Implementation of Robotic Process Automation: Audit Process, Workflow, and Competencies in Indonesian Banking Firms

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Abstract

This study examines if the application of a technology, Robotic Process Automation, in the work processes of banking firms in Indonesia had substantial impacts in developing technologies by employing audit procedures, workflows, and competences as independent variables. This research is a quantitative study that employs primary data collected from the questionnaires issued to research subjects, specifically internal auditors working at the top ten banks in Indonesia according to Forbes Indonesia 2022. The data from this study will be examined utilizing SMARTPLS software and structural equation modelling (SEM). This study's findings are designed to offer an overview of the evolution of the usage of Robotic Process Automation and its efficacy in banking procedures.

Keywords

RPA, Audit Process, Competencies, Workflow, Emerging Technologies

1. Introduction

Technology has become an integral part of our culture and is pervasive in our daily lives. Various technologies continue to shape how the way people and organizations work and think. Reporting from the McKinsey Global Institute 2022, digital technology adoption is developing quite rapidly in Asia compared to other parts of the world. The Asian region has accounted for about 52% of the global growth in technology company revenue and also influences technology-related economic developments. Aside from that, the Asia-Pacific region has taken the advantage of implementing various technologies from the industrial revolution 4.0, such as robotic automation, artificial intelligence, and blockchain (Ernst & Young, 2019).

Robotic process automation defined as one of the industrial revolution 4.0 technologies software that records computer movements and repeat the process for recurring transactions, manipulating data, and be able to synchronize with other software systems Furthermore, RPA is recognized as a technology capable of overcoming cost reduction in corporate operations, which has benefits in accounting tasks such as: creating real-time accessibility to financial data, allowing reporting and analysis to be done at one time and constantly (Kaya et al, 2019). According to Deloitte's survey, 63% of organizations examined failed to fulfil their RPA delivery deadlines

(Deloitte, 2018b), While Ernst & Young survey found that 30-50% of companies that were surveyed failed their robotic process automation projects (E&Y, 2017a). Judging from a survey conducted by PwC of Indonesian Banks, about 43% of bankers intend to invest in technology in their business processes to support the driving change in Indonesian banking. According to the survey by Deloitte, automated systems have helped industrialization in many divisions. Mostly in accounting and finance and followed by operational activities. With a success rate of 2% in 2017, robotic process automation was successfully introduced in the internal audit division. This 2% rate indicates that there is more to learn about robotic process automation in the internal audit department. For example, RPA could shorten the time needed for evidence collection and potentially preparations for audit activities by merging the data collected into a single audit paper.

EY Survey (2017b) shows that various manual processing that is usually done during the work process can be assisted by RPA with the time used to complete various jobs in proportion to the available effective working time seen from the increase in the percentage in each work process. PwC 2018 regarding Robotic Process Automation for Finance Function in Indonesia, it shows that the implementation of Robotic Process Automation is still around 65% in Indonesia. This percentage indicates that their finance teams in the company are still exploring various RPA usage, and still lack basic automation related skills. While another 35% believe that their finance teams already have basic automation skills.

A survey conducted by EY and NASCIO (2020), which shows that most countries are concerned about emerging technologies that have an impact on business processes where RPA is second on the list in determining long-term viability for the operation of certain sections. Many factors go into implementing the right workflow solution and building the right workflow process from data gathering, data processing, data storage, recovering, and presenting the processing results of accounting information has changed, by interpreting information needs by incorporating new technology that will produce a reasonable reliability grade at various levels (Segura A. et al, 2020). According to KPMG research (2019), more than 74% of the corporate finance high ups said that their auditors have used advanced technologies such as auditing software, and about 94% of the auditors opine that the technologies improve the audit quality. Based on prior research, growing digitalization, automation, and technological development have resulted in an upward shift in work structure, resulting in the proliferation of highly skilled occupations (Oesterreich, F. Teuteberg, F. Bensberg, et al., 2019).

1.1. Objectives

The goal of this research is to investigate whether robotic process automation in banking firms has significant effects in emerging technologies by using audit process, workflow, and competencies as independent variables. This study focuses on banking companies in Indonesia that have implemented robotic process automation and those that have not implemented robotic process automation in terms of emerging technologies.

