



Performance Measurement of Robotic Process Automation in Policy Issuance Activities in Insurance Companies

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Abstract

The issuing policies process in the insurance industry is a complex activity that requires high precision, especially in verifying data and ensuring compliance with regulations. This process is often done manually, which takes a long time, is prone to errors, and is less efficient in handling high workloads. Robotic Process Automation (RPA) offers a solution to automate the policy issuance process to improve operational efficiency, reduce human errors, and speed up the process time. The research aims are to build RPA on the motor vehicle policy issuance process and measure its performance in comparison with the manual method. The research methods used include business process analysis, system design, RPA development using UiPath, testing, implementation, and performance evaluation based on five main variables: speed, availability, compliance, quality, and human resource efficiency measured by Full Time Equivalent (FTE). The results show that RPA can increase the efficiency of policy issuance by reducing processing time by 97.2%, from an average of 90 minutes per policy to 2 minutes 30 seconds. Regarding availability, RPA can operate 24/7 with an uptime of 99.9%. In addition, RPA result performance is 4,861 FTE in labor savings, ensuring compliance with regulations with a lower error rate than manual processes. However, certain cases still require manual intervention, especially in high-risk policies. The research results can serve as a reference for insurance companies in optimizing the implementation of RPA to enhance operational efficiency and provide faster and more accurate service to customers.

Keywords : Compliance; efficiency; policy issuance; RPA

1. Introduction

In the current era of digitalisation, technological developments have impacted various industries, including the insurance industry. One of the fastest-growing technologies is Robotic Process Automation (RPA). This technology enables the automation of repetitive tasks previously performed by humans, thereby improving the efficiency and accuracy of various business processes. In the insurance industry, policy issuance often involves a series of administrative tasks such as data collection, document verification, and policy creation and delivery to customers. This process, when done manually, takes a long time, is prone to errors, and requires significant human resources (Anagnoste, 2017; Fernandez & Aman, 2021; Patil, Mane, & Patil, 2019).

Implementing RPA is a strategic solution to address these challenges. By automating the policy issuance process, organisations can increase data processing speed, reduce human error rates and free up staff to focus on more strategic tasks. In addition, RPA enables 24/7 uninterrupted operations, ensuring that policy issuance is sustainable without relying on human work schedules (Aalst, W. M. P. Van Der, Bichler, M., & Heinzl, A., 2018).

An insurance company in Central Jakarta was facing challenges with its repetitive and manual policy issuing process. Every day, the company has to process hundreds to thousands of policies that require accurate and fast data entry. Delays in this process not only affected the company's internal operations, but also the satisfaction of customers who wanted fast and timely service. Implementing RPA was therefore seen as a strategic step to improve the company's policy issuing performance.

The benefits offered by RPA are significant, including increased productivity of up to 94%, reduced data entry costs of up to 70%, and labour cost savings of up to 30% (Anagnoste, 2017; Fernandez & Aman, 2021; Patil, Mane, & Patil, 2019). In addition, RPA also enables regulatory compliance, as every process performed by the robot is well documented and can be audited at any time, which is an important aspect in the insurance industry, which has to comply with various strict regulations regarding customer privacy and information security (Vuksic, 2019).

However, there are challenges to implementing RPA, particularly when it comes to integrating with existing systems. The complexity of business processes often requires customisation for RPA to work optimally. There is also the challenge of changing work culture, with employees having to

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adapt to new roles that focus more on analysis and decision-making, while leaving manual tasks to robots.

Therefore, it is important for organisations to perform RPA performance measurement to ensure that the technology is delivering the expected benefits. Performance measurement includes aspects such as process speed, resource savings, output quality and regulatory compliance. One of the methods used in this research is the calculation of full-time equivalent (FTE) savings, which can provide an overview of how many human resources have been saved following RPA implementation (Wewerka & Reichert, 2020).

This study aims to measure the performance of RPA in the issuing of motor insurance policies by comparing the efficiency of manual and automated processes. The evaluation is based on five main variables, namely process speed, system availability, regulatory compliance, output quality and human resource efficiency. With this measurement, companies can evaluate the effectiveness of their RPA implementation and identify strategic steps to optimise the technology in the future.

