichler, & Heinzl, 2018). Even the user can modify the rules that are automated by RPA. Only a highly skilled programmer could make changes to traditional software's functionality but RPA is highly adaptable and it can be trained by changing the visual graphs, through visual representation of tasks performed manually or using simple logical statements.

6.4 Challenges of RPA

As we discussed the benefits of RPA, there are also some challenges in implementing RPA in business processes, which could be in terms of technical barriers, financial barriers, or cultural barriers (Pramod,2022). As RPA interacts via user interface, there may exist compatibility issues because of integration problems with the older system or the requirement of detailed customization or a change of system. So, it may lead to delays or failure in the implementation of RPA as well, and it could be costly and time-consuming (Okolie et al., 2022). Employees may think that RPA will take over their jobs, so they may hesitate to adopt the technology. The risk of a cultural barrier is high when the role of RPA is not properly communicated to the employees. They should be informed that

human resources will be more focused on strategic high-value tasks, and RPA will only take over repetitive, low-value tasks to foster collaboration (Okolie et al., 2022).

Moffitt et al. (2018) observe that RPA can enhance security since human interactions are reduced with sensitive systems and processes are monitored in a better manner. However, robots that handle data are a form of risks, particularly those that are concerned about hacker attacks, as stated by Flechsig et al. (2022). Robots will enter systems through company credentials and therefore gain access to passwords, which can be a possible risk point for unauthorized entry when not well-secured. Furthermore, if errors have occurred in configuring the robots, it ends in serious errors in the various systems that it has access to, and a malicious robot may perform activities that will be detrimental to the firm (Fernandez & Aman, 2021).

According to Flechsig et al. (2022), the risk associated with hacker attacks increases because of RPA as it uses the company's credentials and password, and if it is not secured properly, there may be a risk of unauthorized access. If there exists any error during robot configuration, then it may lead to a serious issue for the system of organization (Fernandez & Aman, 2021). Digital transformation is evolving rapidly, and new technologies such as AI-driven RPA, cognitive bots are emerging, which provide higher value to improve the business processes (Okolie et al., 2022). As RPA only performs tasks based on the training provided and cannot provide logical judgements, along with the rise of hyper automation technologies, which are combined with AI, machine learning, which also contribute to complex processes, businesses may shift towards hyper automation technologies rather than traditional RPAs.

7 The Present Condition of Operative Procurement: A Quantitative Baseline

7.1 Frequency of tasks and task allocation

Operative purchasing team is subdivided into different regions and operational purchasing activity of the organization is assigned systematically across regional teams, i.e., North Europe, Central and South Europe, America & Africa, and MEA (Middle East and Africa). In regions where the volumes of tasks are high, task-by-task assignments are made to provide a balanced workload and timely accomplishment, whereas in regions where the task volumes are moderate, the responsibilities are assigned based on the distribution of workload.

Purchase requisitions, purchase order change requests, purchase order unsent lists, integration error lists, emails, and Xflow invoices are carried out every day. Some tasks are carried out at certain intervals, such as ZMRBR lists are normally reviewed and processed twice a week. Similarly, intrastat reporting is normally conducted twice or thrice when they receive the relevant data list. Soft closing tasks are carried out on a need basis depending upon the requirement. In addition, project-related purchase orders, which are more complex and require delicate handling, are assigned to a specific purchaser and are typically processed on a weekly basis.

7.1.1 Task Volume

The volume of task in operative purchasing was assessed using a blend of quantitative data and qualitative assessment. Qualitative information was drawn from the internal databases as well as procurement reports which contained data and metrics in key operative purchasing activities except email handling. System generated logs over fixed periods were used to gather this data. On the other hand, email communication tasks and Intrastat tasks were not tracked and thus, could not be systematically recorded within

the systems. To fill the gap, volume of this task is estimated through direct observation. Even though this is qualitative in nature, it enriches the analysis of operative purchaser's task by providing a valuable estimation.

7.1.2 Volume of purchase order and purchase order line

To understand thoroughly the operative purchaser's (OP) workload concerning purchase order, an analysis is made on the volume of POs and PO lines within a specific timeframe. Since PO-related activities are the key tasks of operative purchasers, this information could provide an insight on the distribution of tasks, workload dynamics, and possible efficiency improvements within the workflows. The data provided in the table below presents the quarterly volumes of POs and PO lines from Q1 2024 through Q2 2025. This analysis reflects the trends over several months and adds a global perspective to support the identification of operational patterns.

Date	POs	PO Lines	Avg Lines Per PO
2024/Q1	**16232**	**30649**	**1.89**
2024/01	5956	11376	1.91
2024/02	5036	9444	1.88
2024/03	5240	9829	1.88
2024/Q2	**14944**	**27949**	**1.87**
2024/04	5037	9378	1.86
2024/05	5089	9498	1.87
2024/06	4818	9073	1.88
2024/Q3	**14288**	**27350**	**1.91**
2024/07	4617	8918	1.93
2024/08	4674	8806	1.88
2024/09	4997	9626	1.93
2024/Q4	**16267**	**31119**	**1.91**
2024/10	5735	11023	1.92
2024/11	5304	10219	1.93
2024/12	5228	9877	1.89

Figure 7. Volume of purchase order and purchase order line.

The above table represents the volume of purchase orders and purchase order lines in indirect procurement in the year 2024 and up to the 2nd quarter of 2025. The figure illustrates that the total purchase order for the year 2024 was 61731, and the average PO line for the years 2024 and 2025 is similar, remaining close to 1.9. The average PO volume per day is 169.12.

7.2 Task Volume and completion time (North Europe)

To sharpen the analysis and maintain the consistency of the data extracted, I am narrowing the scope of study and limiting it to the dataset of the North Europe region which has 5 countries including Finland, Norway, Denmark, Sweden and the UK.

7.2.1 Volume of purchase order and purchase order line (North Europe)

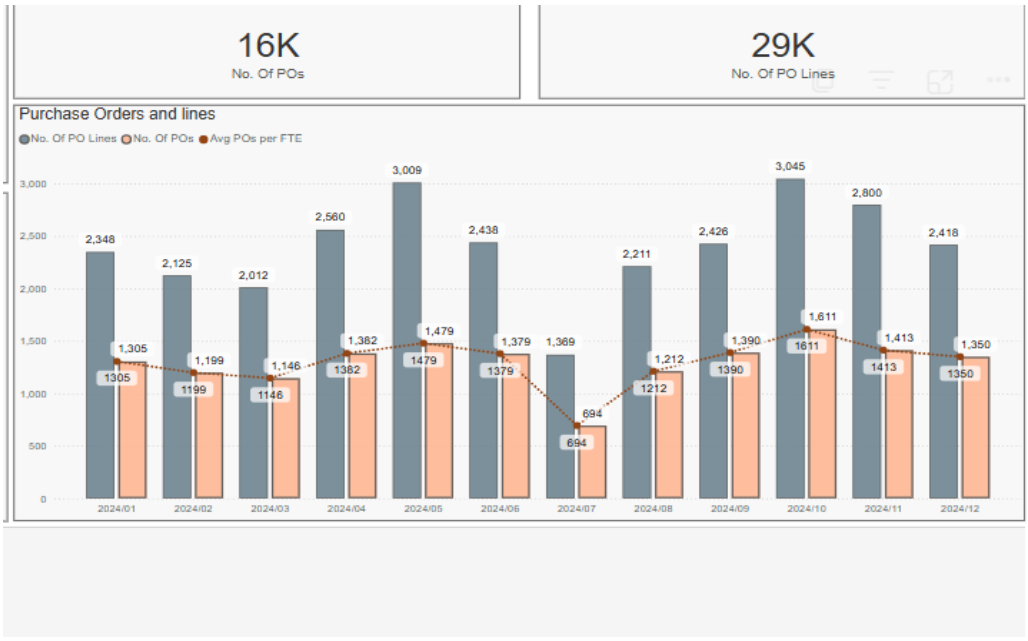

Figure 8. Volume of Purchase order and purchase order lines of North Europe (Year 2024).