2. Literature Review

2.1. Behavioral Accounting Theory

Becker (1967) presented behavioral accounting as an application of methods and approaches of behavioral sciences while investigating the relation between accounting and human behavior. Behavioral accounting theory is a theory that explains employee behavior related to the traditional accounting knowledge and their behavior toward the accounting decision made by the company. Behavioral accounting technology examines the process of communication between two subjects, which are the accounting information system and its client (Coskun A.,2020).

2.2. Stakeholder Theory

A theory called stakeholder theory describes how business operates at its best and how it may function in both descriptive and prescriptive as well as instrumental ways at the same time (Donaldson and Preston, 1995). Stakeholder theory stated the stakeholder as a key to influence the company to achieve the company goals as the best on how business works (Freeman E., 2019).

2.3. Task Technology Fit Theory

Task-technology fit was proposed by Goodhue & Goodhue, and Thompson (1995) as the evaluation of a construct defined within a perspective theory that assesses the aspects of technology and the understanding of the usage of technology that could affect the performance impacts. TTF (Task-technology fit) describes the interrelationship between functionality, task requirements, and individual abilities (Goodhew, 1995 ; Goodhue & Thompson, 1995)

2.4. Robotic Process Automation

Robotic Process Automation (RPA) is a new technique that use software-based robots to accomplish activities that previously required physical labor. William Z. (2019) explains that Robotic Process Automation is a procedure where the business processes are automated by using robots to minimize human intervention. According to the Institute for Robotic Process Automation & Artificial Intelligence, Robotic Process Automation is the use of technology to create software robots that collect and understand current applications for the purpose of executing transactions, changing data, and connecting with other software systems.

Robotic process automation refers to the robot that processes the tasks programmed by mimicking human actions to automate the company business process (Saldanha A.,2021). The software presentation layer is the means through which RPA robots carry out work in a manner similar to that of humans (Ribeiro J., 2021). RPA, in contrast to robotics in production, focuses more on autonomous acting software systems, sometimes known as "software robots," than it does actual, physical robots (e. g., Groover, 2008). Advantages that robotic process automation offers in William Z's book are that robotic process automation could enhance business outcomes, minimizes risks, elimination of errors, etc. (William Z., 2019).

2.5. Emerging Technology

Technology development has developed quickly in the previous years to the interest of auditing and accounting through the potential that has been identified (Gotthardt M., 2019). Lots of new emerging technologies appeared to support the business process of a company. The emerging technologies surely do need knowledge and skills on how to use and apply it (Kwan R., 2008).

According to prior study (Abad E., 2020), Emerging technology allows the user to process mass amounts of data needed to provide specific information for the companies including the operational management and managerial control for efficient planning. Abad E., (2020) stated that emerging technologies are very useful financial process especially in corporate accounting that the results show high impact according to the previous research. In addition, the impact of technology development is able to play an important role by increasing the efficiency and performance of bank employees resulting in increased productivity that occurs in the automation process shows that it can reduce the traditional enriching elements of work by improving the mechanistic aspects of work (Gupta & Yadav, 2020)

2.6. Audit Process

Moffitt (2018) describes that the audit process has some repetitive processes, which are: reconciliations, internal control testing and detail testing. These audit processes could be automated in robotic process automation, so that one of the advantages of implementing robotic process automation, time efficiency is fulfilled, the auditor could focus on another audit process that needs professional judgment (Huang F., 2018). Study by Kokina J. (2017) stated that robotic process automation will be useful to help auditors conduct their audit process. Research in 2018 related to robotic process automation by Moffitt (2018), the future of audit will be projected by implementing robotic process automation systems in the audit sector and analyzing its usefulness in the auditing process.

Although robotic process automation in audit still needs to be explored, robotic process automation would be helpful for an auditor to conduct their audit procedures because it helps auditors to reduce their unnecessary activities that can be automated and allocate more of their time in the process that needs more human judgment ability. RPA could expand auditors' capacity while also introducing new risks to the environment control which is becoming a challenge for auditors to create a control for the risks (Wiley, 2019). Many opportunities offered by RPA implementation for auditors, therefore, auditors should be aware that new skills and competencies / expertise are required (Wiley, 2019).

