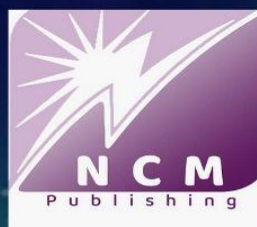

A COMPREHENSIVE
UNDERSTANDING OF
GLOBALIZATION, GENDER,
SOCIO-ECONOMIC
DEVELOPMENT &
BUSINESS PERSPECTIVES
IN THE MODERN DIGITAL
ERA

Editors

Assoc. Prof. Dr. Muhammad Ali Tarar

Lawrence Walambuka



A Comprehensive Understanding of Globalization, Gender, Socio-economic Development & Business Perspectives in the Modern Digital Era



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Assoc. Prof. Dr. Muhammad Ali Tarar
Lawrence Walambuka

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PREFACE

The edition of the Global digital era perspectives, just like its previous editions, has been enriched by working together of various authors from different universities and countries across the globe. The authors and co-authors enriched this edition by considering feedback from the 9th CEO Congress publications, readers and audiences. The editors wish to thank all those who offered comments, commitment, advice and also thank NCM Publishing House for its decision to publish this edition.

We would also like to thank all participants who made it possible throughout the 9th CEO Congress presentations and all the universities for excellent research assistance throughout this edition of Global digital era, as well as help with online resources to gather different talents internationally.

As for the content, this edition includes chapters in technology, social, environmental sciences, public issues, green technologies, monetary policies, community well-being, law and society development, AI and multi-media creation.

The editors hope that, by collection of case studies from various and cross sectional fields around a common topic, Global digital era, the conditions for grouping, comparing, and analysis cases, countries and systems has been met.

All the chapters are new research which was scientifically and methodologically put together by authors who paid attention to global digital era technologies and perspectives in business and society.

The edited chapters, includes include: fresh new digital era technologies, educative content, illustrative diagrams, which encourage further research and reading. In terms of chapter arrangement, a logical order and a conscious effort has been followed to guide readers on fresh global digital era technologies and perspectives. More importantly, to impart knowledge to readers about the impact of ICT on society. The selection of authors was a conscious exercise that considered equality in gender parity and global outreach CEO Congress program of sourcing participants and authors.

Assoc. Prof. Dr. Muhammad Ali Tarar
Mr. Lawrence Walambuka
Bursa – July 2024

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CHAPTER 1

The Nexus of Cigarette Taxes, Economic Growth and Public Health in Indonesia: A Systematic Literature Review

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ABSTRACT

This study investigated the effects of cigarette smoking on tobacco use, health outcomes, and economic implications in Indonesia. Raising cigarette taxes is a common tobacco control policy globally used to reduce smoking rates and related health risks. This review pooled data from various studies to determine the impact of cigarette taxes on smoking behavior, cessation rates, and health outcomes in different populations. The analysis also found that the cigarette excise tax led to lower tobacco consumption and smoking prevalence, particularly among vulnerable groups such as young people and low-income households. This supports findings on the price elasticity of tobacco demand. The economic impact of increased taxes was also considered, with additional tax revenues potentially supporting public health programs and services. However, the allocation of these funds is often not aligned with public health goals, because of political and economic factors. Higher taxes can disproportionately impact low-income households, raising concerns about economic inequality. The review included 66 articles published between 2017 and 2023 and selected using the PRISMA guidelines. The findings suggest that, while higher cigarette taxes effectively reduce smoking rates and improve public health, policymakers must consider the economic implications to ensure fair outcomes. This study provides valuable evidence for designing effective and equitable tobacco control interventions in Indonesia.

Keywords: Cigarette taxes, Tobacco control, Smoking behavior, Health outcomes, Economic implications

1. INTRODUCTION

Globally, cigarettes are the most commonly consumed tobacco product and pose a major risk factor for numerous chronic diseases and premature death. According to the World Health Organization (WHO), tobacco use accounts for over 8 million fatalities annually, with 7 million of these due to direct consumption and 1.2 million as a result of secondhand smoke exposure (World Health Organization, 2020). Given the significant health and economic impacts of cigarettes, numerous countries have implemented tobacco control policies such as increasing cigarette taxes.

Raising cigarette taxes has been shown to decrease the demand and prevalence of smoking in diverse populations. Cigarette price hikes resulting from taxes encourage current smokers to quit or reduce their consumption, and deter young people from taking up smoking. Nevertheless, the effectiveness of cigarette tax increases may vary based on socioeconomic characteristics such as age, gender, and socioeconomic status. Lower socioeconomic groups tend to be more responsive to changes in cigarette prices than are higher socioeconomic groups (Chaloupka et al., 2012; Jha & Peto, 2014; Veligati et al., 2020; Farrelly et al., 2003; Townsend et al., 1994).

Apart from its impact on smoking behavior, raising cigarette taxes also has broader economic implications. Revenues from tobacco product taxes can be a substantial source of income for governments, and can be utilized for public health programs, education, and other essential services (World Health Organization, 2015). However, the allocation of cigarette tax revenues may not always align with public health goals, because of political and economic factors. Higher cigarette taxes can also disproportionately affect low-income households, raising concerns about regressivity and socioeconomic inequality (Hoffer et al., 2018; Immurana, Boachie, & Kisseih, 2021; Verguet et al., 2015).

Although literature on tobacco economics has grown substantially, considerable research gaps remain. One gap relates to the long-term consequences of cigarette tax increases on government revenue and health spending, the understanding of which remains uncertain (Hoffer et al. 2018; Oshio and Nakamura 2022). To ensure the sustainability of tobacco control policies, it is essential to bridge this knowledge gap. Another research gap involves exploring the dynamics of illegal cigarette trade and its impact on the effectiveness of excise tax policies. Further investigation is needed to understand the influence of illegal trade on tax increases and incorporate it into policy design and implementation (Gallego et al., 2020; Wang et al., 2019). Additionally, there is a need for more research on socioeconomic disparities in smoking behavior and the responsiveness of different population groups to tobacco control policies.

Investigating these differences can help develop more targeted and effective strategies (Kim & Lee, 2020; Raei et al., 2021). In the Indonesian context, research on the impact of cigarette tax increases on smoking interest, cigarette consumption, and expenditure allocation is particularly pertinent. Indonesia faces significant challenges in controlling tobacco epidemics, as it has one of the highest smoking prevalence rates globally. Understanding the factors that contribute to smoking behavior, including addiction and social norms, is crucial for designing effective interventions (Susilawati et al. 2022).

Tobacco economics have important implications for public health policies. By examining

the factors that influence smoking behavior and the effectiveness of tobacco control measures, research in this area can help policymakers develop evidence-based strategies to reduce tobacco consumption and enhance public health. Additionally, this study supports advocacy efforts and resource allocation for tobacco control.

The importance of comprehending the broader implications of cigarette taxation policies, including their effects on smoking behavior, health outcomes, and various economic aspects, cannot be overstated. This systematic literature review aimed to synthesize the latest evidence regarding the impact of cigarette taxes on smoking behavior; tobacco consumption; and the economic, health, and financial implications of cigarette-excise tax increases on smoking prevalence, cessation efforts, and tobacco use reduction. This review aims to provide valuable insights for policymakers and researchers in designing and evaluating effective and equitable tobacco control interventions that can alleviate the global health and economic burden associated with tobacco use. Two problem formulations serve as a guide for this systematic literature review: first, examining how an increase in cigarette tax influences smoking behavior, tobacco consumption, and related economic, health, and financial aspects, and second, investigating the impact of cigarette-excise tax hikes on smoking prevalence, cessation efforts, and tobacco use reduction.

2. LITERATURE REVIEW

Smoking is a major public health challenge in Indonesia, with a high prevalence and significant burden of smoking-related disease. One of the key strategies for addressing the tobacco epidemic is the implementation of tax policies, particularly cigarette-excise taxes. This literature review aimed to synthesize findings from recent research on the impact of cigarette taxes on smoking behavior, health outcomes, and economic factors in Indonesia.

Evidence has consistently demonstrated that cigarette-excise increases can effectively decrease cigarette consumption and the prevalence of smoking in Indonesia. It has been found that higher cigarette prices resulting from tax increases lead to decreased smoking rates, particularly among vulnerable groups such as youth and low-income populations. These findings align with the extensive international literature on the price elasticity of cigarette demand and emphasize the crucial role of price policies in controlling smoking behavior (Pei et al., 2023; Susilawati et al., 2022).

Although the primary objective of cigarette-excise taxes is to reduce tobacco consumption and improve public health, few studies have explored the economic implications of such policies. Research has found that cigarette taxes do not significantly impact government healthcare spending in Indonesia, suggesting that the health benefits of cigarette taxes may not necessarily result in substantial short-term savings in health costs. Additionally, it has been suggested that cigarette tax increases in Japan are driven more by revenue stabilization goals than by public health concerns, highlighting the potential economic motivation behind tobacco taxation policies (Hoffer et al., 2018; Oshio & Nakamura, 2022).

