ORIGINAL PAPER

USING ROBOTIC PROCESS AUTOMATION (RPA) TO ENHANCE ITEM MASTER DATA MAINTENANCE PROCESS

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ABSTRACT. **Background:** Manufacturing companies nowadays have to cope with ever-increasing speed and complexity to manage their global supply chain. Information flow manage the supply chain needs to be more accurate and real-time than ever before. Item master data management is no exception as well. This research demonstrates the potential benefits of applying robotic process automation (RPA) technology in master data management based on two companies in the manufacturing industry.

Methods: The method approached by the research was a qualitative method, utilizing interpretation of data extracted from literature and semi-constructed interviews.

Results: The article proposes a framework for RPA implementation in the master data managing process. Automation with software robots can greatly benefit the organization, namely: lower processing time, reduce human errors, lower operations cost, improved compliance level and higher data accuracy.

Conclusions: With the objective to examine the benefits of RPA in master data management, the researchers have investigated 2 companies in the manufacturing industry to understand how they have benefited from RPA for item master data management processes. The result showed that RPA is affirmed to bring about many benefits for the organizations through structured automation. The researchers have proposed a framework for implementing RPA to capture item master data based on the change management model and the framework is separated in 3 phases involving important tasks in each phase. Future researches might use this study as a stepping stone for further studies in cognitive RPA, utilizing cognitive technology in combination with RPA technology with the mean to achieve a higher level of automation.

Key words: Robotic process automation (RPA), master data management, manufacturing industry, business process improvement, productivity improvement.

INTRODUCTION

Manufacturing companies nowadays have to cope with ever-increasing speed and complexity to manage their global supply chain. Information flow manage the supply chain needs to be more accurate and real-time than ever before. Data, in particular master data, is the foundation of all digital initiatives, from key performance indicator (KPI) dashboards to optimization algorithms to prescriptive analytics – today categorized as descriptive, predictive and prescriptive analytics - and is ubiquitous [Vilminko-Heikkinen, Pekkola 2017, Silvola et al. 2010]. However, master data is often of poor quality due to the effect of poor data quality on artificial intelligence (AI) initiatives [Loten 2019]. Vas Narasimhan, chief executive officer of the leading pharma company Novartis AG, had to admit in an interview, that master data quality was insufficient to push artificial intelligence initiatives forward since it needs accurate data to learn [Shaywitz, 2019]. Data quality issues can be missing data, wrong data, typos, and much more. While automation operates very fast and reliable compared to human users, consider the versatility of human

users who can compensate data quality errors ad-hoc.

To reduce the occurrence of issues with master data, in many companies the creation of master data is subject to stringent control processes: Four-eye principle, multiple gateways, preference of drop-down fields. However, the process of maintaining data quality suffers from multiple factors. The lack of direct interfaces between systems requires human users to transfer data manually between disconnected systems. Business processes to address data quality are designed in a green field mode and don't consider other business requirements and competing urgencies of daily operations. Business processes aren't intuitive and consistent onboarding, training and re-training efforts are missing, which result in quick deterioration of process adherence. The benefits of good data quality only become apparent at very different stages in the value creation process posing an incentive problem for the users responsible to enter the data and the ones using it.

Many organizations are looking at RPA as a generally cost-effective solution that helps to save time and lower compliance risk. The term RPA refers to programmed software robots that mimic repetitive manual tasks performed by human workers and replace these workers [Cewe, Koch, Mertens 2017, Tornbohm 2017]. From simple screen scraping RPA has now evolved to help organizations achieve greater efficiencies and support business growth in more complex and critical processes [Van der Aalst, Bichler, Heinzl 2018, Aguirre, Rodriguez 2017]. Instead of requiring time consuming process reengineering that leads to heavy investment on IT system transformations, RPA is able to perform such routine processes by running across systems. The main scope of RPA has been routine processes that don't change over time and are repeated thousands of times on a daily basis. Before RPA, organizations have applied many different special-purpose systems for planning and recording next to the enterprise resource planning (ERP) system yet indispensable processes still need to be carried out manually or under supervision of humans [Lowes, Lowes 2017]. Now, software robots relieve human users from low-value added back office

work and make time for higher value-added tasks, thus increasing organizational efficiency and productivity.

