The benefits of ERP and RPA integration in the context of industry 4.0: Efficient Master Data management in the SAP System

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Abstract: Given the constant development of technology, the digitization of processes is a crucial issue for economic entities that want to increase performance. ERP systems and RPA technologies can be used both together and separately with the aim of easing employees' workloads, reducing the risk of human error. The objective of this paper is to present the benefits of the integrated use of these technologies. Additionally, the review on ERP and RPA literature is illustrated in the study, being supported by a concrete example regarding the automation of master data management in the ERP system - SAP, more specifically, the automatic addition of new master data. Therefore, it demonstrates how ERP and RPA integration can lead to improved workflows, representing a starting point for entities looking to digitalize.

1. INTRODUCTION

As time passed, economic entities have had to resort to various innovative methods to improve processes in order to face new challenges on the market (Caputo, Andrea, et al., 2021). Digitalization involves the increasing use of technologies to simplify activities and reduce their execution time (Caputo, Andrea, et al., 2021). Also, entities that turn their attention to digitalization-based solutions have a strong competitive advantage over those who still use traditional methods (Ritter, Thomas, and Carsten Lund Pedersen, 2020). Therefore, it can be noted that digitalization is positively influencing the way in which operational processes are conducted.

In order to optimize workflows, economic entities of different sizes have opted for the implementation of an ERP (Enterprise Resource Planning) system. With their help, functions across multiple departments are integrated into a single platform (Manavalan, Ethirajan, and Kandasamy Jayakrishna, 2019). Thus, communication between employees is supported and the exchange of information is much faster (Manavalan, Ethirajan, and Kandasamy Jayakrishna, 2019).

One of the most commonly used integrated ERP systems is SAP (Elbahri, Faisel Mohamed, et al., 2019). SAP provides users with modules that perform specific functions for different departments in a variety of business areas (Elbahri, Faisel Mohamed, et al., 2019). Some of the most frequently chosen modules are: FI (Financial Accounting), MM (Materials Management), SD (Sales and Distribution), PP (Production Planning) (Kirana et al., 2021).

At the level of each module there is master data, representing the essential information on which all operational processes are based upon (Prokhorov, Igor, and Nikolai Kolesnik, 2018). In the master data category can be included information about materials, vendors, customers and more depending on the specifics of each entity (Prokhorov, Igor, and Nikolai Kolesnik, 2018).

All this master data has to be entered into the SAP system by the employees, but this activity can be done automatically with the help of another process digitalization technology, RPA (Robotic Process Automation). RPA is a solution based on software robots for automating repetitive and time-consuming tasks (Nielsen, Izabela Ewa, et al., 2023). These software robots can imitate tasks performed by a user, although their role is not to replace the workforce, but to ease the responsibilities of the personnel (Axmann, Bernhard, and Harmoko Harmoko, 2020). Thus, their use can lead to a decrease in the occurrence of human errors, increased efficiency and employee satisfaction at the workplace (Nielsen, Izabela Ewa, et al., 2023).

The study will illustrate how these two types of innovative technologies, ERP and RPA, can be used together to efficiently manage master data present in the Materials Management (MM) module of the SAP system. In order to see exactly how these solutions can be applied, the process according to which a software robot automatically introduce master data such as vendors and materials into SAP will be described. The authors' ultimate

goal is to outline the benefits generated by the integrated use of ERP systems and RPA solutions within an economic entity.

2. LITERATURE REVIEW

2.1 ERP and RPA integration

Over the years, it has been highlighted in numerous papers how ERP and RPA technologies have revolutionized the way economic entities operate. The decision to implement such solutions is taken at the time when the optimization of the processes in order to gain competitive advantages. Based on these aspects, it is notable that recent studies talk about the integrated use of ERP systems with RPA solutions. Enterprises can turn their attention to such an approach in order to increase operational and financial benefits.

According to Yendluri, Dileep Kumar, et al. (2023), the integration of ERP with RPA plays a key role in the digitalization of processes, and there are a multitude of reasons as to why entities should turn to this innovative method. Repetitive and not very complex tasks can be performed automatically by a software robot (Yendluri, Dileep Kumar, et al., 2023). Therefore, ERP systems can be used in particular to improve the performance of the enterprise (Yendluri, Dileep Kumar, et al., 2023).