2. Theoretical Framework

Policy issuance is an important stage in the insurance industry, which is undergoing digital transformation to improve efficiency and accuracy (Adam & Hikmah, 2022). In motor insurance, this process includes additional risk assessments such as vehicle condition and usage history (IWFFirstCall, 2023). The underwriting process is a critical element in assessing risk worthiness and setting premiums, which is now supported by data-driven digital systems to reduce manual errors and improve consistency (Insurance Universe, 2024). Digitalisation in policy issuance and underwriting not only speeds up the process, but also builds customer trust and satisfaction with insurance services (Insurance Universe, 2024).

2.1 Robotic Process Automation (RPA)

RPA is a technology that enables the automation of repetitive tasks previously performed by humans. This technology has key benefits such as operational efficiency, increased accuracy and reduced costs. However, there are also challenges to implementing RPA, such as reliance on organised data structures and high initial investment (Abildtrup, 2024).

2.2 UiPath

UiPath is one of the leading RPA platforms for rule-based business process automation. It has advantages in ease of use, a large user community and advanced features such as integration with Artificial Intelligence (AI) and Machine Learning (ML). However, high licensing fees and the complexity of customising business processes are challenges in

implementing UiPath (Hadikusuma, Bijokangko, & Ananda, 2023).

2.3 Performance Measurement

RPA performance measurement is based on 5 (five) main variables: speed, availability, compliance, quality and labour efficiency measured by full time equivalent (FTE). Speed is measured by comparing processing time before and after RPA implementation, while labour efficiency is calculated using the FTE savings method (Wewerka & Reichert, 2020).

FTE savings are calculated using Equation (1).
$$\text{FTE Savings} = \frac{\text{cases per day} \times \text{time(minutes) per case}}{\text{employee working time per day}} \quad (1)$$

2.4 Insurance Policy Issuance

Policy issuance is an important process in the insurance industry, involving data verification and regulatory compliance. The implementation of RPA can make this process faster and more accurate, reducing human error and improving operational efficiency (Adam & Hikmah, 2022).

2.5 Motor Vehicle Insurance

Motor insurance provides protection against the risk of damage to or loss of vehicles. The use of RPA in the underwriting process for motor insurance enables faster and more accurate risk assessment, helping companies to set more appropriate premiums (IWFFirstCall, 2023).

2.6 Underwriting in Insurance

Underwriting is the process of assessing risk before issuing a policy. Digital technology enables a more accurate and faster underwriting process, helping insurance companies to better manage risk (Insurance Universe, 2024).

2.7 Business Process Modeling Notation (BPMN)

BPMN is a business process modelling language used to visually describe workflows. In this research, BPMN is used to design the policy issuance process flow that is automated with RPA (Novian, Idah, & Rifai, 2022).

2.8 RPA Lifecycle

The RPA lifecycle has six main stages: analysis, design, construction, deployment, control and monitoring, and evaluation and performance. Each of these stages is important to ensure that the RPA implementation is fit for purpose and delivers maximum business value (Enriquez et al., 2020).

2.9 RPA Architecture

The RPA architecture consists of three main components: input sensors, an intelligence centre, and output actuators. This architecture allows the software robot to understand the work environment, process the

data, and produce appropriate outputs (Czarnecki & Fettke, 2021).

3. Method

This research uses a quantitative method with an experimental approach to compare the performance of the policy issuance process before and after the implementation of Robotic Process Automation (RPA). The research stages include business process analysis, system design, development, testing and implementation of RPA, and performance evaluation based on pre-defined indicators. The research flowchart is shown in Figure 1.