The above figure illustrates the volume of purchase orders and purchase order lines in the North Europe region in indirect procurement in the year 2024, where the total number of purchase orders was 15,576 and purchase order lines was 28,761. We can see the

fluctuation of purchase orders over the year. Purchase order are created once the requisitions are approved, so volume of purchase order and PO lines represent the volume of requisitions.

Table 1. Processing time of Purchase Requisition.

Year	Purchase requisition	Total hours	Average Hour	Average Requisition per day
2024	**16353**	**356396**	**21.79**	**44.80**
2025(Upto 2nd quarter)	**7886**	**123441**	**15.65**	**43.21**

From the above table, we can see that the total number of purchase requisition in year 2024 was 16,353 whereas up to 2nd quarter of year 2025, it was 7886 and the average hour per requisition was 21.79 hours and it was decreased to 15.65 hours in year 2025 We also notice that the average requisition per day decreases from 44.80 to 43.21 from year 2024 to year 2025, up to 2nd quarter.

7.2.1.1 Comparison of average requisition per day and average hour per task over 2024 and 2025 (Upto 2nd quarter)

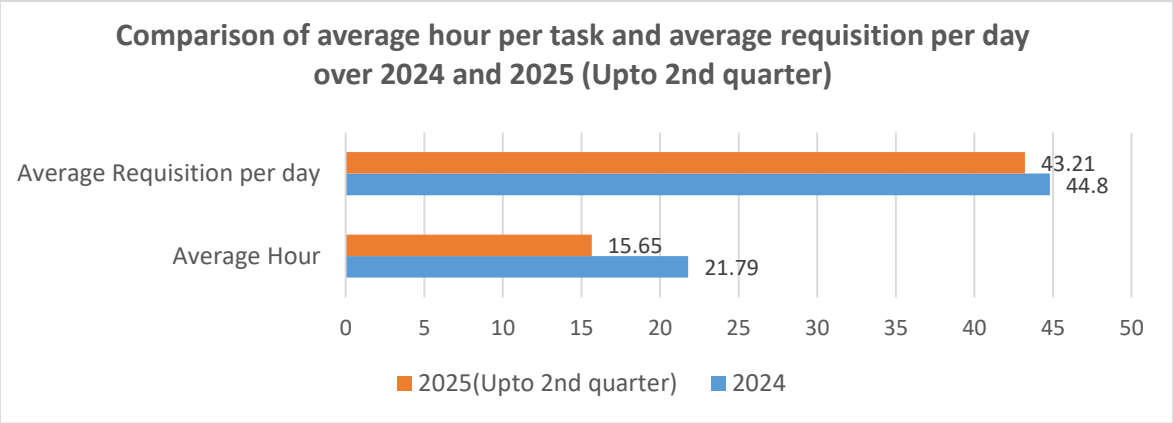

Figure 9. Comparison of average requisition per day and average hour per task over 2024 and 2025 (Up to 2nd quarter).

Above figure shows the comparison of average requisition per day and average hour taken to complete per task in year 2024 and 2025 (up to 2nd quarter). The figure shows that the average requisition per day was 44.8 in 2024 which is reduced to 43.21 in 2025. On the other hand, there is an appreciable improvement in processing time for requisition in year 2025 which is 15.65 hours and was reduced by 6.14 hours comparing to the average processing time in 2024.

7.2.2 Purchase Order Change Request

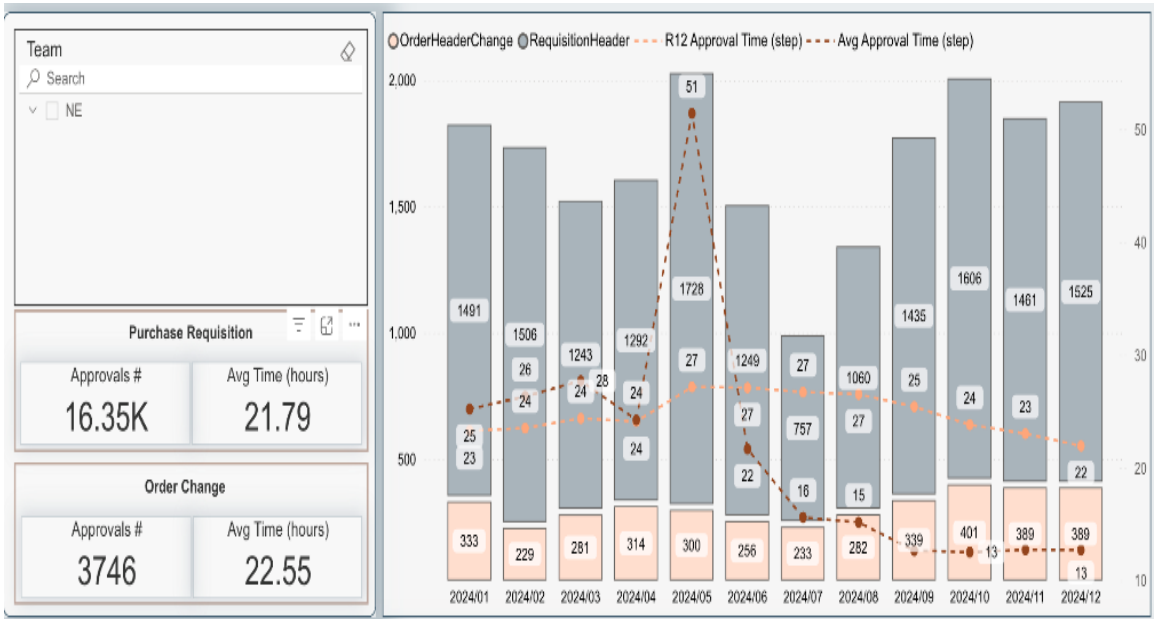

Figure 10. Volume of purchase order change request.

The above figure shows the frequency of monthly purchase order changes over the year 2024, where we can see the fluctuation in number of change request over the year. We can see that the highest volume for change requests was in December. Altogether, there were 3746 change requests in North Europe for the year 2024.

Table 2. Processing time of purchase order change request

Year	Order Header Change	Total hours	Average Hour	Average Order Header Change per day
2024	**3746**	**84468**	**22.55**	**10.26**
2025 (Upto 2nd quarter)	**1724**	**33,394**	**19.37**	**9.44**

The table illustrates that the total number of change requests in year 2024 was 3746 and the average change requests per day was 10.26, whereas in year 2025, up to the 2nd quarter, it was 1744, resulting in an average of 9.44 per day. We can see improvement in handling time as it was 22.55 in 2024, which has decreased to 19.37 hours while analyzing the data till the 2nd quarter of 2025.

