



Striving in Banking Industry in Indonesia Through Technology Information Investment Effectiveness

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ABSTRACT

Digitalization in the banking industry has rapidly sped up, especially during this pandemic era. Customers' needs and expectations push banking companies to invest in technology even more, forcing banks to select and implement the technology prudently and effectively. This study aims to analyze the effect of information technology investment effectiveness in the banking industry in Indonesia. The data in this study was obtained from 33 banks listed on the Indonesia Stock Exchange (IDX), from 2015-2020. Data analyzed using Eviews 9. The results of this research show that there is a relationship between information technology investment on bank performance that is measured by two parameters, the first one is a financial performance using return on asset (ROA) and the second one is bank efficiency using cost efficiency (CEFF). The effectiveness of information technology investment in this study was measured by Total Investment Per Employee (TIPE), Employee Expense per total Asset (EEAR), the total number of Automatic Teller Machine (ATM), and Investment Computer Software (ICS). The results are, for TIPE and total of ATM have a positive and significant relationship on bank performance whereas the EEAR and ICS have a negative and significant relationship to bank performance. This study provides implications and unique insights about the role of management in managing the information technology investment effectiveness for bank performance.

KEYWORDS

Information Technology Investment, Bank Performance, Technology Investment Efficiency, TIPE, EEAR

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1 INTRODUCTION

In this era of digitalization in the banking industry, ignorance of prudent investment in the technology will impact greatly such

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as monetary loss, high-cost expenditures, increasingly large levels of competition, difficulties in supporting complex business operation processes and resource management (Roy & Thangaraj, 2020). The needs of information technology innovation must be adjusted to the needs of each business so it can maximize its impact on company performance. Previous research is divided into two opinions regarding the influence of information technology on the performance of banking companies. Some research showed that Information technology innovations in the banking industry will bring changes that can change the map of competition and prevent banking companies from bankruptcy (Gunawan & Serlyna, 2018) and will transform efficient business operations, reduce operational costs and increase ease of access from business operations (Le & Ngo, 2020), and also can reduce labor costs (Roy & Thangaraj, 2020). This research states that the effect of information technology on banking can support operational performance through the development of financial products needed by the market, can develop alternative banking channels in addition to using conservative methods through branch offices and reduce costs (Takeda, Takeda, Takemura, & Ueda, 2021). The other side of information technology investment is that it requires large costs and requires large resources in the implementation process and if not followed by a maximum application for business needs can reduce profitability, which proves the existence of a tech-pro paradox (Roy & Thangaraj, 2020). This result states that information technology has a negative influence on bank performance, known as the theory of profitability paradox or Solow paradox. Other research in Lebanese banking studied another variable of influence in information technology investment, especially in automated teller machines (ATMs), Total Point of Sales (POS), and investment in banking software on ROA (Le & Ngo, 2020). Another study by Abd. Karim, Anuar, & Mohd. Khan (2020), showed the effect of information technology investment in this study will use variables such as technology investment per employee (TIPE), employee expense per total asset (EEAR), number of ATMs, and investment in computer software (ICS). Measurement in the bank company divides into two parts; the first is the bank's financial performance which is measured through ROA and the second part using bank efficiency in the form of cost efficiency (CEFF) which will be measured using the data envelopment analysis (DEA) method.

2 LITERATURE REVIEW

2.1 Conceptual Framework

There are four independent variables in determining the information technology investment effectiveness used in this study: Technology Investment Per Employee (TIPE), Employee Expense per Total Asset (EEAR), number of automated teller machines (ATMs)