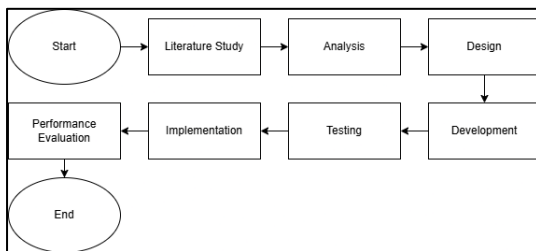


Figure 1. Research Flow

3.1 Analysis

This section provides an in-depth analysis of the implementation of Robotic Process Automation (RPA) in the policy issue process in insurance companies. The main objective of this analysis is to evaluate the effectiveness and efficiency generated by the implementation of RPA, particularly in terms of time savings, improved accuracy and optimised use of human resources. The analysis also identifies the challenges encountered during the implementation process and the solutions adopted to overcome these constraints.

3.1.1 Problem Analysis

At this stage, the problem analysed relates to the effectiveness and efficiency of the policy issue process in insurance companies. Previously, the policy issue process was carried out manually by the underwriting team, which was time consuming and prone to human error. Table 1 below lists some of the key barriers to the manual process.

Table 1. Major limitations of the manual process

No	Problems	Impact
1	Long processing time	Manual input of policy data requires a lot of time, especially when the data volume is large.
2	High error potential	Risk of errors in filling out policy data due to human error.
3	Regulatory compliance	Manual data processing hinders the audit process and track record of data processing.

Based on the company's internal data, the manual policy issuance process took an average of 1 day per policy. To solve the problem, a solution using RPA was proposed to automate most of the routine and repetitive tasks. Table 2 below shows the result of the interview regarding the possibility of automation.

Table 2. Interview results on the possibility of automation

No	Question	Answer
1	Can the proposed task be fully or partially automated?	Tasks can be fully automated, except for policies with cancellation categories that require further analysis by the underwriter.
2	To what extent can the robot handle the processes in the BRD?	Robots can execute the entire workflow with high accuracy and efficiency.
3	Are there any technical or regulatory limitations?	There are no technical or regulatory restrictions that prevent full automation.

BRD : Business Requirement Document

3.1.2 Business Process Analysis

Once the problem had been formulated, the business process analysis was carried out using semi-structured interviews with the Motor Underwriters and the Head of Retail Underwriting. Table 3 below shows the results of the policy issue workflow interview.

Table 3. Interview Results regarding Policy Issuance Workflow

No	Pertanyaan	Jawaban
1	What is the current workflow of motor vehicle policy issuance?	RO inputs data into SPPA, then it is sent to Underwriter for validation, then issued by Policy Admin.
2	What are the main challenges in the manual process?	High policy volumes slow down the issuance process and increase underwriter workload.
3	Do all parts of the policy have to be validated?	Yes, every field in the request number must be validated to ensure regulatory compliance.

RO : Representative Office; SPPA : Insurance Closure Request Letter

3.1.3 Data Analysis

The data used is taken from the insurance company's website and includes attributes such as policy condition, object term, region, vehicle type, police number, year of manufacture, usage, fuel type and cover type.

3.1.4 Analysis of Policy and Premium Distribution Based on Issuance Method

The implementation of RPA has increased the number of policies issued to approximately 69.22% of the total policies issued. However, the total premium from RPA policies is still lower than the premium from manual policies, which is around 63.68% of the total premium. This difference may be due to the complexity or value of the policies issued. Table 4 below shows the distribution of policies and premiums by method of issue.

Table 4. Distribution of Policies and Premiums Based on Issuance Methods

Issuance Method	Number of Policies (%)	Total Premium (%)
Manual	30.78	63.68
RPA	69.22	36.32

3.2 Design

After the analysis, the next stage is the design stage, namely the design of the Business Process Modelling Notation (BPMN). BPMN is a representation of a business process diagram based on flowcharting techniques, assembled to create graphical models of business operations where there are activities and flow controls that define the sequence of work (Novian, Idah, and Rifai, 2022).

3.3 Development

Once the RPA design has been created, the next stage is the development stage. The development phase is carried out by building the RPA using UiPath software with Visual Basic language.

