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PROCESS ANALYSIS FACTORS TO ADOPT INTELLIGENT ROBOTIC PROCESS AUTOMATION IN SUPPLY CHAINS

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ABSTRACT - Intelligent Robotic Process Automation (IRPA) is becoming one of the leading technologies in today's businesses that compete in more dynamic business environments. IRPA helps to automate rule-based and repetitive processes in businesses. However, it is necessary to identify process analysis factors to adopt IRPA in supply chains, although there are available factors and frameworks to adopt RPA. Therefore, this research aims to identify process analysis factors to adopt IRPA using the Relative Importance Index (RII) method while categorizing the primary and secondary factors among them. Overall, the findings of this study will help researchers and industry practitioners identify the most critical and secondary factors that need to be considered when adopting IRPA.

Keywords: Robotic Process Automation; Intelligent Robotic Process Automation; Process Analysis Factors; Supply Chains

1. INTRODUCTION

There are major drivers that lead to digital transformation in businesses. The importance of innovation, industry 4.0, globalization, changes in consumer behaviour, and technological contributions like the appearance of the Artificial Intelligence (AI), Cloud Computing (CC), big data, Internet of Things (IoT), and robots are some of the major causes for this digital transformation [1]. The reason behind the technology adoption is to improve productivity with even fewer changes to the process, increase the quality of the services, and reduce delivery time while automating corporate procedures and relieving staff of tedious and repetitive work [2].

Robotic Process Automation (RPA) is one such technology that is widely used to automate processes using software bots in industries since it can replace the tedious and repetitive human tasks that are rule-based and work with structured data [1], [3]. But RPA with AI or intelligent robotic process automation is more efficient than traditional RPA [4]. The supply chain (SC) sector is one of the broader fields that is used to improve its efficiency using IRPA while applying it to different process analysis approaches in SCs [5]. Although a considerable number of previous studies provide the process analysis factors that need to be considered when adopting RPA in SCs, there is a lack of studies which the process analysis factors that need to be considered when selecting processes to adopt IRPA. Therefore, a research gap prevails for a comprehensive study on process analysis factors to adopt IRPA in supply chains. Hence, this study intends to achieve two research objectives (Ros): RO1: Identify process analysis factors that help to select the most beneficial process for IRPA and RO2: Identify the contribution of each process analysis factor when selecting the most beneficial process for IRPA.

2. METHODS

RO1: At the beginning of this study, seven (7) process analysis factors were identified that need to be considered to adopt RPA through the literature and then verified the suitability for IRPA through survey 1. At

the same time, respondents were requested to suggest any other factors that are applicable for IRPA implementations. It gave another 15 factors and altogether there were 22 factors. Secondly, another survey was conducted to identify the most supportive factors for a successful IRPA process selection. The survey form contained a briefing to ensure the reliability of responses. It defines the nature of the study, how data will be collected, and what will be done with the results. When gathering responses, individuals with various organizational powers and perspectives were evaluated to assure the validity of the responses. The RPA/ IRPA consultants, developers, and team leaders were included in this survey sample. It was noted that the majority of the survey participants had at least three years of combined expertise in the SC and RPA/ IRPA disciplines.

RO2: The Relative Importance Index (RII) method was used to analyze the data collected from the third survey. Factors were divided into two categories (primary and secondary process analysis factors) based on the RII values received for each factor [6]. The mean value of the RII 0.85 was used as an internal benchmark to categorize the factors [7]. Hence, factors that are coming under the primary category have RII value of greater than or equal to 0.85. Finally, the findings of the analysis were validated using literature.

3. RESULTS AND DISCUSSION

3.1. Primary Factors and Secondary Factors – IRPA

The results of the analysis show that accuracy, level of human involvement in a task, and standardization are the three most important factors. Figure 1 shows the RII weights that the total 15 factors carried from the expert rankings (survey 3) and Figure 2 shows the final output of the study. The threshold point for the categorization of primary and secondary factors were based on the mean value of the RII.

Factor	RII
Accuracy	0.9308
Level of human involvement in a task	0.9154
Standardization	0.9077
Stability and maturity	0.9000
Structured data input	0.8769
Reliability	0.8769
Time and speed	0.8769
Volume	0.8615
Dependency	0.8538
Digital data input	0.8462
Integration with existing systems	0.8385
Cost	0.8231
Complexity	0.7846
Change management	0.7462
Automation rate	0.7154

Figure 1. RII weights of the factors

Primary Factors
Accuracy
Level of human involvement in a task
Standardization
Stability and maturity
Structured data input
Reliability
Time and speed
Volume
Dependency

Secondary Factors
Digital data input
Integration with existing systems
Cost
Complexity
Change management
Automation rate

Figure 2. Categorization of primary & secondary factors

IRPA relies heavily on accurate and reliable data inputs to perform tasks and make decisions. If the data used in the automated process is inaccurate, incomplete, or inconsistent, it can lead to errors, inefficiencies, and incorrect outcomes. Therefore, ensuring data accuracy is essential to maintain the reliability and effectiveness of the IRPA system. On the other hand, implementing IRPA involves significant changes to current processes. Considering change management during process selection helps to identify processes that are more suitable for automation and where the organization is better prepared to embrace the changes brought by IRPA [1], [4]. Standardizing processes before implementing IRPA improves efficiency and consistency. IRPA operates based on predefined rules and workflows. If processes are not standardized or have variations across different departments or regions, it can complicate the automation implementation. Standardizing processes involves

streamlining workflows, defining clear rules and guidelines, and ensuring consistency in data formats and inputs. This enables smoother implementation and more effective automation with IRPA [4].

4. CONCLUSION

In conclusion, this research provides perceptions for academics and industry professionals regarding the most necessary factors and the secondary factors that need to be taken into account when adopting IRPA initiatives. Nine factors were finalized as the primary factors among the 15 factors. Furthermore, developing a process analysis framework to adopt IRPA can be identified as a future research direction.

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