However, in organizations there are many routine processes performed manually that are currently considered to lack the scale or value to apply automation, and master data creation is considered one of them. This research focuses on the perspective that master data is a core factor that directly affects the ability for digitalization to improve organizational performance. Erratic or incomplete master data can obstruct production which in turn impacts the return on investment of IT systems, because only manual case-specific intervention can resolve any issues. Maintaining master data is hence crucial to manufacturing industry especially in the era of industry 4.0 where internet of thing is promoted and business leaders all over the world have realized the importance of using high-quality data to drive business success.

To meet these expectations, this research suggests that businesses should use RPA to enhance item master management processes to capture the data. The authors investigate 2 companies where RPA was used to improve master data management process, to present the benefits and then propose a framework for managing master data management process using RPA. Evidences have shown that RPA could help to reduce transaction times, mitigate human errors and consequently reduce cost in manufacturing industry.

LITERATURE REVIEW

Master data contains all the cleansed and structured records stored in a business's system that characterize its entity. High quality master data hence is a prerequisite success factor for its performance [Hüner, Otto 2009]. Master data is also referred to as material master in the manufacturing industry as a major part of master data is constituted by bills of material (BOM), their detailed descriptions and inventory level, all of which are indispensable assets that provide useful insight into the manufacturing activities [Berson, Dubov 2007]. In a manufacturing company, it operating system can contains a large number

of employees from many departments such as Purchasing, Logistics, Production, Production Planning, Finance, Accounting, Sales, etc. Thus, with the mean to provide a single point of reference, master data need to be stored in multiple sources so that it can be available to users from different departments and production plants [Haug et. al. 2013]. Though after the introduction of enterprise resource planning (ERP) systems, data discrepancy and redundancy issues has been reduced thanks to their single materials database concept [Haug, Arlbjørn, Pedersen 2009, Knolmayer, Röthlin 2006]. However, due to the large amount of data and management needs in the globalized context beyond the capabilities of traditional ERP technology, organizations are now facing difficulties in managing their database efficiently [Vilminko-Heikkinen, Pekkola 2017, Silvola et al. 2010].

Robotic process automation (RPA) is an emerging technology that base on the use of virtual robot to mimic human interactions across various systems [Zhang, Liu 2019, Lacity, Willcocks 2016]. RPA robots can be programed to carry out repetitive and rule-based tasks in replacement for human in a faster and more accurate manner [Willcocks, Lacity, Craig 2017]. It can operates over

existing system without interfering on any of the systems as it only mimicking human activities like a digital version of human employees [Rajesh et al. 2018, Fersht, Slaby 2012]. One bot can be assigned multiple tasks or multiple bots can be assigned to do one task depends on the volume of the task [Madakam et al. 2019, Rajesh et al. 2018, Willcocks, Lacity, Craig 2017]. Hence Robotic Process Automation (RPA) has been proven as one of the reasonably priced and practical solutions to eliminate the need for human labours in repetitive structured task [Lacity, Willcocks 2016]. The advantages of RPA implementation has long been recognized by experts over the world. These advantages include and might not be limited to Table 1.

From Table 1, we can see that studies seem to be in agreement that RPA can bring about highly positive impacts: Processing time reduction; Productivity increase; Compliance levels improvement; Data accuracy improvement or human errors reduction; Costs minimization.