2.7. Workflow

Prior to the application of technology, some financial administration such as auditing, personnel administration, salaries, book-keeping, and management accounting were operated first with a human-led manual process that required several steps before validating a data. This process is judged to be quite prone to human error and can bear the complexity of the assessment. Some repetitive transactions can be automated by RPA robots with quite different workflows than human-led manual processes (Gotthardt et al, 2020). By implementing robotic process automation in a company, the company will be needed to redesign their workflow by evaluating the efficiency and effectiveness to create greater opportunities in using the robotic process automation. (Busulwa R., 2021).

IFAC proposed that accountants are important factors in creating or redesigning an optimal workflow (Busulwa R., 2021). For example, an accountant, especially in accounts payable division, the workflow from manual invoice processing will be changed to be processed by RPA, which will change the workflow from manual into robot process.

2.8. Competencies

An underlying personality trait known as a person's competencies is one that is causally connected to successful and/or exceptional performance in a role or circumstance as measured by criteria. (Spencer and Spencer, 1993). Based on the findings of the study, Blanka (2022) recommended that the corporation put more emphasis on its staff members' capacity to evaluate the opportunities presented by digitalization to spur change. However, in order to ensure an equal distribution of capabilities for digital change, the organization must take into account the vertical distribution of digital competences owing to the company's digital transformation with strategic considerations (Yeow et al., 2018). Forrester research explains about RPA and other automation that could replace 16% human jobs by 2025 (Wiley, 2020). Competencies in work labor are needed to participate in the new roles of implementation robotic process automation to work side by side with the robots.

3. Methods

The type of research used in the research entitled "IMPLEMENTATION OF ROBOTIC PROCESS AUTOMATION: AUDIT PROCESS, WORKFLOW, AND COMPETENCIES IN BANKING FIRMS" using quantitative approach. A social problem is investigated using a quantitative approach, which collects numerical data and analyzes it using techniques with a mathematical foundation (Aliaga and Gunderson, 2002). This study employed a survey approach as its research design. To characterize, compare, or explain people's knowledge, attitudes, and behavior, a survey is a technique for gathering information from or about them (Fink, 2003). This approach makes use of surveys that are frequently compiled into self-administered forms that respondents complete independently, either manually or digitally.

4. Data Collection

The approach or methods that a researcher can employ to acquire data are referred to as data collection techniques. According to Arikunto (2012: 114), the researcher employs the instrument as a tool when using the approach. Because it is a set of methods that is used to collect data, the research instrument is very significant in obtaining the results. The advantage of using primary data sources is that researchers can collect data as desired because irrelevant data can be eliminated. Questionnaire is a technique for collecting data by giving a set question or statements for the respondents to answer. The statements in the questionnaire were made using a Likert Scale from 1 to 6. According to Sekaran & Bougie (2016), a likert scale is a scale meant to measure how strongly respondents agree with a statement. Each statement was assigned the following values from 1 (strongly disagree) to 6 defined (strongly agree).

According to Hair et al. (2010), an appropriate sample size is between 100 and 200 respondents when utilizing approximated interpretation with the Structural Equation Model (SEM), hence 100 respondents will be used in this study. In this study, the population to be studied are internal auditors and back-office staff who are in the top 10 banks in Indonesia with qualifications using Robotic Process Automation. This questionnaire uses purposive sampling to get the data. This kind of sampling is restricted to a small number of people who can provide the necessary data, either because they are the only ones with it or because they satisfy the researcher's criteria (Sekaran, U. & Bougie, R., 2016).

5. Results and Discussion

5.1. Numerical Results

5.1.1. Demographic Characteristics

Based on the data collected through Google Form media, we collected 100 respondents who are internal auditors from 10 largest non-government bank in Indonesia according to Forbes in 2022. The results show demographic of samples collected on Table 1 & 2:

Table 1. Banks where respondents work

Bank Name	Percentage
Bank Central Asia	17%
Bank Rakyat Indonesia	14.2%
Citibank	10.4%
Bank Jago	10.4%
Panin Bank	9.4%
Bank Negara Indonesia	9.4%
Bank Mandiri	8.5%
HSBC Holdings	7.5%
Bank DBS Indonesia	7.5%
UOB Bank	5.7%

Diversion of respondent's backgrounds is shown in this Table 2:

Table 2. Respondent's Characteristic Background

Gender	Male	61.3%
	Female	38.7%
Age	<25	12.3%
	26 - 54	86.8%
	>55	0.9%
Education Level	High School Graduate (SMA/SMK)	1.9%
	Bachelor (S1) / Diploma	85.8%
	Master (S2)	12.3%
	Doctoral (S3)	0.0%

Based on the demographic results relating to the length of time for banks to use RPA shows that, it can be concluded that 14.4% of the respondents have implemented RPA for under than 1 year in their companies, 24% of the respondents have implemented RPA for 1-3 years in their companies, 51% of the respondents have implemented RPA for 3-5 years in their companies, and 1% of the respondents is still planning on implementing RPA for their companies.

5.1.2. Outer Model

Factor loading results above 0.7 are required in order to meet the requirement for the convergent validity test (Chin, 2017). Outer loading, as one of the factors loading, shows the results for this research is shown as Table 3 below:

Table 3. Outer Loadings from the data analyzed

Indicator	Outer Loading Results	Indicator	Outer Loading Results
Z*X1	1.638	X3.6	0.672
Z*X2	1.329	X3.7	0.685
Z*X3	1.477	X3.8	0.851
X1.2	0.866	Y1	0.790
X1.3	0.634	Y6	0.682
X1.4	0.576	Y7	0.673
X1.5	0.625	Y8	0.698
X1.6	0.868	Y9	0.733

X2.10	0.756	Z10	0.685
X2.11	0.752	Z11	0.708
X2.2	0.695	Z2	0.793
X2.4	0.714	Z6	0.722
X3.3	0.854	Z9	0.650
X3.4	0.629		

The reliability of the data is examined using Cronbach's Alpha. A Cronbach's Alpha rating of over 0.7 indicates reliability. The five variables employed in this study were found to be trustworthy based on the results shown on Table 4, which indicate that Cronbach's Alpha values are above 0.7.

Table 4. Cronbach's Alpha

Variables	**Cronbach's Alpha**	**Rule of Thumb**	**Results**
Robotic process automation	0.764	>0.7	Reliable
Audit process	0.761	>0.7	Reliable
Workflow	0.710	>0.7	Reliable
Competencies	0.794	>0.7	Reliable
Emerging technologies	0.757	>0.7	Reliable

Composite Reliability is used to determine if the data are reliable. The value needed to pass this composite reliability test are above 0.7. The findings listed on Table 5 lead to the conclusion that the five variables used in this research are reliable because it shows that the value of Composite Reliability is above 0.7.

Table 5. Composite Reliability

Variables	**Composite Reliability**	**Rule of Thumb**	**Results**
Robotic process automation	0.840	>0.7	Reliable
Audit process	0.843	>0.7	Reliable
Workflow	0.820	>0.7	Reliable
Competencies	0.859	>0.7	Reliable
Emerging technologies	0.838	>0.7	Reliable

5.2. Graphical Results

R Square determines how high or low is the influence of a variable to the other variable. (Figure 1) Based on the data, the R Square shown the value of 0.604 on Table 6, meaning that the research has moderate effects between independent variables, moderating variable, and dependent variable.