7.2.2.1 Comparison of average hour per task and average change request per day over 2024 and 2025 (Upto 2nd quarter)

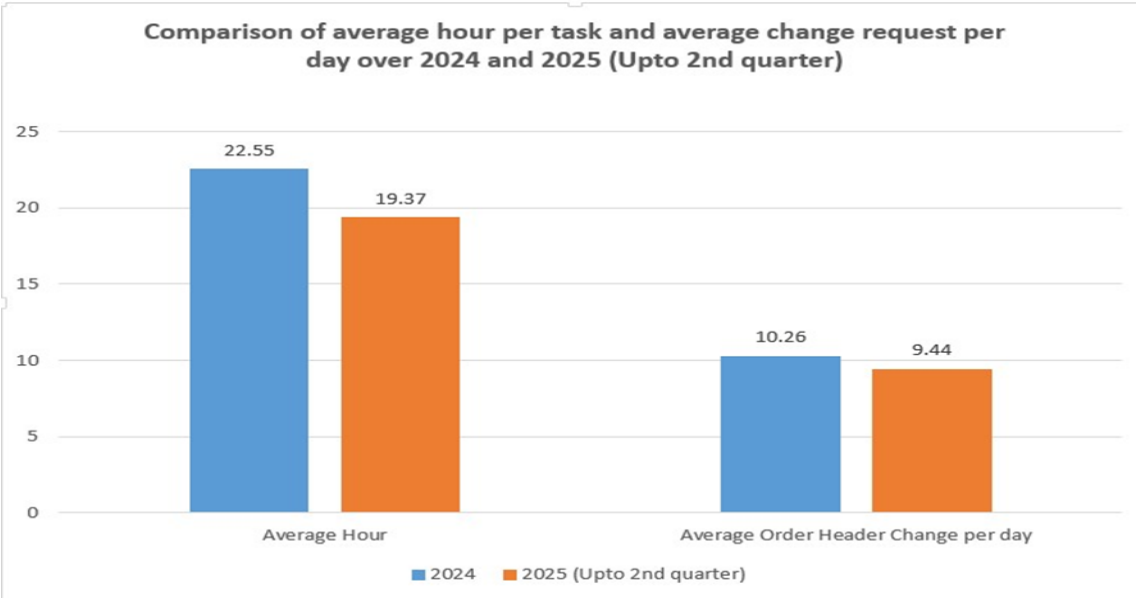

Figure 11. Comparison of average hour per task and average change request per day over 2024 and 2025 (Up to 2nd quarter).

Above figure shows the comparison of average hour per task and average change request per day over 2024 and 2025 (Up to 2nd quarter). The figure shows that the average order change request per day was 10.26 in 2024 which is reduced to 9.44 in 2025. We can also see the improvement in processing time which was reduced from 22.55 hours to 19.37 hours per task.

7.2.3 Purchase Order unsent lists

Table 3. Volume and processing time of Purchase Order unsent lists.

Year	Volume	Average hour	Average volume per day
2024	**3800**	**0.08**	**10.41**

According to the data extracted, there were 3800 purchase orders that were not sent to the supplier directly and needed an operative purchaser's action to send them manually to the supplier. On an average, there are 10.41 purchase orders that end up in an unsent list which are handled by OP. Based on the observation, it takes approximately 5 minutes to complete a single task.

7.2.4 Integration errors

Table 4. Volume and processing time of Integration errors.

Year	Volume	Average hour	Average volume per day
2024	**1600**	**8**	**4.38**

This table illustrates the number of cases that fail to integrate with SAP and need some correction from the operative purchaser. There were 1600 purchase orders that had an integration error in year 2024 and were handled by operative purchaser. There may be complicated errors which needs attention of other stakeholders like cost owner as well so the handling period doesn't solely depend on the operative purchaser. As most of the cases are handled within an hour, it is estimated that it is handled within a working hour. There is continuous development in the area of integration problem which shows a decreasing trend in the year 2025 which contributes to lower manual intervention.

7.2.5 Email handling

According to the observation, there are around 120 emails per day, 90% emails are straightforward, such as minor clarifications, robot emails, order confirmations which do not require much effort whereas around 10% emails are related to complex issue such as product missing, involve disprecencies or other escalations which needs to be coordinated with other stakeholders such as supplier, end user, strategic purchaser or cost owner.

Table 5. Volume and processing time of Email handling.

Average Volume per day	**Average total hours**	**Average hour per email**
120	**873**	**7.275**

These cases may take more time, estimating that it takes around 2-3 working days and 90% other emails take 5 minutes per email , so on an average it took 873 hours.

7.2.6 Invoices

Invoice Handling revealed a critical insight into the current state of automation. While 79,642 invoices were processed in 2024, 65% were handled automatically by existing RPAs.

Table 6. Volume and processing time of invoices.

Year	**Volume**	**No of manual invoices**	**Invoice manual (%)**	**Average volume per day**	**Average hour**
2024	**79642**	**27,562**	**35%**	**75.51**	**36**

This demonstrates the proven value of automation within the function. However, the remaining 27,874 invoices (35%) required manual intervention, consuming a disproportionate amount of operative purchaser time due to their complex, coordination-heavy nature.

7.2.7 Intrastat

The figure below shows that there were 2129 PO for intrastat reporting and 5004 PO lines, among which 37.77 % were free text POs, 61.97% were punch-out POs and 0.26 % were catalog PO.

Table 7. Volume of Intrastat tasks for different types of Purchase orders.

Type of PO	**No. of Purchase Order**	**No. of Purchase order lines**	**PO line percentage**
Free text PO	1146	1890	37.77 %
Punch-out PO	971	3101	61.97 %
Catalog PO	12	13	0.26 %
Total	2129	5004	100 %

Based on the observation, it takes around 2 minutes for punch-out and catalog POs whereas it may takes around 5 minutes on an average for free text PO which constitute the total time taken to complete the intrastat reporting tasks for year 2024 is 103.36 hours for punch-out PO, 0.43 hours for catalog POs and 157.5 hours for free text POs totaling to 261, 29 hours as a whole.

Table 8. Processing time of Intrastat tasks.

Year	PO volume	PO lines volume	Average volume per day	Total time	Average time
2024	**2129**	**5004**	**13,71**	**261,29**	**0.052 hours (3.13 minutes)**

In the year 2024, intrastat reporting was done for 5004 PO lines and the estimated total time taken to complete those tasks is 261,29 hours averaging 3.13 minutes per PO line.

7.3 Task complexity

According to Baker & Huntington-Klein (2025), task complexity is influenced by various factors that are involved in a particular task and their relationship with the task. When the task or element is interconnected and dependent, then it increases the complexity of the task (Baker & Huntington-Klein, 2025). Task complexity in terms of tasks of operative purchasing is determined by the effort level, automation, decision making, and coordination among other stakeholders. Task complexity is an important factor that determines the workload as well as the task handling time of operative tasks.

Table 9. The complexity of tasks.

Operative Tasks	Frequency of task	Decision making	Automation level	Coordination required	Task complexity
Purchase requisition	Daily	Low-medium	Manual	Medium	Medium
PO change request	Daily	Low	Manual	Low -Medium	Low-Medium
PO unsent lists	Daily	Low	Manual	Low	Low
Integration errors	Daily	Medium	Manual	Low-Medium	Medium - High
Email communication	Daily	Medium-High	Low	High	Low-High
Xflow invoice	Daily	Medium - High	Medium	Medium- High	Medium
ZMRBR	Twice a week	Medium - High	Medium	Medium - High	Medium - High
Intrastat	3 times a week	Low	Manual	Low	Low

The table analyzes the complexity of tasks based on several factors, such as frequency of task, decision-making, automation level, and the requirement for coordination with other stakeholders, including suppliers, end-users, strategic purchasers, accounts payable, or cost owners. Low-complexity tasks, such as purchase order change requests and purchase order unsent lists, do not require more coordination with stakeholders, nor do they require decision-making. On the other hand, tasks such as purchase requisition, Xflow, and ZMRBR, as well as email handling, require more coordination and decision-making, which makes the tasks complex. In some of the tasks like Xflow invoice, ZMRBR, email communication, some of the steps are being handled by the robots.

8 Data Analysis and Findings

This chapter represents the core analytical component of the thesis. It moves beyond the descriptive baseline established in the previous chapter to a rigorous, data-driven investigation. By applying the integrated Task-Technology Fit (TTF) and Technology Acceptance Model (TAM) framework to the quantitative and qualitative data, this chapter identifies, evaluates, and prioritizes operative purchasing tasks for Robotic Process Automation (RPA). The findings directly address the research questions by pinpointing the most feasible processes for automation and projecting the specific efficiency gains achievable, thereby providing an evidence-based foundation for the recommendations to follow.