Table 1. Key benefits of RPA
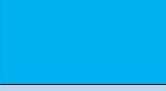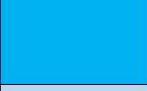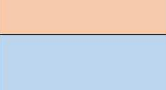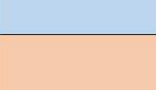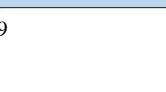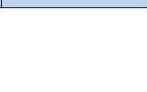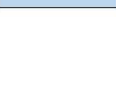
No.	Studies	Processing times reduction	Productivity increase	Compliance levels improvement	Data accuracy improvement/ Human errors reduction	Cost reduction
1	Anagnoste 2018	✔	✔	✔	✔	
2	Bloem et al. 2014	✔	✔	✔		
3	Friedman 2006			✔		
4	Fung 2014	✔	✔	✔	✔	✔
5	Institute for Robotic Process Automation 2015	✔	✔	✔	✔	✔
6	Wald 2017	✔	✔		✔	✔
7	Kedziora & Kiviranta 2018	✔	✔		✔	✔
8	Lacity & Willcocks 2016	✔	✔	✔	✔	
9	Fersht & Slaby 2012	✔	✔	✔		✔
10	Fersht & Snowdon 2018	✔	✔	✔		✔
11	Rajesh, Ramesh & Rao 2018	✔	✔	✔	✔	
12	Sibalija, Jovanović & Đurić 2019	✔	✔	✔	✔	✔
13	Willcocks, Lacity & Craig 2015A	✔	✔	✔	✔	✔
14	Willcocks, Lacity & Craig 2015B	✔	✔	✔	✔	✔
15	Willcocks, Lacity & Craig 2017	✔	✔			
16	Zhang & Liu 2019	✔	✔			

Source: extracted from various literature

Table 2. RPA application by industry and function

Potential for RPA — Low [gradient] High   illustrative process with High-Potentail

Function	F & A	Procurment	Human Resource	Conatct Centre	Indusry Specific Purposes	
Industry	Accounts Payable, Acounts Receivables, General Leadger	Invoice processing, Requesting to Purchasing Orders	Payroll, Hiring, Candidate Managment	Customer Service		
Banking & Finanacial Services						✓ Cards activation ✓ Frauds Cliams Discovery
Insurance						✓ Claims Processing ✓ New Business Preparatiion
Healthcare						✓ Reports Automation ✓ System Reconciliation
Manufacturing						✓ Bills of Materail (BoM) Generation
High Tech & Telecom						✓ Service order Management ✓ Quality Reporting
Energy Utilites						✓ Account setup ✓ Meter Reading Validation

Source: Madakam, Holmukhe, Jaiswal, 2019

Table 2 indicates that Robotic Process Automation has several applications in numerous industries. The most common applications of RPA would be seen in data entry task where RPA logins to systems, reads emails, generate needed data and keys data in a structured form. Upper level can be seen in enterprise level as RPA can also transfer data from different systems to enterprise management system such as ERP. Specifically, manufacturing firm's application in bills of material (BOM) generation is discussed to be a highly promising area for RPA integration. We all know that material master management is one of the most important yet repetitive tasks. With above mentioned benefits, RPA is expected to become increasingly essential in master data management [Madakam, Holmukhe, Jaiswal 2019].

In all, master data management is important to the growth and desirable performance of businesses including manufacturing ones. Existing literature suggests that master data management is increasingly become harder of a challenge in nowadays marketplace, and a sufficient management tool is not yet found in the many organizations [Vilminko-Heikkinen, Pekkola 2017, Silvola et al. 2011]. Advances in technologies like that of RPA can help in enhancing this process in the near future. Literature review also pointed out that despite of the compelling possibility for growth of RPA in master data management field, not much RPA providers has been seen to circulate their business in this area [Kappagantula 2019].

RESEARCH METHOD

The aim of this research is to develop a framework to use RPA for capturing item master data for manufacturing companies. To develop the framework, pros and cons for RPA are evaluated while considering various business objectives. Two companies are selected for this research, one from the pharmaceutical company and another from the electronic company. These 2 companies have implemented RPA to capture item master data and thus fall within the scope of our research.