Several studies have emphasized the potential economic advantages of implementing higher cigarette taxes, particularly for low-income households. According to one study, the price increases resulting from tax increases can provide economic benefits to low-income populations by preventing catastrophic health spending and reducing poverty. These results

suggest that higher cigarette taxes may have a redistribution effect and contribute to reducing economic inequality. Furthermore, research has found that higher tobacco taxes have a positive impact on economic growth and public health in 38 African countries, both in the short and long term, indicating the potential for broader economic benefits from tobacco control (Wu et al., 2020; Immurana et al., 2021).

3. RESEARCH METHODS

Systematic Literature Reviews (SLRs) are essential for research on the influence of cigarette taxes on smoking behavior, public health, and the Indonesian economy for the following reasons.

1. Identifying research gaps: Existing evidence consistently shows that cigarette-excise increases can reduce cigarette consumption and smoking prevalence, particularly in vulnerable populations. Systematic Literature Reviews (SLRs) can help researchers identify areas that have not been thoroughly explored in existing literature. By systematically analyzing previous research, researchers can pinpoint gaps that can be addressed with new studies (Pei et al., 2023; Susilawati et al., 2022; Kitchenham, B, & Charter, 2007).
2. Synthesizing existing evidence: SLR allows researchers to integrate and summarize the findings from various studies on the impact of cigarette taxes in Indonesia, providing a more comprehensive understanding of the topic. This synthesis can reveal trends, patterns, and relationships that may not be apparent in individual studies (Petticrew and Roberts, 2006). Given that the economic implications of cigarette-excise taxes are still an active area of research with varied findings, such as the lack of a significant impact on government healthcare spending or potential economic benefits for low-income households, this comprehensive synthesis is crucial (Hoffer et al., 2018; Wu et al., 2020).

In summary, owing to the widespread prevalence of smoking and the significant impact of smoking-related illnesses in Indonesia as well as the intricate interplay between cigarette taxation policies, smoking behaviors, health consequences, and economic factors, systematic literature reviews (SLRs) are imperative to provide comprehensive evidence synthesis and guide more effective and research-based tobacco control initiatives in the country. Before presenting the filtering results, the following table provides an overview of the number of eligible articles that will be used (eligible articles).

Table 1. Tabulation of Inclusion &; Exclusion of Data Sources

<i>Keywords Used</i> (Publish or Perish)						
2017-2023	Health Effect of Smoking	Cigarette Tax	Impact of Cigarette Excise Tax	Cigarette Tax	Cigarette Economy	Tobacco Economic Growth
Recorded	54	88	10	14	40	4

Gross Total	210					
Excluded	38	60	5	12	27	2
Included	16	28	5	2	13	2
Total Articles Included	66					

Author (2024)

Additionally, the efficacy of the PRISMA framework regarding the screening process for the inclusion and exclusion criteria of data sources will be demonstrate.

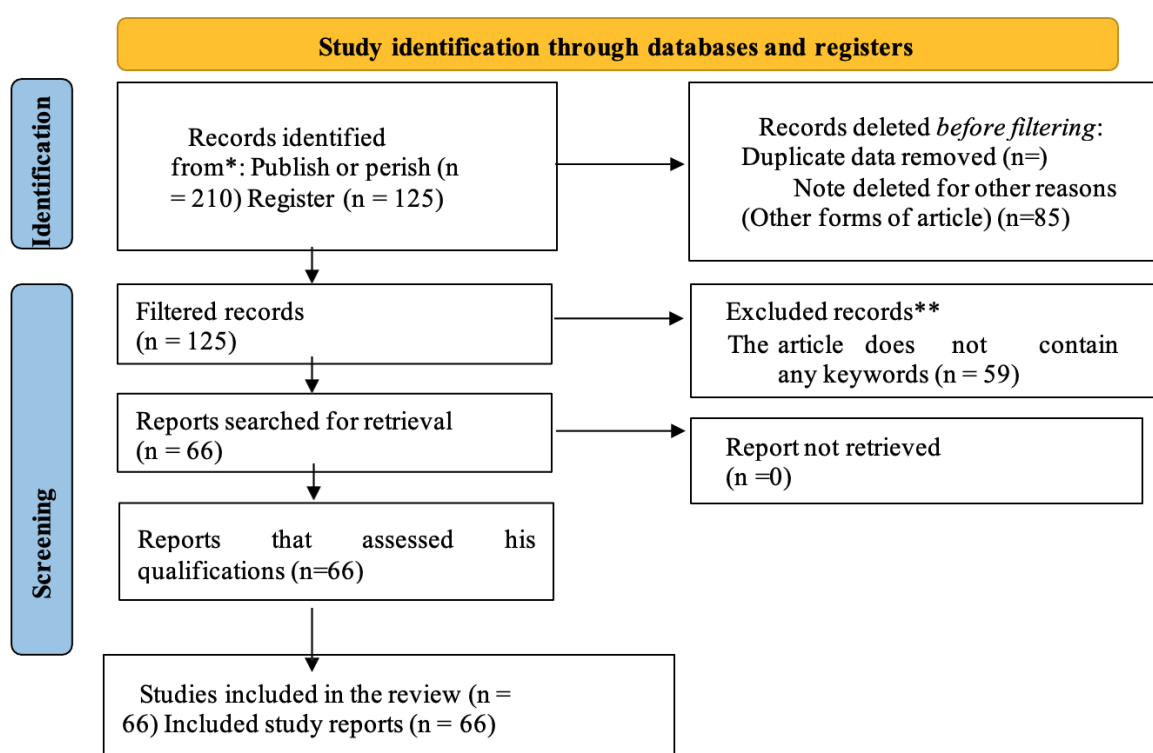


Figure 1. Diagram article filtering was performed using PRISMA (Moher et al., 2009) Data Processed (2024)

The table and chart above illustrate the use of keywords in article searches and data sources with the aid of Publish or Perish (PoP) software, utilizing a publication time frame of 2019-2023 (5 years). The keywords employed were (i) Cigarette Tax, (ii) Cigarette-Excise Tax Impact, (iii) Cigarette Taxation, (iv) Cigarette Economic, (v) Cigarette Health Impact, and (vi) Tobacco Economic Growth. These keywords were selected to align with the primary themes and research objectives. A total of 210 data points were generated using these keywords, with each keyword producing a specific amount of data: (i) Cigarette Tax, 88 data; (ii) cigarette– excise tax impact, 10 data; (iii) Cigarette Taxation, 14 data; (iv) Cigarette Economic, 40 data; (v) Cigarette Health Impact, 54 data; and (vi) Tobacco Economic Growth, 4 data.

To narrow down the data for analysis, the first exclusion criterion is applied, which requires the data to be published in the form of articles and no other forms, such as chapters in books, reviews, books, and notes. This was achieved by utilizing a keyword network analysis, which was conducted in the subsequent stage. It is important to note that data in forms other than articles tends to be limited and may not contain relevant keywords.

The first criterion involved analyzing 85 data points that were not in the form of articles, resulting in the remaining 125 data points. The second criterion involved filtering out articles that did not contain specific keywords to conduct a keyword network analysis at a later stage. Consequently, 59 articles without keywords in the article form were eliminated, leaving 66 articles for further data processing. Based on these two criteria, it can be concluded that 66 articles were eligible for further analysis.

4. RESULTS AND DISCUSSION

The initial screening process identified 66 articles that met the specified inclusion criteria and served as the foundation for subsequent analysis and discussion. A partial network mapping was performed.

The six major themes of this study are as follows.

4.1. The Influence of Cigarette Taxation on Smoking Habits, Tobacco Consumption, and Health and Financial Implications

The findings from multiple studies underline the significance of cigarette tax increases in influencing smoking behavior, tobacco consumption, and the associated health and financial consequences.

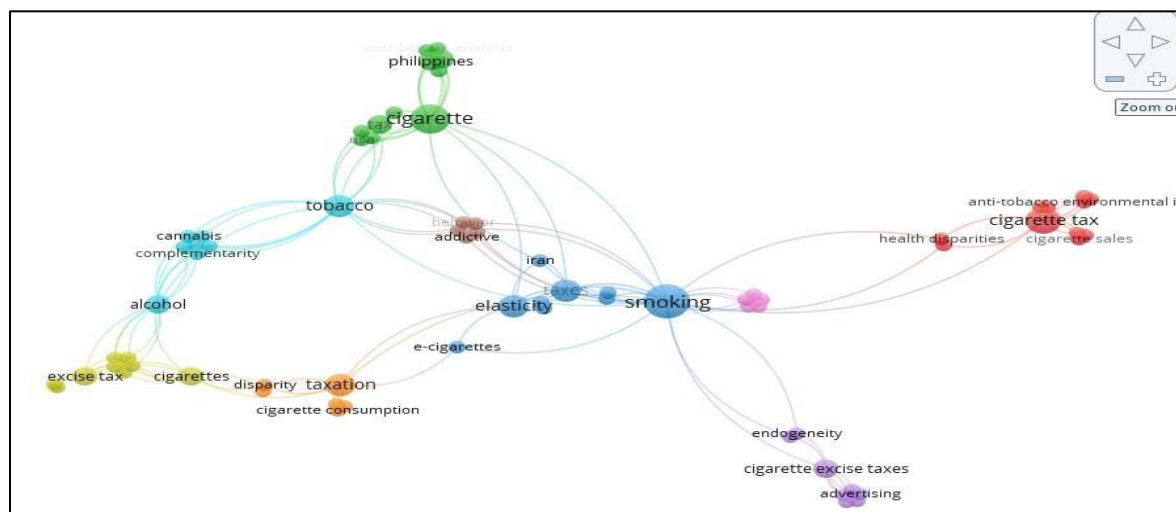


Figure 2. Cigarette tax & cigarette taxation keyword network
(Data Processed 2024)