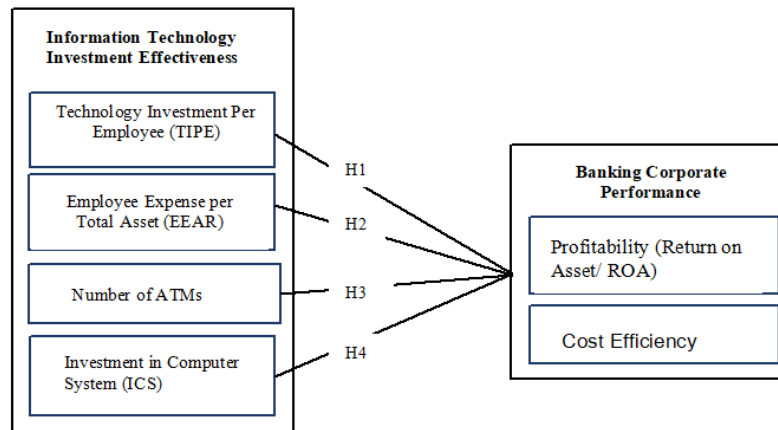


Figure 1: : Conceptual Framework

and investment in the computer system (ICS). The first variable, Technology Investment Per Employee (TIPE), study in Indian banks shows TIPE has a significant value and has a positive effect on company performance (Chhabra Roy, 2021). The second variable is Employee Expenses to Total Assets (EEAR). Based on research by Chhabra Roy (2021) for Employee Expenses to Total Assets (EEAR) has a negative effect on the performance of banking companies because the existence of technology investments is not supported by the training of its employees in their operations which can reduce the efficiency and motivation of workers to reduce profitability. The third variable is a large number of automated teller machines (ATMs) owned by banking companies, which according to previous results reports have a positive effect on the company's performance because the existence of ATMs can reduce operational costs such as maintenance costs for branches, labor costs and other related costs (Le & Ngo, 2020). The last variable is the amount of investment in computer software (ICS). The previous research had two different views, first related to the profitability paradox or Solow paradox theory that argues investment in technology, both software, hardware, and other IT services, had a negative effect on the performance of banking companies. On the other hand, research by Doluca & Doluca (2012) states that investment in computer software, especially enterprise resource planning (ERP), has a positive influence on company performance. Based on the studies above, the following is the conceptual framework of this study:

2.2 Hypothesis Development

The amount of Technology Investment Per Employee (TIPE) in banking companies has a positive influence on the company's performance and efficiency. This report is supported by research by Indian banks, where TIPE has significant value and positively affects the company's performance and efficiency because the large investment in technology per employee shows that companies are committed to utilizing their resources efficiently such as in the application of training to improve company performance and efficiency (Chhabra Roy, 2021). Meanwhile, research in Kuwait states that Al Ali (2020) total assets per total number of employees have a significant and positive influence on financial performance (ROA and

ROE). Based on the above research can be formulated hypotheses as follows: Based on the discussion above, a hypothesis is formulated as follows:

H1: There is an effect between Technology Investment per Employee (TIPE) on the performance of bank companies

Based on research by Chhabra Roy (2021) Employee Expenses to Total Assets (EEAR) has a significant and negative effect on the performance and efficiency of banking companies because the investment in technology is not supported by the training of its employees in their operations which can reduce the efficiency and motivation of workers to reduce the performance and efficiency of the company. The results of this research are also supported by previous research by Roy & Thangaraj (2020) that Employee Expenses per Total Asset (EEAR) have a significant and negative effect on the company's financial performance. Based on the above research can be formulated hypotheses as follows:

H2: There is an effect between Employee Expenses per total Asset (EEAR) on the performance of the bank company

A large number of automated teller machines (ATMs) owned by banking companies has a significant and positive effect on performance and the company because the existence of ATMs can reduce operational costs such as maintenance costs for branches, labor costs, and other related costs (Le & Ngo, 2020). This result is supported by El-Chaarani & Abiad (2018) in Lebanon, that the number of ATMs has a significant and positive influence on the performance and efficiency of the company because in Lebanon ATMs are needed by consumers compared to having to go to branch offices. Contrary to the results of research from Sathye & Sathye (2017) which states that the number of ATMs has a significant and negative effect on bank efficiency and also financial performance. This can happen because the existence of ATMs cannot directly reduce the number of workers. After all, there is still a lot of work done manually so management must have a precautionary in determining their investment. Based on the above research can be formulated hypotheses as follows:

H3: There is an effect between the number of Automated Teller Machines (ATMs) on the performance of bank companies

Solow paradox theory reveals that technology investments in both software, hardware, and other IT services have a negative influence on the performance of banking companies. This statement is supported by Doluca & Doluca (2012) using data on banking companies in the United States as many as 157 banks. Solow paradox is also supported by Kabiru & Farouk (2015) through his research in Nigerian banking companies, that the cost of technology investment (software, hardware, and other services) has a significant and negative influence on financial performance that can be measured using return on equity (ROE), return on assets (ROA) and earnings per share (EPS). However, the same research by Doluca & Doluca (2012) states that investment in computer software, especially enterprise resource planning (ERP), has a significant and positive influence on the performance and efficiency of bank companies if followed by organizational restructuring to adjust the updated business operations. Based on the above research can be formulated hypotheses as follows:

H4: There is an effect between the amount of investment in computer software (ICS) on the performance of bank companies

3 RESULTS AND DISCUSSION

Hypothesis testing uses the results of the analysis of the selected model by comparing the degree of probability and the degree of significance ($\alpha = 0.001, 0.05$ and 0.01). Therefore, the following describes the effect of each independent variable on the dependent variable:

H1: There is a significant positive effect between Total Investment per Employee (TIPE) and the bank's company performance

The Log_TIPE variable has a coefficient value of -0.0014 for ROA and 0.0977 for CEFF, where the probability against ROA and CEFF respectively is 0.7560 and 0.0190. Based on these results, it shows that Log_TIPE or Total Investment Per Employee has a significant positive influence on CEFF or cost efficiency and is not significant on ROA. The H1 hypothesis is accepted because the Total Investment per Employee (TIPE) has a significant and positive influence on the performance of the Bank's company. Total Investment Per Employee (TIPE) has a significant positive influence on cost efficiency in Indonesian banks because management shows a willingness to process its human resources. Company management provides support in information technology investment so that the ability of employees can continue to keep up and in the end will provide opportunities for employees to work efficiently for the company. These results are in line with several previous studies by Chhabra Roy (2021) which stated that the amount of Technology Investment Per Employee (TIPE) in banking companies has a significant positive influence on company performance and efficiency.

H2: There is a significant negative effect between Employee Expenses per total Asset (EEAR) on the bank's company performance

The result for the independent variable EEAR has a coefficient to ROA and CEFF respectively is -0.8145 and 0.8675 while for the probability values it is 0.0001 and 0.6466. Based on these results EEAR has no significant influence on bank efficiency or cost efficiency (CEFF). On the other hand, EEAR has a significant negative influence on financial performance, namely ROA. In conclusion, EEAR has a significant negative influence on the performance of

bank companies. The results of this study show that the value of EEAR has a significant negative influence on financial performance because it is widely found in an organization or company that is carrying out digital transformation factors that often hinder. After all, employees were previously unfamiliar with the use of technology and this is a challenge for management to implement organizational change management to maximize the technological transformation applied. The results of the study for the influence of EEAR on company performance that was significantly negative were also stated by previous research by Chhabra Roy (2021) and Roy & Thangaraj (2020) where Employee Expenses to total Assets (EEAR) has a significant negative influence on the performance and efficiency of banking companies because of the presence of technology investment but is not supported by the training of its employees in its operations which can reduce efficiency and motivation of workers thereby reducing the company's performance and efficiency.

H3: There is a significant positive effect between the number of Automated Teller Machines (ATMs) on the bank's company performance

Another variable in this study is the number of ATMs that have coefficients against ROA and CEFF respectively 0.0207 and 0.2429 and the probability value is 0.0572 against ROA and 0.0134 against CEFF. This means that the ATM variable has a significant positive influence both on financial performance (ROA) and bank efficiency (CEFF) so that the H3 hypothesis is accepted or ATMs have a significant positive influence on the Bank's performance. The number of ATMs for bank companies in Indonesia has an important role because most people need ATM machines to support banking or non-banking activities such as withdrawing cash, depositing cash, paying credit instalment bills, paying household needs bills (electricity, telephone, regional drinking water companies (PDAMs) and others). The large need of the Indonesian people for ATM machines has become a preference for the public in choosing a bank that has an ATM network that is easily accessible and will increase transactions to improve the company's financial performance. In addition, ATMs can also reduce the need for operational costs in terms of human resources, so that the bank company's human resources can be more focused on the company's start-up activities and will result in bank efficiency on the cost side. The results of this study are supported by several studies that state the same thing that the number of ATMs has a significant positive influence on bank performance. One of them is research from Le & Ngo (2020) and El-Chaarani & Abiad (2018) which resulted in the conclusion that a large number of automated teller machines (ATMs) owned by banking companies has a significant positive effect on performance and companies.