Company 1 – Electronic Company in Vietnam

The first case study was conducted on ABC Electronics Company in Vietnam. The process involved was for phone repairing where requests are sent to the factory in order to replace broken parts. Due to the nature of repair service, generation of BOM for production of a repaired phone cannot be automated via ERP system like normal production. The exception requests are collected and combined into the global supply chain management system – a legacy system shared between different departments within the company. Production planners then have to download these requests and generate excel data sheets base on the data on GSCM. Purchasing department then have to download BOM list from SAP and use excel tools to match and sort out the shortage materials using production planners' sheets from GSCM and downloaded BOM from SAP. The processed data is then sent back to the planners via emails to upload on SAP and generate exception production orders. The whole process needs to be done at least three times prior to weekly production at the end of the week in order to ensure availability and accuracy. However, repair production plan still suffers from countless plan postponement due to shortages of material that result partially from an inaccurate database. The problems are consistent with literature on challenges associate with master data management with three major issues being addressed: disconnected systems that require manual transfer of data, inconsistent material master in multiple systems; manual matching and sorting process depends purely on personal skill.
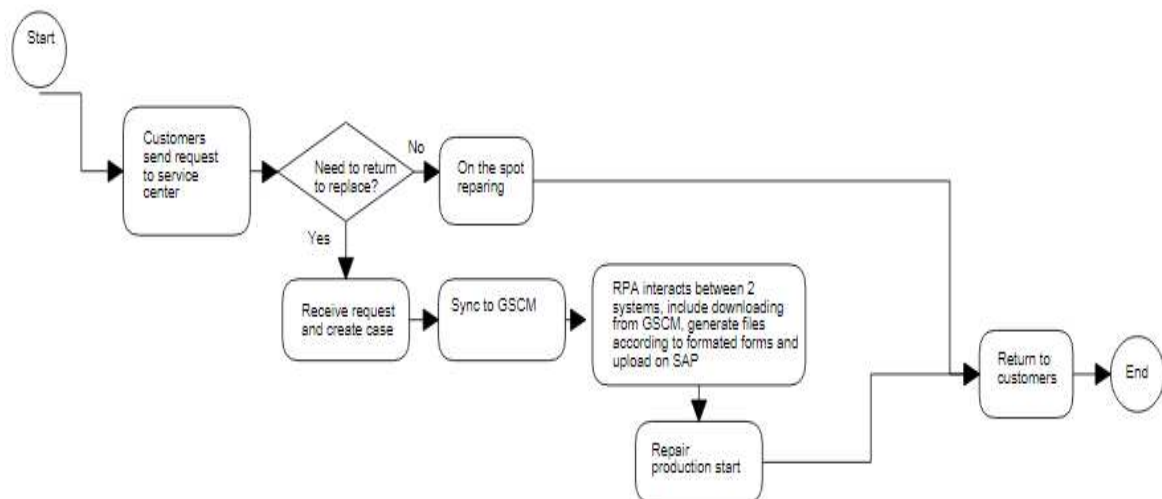
Fig. 1. Repair process flow after RPA implementation

Figure 1 shows the automated process after RPA implementation. The repetitive task such as logging in to GSCM and SAP, downloading BOM to spread sheet according to formulated layout, matching of BOM between two systems and upload on SAP to generate exceptional production order were taken over by a software robot (RPA). Firstly RPA open GSCM under assigned ID, and then download material master from the system. It then login to SAP and download the second material list via a BOM list download t-code. Next the robot matches material data between two downloaded sheets and generates final version of shortage components to upload on SAP. Any not-found issue will be recorded and reported for easier tracking and solving actions. Though issues like mismatching of material master still occur due to disconnections between systems, but in such cases, RPA will send an alert for mismatch errors to system users. The human employees then can focus on dealing with only these errors and carry out corrective actions to

maintain material master in order to ensure better data synchronization the following time.

To evaluate the outcome, RPA was implemented partially in separated departments, one group containing departments applying RPA integration and another group containing departments without RPA support. Over the evaluation period significant differences was found separating the two groups. The group using RPA robot realized improvements that are similar to those discussed in the literature reviews:

– Reduce transaction times: Time taken to complete a request reduced by approximately 80%
– Increase productivity: Level of job satisfaction also raised as low-skilled tasks are eliminated; Human labour are reported to have more time to do other important tasks; Less production halts due to emergency material shortage
– Improve levels of compliance, reduce the human errors: RPA software robot provides traceable records that can support further improvement in aligning the two systems; Robots are programmed act in accordance with one set of structured if-then rules so human errors depending on excel skill and method of sorting is eliminated; Out of standard working process is eliminated
– Data accuracy: Increased due to standardization however due to misalignment between the legacy system and the ERP system, data accuracy did not reach 100%
– Minimize costs in term of poor production adherence, loss of customer satisfaction, extra working hour's salary, etc.