Several studies have indicated that increasing cigarette taxes is an effective strategy to reduce smoking prevalence and consumption across various populations (Craftsman Wood & Sansone, 2021; Kim & Jung, 2020). However, smokers' responses to price changes can vary based on socioeconomic factors, with evidence suggesting that tax increases may be less effective in areas with substantial minority populations (Kim & Lee, 2020). The price

elasticity of cigarette demand is a crucial factor for determining the impact of taxes on consumption. Studies have found that traditional cigarettes and e-cigarettes are substitutes, with higher taxes on traditional cigarettes leading to decreased traditional cigarette use and increased e-cigarette use among adults (Pesko et al., 2020).

A reduction in tobacco consumption owing to tax increases has the potential to yield significant health benefits. Research estimates that higher prices lead to a substantial number of smokers quitting smoking, resulting in avoided deaths, additional years of life gained, and economic savings, particularly benefiting low-income groups (Wu et al. 2020; Raei et al. 2021). However, some studies have also highlighted potential indirect effects on other substance use behaviors, such as a reduction in regular alcohol consumption among male smokers following cigarette tax increases (Zhang & Zheng, 2020).

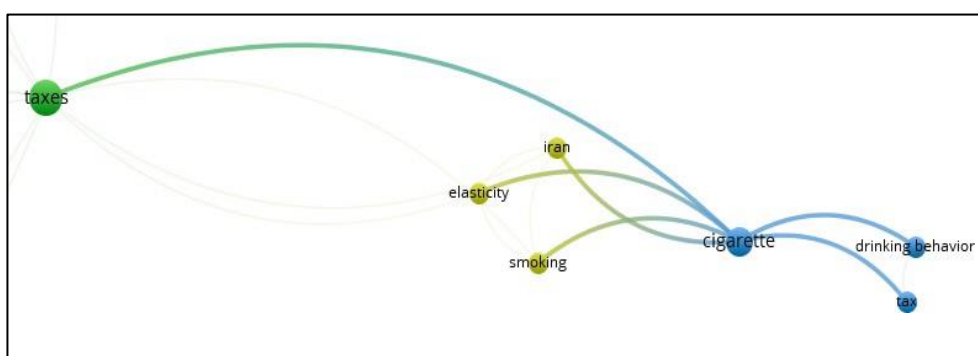


Figure 3. Drinking behavior vs cigarette vs tax (Data Processed 2024)

An increase in cigarette taxes has substantial financial implications for individuals, households, and communities. Studies have found a positive correlation between cigarette tax rates and the growth of healthcare expenditures, although the underlying factors for this increase remain unclear (Hoffer et al., 2018). The potential of cigarette tax policies to generate financial benefits, especially for low-income groups, by reducing out-of-pocket expenses and providing financial protection against smoking-related diseases has been emphasized (Raei et al., 2021). However, concerns about the regressive nature of cigarette taxes persist because they disproportionately affect low-income households.

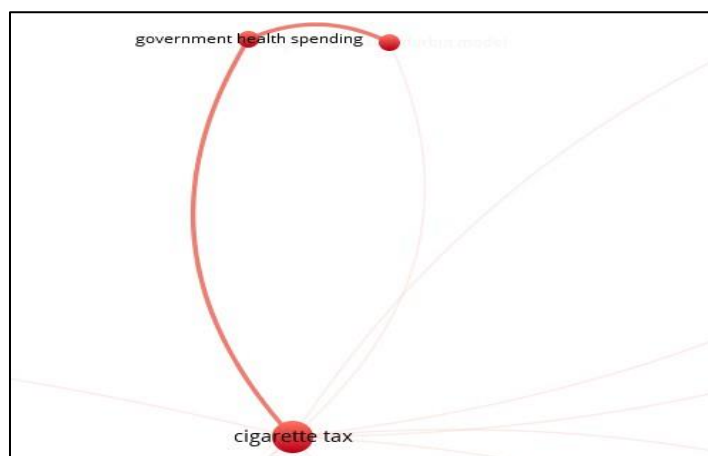


Figure 4. Government health spending vs. cigarette taxes (Data Processed 2024)

In a related study, Oshio and Nakamura (2022) emphasized that cigarette taxes are often imposed to strengthen and stabilize state revenues rather than specifically increasing health budgets. Research has also explored the impact of cigarette tax increases on the market share of illegal cigarettes, finding that higher taxes can lead to a substantial increase in the illegal market share (Bate et al., 2020). This highlights the potential unintended consequences of tax hikes such as reduced revenue and increased illegal cigarette trade. The literature underscores the crucial role of cigarette tax revenue in funding public health initiatives (Wang et al. 2021). Although antismoking advertising campaigns are partially funded by cigarette tax revenue, they do not impose direct costs on smokers, indicating reliance on the revenue stream generated by tobacco consumption.

In conclusion, substantial evidence supports the effectiveness of cigarette tax increases in reducing smoking behavior, lowering tobacco consumption, and improving health outcomes across various populations. However, the complexity and potential unintended consequences of cigarette tax increases have also been highlighted, thus emphasizing the need for careful consideration when designing and implementing such policies.

4.2. Cigarette-Excise Tax Increase on Smoking Prevalence, Smoking Behavior, and Smoking Cessation Efforts, as well as Tobacco Use Reductio

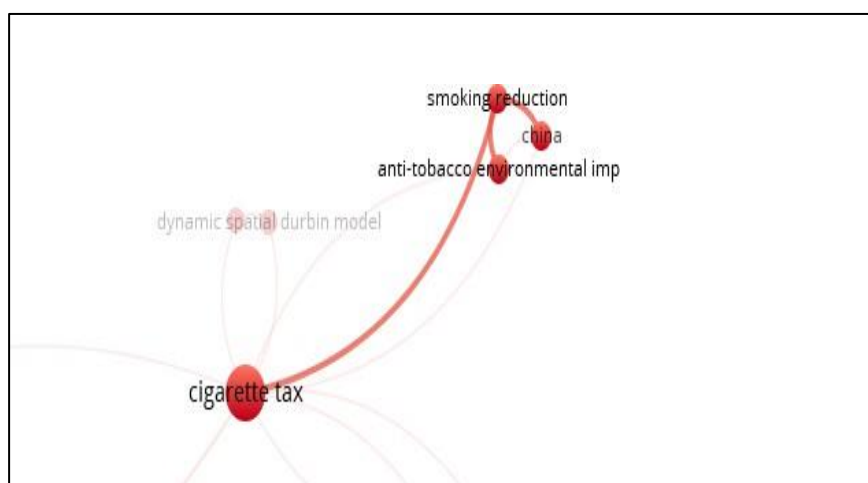


Figure 5. Smoking Reduction vs Cigarette-Excise Taxes
(Data Processed 2024)

This section focuses on the impact of cigarette tax increases on smoking prevalence, smoking behavior, quitting attempts, and overall tobacco use reduction. Cigarette tax hikes have emerged as one of the most effective tobacco control strategies in various countries (Boyle et al., 2019). By directly affecting cigarette prices and making them less affordable to consumers, tax increases ultimately reduce tobacco consumption. Several studies have revealed that higher cigarette taxes significantly decrease the smoking prevalence across different populations. Research conducted in countries such as the United States, Australia, Germany, New Zealand, and Mexico has shown that higher cigarette taxes substantially affect smoking behavior and quit attempts, contributing to public health initiatives aimed at reducing tobacco use (Boyle et al., 2019; Dunbar et al., 2021).

Higher cigarette taxes have been associated with a lower likelihood of smoking and

tobacco use, fewer smoking days per month, and greater likelihood of quitting among adults. The impact of comprehensive tobacco control policies, including tax hikes and pictorial warning labels (PWL), on quitting behavior has been studied, with findings indicating that substantial tobacco tax increases can lead to higher quit incidence across various subgroups (Kim & Khang, 2020).

The response to cigarette-excise in relation to the use of cigarettes and e-cigarettes has also been investigated, showing that tax policies significantly influence the smoking and vaping rates. This underscores the importance of considering brand dynamics and consumer behavior when designing policies that target smoking behavior (Pesko et al., 2020). Studies have consistently demonstrated that higher cigarette taxes positively affect quitting attempts. Tax increases have been linked to more successful quitting attempts and a higher likelihood of quitting among adults (Boyle et al., 2019; Kim & Khang, 2020; Dunbar et al., 2021). However, the effectiveness of taxes in reducing consumption rates among established smokers may be limited, highlighting the need for complementary intervention.