With RPA technologies, it is possible to automate processes such as extracting the required information, transferring data between systems, generating various documents in the system and much more (Stoykova, Stela, Radoslav Hrischev, and Nikola Shakev, 2022). The robot has the ability to detect objects on the screen, imitate and record operations performed by a user (Ratchatawetchakul, Yongyut, et al., 2024). This allows management to make decisions based on reliable information, increasing data accuracy (Yendluri, Dileep Kumar, et al., 2023).

The generated software robot can accomplish the tasks much faster, as can be seen in the results obtained by Ratchatawetchakul, Yongyut, et al. (2024). The authors made a comparison between the execution time of processes performed manually and by the software robot (Ratchatawetchakul, Yongyut, et al., 2024). It was found that the execution time of the tasks performed by the robot is lower in each tested case (Ratchatawetchakul, Yongyut, et al., 2024).

This aspect is also well highlighted by Stoykova, Stela, Radoslav Hrischev, and Nikola Shakev (2022), illustrating the idea that employees are wasting valuable time on activities that could easily be done by a software robot. Thus, employees could focus on important tasks that require human expertise (Stoykova, Stela, Radoslav Hrischev, and Nikola Shakev, 2022).

Therefore, at the level of the literature targeting ERP and RPA technologies, the benefits of the integrated use of these solutions are outlined. Economic entities can benefit from an appropriate allocation of resources, the processes being carried out at a much faster rate, the risk of errors being reduced.

In order to strengthen the arguments regarding the integration of ERP with RPA, we realized a scheme (Figure no. 1) using the VOSviewer software. The analyzed articles on both ERP systems and RPA solutions were extracted from the Web of Science database. In this scheme, one can observe the key words mentioned by the authors and the connections between them. In total 10 clusters were generated, some of them focusing on terms such as: ERP, robotic process automation, RPA, implementation, post-implementation, critical

success factors, SAP, software robots. In this way, the growing interest of economic entities for innovative automation technologies can be emphasied.

Figure no. 1 – Keyword co-occurrence in ERP and RPA research

3. RESEARCH METHODOLOGY

In order to better outline how these two types of technologies, ERP and RPA, can be used together to improve operational processes, in the following sections will be presented the process of automating master data recording in an ERP system. The tools used will be specified and will also describe the steps taken and the approach used for implementation. At the level of the generated solution, the integrated ERP system - SAP and the UiPath platform, which provides users with RPA tools, were used.

As previously mentioned, the majority of economic entities choose to implement SAP system. Some key factors for a successful implementation that could be mentioned are: clearly setting objectives to determine which variant, customized or standard, should be implemented, support from the project team, management and consultants, staff training, planning, budgeting and testing (Gargeya, Vidyaranya B., and Cydnee Brady, 2005). The latest version of SAP is called SAP S/4HANA, an intuitive platform that helps streamline the processes, decrease time to run analytics and increase transaction efficiency (Pattanayak, Abani, 2017).

The company UiPath was founded in 2005 and provides users with tools for generating the robots used in process automation (Issac et al., 2018). These solutions can be implemented by economic entities around the world and from different industries (Issac et al., 2018). At the level of the platform, software robots can be created by chaining several activities together using drag and drop, and can be edited at any time afterwards (Ketkar, Yashodhan, and Sushopti Gawade, 2021).

In this context, the proposed optimization solution consists in generating a software robot using UiPath tools for automatic master data recording in the SAP system, MM

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module. Master data is essential information for the correct execution of processes (Prokhorov, Igor, and Nikolai Kolesnik, 2018). It is the module that deals with the management of materials, stocks, vendors and purchasing processes, the master data to be added are vendors and materials (Kirana et al., 2021). The registration of new materials or new vendors is a manual job for employees, but with RPA technologies it can be done much faster, reducing the risk of human error. The robot will perform tasks such as entering data into text boxes in the SAP system and performing clicks on the screen. The activities will be presented in more detail in the following section.