Company 2 – Pharmaceutical company in Singapore

For this company, the material master data quality was suffering from multiple issues similar to those introduced in previous part. The material master maintenance process requires repetitive interactions with multiple systems and user interfaces. There are two repetitive processes in this managing SKU on SAP, which are: Go to material master of predecessor SKU and retrieve parameters and Setup successor SKU with predecessor SKU.

While doing these repetitive activities, the apparent issues were missing product dimensions and weights. Recently, the problem went beyond just missing data. When making the fields mandatory entries, users provided fake data or mock up data, hence master data recorded a significant number of pharmaceutical products has the size of a pack of cigarettes. In addition, the meaning of different material status wasn't widely understood, which lead to either friction or emergency fixes. For example, materials could be set up without dimensions and weights and then used for forecasting and production planning. This resulted in claims and escalations to provide data that simply was neither available nor required yet. Missing data was then usually obtained outside the standard processes based on personal relationships and manual transfers. On the other hand, users who were aware of the required data sometimes forgot to return to the material master setup to update missing data which was only noticed when subsequent process steps couldn't proceed. Follow-up users frequently have to create support tickets to the key users to ask for clarification of master data. The general process steps were well understood, but when rare use cases required exceptional process steps, the majority of users didn't recall them. This issue is rampant in complex processes. When confronted with a choice to fulfil an order of life-saving products or to ensure 100% master data quality, users opted in favour of the patient. Then, over time, the process short cuts became the standard process. This led to missing data which will have to be resolved during later data correction efforts in order to ensure accurate master data for the production of life-saving products. In addition, due to the nature of a multi-national corporation the IT system landscape is made up of multiple systems and multiple releases which increase the demand of interfaces beyond the available resources of the IT Department.

The RPA solution started with the coding of the standard operating procedure into the RPA software robot. In practice, the affinity for innovation among a small team was sufficient to acquire the robot coding skills with online available training materials. This allowed a regional prioritization of robot needs. It also allowed for fast iterations in an agile

development approach with the users as product owners to ensure any activities which aren't part of the standard operating procedure were considered (e.g. a local log book of material creations). Major effort was required to ensure the IT Department support over the acquisition of the RPA software, and to ensure the Accounting department control over compliance of the agreements between legal entities. The new process is showed in Figure 2 where RPA is used to automate some of the steps.
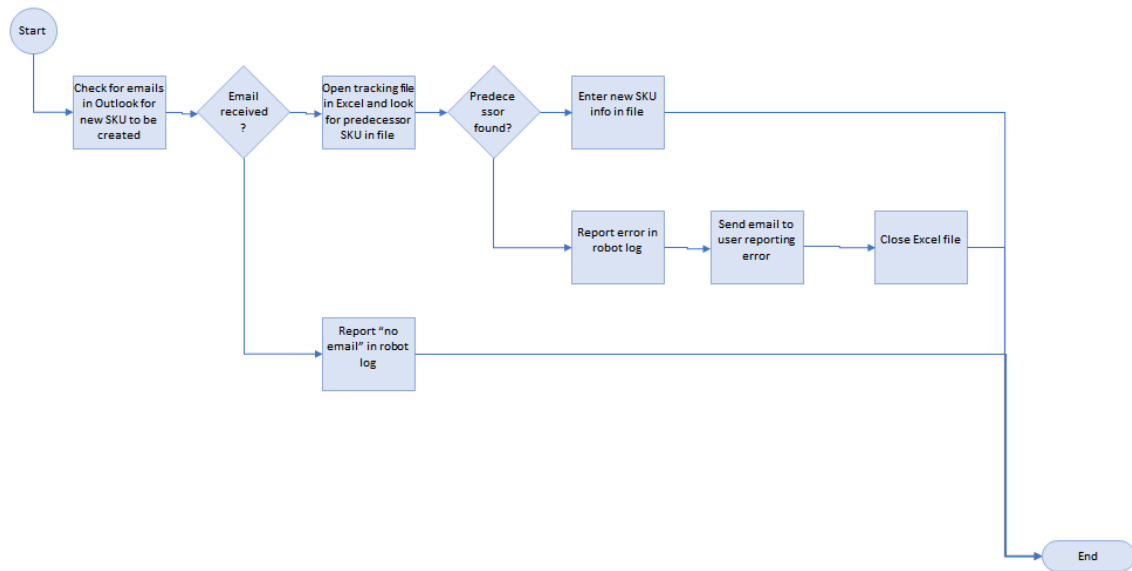