The literature has unambiguously demonstrated the effectiveness of increasing cigarette taxes to reduce overall tobacco use. Studies have examined the influence of cigarette-excise taxes on consumption, brand loyalty, and health awareness, finding that, while tax implementation may not significantly alter consumption patterns, it can positively impact brand loyalty and health awareness among populations (Hussain et al., 2023). Research also highlights the substantial health benefits resulting from higher cigarette prices achieved through tax increases, especially for individuals in the lowest-income groups (Jha et al., 2020). Estimates suggest that price hikes lead to a significant number of smokers quitting, avoiding death, and generating additional years of life, particularly benefiting low-income individuals (Wu et al., 2020).

In conclusion, this section provides substantial evidence of the effectiveness of increasing cigarette taxes in reducing smoking prevalence, altering smoking behavior, encouraging quitting attempts, and lowering overall tobacco consumption. The various studies reviewed, conducted across different countries and contexts, consistently showed a positive impact of higher cigarette taxes on smoking-related outcomes. However, the complexity of the behavioral, health, and financial dynamics involved in exercise policies is emphasized, highlighting the need for careful consideration in their design and implementation, as well as the importance of complementary interventions to optimize their impact on smoking behavior and health outcomes.

4.3. The Linkage of Cigarettes Tax with Economic Aspects

Impact of enhancing cigarette taxes on smoking behavior, cessation initiatives, tobacco consumption, and related economic consequences. This section explores the relationship between cigarette taxes and various economic aspects, including smoking behavior, quitting attempts, tobacco consumption, and related health and financial consequences. Several studies investigate the impact of cigarette tax increases on these outcomes.

Research has shown that increasing tobacco taxes significantly affects smoking behavior across different populations. The effectiveness of state cigarette-excise taxes in reducing smoking rates has been demonstrated among various demographic groups, including

teenagers, adults, pregnant women, racial and ethnic minorities, and sexual minorities (Carpenter and Sansone, 2021). However, smokers' responses to price changes can vary based on socioeconomic characteristics, with some evidence suggesting that the effectiveness of cigarette taxes in reducing smoking rates may diminish over time for certain groups such as individuals in same-sex households (Carpenter & Sansone, 2021).

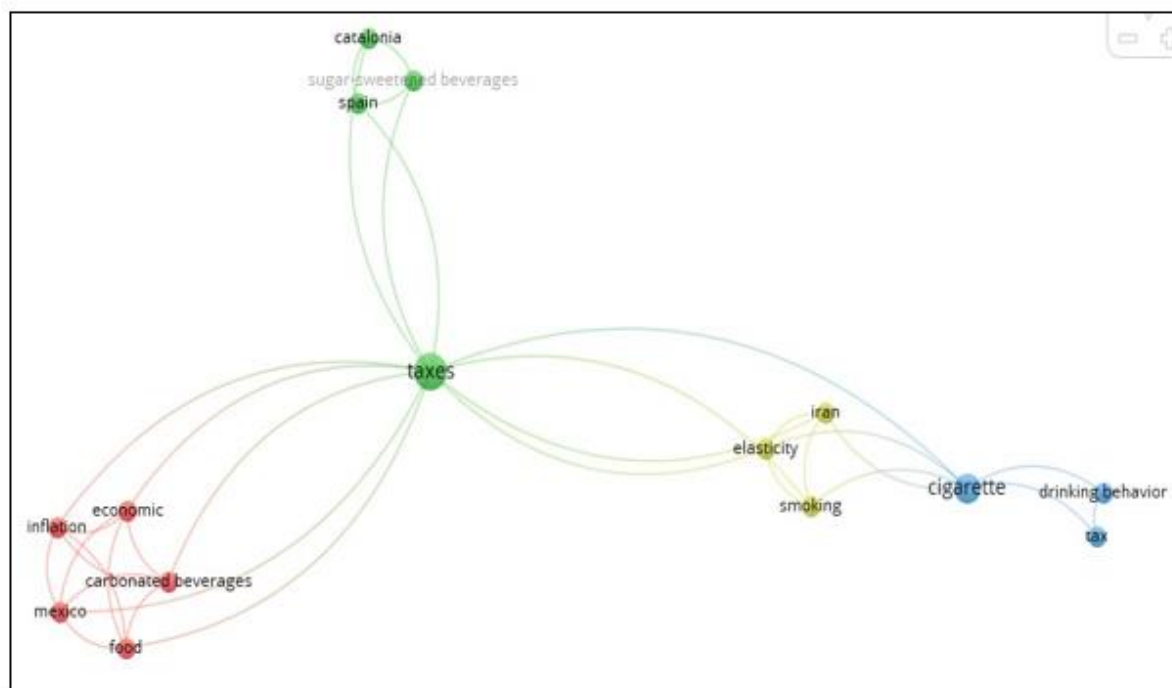


Figure 6. Cigarettes Tax Impact Keyword Network Mapping

(Data Processed 2024)

Higher tobacco taxes have also been found to have beneficial effects on attempts to quit. A behavioral economics framework was proposed to address teenage smoking behavior and identify high-risk aspects of reinforcement pathology. Recent studies have shown that the demand measures can predict moderate treatment outcomes (Cassidy et al. 2020). This framework suggests that treatment approaches should focus on recognizing and supporting sources of reinforcement for non-smoking choices.

The effectiveness of raising cigarette taxes in reducing overall tobacco use has been demonstrated. Studies have examined the price elasticity of demand for traditional cigarettes and e-cigarettes among adults in the United States, with previous research indicating that although price changes affect smoking behavior, demand remains relatively inelastic, with price elasticity estimated to range from -0.3 to -0.5 for adults (Pesko et al., 2020). The importance of economic evidence in tobacco control as a driver of public health policies has been emphasized. Previous research has laid the groundwork for this field, while recent studies have highlighted the effectiveness of substantial tax increases in curbing smoking behavior (S. Wang et al., 2019; Chaloupka, FJ, & Warner, 2000).

An increase in cigarette tax has significant economic implications for individuals,

households, and communities. Research has examined the illegal cigarette market in Latin America, highlighting the complexity of the illegal cigarette market driven by economic incentives and consumer behavior and emphasizing the challenges in implementing tobacco control policies amid entrenched illegal trade (Bate et al., 2020). Studies have also presented methodological approaches to estimate the impact of tax increases on illegal cigarette trade (ICT), focusing on year-to-year variations in the proportion of ICT between low- and high-priced cigarettes and considering the main reasons behind smokers' brand choices (Gallego et al., 2020).

Although some studies indicate potential unintended consequences of cigarette tax increases, such as increased illegal cigarette trade and reduced tax effectiveness over time, most evidence supports cigarette tax hikes as an effective policy intervention to reduce tobacco consumption and improve public health. Nonetheless, the complex behavioral, health, and economic dynamics involved in designing and implementing cigarette tax policies must be carefully considered, with tailored approaches needed to address the varying responsiveness among population subgroups and complementary measures to enhance policy effectiveness (Oshio & Nakamura, 2022).

Further research is needed to better understand the factors influencing responsiveness to tax changes among different groups, and to explore additional strategies to mitigate the negative impacts of cigarette tax increases. Moreover, studying the decision-making processes behind cigarette tax policies and the potential effects of tax increases on cigarette demand and brand preferences can provide valuable insights for future tobacco control efforts (Oshio & Nakamura, 2022; Wang et al., 2021).

In summary, this review strongly supports the idea that increasing cigarette taxes plays a crucial role in a comprehensive tobacco control plan. By designing and implementing effective tobacco tax policies, policymakers can make significant strides toward reducing the health and economic consequences of tobacco use and promoting healthier communities.

4.4. The Relationship of Cigarette Tax with Health Aspects

The implementation of increased cigarette-excise taxes has proven to be a highly effective and widely adopted tobacco control strategy in numerous countries. By raising the taxes on cigarettes, these products become less accessible to consumers, leading to a decrease in tobacco consumption.