3.4 Testing

Testing was conducted in a non-production environment using the Black Box Testing method. The testing scenarios include:

1. Basic Success Scenario (Happy Path): Ensuring that the RPA can process policies without errors.
2. Error Handling Scenario: Testing the RPA's ability to handle data input errors.
3. Boundary Testing Scenario: Testing the limits of the RPA's ability to process policies with a large number of insured objects.
4. Stress Testing Scenario: Testing the RPA's performance in processing 20 policies simultaneously.
5. Compliance Testing Scenario: Ensuring that the policy issuance process complies with regulations.

3.5 Implementation

After successful testing, the RPA was implemented in the production environment. The implementation process involved the integration between the local development environment and the RPA server through GitLab. The RPA robot began executing tasks directly within the policy issuance process.

3.6 Performance Evaluation

The final stage of this research is performance evaluation. Based on the literature review, the implementation of RPA has effects on the company and its business processes, as well as effects on Underwriters. Due to the limited scope of this study, only the expected effects on the company are considered, which are as follows:

1. Speed. In this variable, measurement is carried out by calculating the processing time duration before and after RPA implementation. In addition, the

Full Time Equivalent (FTE) value is also calculated using Equation (1).

2. Availability. In this variable, measurement is conducted through interviews that capture unexpected RPA downtimes.
3. Compliance. In this variable, measurement is done by calculating the percentage of cases with compliance issues.
4. Quality. Measurement for this variable is carried out by calculating the percentage of problematic cases.
5. RPA as an Optional Solution. Measurement is conducted through interviews regarding RPA as an optional solution.

The measurement of RPA effects was conducted before and after implementation for comparison purposes. This was done to determine whether there is a performance gap, thus allowing for the evaluation of RPA performance.

The interview method used was semi-structured interviews, providing flexibility for informants to expand their answers while remaining guided by pre-prepared questions. The questions were formulated in advance to ensure that the interviews remained focused and achieved the objective of evaluating RPA performance. The interviews involved four informants who had relatively similar roles. The identification of each informant's role is presented in Table 5.

Table 5. Identification of Key Informants

Informants	Role
Informants 01	Group Head Underwriting Retail
Informants 02	Head of SME Underwriting & Administration
Informants 03	Senior Underwriter
Informants 04	Officer

The interviews conducted with Informant 01 and Informant 02 aimed to explore RPA as an optional solution, the return on human capital, improvements in the experience of Underwriters and Policyholders, and the scalability of RPA development in other business processes within the insurance company.

Meanwhile, the interviews with Informant 03 and Informant 04 aimed to gather information on the input time per case, the occurrence of input errors, compliance in the input process, working hours per day, and feedback regarding the use of bots for data input processes.

4. Results and Discussion

This section outlines the results and discussion of the implementation of Robotic Process Automation (RPA) in the motor vehicle policy issuance process. The evaluation was conducted based on several key aspects, such as business process simplification, operational efficiency, processing speed, regulatory compliance, and the quality of the outcomes produced

by RPA. This analysis aims to compare the effectiveness of the automation method with the previously applied manual processes within the insurance company.

4.1 Results

The results of this study represent the implementation of RPA in the issuance of motor vehicle insurance policies. The implementation of RPA has had a significant impact on improving business process efficiency. The evaluation was conducted by comparing the conditions before and after the implementation of RPA.

4.1.1 Business Process Simplification

Before the implementation of RPA, the motor vehicle policy issuance process consisted of several manual stages that required coordination among multiple parties. The process involved the Representative Office (RO) for data input, the underwriter for validation, and the policy administration team for policy issuance. Each of these stages carried the potential for delays due to data input errors or the need for information revisions.

With the implementation of RPA, processes that were previously manual have been automated into a more streamlined workflow. RPA takes over tasks such as data validation, filling in receipt numbers, uploading supporting documents, and automatically issuing policies. This automation has allowed the company to reduce data entry errors and significantly accelerate overall processing

4.1.2 Speed and FTE Savings

The implementation of RPA in the motor vehicle policy issuance process has significantly improved processing time efficiency. Prior to RPA implementation, the manual issuance process required an average of 90 minutes per policy, impacting the total daily issuance time. With RPA implementation, the time required to process a single policy drastically decreased to only 2 minutes and 30 seconds.