Fig. 2. Material master maintenance process after RPA implementation

As it turns out, system owners of legacy systems are generally favourable of RPA initiatives because they do not generate effort for the system owners but promise substantial benefits for the users. Process owners were found to be in favour due to the awareness of process adherence issues, the avoidance of process change and the avoidance of changes to user rights. Process adherence is guaranteed because the process steps are hardwired into the software robot. In addition, the standard process was not changed – it is well-defined however, the execution in real-life operations suffers due to lack of resources. Users rights of the robot are limited by the user credentials, so in case of any unforeseen errors, the user will be able resolve these with his/her authorizations. Data owners were supportive once the real-live environment of business processes is understood. In addition, they were a great source of parameter derivation rules. Data is often dependent on each other hence the robot was able to also check whether the combination of parameters were valid entries. In all, significant improvements were found in:

– Improved master data quality: SKU master data quality improves because the software robot is has highest process adherence (100%), and provides logs to trace back any issues; Master data becomes more consistent across multiple markets and systems because the standard operation procedure is the basis for coding
– Organizational efficiency: Productivity increased in each country supply chain due to reduced processing time and reduced peak workloads as the robot is able to work 24/7 and can reduce 80% of process duration; Single development can be transferred easily and modified to multiple systems within the same company
– Costs saving: Reduce peak workloads results in less work outside business hours; Costs of poor data quality are eliminated.

FINDINGS FROM THE TWO COMPANIES

In the first case, ABC Electronics Vietnam has applied RPA into their bill of material generation process and in the second case XYZ a pharmaceutical company based in Singapore has applied RPA into their material master maintenance process. As discussed by Rezazadeh and Carvalho [2017] prior to the implement of any innovation, it is crucial to conduct a value-base analysis in order to introduce the new technology in appropriate way. With the mean to assess the significance of RPA implementation in master data management related processes, the authors proposes a value positioning analysis. In the case of ABC Electronics, the volume of repetitive task is enormous because it deals with master data generation which contains hundreds of thousands of SKUs from out-of-warranty models to normal production models. Additionally, the task of updating material shortage for the repair production line is not only a time consuming repetitive task but it also occurs almost on a daily basis at the purchasing department given a fast moving nature associates with a mobile producer. Moreover, the repair service should not be delayed as it directly affects customer satisfaction. In other words, the outcome of the process has a significant value concerning customer satisfaction. Combining these characteristics, we can categorize the ABC case in the high volume, high value sector.

XYZ case however deals with the issue of implementing RPA in master data amendment process. This process is only triggered when there is a new set of data need to be updated on the ERP system. As literature review already addressed, HüNer, Otto and ÖSterle [2011] fundamental entities of master data tend to stay constant over the materials life-cycle, thus master data amendment process should be low in volume with regard to number of occurrences. The impact of ensuring this piece of master data however should be categorized significantly high. If master data is expose to human errors as mentioned in the case study discussion, it master data would gradually decreased in quality over time. As the master data's accuracy directly affects the quality, production and deliverable of many life-saving

products, the act of ensuring 100% data entry adherence with additional logs to trace back using RPA is relatively of high value.