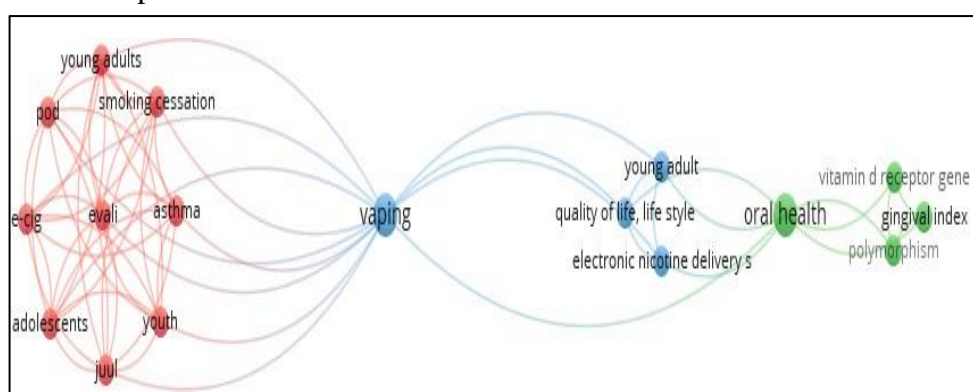


Figure 7. Cigarette health impact keyword network mapping
(Data Processed 2024)

This literature review synthesizes findings from various studies to explore the implications of increasing cigarette-excise taxes on public health. Ghassempour et al. (2022) investigated the effects of Reduced Fire Risk (RFR) cigarette regulations in New South Wales, Australia and found no substantial changes in fire rates or related health outcomes. Álvarez et al. (2020) highlighted the significant role of cigarette taxation in shaping health policies, emphasizing its impact on healthcare management and national budgets. Additionally, the WHO's strategies for minimizing alcohol consumption offer insights into the benefits of taxing harmful products, such as tobacco and alcohol. Tripathy and Verma (2022) examined the effectiveness of pictorial health warnings (PHWs) on cigarette packs in India, revealing their potential to motivate smokers to quit. Vargas-Claudio et al. (2023) stressed the importance of documenting e-cigarette use in medical records due to potential health risks. Despite these findings, challenges remain, such as the persistence of smoking-related fires and varying effectiveness of PHWs across countries. Nonetheless, implementing higher cigarette-excise taxes as part of comprehensive tobacco control strategies can significantly reduce the health burden of tobacco use while promoting healthier communities, as confirmed by Wu et al. (2020) in their study on impoverished populations in India. Overall, raising cigarette taxes can benefit both the economy and public health by reducing smoking-related harm and poverty by avoiding catastrophic health expenditure.

4.5. Important Economic Aspects Related to Smoking Habits

Considering the relationship between economic factors and the keyword "Cigarette Economic & Tobacco Economic," a comprehensive network will be depicted.

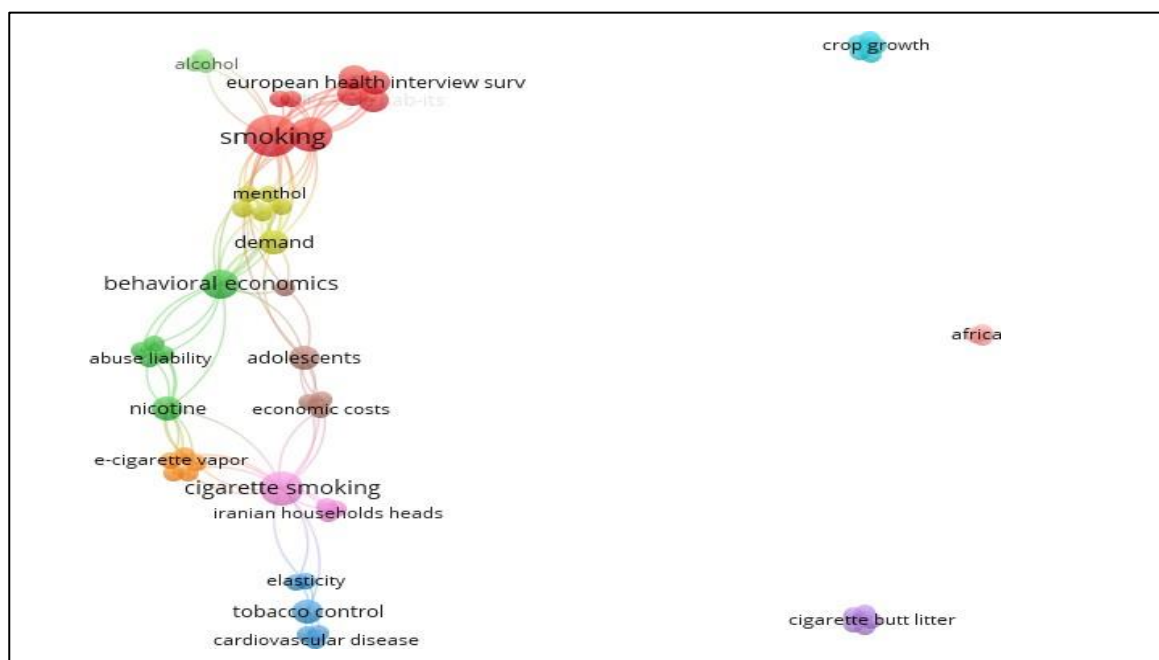


Figure 8. Keyword Network "Cigarette Economic & Tobacco Economic
(Data Processed 2024)

The discussion encompasses various economic dimensions of smoking habits as derived from an extensive literature review. Bate, Kallen, and Mathur (2020) delve into the complexities of

the illicit cigarette market, particularly examining the role of gang networks in Paraguay. This study underscores the challenges in implementing tobacco control policies amidst illicit trade, highlighting the disparities between the availability and actual consumption of illegal cigarettes. Carpenter and Sansone (2021) explore the efficacy of cigarette taxation in reducing smoking prevalence, revealing a robust correlation between higher taxes and decreased smoking rates across diverse demographic segments. However, recent studies suggest a potential decline in tax effectiveness over time, possibly due to narrowed income disparities and increased mental health issues among smokers. Oshio and Nakamura (2022) emphasized the importance of considering policy endogeneity and the decision-making processes behind cigarette tax policies. They advocate for a comprehensive understanding to sustainably formulate effective tobacco control strategies. Furthermore, they stressed the necessity of ongoing research to overcome the challenges posed by limited data and the intricate dynamics of the cigarette market, thereby facilitating the development of policies that promote public health and economic well-being.

4.6. Impact of Tobacco Tax Policy on Economic Growth

Looking at the relationship between *tobacco taxation on the economic growth*, the following network will map the keyword "*tobacco taxation on the economic growth*"

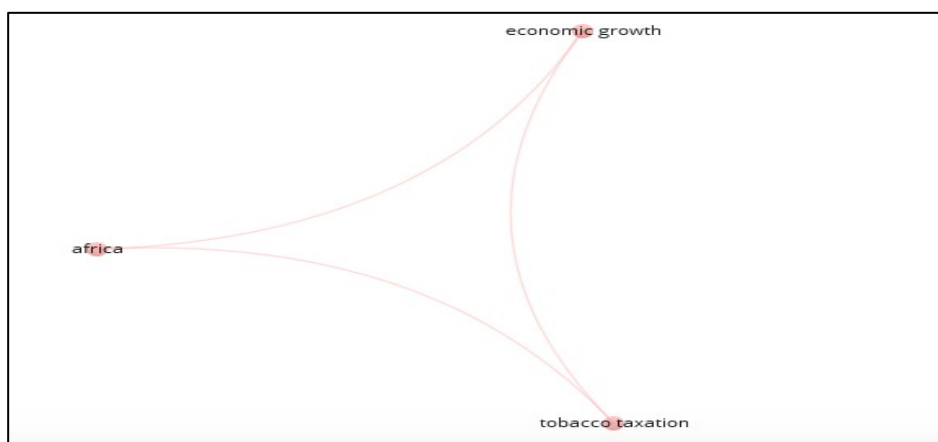


Figure 9. Economic Growth vs Tobacco Taxation
(Data Processed 2024)

The use of tobacco taxation as a policy instrument to control cigarette consumption is common practice among governments. Nevertheless, the influence of this policy on economic growth remains debatable. This literature review investigates the connection between tobacco taxation and economic growth by examining several relevant studies.

This study examined the impact of tobacco taxation on economic growth across 38 African countries between 2008 and 2018. The study employed the generalized method of moments using regression (GMM), and the results indicated that tobacco taxation has a positive effect on economic growth in both the short and long term, mainly due to its favorable influence on population health (Immurana, Boachie, Dalaba, et al. 2021).

The study recommends that African governments increase tobacco taxes, as these policies not only decrease cigarette consumption but also stimulate economic growth by reallocating consumer savings towards productive sectors. Despite concerns regarding job losses and regressive taxation, this study highlights the overall benefits of tobacco taxation for public health and economic development.

Martín Álvarez and his colleagues (2020) explored the connection between economic growth, recession, and cigarette consumption in Spain from 1957 to 2016. Using a nonlinear autoregressive distributed lag model, researchers have discovered that cigarette consumption exhibits an asymmetric response to economic shocks. During periods of economic expansion, cigarette consumption increased but decreased significantly during recessions.

Additionally, the study confirmed the anticipated behavior of price elasticity, in which higher cigarette prices led to a decrease in smoking. These findings emphasize the importance of considering economic factors when formulating tobacco control policies, especially during economic downturns.

According to Pei et al. (2023), some countries in the WHO Southeast Asia Region (SEAR) have attempted to raise the price of tobacco products, but their tobacco control policies have not kept pace with rapid economic growth in the region. Therefore, it is crucial to raise taxes on tobacco products and sufficiently increase their prices to offset the effects of revenue growth and effectively reduce the affordability and consumption of tobacco products. Being cognizant of the significant economic impact of tobacco use is essential for implementing effective tobacco control measures.