Figure 2 shows a comparison of the total policy issuance time per day before and after the implementation of RPA. Before RPA was implemented, the company required approximately 540 minutes per day to complete 30 policies. After RPA was deployed, the time needed decreased to 75 minutes per day, demonstrating an efficiency improvement of 86.1% compared to the manual method.

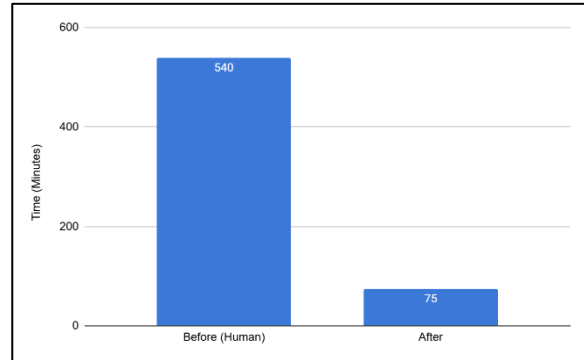


Figure 2. Graph of Total Policy Issuance Time Per Day Before and After RPA Implementation

In addition, the implementation of RPA has also resulted in significant labor savings. Based on Figure 3, with Full-Time Equivalent (FTE) calculations, RPA successfully saved 4.861 FTE. With the reduction of manual workload, human labor can now focus more on strategic tasks that require more complex analysis and decision-making.

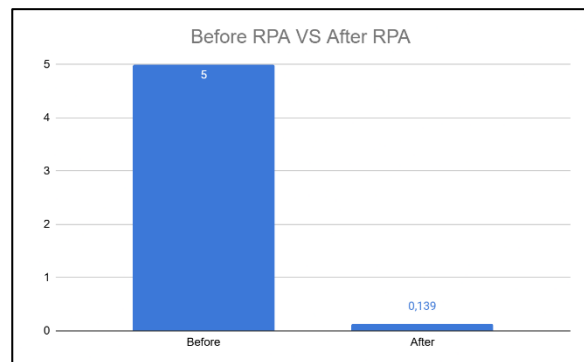


Figure 3. Graph of FTE Value Before and After RPA Implementation

4.1.3 Availability

Another advantage of implementing RPA is its ability to operate 24 hours a day without interruption. Unlike manual processes that rely on employee working hours, RPA can run continuously with an uptime of 99.9%. This ensures that the policy issuance process continues without delays due to operational time limitations.

Furthermore, the RPA infrastructure is equipped with exception handling and automatic retry mechanisms. If an error occurs during execution, the system can detect and correct the issue without requiring manual intervention. This ensures that the entire business process remains smooth and efficient.

4.1.4 Compliance

The implementation of RPA also contributes to improving compliance with applicable regulations. With automation, each stage of the policy issuance process is well-documented, ensuring that all procedures meet the company's policies and insurance industry regulations. The automatic validation applied by RPA reduces the risk of data entry errors, thereby improving accuracy and compliance in policy issuance. Through automation, RPA ensures that each policy undergoes systematic validation to reduce human errors that often occur in manual processes.

Based on an evaluation of 355 processed policies, the results show that 83.4% of policies were issued without errors, while 14.9% of policies were returned to the Representative Office (RO) for revision due to data entry errors, and 1.7% required additional validation from the underwriter. Figure 4 shows the distribution of compliance and data input errors in the RPA system compared to the manual method.

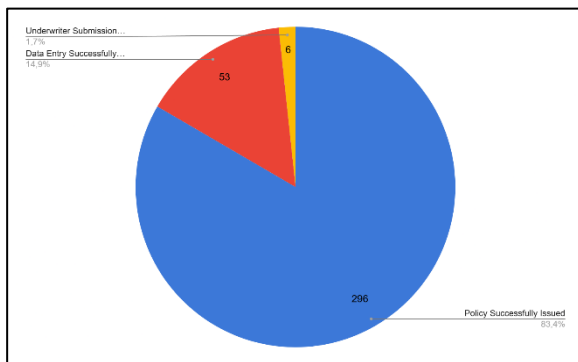


Figure 4. Percentage of Policy Quality by RPA

4.2 Discussion

This section discusses the implications of the research findings regarding the implementation of RPA in motor vehicle policy issuance. The analysis is conducted by considering operational efficiency, process accuracy, the flexibility of RPA as an optional solution, and its scalability for future development.