The results from both cases showed that the integration of RPA into the master data management process can bring about significant benefits as listed in Table 3.
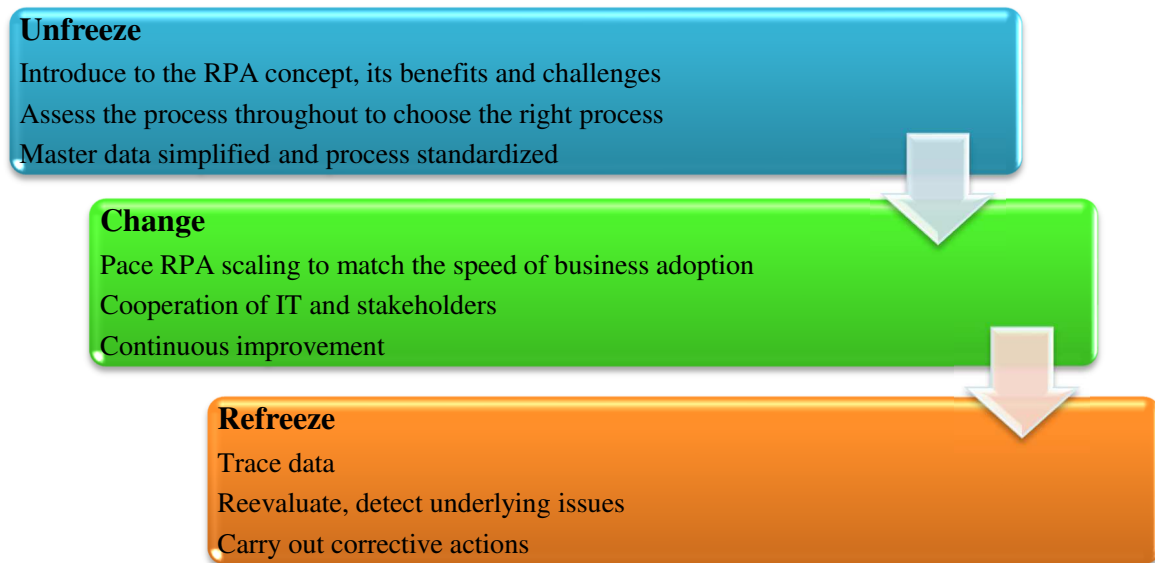
Table 3. Benefits of applying RPA in master data management in manufacturing industry

Benefits	ABC case	XYZ case
Improve master data quality	✔	✔
Reduce human errors	✔	✔
Reduce transactional time	✔	✔
Increase productivity	✔	✔
Free employees from repetitive tasks to focus on analysis tasks	✔	✔
Monetary benefit	✔	✔

In fact, this research has confirmed that integration of RPA software into master data management can create significant benefit to any size of master data as long as it is valuable to the performance of the organization. However each type of organization should have different problems arise when trying to introduce RPA into implementation. The XYZ company suggests that the master data process needs to be break into a really detailed level in order to construct a set of structured data to be automated at a suitable scale that fits the need of the organization. The ABC company, however, suggests that synchronization between separate systems and simplification of data prior to the implementation phase is crucial if the organization aims to achieve 100% adherence and data accuracy after using RPA. Besides, a clear introduction to the RPA concept, benefits and challenges would create better buy-in to the transition of the technology.

RECOMMENDATIONS

Based on the study from the 2 companies, the researchers have proposed the following framework in Figure 3 as the road map to RPA implementation taking into consideration the output of analyzed case studies.

Unfreeze
Introduce to the RPA concept, its benefits and challenges
Assess the process throughout to choose the right process
Master data simplified and process standardized

Change
Pace RPA scaling to match the speed of business adoption
Cooperation of IT and stakeholders
Continuous improvement

Refreeze
Trace data
Reevaluate, detect underlying issues
Carry out corrective actions

Source: Lewin 1947

Fig. 3. RPA implementation roadmap

Figure 3 introduces a roadmap for RPA implementation with regard to master data process. The roadmap is elaborated from the Change management model developed by Lewin [1947]. At the initial stage, the organization should be in good preparation for the integration of the new technology. In this phase, it is most important to get buy-in to the adoption of RPA from stakeholders as it will be able to mitigate the challenge relates to lack of understanding discussed in the literature review section. Awareness and knowledge should be made available to stakeholders so that they will be able to fully understand the RPA concept and how it would empower the master data management process. Managers should involve in helping individuals see how RPA can profit their daily task, eliminate unnecessary manual effort and make their job simpler without limiting their career development. In addition to the fact that this builds certainty around the execution of RPA, it also mitigates the resistance within the organization. As literature pointed out, there are plenty of master data related transactions that can be automated. As the area of automation is defined, it is crucial to do master data normalization and process standardization. Because RPA is a program that can only work with structured data, this phase would help in reducing the potential noises and unstructured factors in the master

data, which would then make the implementation smoother. Data simplify and process standardizes are also discussed to be vital in the successful outcome of RPA integration [Lacity, Willcocks 2016].