8.1 Quantifying the Operational Burden: Volume and Time Analysis

The first step in the analysis was to quantify the scale and time consumption of core operative purchasing tasks within the North Europe (NEU) region. This provides a clear cost-benefit baseline for assessing the potential return on investment from automation.

Purchase Requisitions form the foundation of the workflow, with 16,353 processed in 2024. The critical finding is the high daily volume of 44.80 requisitions, which establishes a continuous, high-frequency workload that demands constant attention from operative purchasers.

Purchase Order Change Requests emerged as a significant contributor to process delays. With 3,746 requests annually (10.26 per day) and an average cycle time of 22.55 hours, this task is a major bottleneck, particularly when invoice payments are held up awaiting PO adjustments.

Invoice Handling revealed a critical insight into the current state of automation. While 79,642 invoices were processed in 2024, 65% were handled automatically by existing RPAs. This demonstrates the proven value of automation within the function. However,

the remaining 27,562 invoices (35%) required manual intervention, consuming a disproportionate amount of operative purchaser time due to their complex, coordination-heavy nature.

The most significant finding from the volume analysis pertains to Intrastat Reporting. The task involved processing 5,004 individual purchase order lines in 2024. Through direct observation, the time per line was calculated at 3.13 minutes. This seemingly small unit of time aggregates into a substantial 261 hours of annual manual effort for the NEU region alone a vivid illustration of the "death by a thousand cuts" phenomenon that plagues indirect procurement and represents a prime opportunity for consolidation through automation.

8.2 Applying the TTF-TAM Framework: A Structured Evaluation of Automation Potential

The collected data was systematically evaluated against the theoretical framework to move from simple quantification to strategic prioritization.

8.2.1 Task-Technology Fit (TTF) Analysis

The TTF model was used to assess the technical feasibility of automating each task based on key RPA suitability characteristics: volume/frequency, rule-based nature, process maturity/standardization, and exception rate. The findings are synthesized in Table 9.1.

Table 10. Task Technology Fit Analysis.

Task	Volume & Frequency	Rule-Based Nature	Process Maturity & Standardization	Exception Rate	Overall TTF
Intrastat Reporting	High (13.7 lines/day)	High (Data lookup & entry)	High (62% from standardized Punch-out/Catalog orders)	Low	**Excellent**

PO Unsent Lists	High (10.4/day)	Very High (Resend email)	Very High (Fixed process)	Very Low	**Excellent**
PO Change Requests	High (10.3/day)	Medium-High (e.g., budget match)	Medium (Structured but requires verification)	Medium	**Good**
Email Triage	Very High (120/day)	Low-Medium (Variable content)	Low (Diverse queries)	High	**Moderate**
Invoice Handling	High (75.5 manual/day)	Low (Requires judgment, coordination)	Medium (Partially automated)	Very High	**Poor**

- **High TTF Tasks: Intrastat Reporting** and **PO Unsent Lists** were identified as optimal candidates. They are high-volume, rule-based, mature processes with minimal exceptions, making them technically straightforward to automate with a high likelihood of success.

- **Medium TTF Tasks: PO Change Requests** for specific subtypes (e.g., budget increments triggered by invoice mismatches) show a good fit. While rule-based, they may require a human-in-the-loop for approval, suggesting a hybrid RPA model. Email Triage for standard queries (90% of emails) is a moderate candidate, suitable for Natural Language Processing (NLP)-enhanced RPA to categorize and route messages.

- **Low TTF Tasks: Complex Invoice Handling** and non-standard **Email queries** scored poorly. These tasks require subjective judgment, problem-solving, and multi-stakeholder coordination, which are beyond the scope of traditional RPA and are better suited for human management.

8.2.2 Technology Acceptance Model (TAM) Considerations

Although user perceptions were not measured via survey, the data and organizational context provide strong indirect evidence for the TAM constructs, which are crucial for successful implementation.

- **Perceived Usefulness (PU):** The quantification of 261 hours spent on manual Intrastat reporting is a powerful, objective metric. Presenting this data makes the utility of automation self-evident to stakeholders and management; it directly and convincingly answers "what's in it for me?" by promising to return hundreds of hours of productive time to the operative purchasing team.

- **Perceived Ease of Use (PEOU):** The successful operation of existing RPAs (e.g., Order Confirmation Attachment RPA, Framework Order Invoice RPA) serves as a critical enabler. Their daily use demonstrates that the technology is reliable, non-disruptive, and well-integrated, thereby lowering the psychological barrier and increasing trust in adopting new bots for Intrastat or Unsent POs.

8.3 Synthesis of Findings: Prioritizing the Automation Pipeline

Synthesizing the TTF analysis with the quantified time burden leads to a clear, prioritized roadmap for RPA implementation.

8.3.1 Intrastat Reporting is the Prime Candidate for a New RPA.

This task stands out due to its perfect storm of high time consumption (261 hours), excellent TTF, and complete lack of existing automation. Its rule-based, repetitive nature, combined with the high standardization of 62% of its data (Punch-out/Catalog orders), makes it technically straightforward. Automating this would yield the most significant immediate benefit in terms of time savings, error reduction, and compliance assurance.

8.3.1.1 Swimlane Diagram for Intrastat Reporting RPA development

Developing an RPA for intrastat reporting begins with creating a master file by extracting all the required data such as HS code, net weight and country of origin from previous catalogue PO's and punch-out PO's and the master file should be updated time and again.

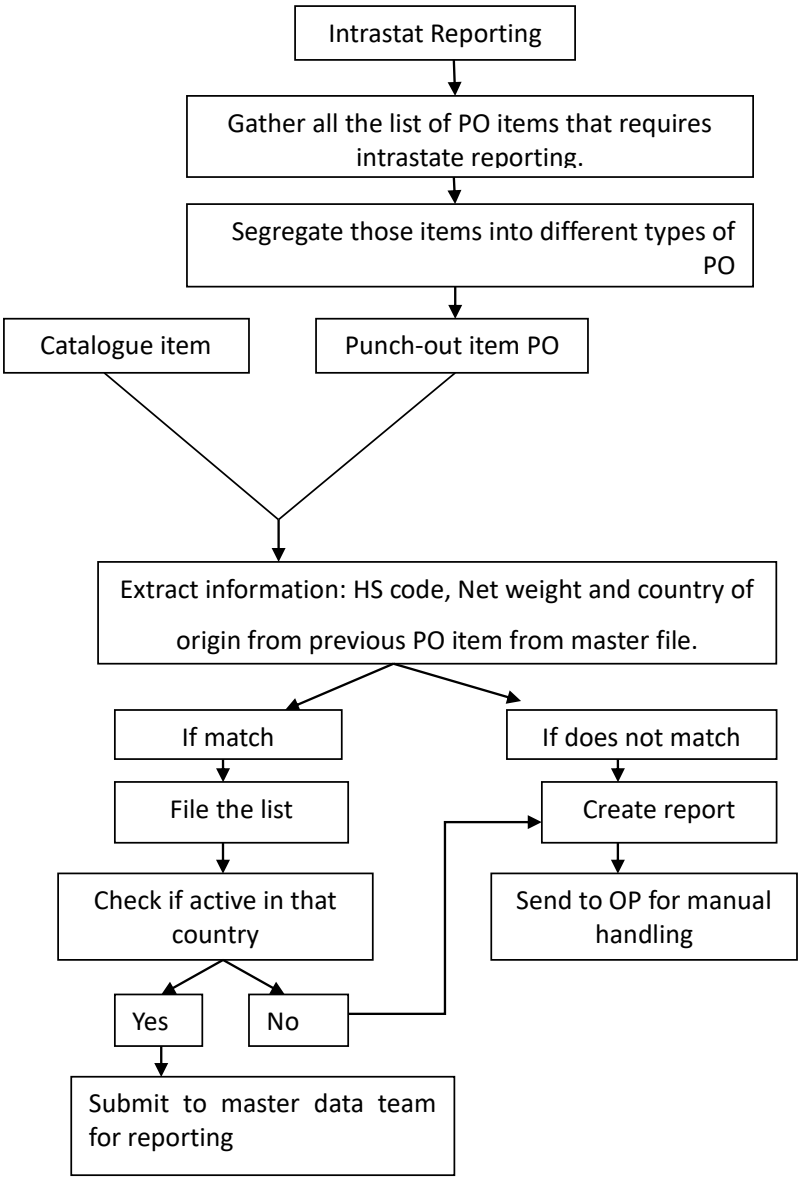

Figure 12. Framework for RPA Development for Intrastat Reporting.