4.2.1 Acceleration of Processes and Operational Efficiency

The implementation of RPA has proven to significantly accelerate the policy issuance process. With faster processing times and reduced manual workload, the company can increase its operational capacity without having to add more workforce. This improvement in efficiency not only reduces operational costs but also enhances customer service quality by speeding up the response time to policy requests.

4.2.2 Accuracy and Compliance

In addition to improving efficiency, the implementation of RPA also contributes to enhancing

the accuracy of the policy issuance process. With automatic data validation, the risk of human errors can be minimized. This is crucial in ensuring that each issued policy complies with the applicable regulations.

Furthermore, compliance with industry regulations has improved with the automatic documentation of each process stage. With a well-documented system, the company can more easily conduct audits and ensure that its operations are always within the policy framework set by regulators.

4.2.3 RPA as an Optional Solution

Although RPA provides many benefits in policy issuance, its use must still be aligned with business needs. In some cases, especially those involving high-risk policies or more complex conditions, human intervention is still required. Therefore, a combination of automation through RPA and manual validation by experts becomes the optimal solution to ensure that every decision made remains accurate and compliant with regulations.

4.2.4 Scalability of RPA Development

The implementation of RPA in motor vehicle policy issuance also demonstrates high scalability potential. With a flexible system, RPA can easily be developed to handle larger workloads without significantly increasing human resources. In addition to speed, efficiency, and compliance, RPA also offers high scalability in the company's operations. With its ability to handle large volumes of policies without requiring additional human labor, the RPA system provides a flexible solution that can be tailored to business needs.

Table 6 below presents a summary of RPA performance evaluation based on several key indicators, such as speed, availability, compliance, quality, and flexibility as an optional solution.

Table 6. Summary of Analysis and Performance Evaluation Results

Evaluation Aspect	RPA Implementation Results
Speed	Time savings of up to 97.2% from manual processes and FTE savings of 4.861.
Availability	RPA is available 24/7.
Compliance	RPA implementation has followed the established standard operating procedures.
Quality	The majority of policies are issued without errors (83.4%).
Optional Solution	RPA is considered an optional solution.

Based on the research findings, the implementation of Robotic Process Automation (RPA) in the policy issuance process at this Insurance Company has proven to significantly improve operational efficiency. RPA successfully reduced the policy processing time from an average of 90 minutes to 2 minutes and 30 seconds, resulting in an efficiency

gain of 97.2%. Additionally, the RPA system can operate automatically 24/7 with an uptime of 99.9%, improving service availability and reducing business process delays.

The implementation of RPA also impacts human resource savings by reducing the need for labor by 4.861 Full-Time Equivalent (FTE). This allows the workforce to focus more on strategic tasks that require complex analysis and decision-making. Furthermore, compliance with regulations is maintained, as the entire automation process follows the applicable standard operating procedures and ensures the validity of every data processed.

The quality of policy issuance has significantly improved, with 83.4% of policies being issued without errors. However, a small percentage of data still requires corrections by the Representative Office (14.9%) or additional validation by the underwriter (1.7%). This indicates that although RPA can enhance speed and accuracy, manual intervention is still necessary to handle special cases such as policies with high-risk levels or conditions requiring further consideration.

5. Conclusion

Overall, the results show that RPA can be an effective solution for improving the efficiency of policy issuance in the insurance industry. With the right implementation strategy, RPA can help companies achieve greater efficiency, reduce operational errors and improve service quality for customers.

Despite its many benefits, there are still challenges to implementing RPA, including integration with existing systems and the need for regular maintenance and monitoring. Therefore, future development could focus on enhancing the artificial intelligence (AI) in RPA systems to increase the flexibility and scope of automation. In addition, insurers need to consider extending the use of RPA to other business processes, such as claims and risk management, to improve overall operational efficiency.

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