Table 6. R Square Results

Variable	R Square	Adjusted R Square
Robotic Process Automation	0.604	0.574

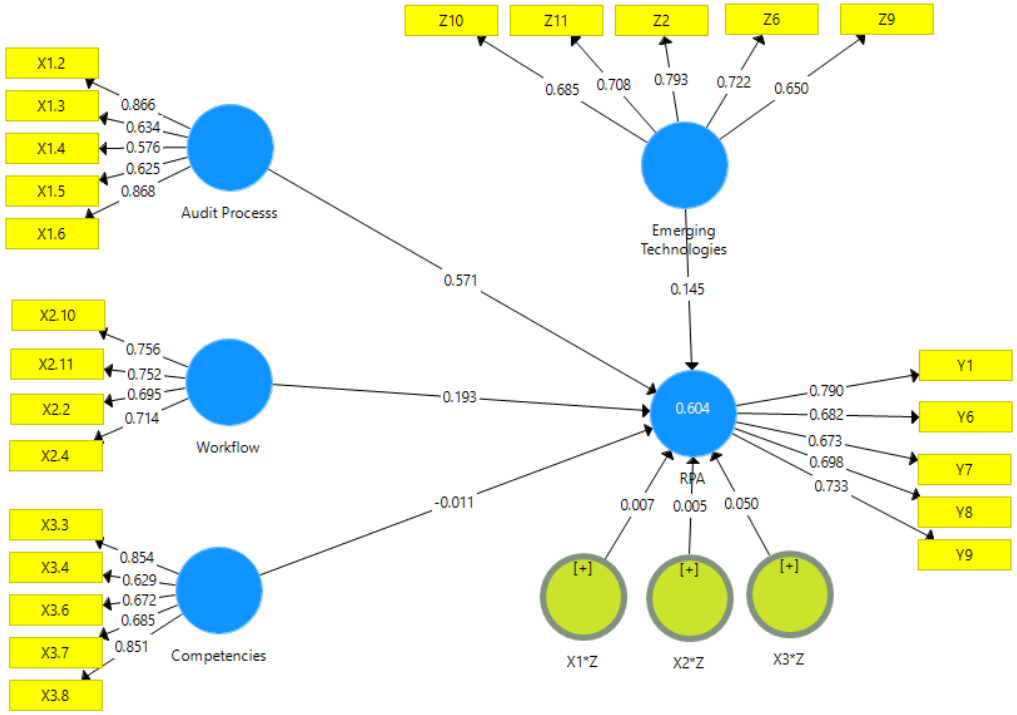

Figure 1. Results of R Square

A Q Square value greater than 0 indicates that the model is predictively relevant. The Q square in this study has a value of 0.270, indicating that the model is predictively relevant as shown on Table 7.

Table 7. Results of Q Square

Variable	Q Square
Robotic Process Automation	0.270

5.3. Proposed Improvements

The result conducted by using SMARTPLS by using structural equation modelling (SEM) method shows the calculations of effect between audit process, workflow, and competencies as independent variables to the implementation of robotic process automation as the dependent variables moderated by emerging technologies. It is hoped that this paper could help banking companies to consider the implementation of robotic process automation in their company by considering the variables that has significant effect on the implementation of robotic process automation. By doing so, the writers hope that this paper could increase the productivity and effectivity of banking sector companies in improving their business process.

Audit Process
RPA offers significant potential changes in the auditing process (Gotthardt M., 2019 & Moffitt, 2018). It can be done by performing audit tasks with lower error risk / error free to improve the data quality and more efficient lower-level error-correction capability. Besides that, RPA is compatible with other software such as SAP and could result in reliable and low-risk records. However, some auditors are still skeptical that RPA can produce optimal audit results in accordance with RPA guidelines. (Eulerich et al., 2021).

Workflow
According to Kokina J. (2019), a significant positive effect in workflow to the adoption of RPA is expected. For instance, by using RPA to check the payroll section, the auditor not only saves a ton of time but is also constantly kept informed of any changes to the law as information about them is typically included in software updates. (Olga et al., 2020).

Competencies
Schwabe, H. (2020) stated that competencies have no significant positive effect between employees with tertiary education and without college degree to the adoption of RPA. Cross-departmental cooperation and a broad perspective are essential for the best use of RPA, which will enable the formulation of problems and the application of the appropriate tactics, allowing the knowledge gained to be directed to the appropriate center of excellence with the appropriate expertise (Kokina J., 2019)

Emerging Technologies
Research results from Eulerich et al. (2021) stated that emerging technologies has no significant positive effect on implementation of RPA. Emerging technologies have frequently fallen short of expectations due to a lack of guidance (Eulerich et al., 2021). A significant part of building the fundamental principles for using technological tools in all thorough coverage of theories and applications is encouraging a positive impact in using emerging technologies in the market and being able to overcome potential issues that arise when their use requires professionalism and ethics (Huda, 2019).

5.4 Validation

The fact that the Average Variance Extracted (AVE) is more than 0.5 indicates that the variance of the data gathered for this study are valid. The five variables utilized in this research are valid, as shown by the data on Table 8, where each variable has an AVE value greater than 0,5.