Above figure illustrates a framework for RPA development in intrastat reporting which begins with a creation of a master file and updating it regularly. On the other hand, RPA should extract the PO number from the list, then segregate it to different type of standard PO. If it is punch-out PO or Catalogue PO, it should search for the relevant item name from master file and extract the data such as HS code, net weight and country of origin from master file, then fill the information in the list. Then, the RPA should check whether the extracted HS code is active in the particular country or not, if not it should create an exceptional list, otherwise it should send the list to master data team for reporting.
For freetext PO, RPA should reject it and create an exceptional file and send it to OP for manual reporting.

8.3.2 Automating the Reminder for PO Change Requests

During the operative purchasing process, invoices often experience delays due to pending change requests. While these requests are typically approved promptly by operative purchasers, bottlenecks frequently occur at higher approval levels, such as top management or cost approvers. Analysis of the approval workflow indicates that approver response times vary significantly across individual users, contributing to overall process inefficiency.

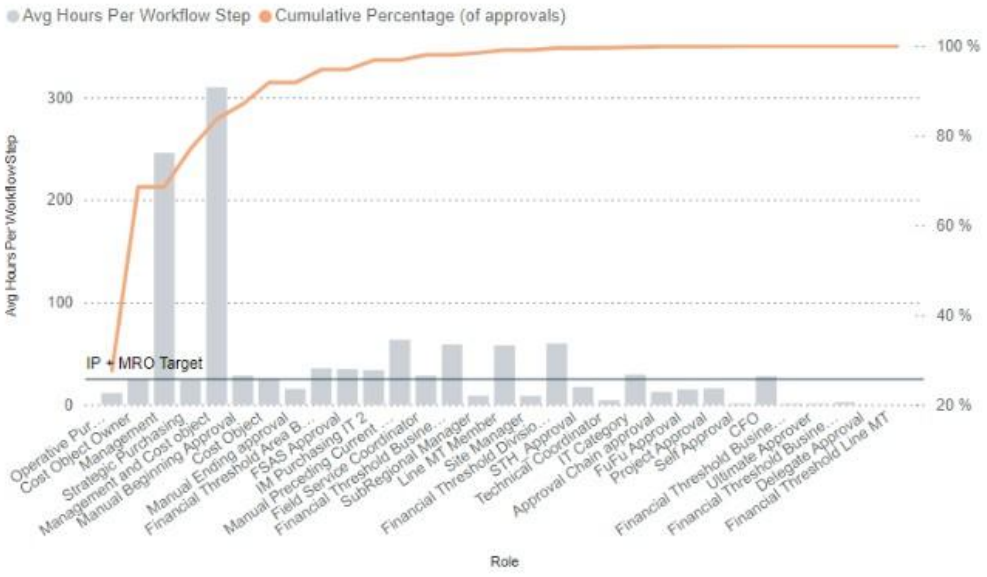

Figure 13. Approval time according to different role.

Above figure illustrates the average hour taken by personnel in different role to take action on change request. To address this challenge, a reminder automation RPA was developed as part of a UiPath training exercise.

This RPA is designed to automatically send reminders to the respective approvers every 24 hours, prompting timely action on pending change requests. By implementing this automated reminder system, the overall approval process is expected to become more efficient, reducing delays and improving the throughput of the operative purchasing workflow.

8.3.2.1 Swimlane Diagram of Reminder for PO Change Requests

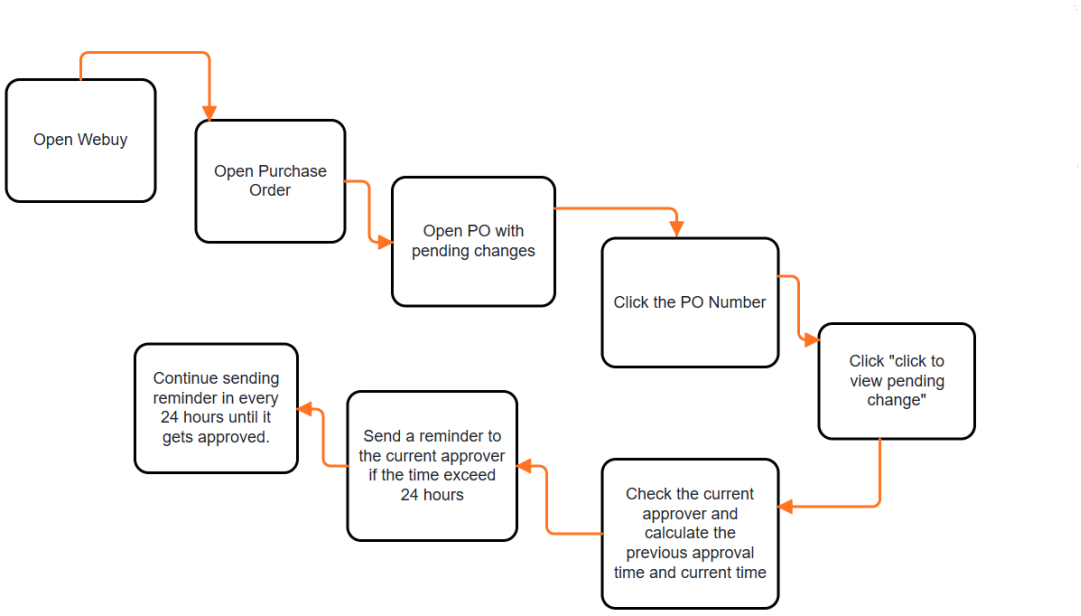

Figure 14. Framework for RPA development of reminder for change requests.

Above figure illustrate the framework to create RPA which reminds the approver to take action to the change request if they do not take action within 24 hours. It will remind the user in every 24 hours which will minimize the delay in invoice handling and payments.