Next phase is when RPA is programmed and integrated into managing the designated master data process. Cooperation of IT and stakeholders are essential for better performance of automation. Following the advice given by IT and stakeholders after the implementation, the business should adjust the pace of RPA scaling to match the speed of business adoption.

Lastly, the refreeze phase will focus on ensuring the implementation is there to stay. Making use of the traceability characteristic of RPA, monitoring actions should be made to ensure continuous improvement. For instants, when operating, unstructured data should be identified, recorded, and reported to the system user. Further corrective actions should be carried out for better operational performance the following time.

CONCLUSION

Robotic process automation is an automation tool that organizations ought to have when trying to tackle repetitive, redundant and manual processes. With the aim to examine the benefits of RPA in master data management, the researchers have investigated 2 companies in the manufacturing industry to understand how they have benefited from RPA for item master data management processes. The method approached by the research was a qualitative method, utilizing interpretation of data attracted from literature and semi-constructed interviews. The result showed that RPA is affirmed to bring about many benefits for the organizations through structured automation. Applying RPA would lower processing time, human errors, and cost; increase productivity, compliance level, and data accuracy. The researchers have proposed a framework for implementing RPA to capture item master data based on the change management model [Lewin 1947], the framework is separated in 3 phase including important tasks in each phase. Overall, it stressed the importance of early preparation within the organization together with prior data simplification and process standardization in the success of implementing RPA in managing master data.

Due to the limited time frame, the researchers are not able to analyze the subjects in the study in a quantitative manner which might provide more accurate findings. As the study could only study two companies of the high-value proposition with regards to master data impact, future studies might consider testing the viability of the proposed framework in remaining sectors. Lastly, with the evolving of AI & machine learning technology, future researches might use this study as a stepping stone for further studies in cognitive RPA, utilizing cognitive technology in combination with RPA technology with the mean to achieve a higher level of automation.

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ZASTOSOWANIE AUTOMATYZACJI PROCESÓW (RPA) W UDO- SKONALANIU PROCESÓW UTRZYMANIA DANYCH PODSTAWOWYCH

STRESZCZENIE. **Wstęp:** Firmy produkcyjne działają obecnie w warunkach coraz większej kompleksowości zarządzania swoim łańcuchem dostaw. Przepływ informacji wspomagający zarządzanie łańcuchem dostaw musi być coraz precyzyjniejszy oraz odbywać się w czasie rzeczywistym. Zarządzanie danymi podstawowymi nie jest tu żadnym wyjątkiem. Praca przedstawia potencjalne zalety zastosowania technologii automatyzacji procesów RPA w zarządzaniu danymi podstawowymi na podstawie dwóch firm produkcyjnych.

Metody: W pracy została zastosowana metoda jakościowa polegająca na interpretacji danych pochodzących z literatury fachowej oraz przeprowadzonych wywiadów.

Wyniki: Wysunięto propozycję zastosowania zasad RPA w procesie zarządzania danymi podstawowymi. Automatyzacja w połączeniu z oprogramowaniem robotów wpływa pozytywnie na pracę przedsiębiorstwa poprzez skrócenia czasu obróbki, redukcję błędów ludzkich, obniżenie kosztów operacyjnych, podniesienie wzajemnej zgodności danych oraz większej ich dokładności.

Wnioski: W celu określenia zalet zastosowania metody RPA w zarządzaniu danymi podstawowymi, zostały poddane analizie dwie firmy produkcyjne, które wdrożyły RPA w procesach zarządzania danymi podstawowymi. Otrzymane wyniki potwierdziły pozytywny wpływ wdrożenia automatyzacji. Zaproponowano model wdrożenia RPA oparty na modelu zarządzania zmianą i podzielony na trzy oddzielne etapy, z wyszczególnieniem zadań specyficznych dla każdego z tych etapów. Uzyskane wyniki mogą być zastosowane w dalszych pracach nad RPA.

Słowa kluczowe: automatyzacja procesów (RPA), zarządzanie danymi podstawowymi, produkcja, udoskonalanie procesów biznesowych, wzrost produktywności

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