Table 8. Average Variance Extracted (AVE)

Variables	Average Variance Extracted (AVE)	Critical Value	Description
Robotic process automation	0.513	>0.5	Valid
Audit process	0.526	>0.5	Valid
Workflow	0.532	>0.5	Valid
Competencies	0.554	>0.5	Valid
Emerging technologies	0.509	>0.5	Valid

Goodness of Fit Index (GoF) shows the eligibility of drawing conclusions between an independent variable to the dependent variable with the level of feasibility as a value. Tenenhau (2004) in Hussein (2004) stated that 0,1 value of GoF is considered as small level of feasibility value, 0,25 as medium level of feasibility value, and 0.38 as large level of feasibility value. GoF is obtained by multiplying average variance extracted to r square, the formula is as shown below:

$$\mathbf{GoF = AVExR^2}$$

According to the Table 9, the average AVE value is 0.526 and the R square is 0.604. This will be resulting in a value of 0,317 for the GoF. A GoF value of 0,317 has meaning that the data has medium level of feasibility because the GoF value reaches above 0,25 and below 0.38.

Table 9. Average of AVE and R Square

Variable	AVE Value	R Square
Robotic Process Automation	0.513	0.604
Audit process	0.526	0.604
Workflow	0.532	0.604
Competencies	0.554	0.604
Emerging technologies	0.509	0.604
Average	**0.526**	**0.604**

5.4.1. Hypothesis Testing

Based on the hypothesis testing data shown on Table 10, it is concluded that audit process and workflow as independent variables have significant effects on robotic process automation. Meanwhile, competencies variable does not have significant effect on robotic process automation. However, three of the dependent variables does not have significant effect on robotic process automation if they are moderated by emerging technologies.

Table 10. T-Statistics

Variable	T-Statistics	Description
Audit Process > RPA	3.988	Significant
Workflow > RPA	1.835	Significant
Competencies > RPA	1.107	Not Significant
Audit Process > RPA moderated by emerging technologies	0.069	Not Significant
Workflow > RPA moderated by emerging technologies	0.045	Not Significant
Competencies > RPA moderated by emerging technologies	0.420	Not Significant

6. Conclusion

This paper analyses the effect between three independent variables (Audit Process, Workflow, and Competencies) to dependent variable (Robotic Process Automation) moderated by emerging technologies in 10 largest non-government Indonesian banking companies. The result of the paper shows that Audit Process (X1) and Workflow (X2) has significant effect on the implementation of Robotic Process Automation (Y). Meanwhile, Competencies (X3) does not have significant effect on the implementation of Robotic Process Automation (Y). However, three of the independent variables (X1, X2, X3) does not have significant effect on the implementation of robotic process automation if moderated by emerging technologies (Z).

By concluding this paper, the writers hope that this paper could help banking companies in considering the factors that could help a company to implement the robotic process automation and for the future research related to the factors that affecting the implementation of robotic process automation in a company.

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Biographies

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Michellin is a fourth-year accounting student at the Bina Nusantara University in Jakarta, Indonesia. She is currently minoring in Auditing as her concentrated major. During her studies, she studied several subjects such as Taxation, Managerial Accounting, Finance, Forensic Accounting, Financial Accounting, and Accounting Information System. She was a full-time accounting intern at one of the IT startups in Indonesia for one year and has participated in the Audit Simulation Competition organized by HIMA Binus University with the Audit Trust.

Ignatius Edward Riantono completed his undergraduate program at the Department of Accounting, Faculty of Economics, University of Surabaya (UBAYA) in 2008 with a concentration in Accounting Information Systems, and completed the Master in Accounting (MAKSI) Postgraduate program at the Faculty of Economics, Tarumanagara University (UNTAR) and completed CCFA degree (Certified Corporate Forensic Auditor) from PPM Management and BNSP (Badan Nasional Sertifikasi Profesi) and Cert.DA (Certificate in Data Analytics) from ACCA (Association of Chartered Certified Accountants). Since March 2021, CPHCM (Certified Professional Human Capital Management) from BINZANI and Certificate in Business Valuations (Cert.BV) from ACCA (Association of Chartered Certified Accountants). He has continued his Doctoral study in the Doctoral of Research in Management Program (DRM), Binus Business School - Bins University with research areas: Big Data and UTAUT Model Implementation in Small Medium Enterprise's (SME's).