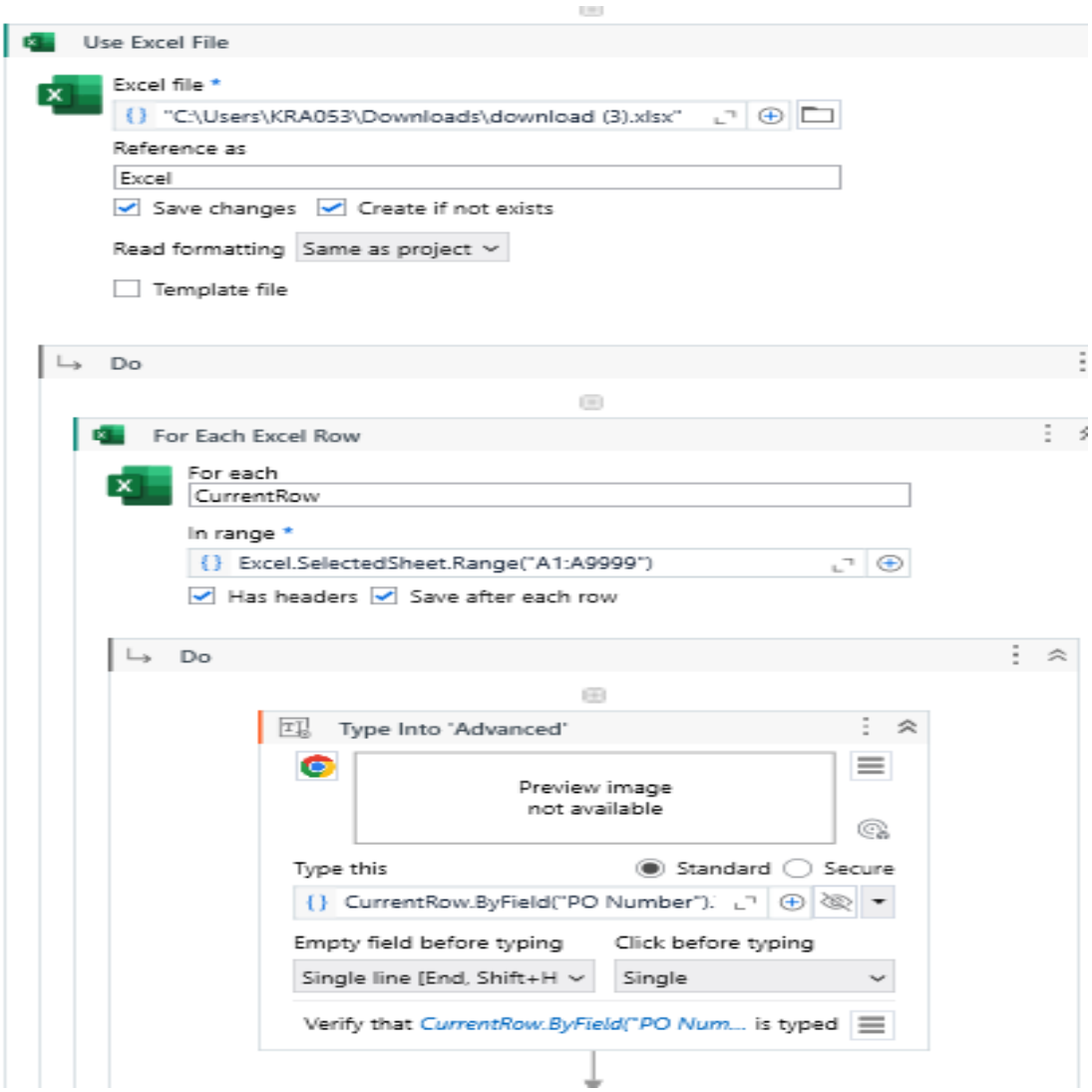

Figure 15. Stage 1 - RPA Development of reminder for change request.

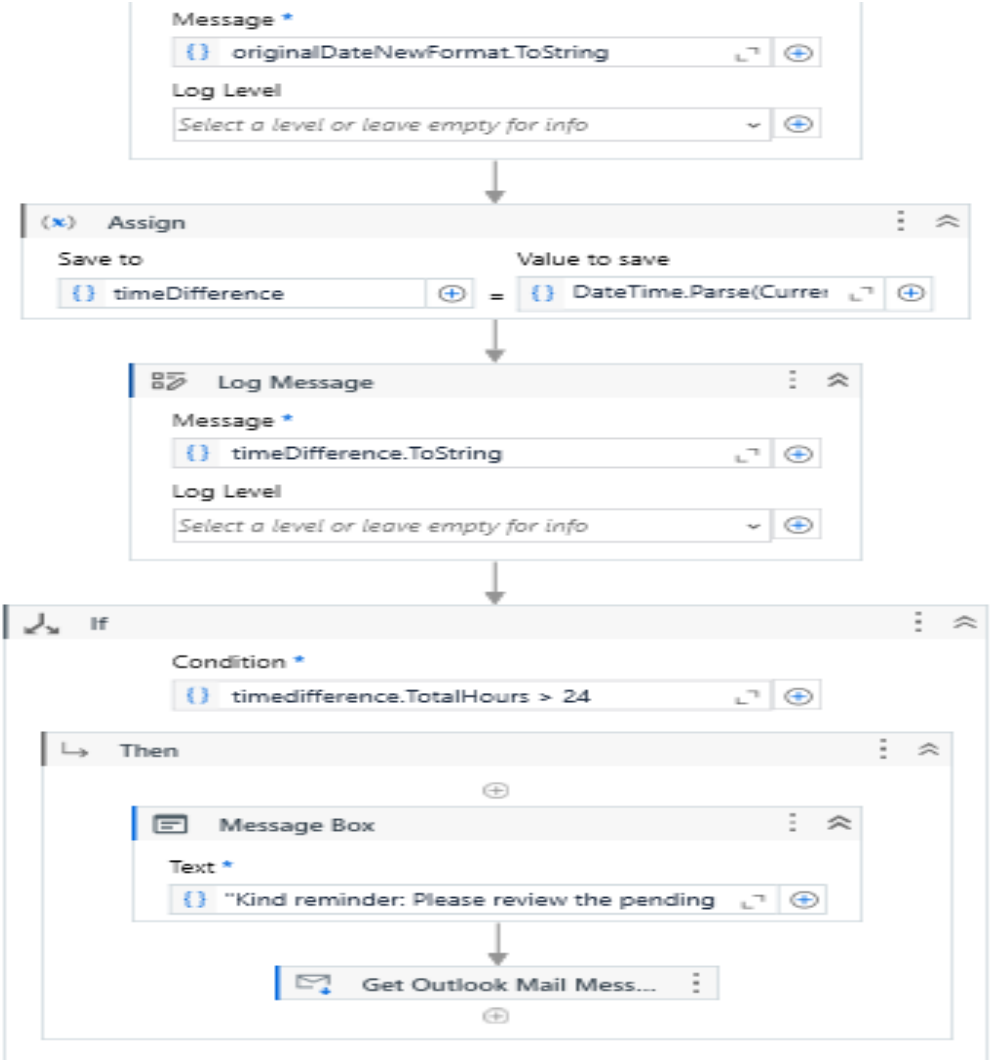

Figure 16. Stage 2 - RPA Development of reminder for change request.