According to the literature review, several key findings relate to the relationship between tobacco taxation and economic growth. First, tobacco taxation has the potential to increase economic growth, primarily through its positive impact on population health. Therefore, governments are encouraged to increase tobacco taxes, as this policy not only reduces cigarette consumption but also redirects consumer savings towards other productive sectors. Second, there is an asymmetric relationship between cigarette consumption and economic shocks, where consumption tends to increase during economic expansions and decrease significantly during recessions. Therefore, economic factors should be considered when developing tobacco control policies, particularly during economic downturns. Finally, some Southeast Asian countries have not implemented tobacco control policies commensurate with rapid economic growth. To effectively reduce the affordability and consumption of tobacco products, it is crucial to raise taxes on tobacco products and sufficiently increase their prices to offset the effects of revenue growth.

Although research has indicated the significance of examining the relationship between tobacco taxation and economic growth, additional studies are necessary to assess this association comprehensively. To make informed decisions, policymakers must consider various factors including job loss, tax regressivity, and the growth of the illegal cigarette market. By gaining a deeper understanding of these intricacies, policymakers can develop sustainable tobacco control strategies to promote public health and economic development.

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5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

Based on the results of this study,

1. Raising cigarette-excise duties has been shown to be a successful strategy for lowering cigarette consumption and smoking prevalence, ultimately resulting in improved public health. In addition to its positive impact on public health, increasing cigarette taxes can also provide economic benefits such as reducing substantial healthcare expenditures and poverty, particularly for low-income households. Higher cigarette taxes can encourage economic growth by enhancing population health and by redirecting consumer savings to other economic sectors. Nonetheless, illegal cigarette trade, driven by economic incentives and consumer behavior, presents a challenge in implementing effective tobacco control policies.
2. The responsiveness of tobacco product demand to price changes varies among demographic groups, with individuals from lower socioeconomic backgrounds exhibiting greater price elasticity. The role of economic evidence in shaping tobacco control policies is crucial; however, tax noncompliance and difficulties in accurately measuring tobacco consumption pose significant challenges. Therefore, it is essential to consider both economic and behavioral factors in designing and implementing effective tobacco control policies and to address the challenges related to illegal cigarette trade and accurate tobacco consumption measurements to ensure the success of such interventions.

5.2. Recommendation

Based on the conclusion of this study,

1. Governments must consider increasing taxes and cigarette-excise duties on cigarettes as part of a comprehensive tobacco control plan given the potential advantages for public health and economic growth.
2. To enhance effectiveness and fairness, tobacco control strategies must be devised with due consideration given to the differential responsiveness to price changes among various demographic groups.
3. Revenues generated from increased cigarette taxes must be strategically allocated to finance public health programs, education, and tobacco control initiatives that align with the public health goals.
4. Complementary measures, such as stricter regulations on smoking in public places, prevention of cigarette access for minors, and support for smoking cessation, should be implemented to optimize the impact of cigarette tax policies.
5. Law enforcement efforts and international cooperation should be intensified to address illegal cigarette trade and minimize tax revenue losses and the negative impacts on public health.
6. Further research is necessary to explore the complex relationships among cigarette

taxation policies, smoking behavior, health outcomes, and economic factors as well as to develop more robust methodologies for measuring tobacco consumption and evaluating policy impacts.

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CHAPTER 2

Evaluation of Vibration Prediction Software to Estimate and Evaluate Harmonic Vibration in Drilling Operations in Australia's Western Territory

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ABSTRACT

In the oil and gas industry, numerous challenges are encountered and experienced during drilling operations, with vibration in the bottomhole assembly (BHA) being a common and major concern. Extensive vibration can damage drilling tools, reduce efficiency, and increase operational costs. Overcoming these challenges has become fundamental, particularly with advancements in information and digital technology. These technological advancements have positively impacted drilling operations, aligning with the primary objective of improving efficiency overall. Technological advancement in the oil and gas industry is the usage of software to predict and analyze potential harmonic or natural vibrations including torsional, axial, and lateral vibrations, which may occur during drilling operations. By using data from drilling operations, such as BHA design, well trajectory, geological formation, well profile, and drilling parameters in historical wells, this software provides a 'Critical Speed Analysis.' This analysis offers recommendations on string rotation speed, reducing the potential for excessive vibration that could damage drilling tools. This paper will discuss whether software implementation can improve drilling efficiency by reducing the risk of tool damage and non-productive time (NPT). The case study will evaluate the software's accuracy in predicting vibrations, thereby assisting operators in their drilling activities, particularly in the planning of BHA design and the selection of drilling parameters.

Keywords: Vibration, bottomhole assembly, Software, Oil and gas, Vibration prediction, Operation efficiency, Critical speed analysis.

1. INTRODUCTION

Downhole vibration is a common and recurring issue in the dynamic and demanding oil and gas drilling industry and can have a big effect on the productivity and safety of drilling operations. Numerous problems, including equipment failure, a decrease in the rate of penetration (ROP), and an increase in the non-productive time (NPT), are caused by these vibrations, which include axial (bit bounce), lateral (whirl), and torsional (stick-slip) motions. As a result, controlling and predicting these vibrations is essential to maximizing drilling efficiency and cutting expenses.

As mentioned, there are three downhole vibrations associated with drilling operations:

Axial Vibration

Vibration is a longitudinal oscillation of the drillstring, also known as bit bounce ([Bailey and Finnie, 1960](#)). Axial vibration is typically affected by factors such as rotational speed, weight on bit, and bit design (commonly occurs when using a roller cone bit). This may lead to premature damage to the bit.

Lateral Vibration

This vibration occurs perpendicular to the string axis and causes side-to-side movement. This movement causes the string to hit the borehole wall, affecting the drillstring and electronic components in the string. As a result, it can damage the measurement while drilling (MWD) tool, potentially causing it to stop functioning and resulting in pulling out of the hole (POOH).

Torsional Vibration

Torsional vibrations are rotational oscillations that occur around the axis of the drillstring. These vibrations are also commonly referred to as ‘stick-slip,’ where the drillstring rotational speed alternates to ‘stop-rotate’ manners, thus the term ‘stick-slip.’ Torsional vibrations can significantly impact drilling efficiency. They can lead to severe damage to the drill bit and BHA components (which can lead to twist-off), reducing ROP and causing operation delays.

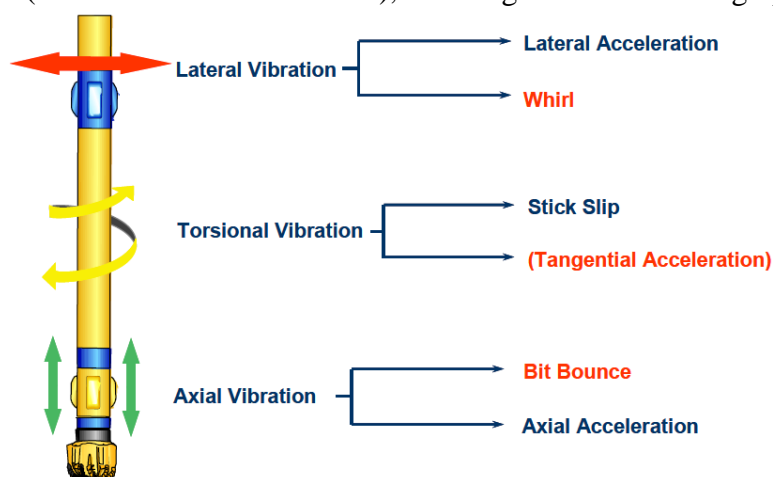


Figure 1. Three common modes of downhole vibration (Sheng Zhan, 2010).

Advancements in technology have led to the development of sophisticated and complex downhole vibration prediction software. These tools gather data from a variety of sources,

including real-time drilling data (commonly in American Standard Code for Information Interchange [ASCII]), material properties of the drillstring, geological information, well profile, BHA design, as well as common parameters used in that particular field to simulate and analyze the dynamic behavior of the drillstring during drilling operations. By accurately predicting the occurrence and nature of downhole vibrations, these software tools allow drilling engineers to make decisions, optimize drilling parameters, and optimize the design of BHAs.

The application of downhole vibration prediction software has improved the approach to monitoring the overall operation. These tools not only improve and anticipate potential vibration-related issues but also provide knowledge to mitigate the effect, resulting in drilling operations being conducted more smoothly, safely, and cost-effectively.

Impact of Dynamic Downhole Vibration During Drilling Operation

Drilling dynamics refers to the drillstring's response to drilling forces and physical conditions during a drilling operation. It involves various factors such as drilling parameters, well profile (well design), BHA configuration (including bit selection), and formation/lithology. The interaction between all these factors, along with drilling fluid, generates an undamped natural frequency, and depending on each vibration mode, it can lead to several impacts. Severe vibrations have been shown to have a significant impact and are harmful to downhole tools. For example, lateral vibration (backward whirl in particular) is common with excessive bit wear (backside of bit's blade) and MWD tool failure. The axial vibration generally can be observed on the bit, damaging the cone area. Also, the torsional vibration will have a significant impact on excessive wear on the threads, which leads to fatigue and twists-off if not mitigated immediately.