4. RESULTS

The software robot, which is designed to automate the process of recording master data, takes the necessary data from an Excel document and inserts it into the required text boxes in the SAP system. First, the program will include the activities for opening the Excel document and reading the information from the used spreadsheet, these are "Use Excel File" and "Read Range".

The next step is to enter the used transaction code in the search bar of the SAP system. To create a new material the code MMH1 is used, and to register a new vendor the code XK01 is used. When the material is being created, the robot will automatically fill in information such as the name, the branch of industry in which the material is classified, its description, the division and material group to which it belongs, the unit of measure and the price. In addition, information on how the material is handled for sale will be included in the "Purchasing" window. All entered data will be saved in the system by pressing the "Save" button.

For transaction code XK01, data related to the new vendor such as name, address, company to which it is assigned and accounting information will be entered. It will also be assigned a procurement role and will be linked to a purchasing organization in order to effectively manage the company's relationship with vendors. If all fields are completed correctly, the generated robot saves the data and a new supplier will be added to the system.

Data is entered into the appropriate boxes using the "Type Into" activity in UiPath. Also, "Click" is used to press the "Save" button, the location of this button is shown on the screen. In order to avoid confusion about the location of fields or buttons on the screen, anchors are used. The following figure includes some examples from the robot that automatically manages master data in the SAP system.
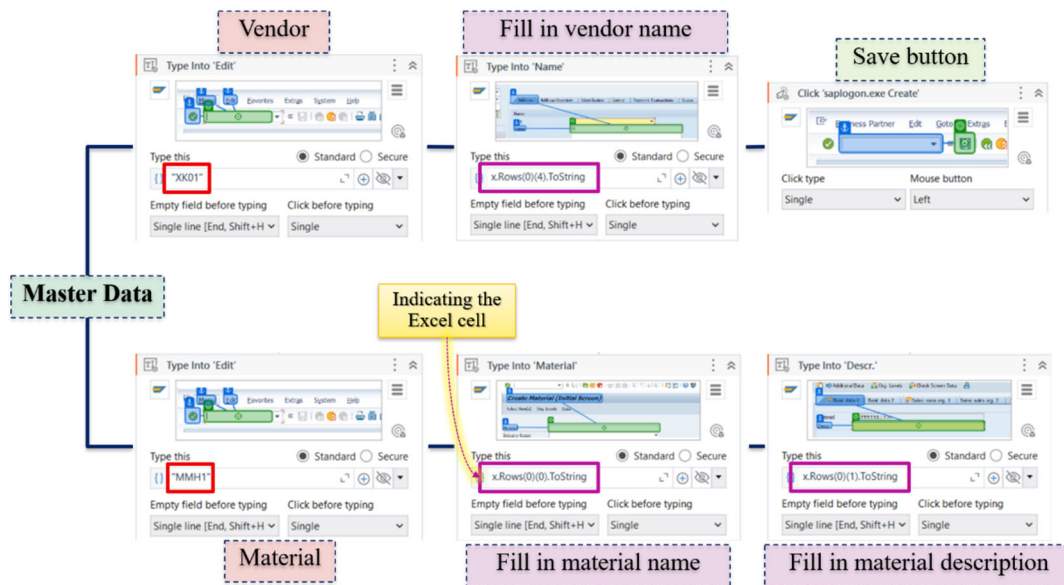
Figure no. 2 Some examples on automating the recording of new materials and vendors using UiPath tools

It is important to note that this robot can be expanded and also, can be programmed to introduce a large number of materials and vendors. In this situation a repetitive statement like the activity "For Each Excel Row" can be used. This will step through each row in the Excel spreadsheet.

5. CONCLUSIONS

Nowadays, turning to digitalization is a crucial issue for economic entities that want to stay relevant on the market. Taking into consideration the aspects mentioned above, one can take none of all the benefits generated by using an ERP system together with RPA technologies. ERP systems facilitate easy access to information by integrating it into a single platform, while RPA solutions are used to automate time-consuming processes. In this study, as a practical part, the process of automating the recording of new vendors and new materials in the SAP system using UiPath tools was presented. This approach can be used by economic entities that want to optimize processes, maximize performance, increase data accuracy and can be a starting point for more complex future research.

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