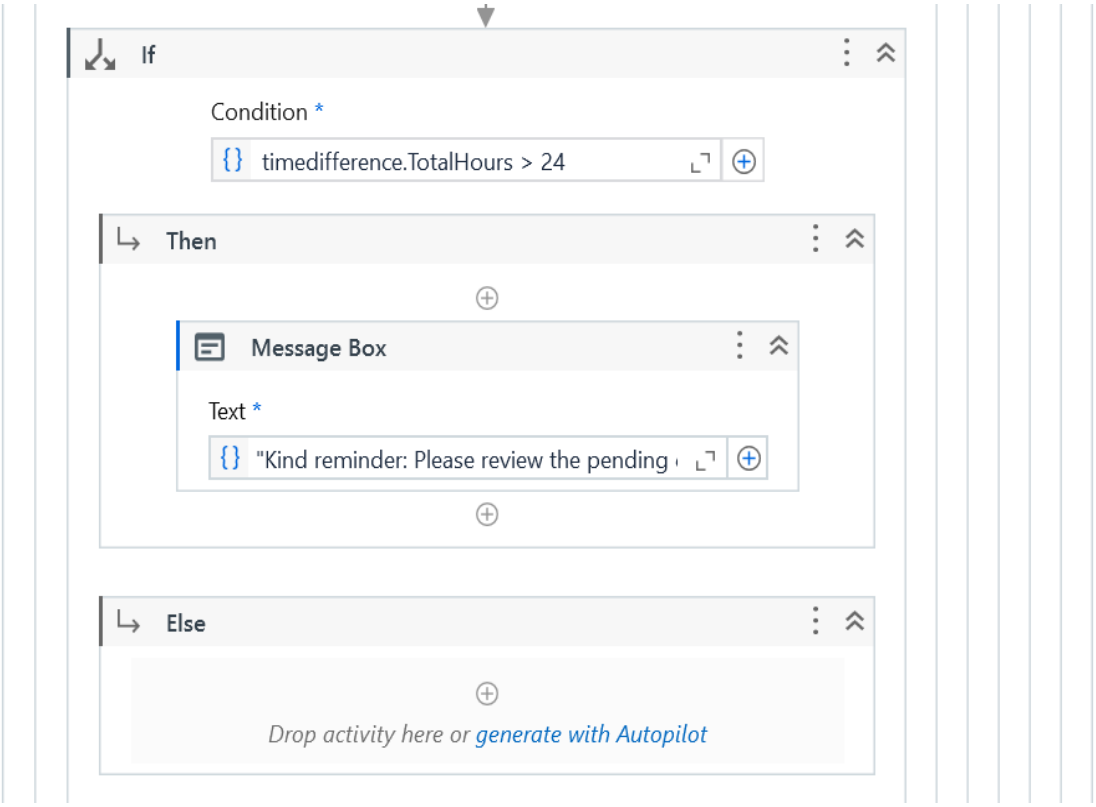

Figure 17. Stage 3 - RPA Development of reminder for change request.

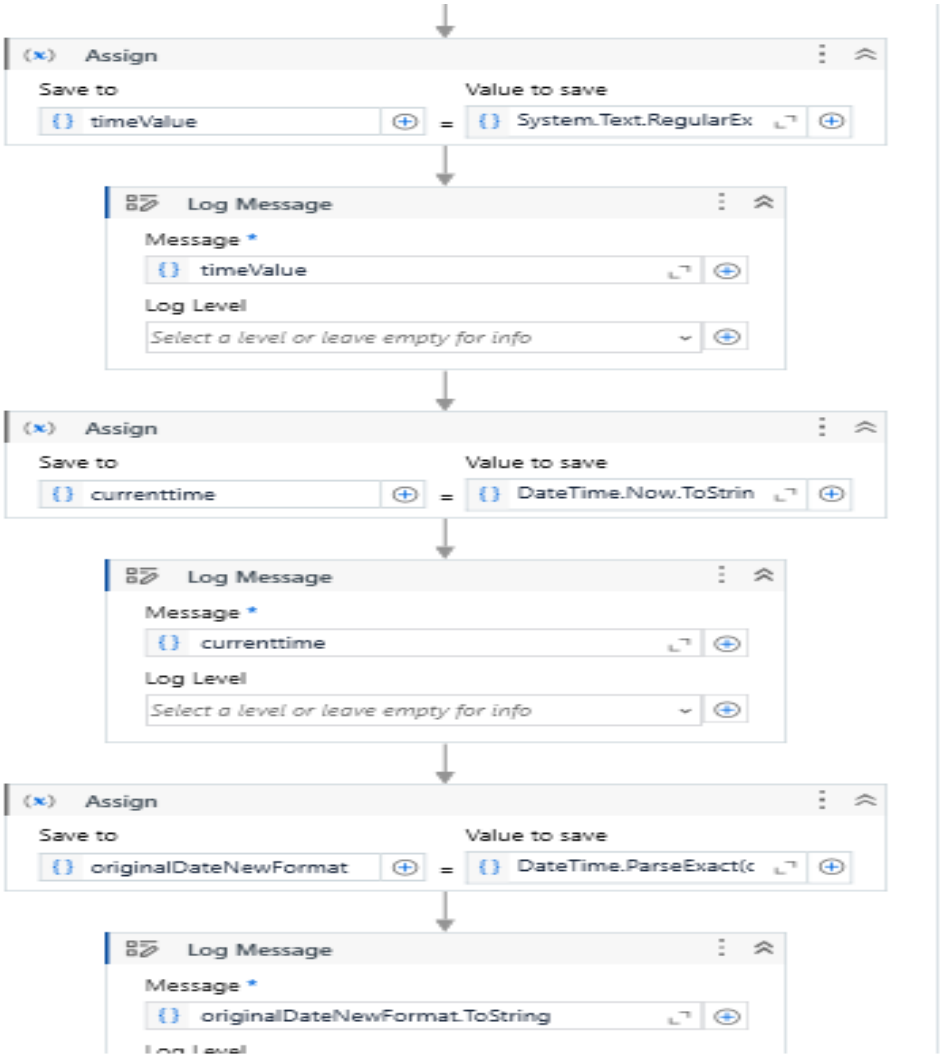

Figure 18. Stage 4 - RPA Development of reminder for change request.

Above figures illustrate the RPA development for reminding the approver to take action to the change request. All these steps were built in Uipath by creating an excel sheet of all the pending change requests, setting up variable, creating time difference and triggering approver.

8.3.3 The "Last Mile" of Automation is the Hardest (Brynjolfsson et al., 2018).

The data confirms that the case company has already successfully automated the "low-hanging fruit," as evidenced by the 65% automatic invoice processing. The remaining manual tasks (the complex 35% of invoices, intricate emails) are inherently less suitable

for basic RPA due to their need for judgment and coordination. This points towards the future need for more advanced AI and cognitive solutions for end-to-end procurement transformation.

Answering the Research Questions

The findings from this analysis provide direct, evidence-based answers to the research questions posed at the outset of this study.

Research Question 1: Which indirect procurement process will be feasible for automation in order to optimize the operational efficiency?

The most feasible processes for automation are, in order of priority:

- **Intrastat Reporting:** Due to its high volume, rule-based nature, significant manual time burden (261 hours), and excellent Task-Technology Fit.

Purchase Order Change Requests Reminder: This will be feasible as there used to be delay in invoice handling due to slowdown in approvals to the change requests.

Research Question 2: How would the automation maximize the operational efficiency?

Automation would maximize efficiency through several interconnected mechanisms:

- **Direct Time Savings:** Freeing up approximately **261 hours annually** in the NEU region from Intrastat reporting alone, allowing staff to reallocate this time to strategic tasks such as supplier management and resolving complex discrepancies.
- **Increased Process Velocity:** Reducing cycle times from days or hours to minutes for tasks like handling unsent POs and change requests, thereby accelerating the entire Procure-to-Pay (P2P) cycle and improving supplier relations.
- **Enhanced Accuracy and Compliance:** Eliminating human error in data-intensive tasks like Intrastat reporting, leading to more reliable data for regulatory compliance and internal reporting.
- **Improved Scalability:** Enabling the operative purchasing team to handle increasing transaction volumes without a linear increase in administrative headcount or costs.

- **Strengthened Employee Satisfaction:** By removing the most monotonous and repetitive tasks, automation increases job engagement and allows operative purchasers to apply their expertise to more rewarding, problem-solving activities.

This chapter has transformed the operational data from previous chapter into strategic, actionable insight. By applying the TTF-TAM framework, it has systematically identified and prioritized a pipeline for automation. The analysis conclusively identifies Intrastat Reporting as the primary target for a new RPA initiative, with standardized Reminder for PO Change Requests as secondary, high-value targets. The quantified time savings and projected efficiency gains provide a compelling and evidence-based business case. This foundational analysis directly informs the concrete set of recommendations and implementation roadmap that will be presented in the concluding chapter.

9 Conclusion, Recommendation

This final chapter synthesizes the journey of this research, from its initial objectives to its concrete findings. It presents the overarching conclusions derived from the data analysis, translates these conclusions into actionable recommendations for the case company, and suggests avenues for future academic inquiry. The chapter serves to bridge the gap between theoretical analysis and practical application, providing a clear roadmap for optimizing indirect procurement through automation.