Figure 2. Broken teeth due to axial vibration.



Figure 3. Broken blade on Polycrystalline Diamond Compact (PDC) bit due to backward whirl



Figure 4. Twist off in 3½-in. drill pipe

Vibration Prediction Software Validation

The calculation of axial, lateral, and torsional vibration generally includes a combination of analytical models such as drilling parameters, BHA design, well profile (including trajectory data), and formation/lithology. However, VibraScope™ does not involve formation or lithological data. A structural dynamic system oscillates freely at a set frequency after a step input is applied, provided there is no additional input that will drive the system (Feauto et al., 2013).

Table 1. Factors that may lead to downhole vibration
(Rivas et al., 2021)

Factor	Description
Hole size /Tool size ratio	High ratios will produce more vibration
Bit Selection	PDC with a large cutter size featuring fewer blades, a low cutter number, and low backrake angles will generate higher potential
BHA Design	Including tool size, for example, stabilizer blade size (Max OD, including tool ID), straight blade stabilizers, high-torque and low RPM downhole motors, and small-size drill collars

Friction Factor	A higher friction factor will likely produce more vibration, stick-slip in particular
Hole Condition	Ledges, washed out, poor hole cleaning
Formation	Particularly in hard or abrasive, interbedded formation

Resonance in drilling operations occurs when the rotary speed aligns closely with one of the natural frequencies of the drillstring's vibration modes, including axial, lateral, and torsional vibrations, as well as flexural vibration due to the weight on bit (WOB). When the frequency of any external excitation matches one of these natural frequencies, the drillstring enters a state of resonance, leading to significantly increased vibration levels. These high amplitudes can accelerate the fatigue of the drillstring and the BHA, potentially causing premature failure and reducing overall drilling efficiency.

As described in **Table 1**, critical speed analysis depends on:

- BHA Design
 - Max Outer Diameter (OD)
 - Inside Diameter (ID)
 - Length
 - Material
 - Type
- Drilling Parameters (estimate or frequently use WOB, RPM within the region/field)
- Well Trajectory (well profile)
- Mud Weight

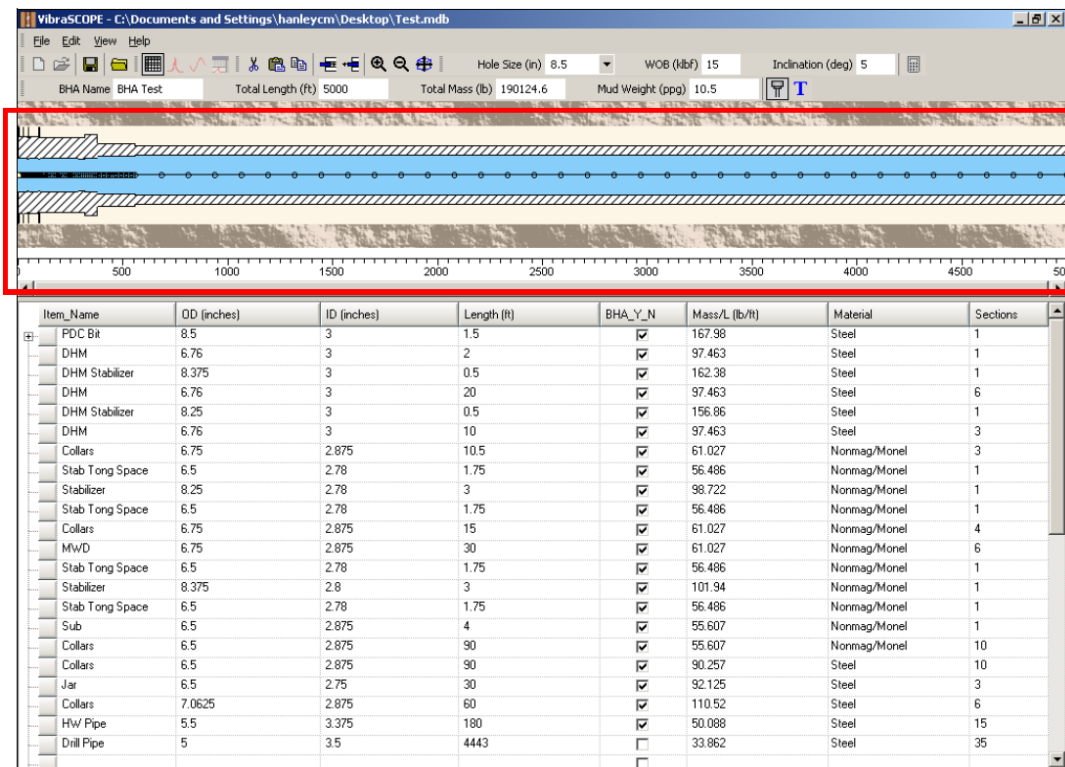


Figure 5. Example of BHA design input in VibraSCOPE

The upper section of the screen displays a graphical representation of the BHA and drillstring system. A scale runs along the bottom of the BHA, marked with a red outline, indicating the relative positions of the various tools along the drillstring. It's crucial to accurately input data for each column, such as hole size, WOB, OD, ID, length, mass, and material properties. Some components may auto-fill, but they must be double-checked for accuracy.

VibraScope software uses built-in calculation values for each tool component based on the provided inputs. Therefore, the engineer must ensure that all component values are entered correctly to achieve accurate output results. This correct input process is essential because any inaccuracies can affect the vibration analysis and overall drilling performance predictions. Properly configuring these parameters helps in optimizing the BHA design and operational parameters, thereby enhancing drilling efficiency and minimizing vibration-related issues.

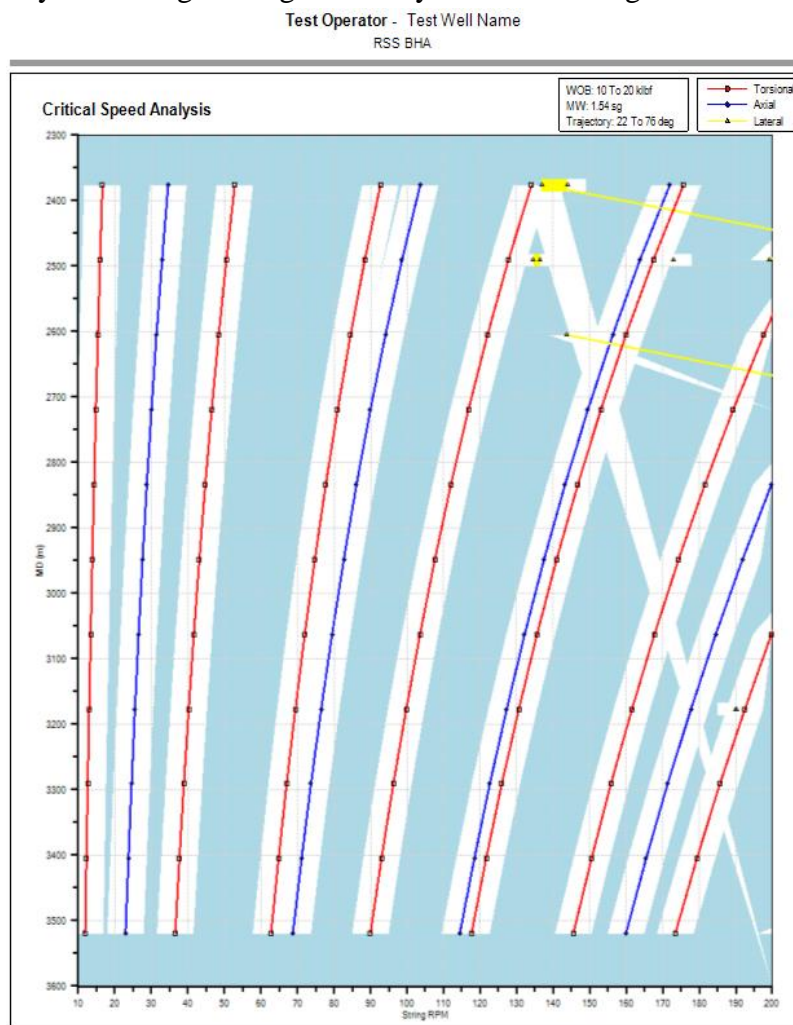


Figure 6. Critical speed analysis

Critical speed analysis, as illustrated in **Figure 6**, highlights potential downhole vibrations with respect to depth in correspondence to torsional, axial, and lateral vibrations, each represented by different line colors or areas. The analysis provides a visual representation of where these vibrations are likely to occur along the drillstring. By interpreting the results, operators can strategically adjust their drilling parameters to avoid

operating at speeds that correspond to these RPMs at certain depths and implement mitigation if deemed necessary. This proactive approach helps minimize the risk of resonant vibrations, thereby enhancing the efficiency and safety of the drilling operation.