H4: There is a significant negative effect between the amount of investment in computer software (ICS) on the performance of bank companies

The results of this study for the fourth independent variable, the ICS, have coefficient values against ROA and CEFF of -0.0007 and -0.1833 respectively. Meanwhile, the probability value of ICS against ROA is 0.9255 which means it is insignificant while the probability value of ICS against CEFF is 0.0038 which means it is significant at alpha 0.01. These results show that ICS has a significant negative influence on bank efficiency (CEFF). The results of this study show the validity of the Solow paradox theory which

reveals that investment in technology, both software, hardware and other IT services, has a negative influence on the performance of banking companies. Investment in information technology on company performance does not have an instant impact because it requires changes that involve changes in the operational level that must be supported by human resources. In the second analysis, information technology investment must also be carried out with careful planning and must be made in a blueprint or road map following future business targets, so that every investment spent can have a maximum impact on the company. The results of this study are supported by Doluca & Doluca (2012) and Kabiru & Farouk (2015) which support the Solow paradox theory, that the cost of technology investment (software, hardware and other services) has a significant negative influence on financial performance.

4 CONCLUSION

The conclusions that can be drawn from the results of this study are as follows:

1. Total Technology Investment per Employee (TIPE) is not significant to financial performance, measured by Return On Assets (ROA), but TIPE has a significant positive influence on the performance of bank companies as measured by cost efficiency (CEFF).
2. Employee Expenses per Total Asset (EEAR) has a significant negative influence on the performance of bank companies as measured through variables of financial performance, return on assets (ROA), while EEAR is not significant to cost efficiency (CEFF).
3. The number of ATMs owned by banks has a significant positive influence on the performance of bank companies both measured through financial performance, ROA and also measured through bank efficiency, CEFF.
4. Investment Computer Software (ICS) which is a combination of total information technology investment is not significant to the company's financial performance, ROA, while ICS has a significant negative influence on the performance of bank companies as measured through the bank efficiency approach, namely CEFF.

5 IMPLICATIONS

5.1 For Banking Companies

The results of this study explain how the effectiveness of information technology investment had impact on company performance measured by Return on Asset (ROA) and bank efficiency as measured through cost efficiency. The management of banking companies should pay attention to the ratio of Total Information Technology Investment to the number of employees, which in this study has a significant and positive influence on the performance of bank companies. This means that the amount of information technology must be balanced with the optimal number of employees.

A large number of ATMs in Indonesia is still favoured by customers because it is proven in this study to be able to improve company performance both from ROA and CEFF performance.

As for the Total Investment in information technology itself, management must be careful in setting the budget because in this study it produces a significant negative influence on company performance where managers must also balance other strategies such as organizational restructuring.

5.2 For Investors

For investors who want to buy shares for bank companies listed on the Indonesia Stock Exchange (IDX) can study the company's annual report related to whether the company already has a budget for information technology investment and then can also see the development of information technology that has been implemented and can be utilized by consumers. Based on the results of this study, investors must carefully have several parameters to measure information technology investment carried out by bank companies such as the number of ATMs and also the total investment in information technology on the number of employees (TIPE) proven to be able to have a significant positive influence on the company's performance. On the other hand, the value of the investment in computer software and employee expenses per total asset (EEAR) has a significant negative impact on the performance of bank companies. Investors must conduct an in-depth analysis of information related to information technology investment information for bank companies that will be invested in capital.

5.3 For Regulators

In this study, regulators or the government can use it as a consideration in making and clarifying regulations for banking companies in the application of information technology. It is hoped that regulations made with strict monitoring can encourage companies to apply information technology in the banking industry to improve their company's performance. The government can also implement regulations through relevant agencies or institutions to clarify the provisions of the application of information technology, especially now that digital banks in Indonesia are very developed so that healthy and fair regulations are obtained for all parties involved.

6 LIMITATIONS AND SUGGESTIONS

Independent variables for the effectiveness of information technology investment consist of 4 variables; Total Investment Per Employee (TIPE), Employee Expenses per total asset (EEAR), number of ATMs, and Investment Computer Software (ICS). The dependent variables for bank company performance in the study are divided into; the company's financial performance as measured through return on assets (ROA) and bank efficiency as measured through cost efficiency (CEFF). Suggestion for later research in the same field is to provide company size variables (Abd. Karim et al., 2020). Another study by Gunawan & Serlyna (2018) used the dependent variable earnings per share (EPS) in looking at its effect on information technology investment and using mobile banking and internet banking to become variable parameters for information technology investment (El-Chaarani & Abiad 2018).

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