9.1 Conclusion

This study set out to explore the potential of Robotic Process Automation (RPA) to optimize operative purchasing within indirect procurement at Wärtsilä Finland Oy. Guided by the integrated Task-Technology Fit (TTF) and Technology Acceptance Model (TAM) framework, the research successfully identified, evaluated, and prioritized tasks for automation based on an analysis of quantitative data and qualitative observations.

The investigation conclusively answers the research questions.
To the first question: **Which indirect procurement process will be feasible for automation to optimize the operational efficiency?**
The answer is clear: Intrastat Reporting is the most feasible and highly impacted candidate. Its high volume, rule-based nature, and significant manual time burden (261 hours annually for the NEU region), coupled with its low complexity and high degree of standardization for a majority of orders, make it an ideal fit for RPA. While analyzing the existing RPAs, development for RPA has not been made in the intrastat field, even though it is rule-based and repetitive task which make it more suitable for automation.
Secondary, high-potential candidates include Purchase Order change requests. There is already an existing RPA which supports this task by submitting a PO change request to cover the invoice amount. Even though the RPA submit the change request, processing gets delayed when the approver do not take action to the change request so a reminder RPA is an addition to the existing RPA which will be feasible as this is high volume, rule

based and repetitive tasks and will be significantly beneficial to improve the processing time.

In response to the second research question: **How would the automation maximize the operational efficiency?**

The findings demonstrate that automation would deliver multi-faceted benefits. These include substantial direct time savings, allowing human expertise to be reallocated to strategic, value-adding activities; a dramatic increase in process velocity and a reduction in cycle times; enhanced accuracy and compliance by eliminating human error in data-intensive tasks; and improved scalability and employee satisfaction.

Furthermore, the research validates the practical application of the TTF-TAM framework in a real-world industrial context. It demonstrated that TTF is an effective tool for the objective selection of automation candidates, while the principles of TAM, though not directly measured via survey, are critical for ensuring adoption and can be supported by showcasing tangible benefits and leveraging existing successful implementations.

In short, this thesis reconfirms that a directed, evidence-based RPA implementation can considerably improve indirect procurement. Through the execution on the recognized high-fit activities, the case company can realize substantial gains in efficiency, decrease costs of operation, and unleash its procurement professionals to deliver value elsewhere, hence enhancing competitiveness as the digital world of business continues to intensify.

Relation to Prior Literature

The results of this study are largely consistent with previous research. Like Mamede et al. (2023), this thesis found that RPA's true value emerges when it targets standardized, repetitive, and rule-based tasks confirming that automation should not reproduce inefficient workflows but instead complement process improvement.

The identification of Intrastat Reporting and PO change requests as feasible automation targets aligns with their finding that Lean RPA produces the highest gains when waste is minimized before automation.

Similarly, the study supports Lacity and Willcocks (2016), who emphasized that RPA serves as a transformation lever for operational efficiency, scalability, and accuracy in shared services. The efficiency and accuracy improvements observed at Wärtsilä reinforce their conclusion that RPA enhances both performance and employee satisfaction when properly governed.

Finally, the results echo Gómez Gandía et al. (2024), confirming that successful automation is not only a technical endeavor but also a human one. Although this research did not directly measure user attitudes, the observed potential for time savings and workload reduction supports their argument that RPA should be framed as a tool for empowerment rather than job displacement.

In conclusion, this thesis reconfirms that a directed, evidence-based RPA implementation can considerably improve indirect procurement. Through execution on the recognized high-fit activities, the case company can realize substantial gains in efficiency, decrease costs of operation, and unleash its procurement professionals to deliver value elsewhere thus enhancing competitiveness as the digital world of business continues to intensify.

9.2 Recommendations

Based on the conclusive findings of this study, the following actionable recommendations are proposed for Wärtsilä Finland Oy. These are structured as a phased roadmap to ensure manageable implementation, demonstrable quick wins, and long-term strategic alignment.

9.2.1 Immediate Priority (0-6 Months): Implement High-Impact RPA Solutions

Recommendation 1: Develop and deploy an Intrastat Reporting RPA.

Action: Commission the development of an unattended RPA bot to automate the data collection and entry for Intrastat reporting. The bot should be designed to extract data from SAP and Coupa, populate the standard Excel template, and submit it to the Master Data team.

Justification: This addresses the largest identified manual time burden (261 hours/year) with an excellent TTF. Starting with the automation of Punch-out and Catalog orders (62% of cases) can deliver immediate value, with scope for later expansion.

Recommendation 2: Automate the Purchase Order Change Request Reminder.

Action: Complete the project started during the RPA training period to remind the approver if it is not completed within 24 hours.

Justification: This is a "quick win." The activity is very repetitive, rule-governed, and low-risk, with potential upfront efficiency savings through the reduction of a task completion period.

9.2.2 Medium-Term Initiatives (6-12 Months): Optimize Current Processes

Recommendation 1: Implement Cognitive Email Triage.

Action: Investigate RPA solutions with Natural Language Processing (NLP) added to automatically sort new incoming emails. Routinely worded questions (e.g., order confirmation receipt, payment status) can be automatically routed to folders or auto responded to as applicable, with complex issues highlighted to be seen by people.

Justification: This will significantly minimize the time spent by buyers on email management so that they can attend to the 10% of the mails that need their professional hands.

9.2.3 Strategic Enablers to Enable Sustainable Automation

Recommendation 1: Create a Center of Excellence (CoE) for Procurement Automation.
Action: Create a cross-functional team with the ownership of the governance, development, and maintenance of RPA and other automation technologies across procurement.
Justification: A CoE eliminates strategy disjointedness, automates the automation pipeline, promulgates best practices, and sustains bots, resulting in increased ROI as well as long-term sustainability.

Recommendation 2: Create the Culture of Digital Acceptance.
Action: Actively promotes the role of RPA as a helper that abolishes repetitive tasks, rather than replacing people. Enroll operating buyers in the development and pilot phases of new bots and retrain them to reskilled them for deeper analytical and strategic functions.
Justification: Overcoming the human factor, as TAM foretells, is paramount to user adoption as well as to reaching the potential of automation.

9.3 Suggestions for Further Research

Whereas this research offers rich insights into automation in a particular corporate setting, the study also presents some future research opportunities:

- **Longitudinal Impact Study:** Future research could follow the execution of the suggested RPAs (e.g., of Intrastat) across 12-18 months at Wärtsilä to quantitatively capture the actual vs. predicted benefits in terms of time consumed in processing, error rates, cost reduction, and worker satisfaction.
- **Investigating the Human Factor:** A devoted research project could use interviews and surveys to objectively gauge the Perceived Usefulness and Perceived Ease of Use (TAM concepts) among operative buyers prior to and after RPA implementation to give deeper, subjective insights about the adoption impediments as well as adoption motivators.

• **After RPA: Where AI And Cognitive Automation Fit:** Science can explore the possibility as well as the potential applications of combining Artificial Intelligence as well as machine learning with RPA to address the "last mile" of challenging procurement tasks that this research found to be a given, such as solving subtle invoice discrepancies as well as making initial supplier risk ratings.

• **Cross-Industry Comparison Study:** A comparison study of the implementation of RPA in indirect procurement within various industries (manufacturing, healthcare, finance, etc.) can derive the widespread challenges, industry-centric success factors, as well as best practices, to derive a generalized automation framework.

Following these recommendations and research avenues, the broader research community and Wärtsilä can carry the digital reformation of procurement a step further to transform operational efficiency into a durable competitive advantage.

10 Declaration of Artificial Intelligence Assistance

In a transparent and limited manner, Artificial intelligence tools were used during this research. Specifically, Grammarly was used for grammatical precision and clarity while Open AI was used to gain the general understanding of the certain topics. These AI tools were used to enhance the language quality and support the authors' deep understanding to some subject matter. Every analyses, interpretations, and conclusions illustrated in this thesis are entirely the author's own research.

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