The output generated during the pre-job planning process is submitted to the client, allowing the driller to create a detailed drilling roadmap in advance. This preemptive plan can later be validated against actual drilling parameters to ensure its accuracy. For further validation, we consolidate data from downhole vibration sensors, typically obtained from MWD tools. This comprehensive approach ensures that the planned parameters align with real-time drilling conditions, enabling more precise and efficient drilling operations. Integrating pre-job planning with real-time data helps in optimizing the drilling process and mitigating potential vibration issues, ultimately enhancing overall performance and safety.

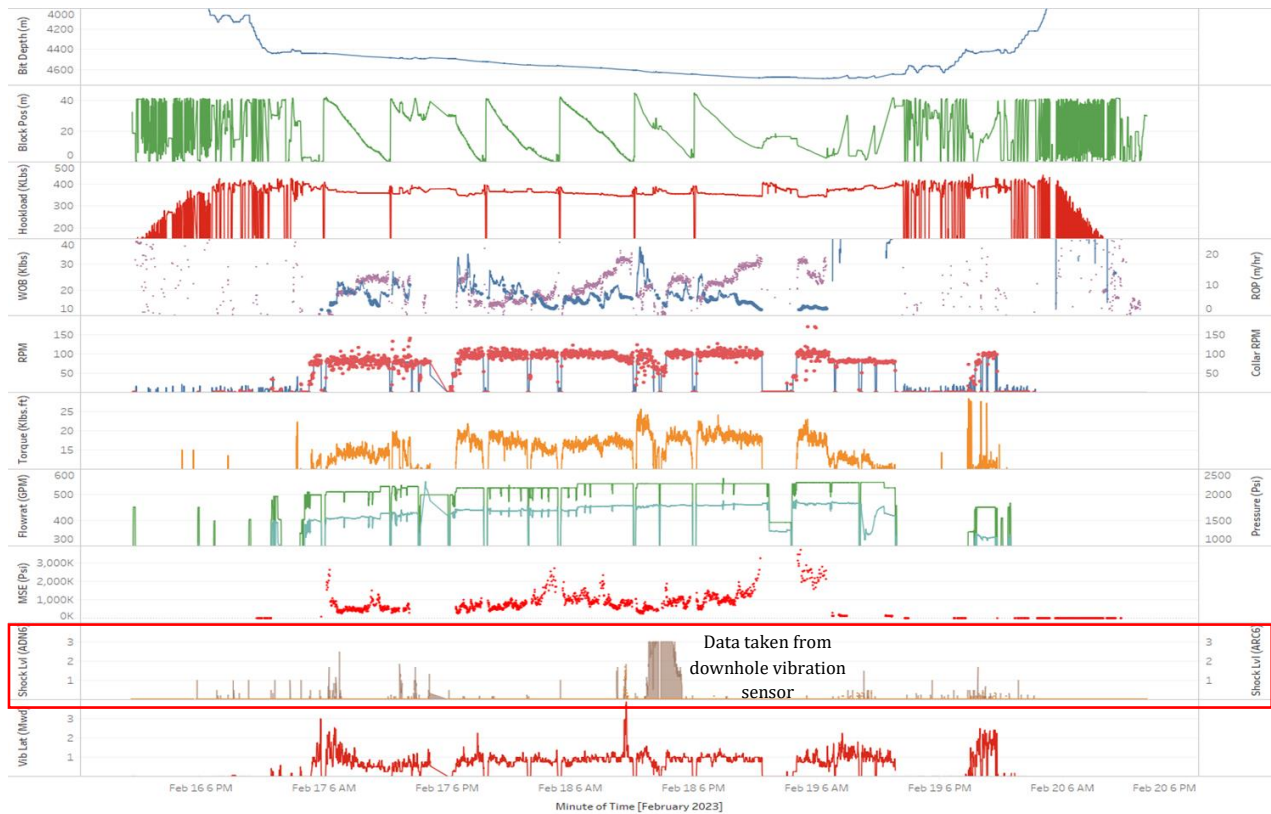
Field Test – Well X

The 9-in. hole section under observation was located in the western territory of Australia, specifically in a sidetrack well. During the run-in-hole (RIH) process, at an estimated depth of 4,420 m measured depth (MD), the top drive system (TDS) stalled. While attempting to adjust the parameters, the jars fired accidentally at an inclination of 75 degrees.

Continuing the RIH, drilling commenced at 4,440 m MD. During this phase, several instances of stick-slip and severe BHA whirl were observed, particularly while drilling through softer formations. This resulted in a significant decrease in bit performance. Upon POOH, the bit was found to have severe broken blades, although the remaining cutters in the cone area were still in good condition. Additionally, another TDS stall occurred while checking the sidetrack hole, causing another accidental jar firing.

Table 2. First run on 9-in. hole section Well X

Start Depth (m)	4,440	Bit Hours	37.8
End Depth (m)	4,685	On Bottom ROP (m/hr)	6.5
Interval (m)	245	Inclination In (degrees)	75
Well Profile	Build to horizontal	Inclination Out (degrees)	89.6



At 4,500 m MD, stick-slip was encountered. To address this, the BHA was picked off bottom and increased the RPM to mitigate the stick-slip. While maintaining a steady weight on bit (WOB), torque increased, likely due to a change in formation. The differential pressure was recorded at 100 psi. Despite increasing the RPM to 100, the ROP decreased with a lower WOB. Increasing the WOB to improve ROP proved ineffective, as the ROP remained less than 10 m/hr. Interestingly, the torque trend showed a decrease; even with increased WOB, the torque remained steady without a significant rise.

Prior to entering a softer formation at 4,599 m MD, the MWD tool detected a spike in lateral vibration. Within this interval, the ROP jumped significantly. Unfortunately, this period also saw an increase in torque. The WOB was reduced, and severe shock levels were detected on the logging while drilling (LWD) tool. Adjustments were made to the RPM to mitigate this issue. Once the severe shock levels were under control, drilling resumed, but the ROP decreased significantly. Increasing the WOB to achieve a higher ROP did not yield the desired results, and the Mechanical Specific Energy (MSE) started to increase as well.

The BHA was lifted off bottom to clear any potential stuck cuttings or release trapped torque, but the ROP remained low, at around 2-3 m/hr. A decision was made to POOH to inspect the BHA, as the steering on the rotary steerable system (RSS) was not functioning as expected. The hole was circulated for cleaning prior to POOH to the surface. During POOH and an attempt to re-enter the sidetrack without pumping or rotation, another accidental jar firing occurred.

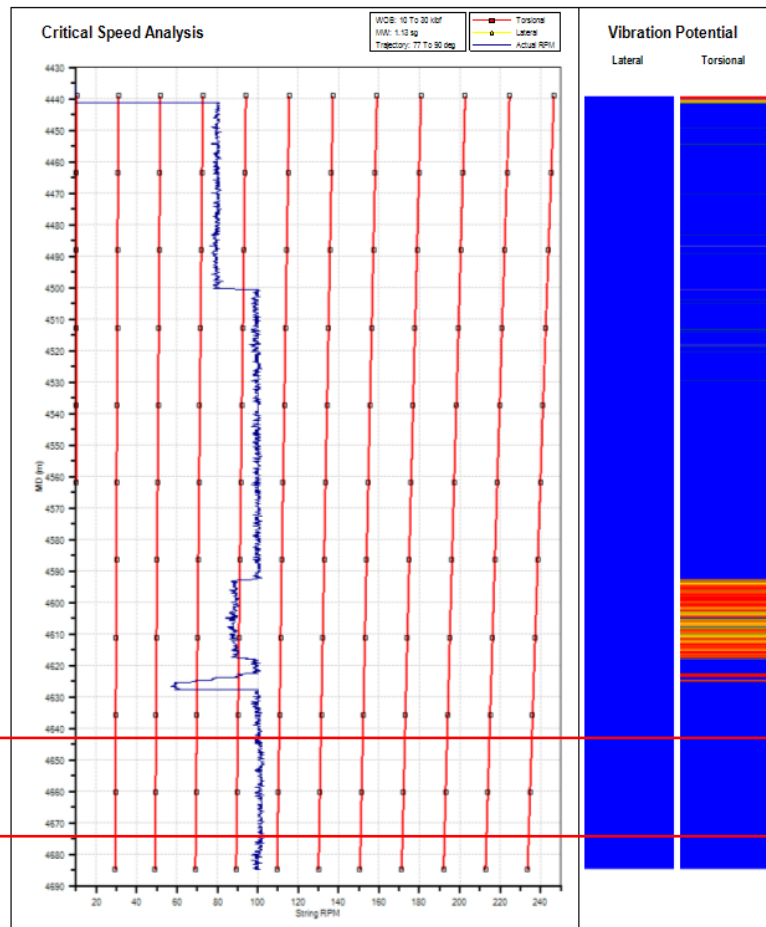


Figure 7. Critical speed analysis output with actual downhole RPM

As illustrated in Figure 7, the actual RPM intersected the torsional line, indicating potential torsional vibration. The dark orange areas highlight zones where the vibration could be severe. Without proper mitigation, this could lead to fatigue, as discussed in the previous section. To address this, the operator effectively mitigated the issue by adjusting the RPM, thereby reducing torsional vibration (stick-slip). This mitigation was crucial in preventing potential damage to drilling equipment.

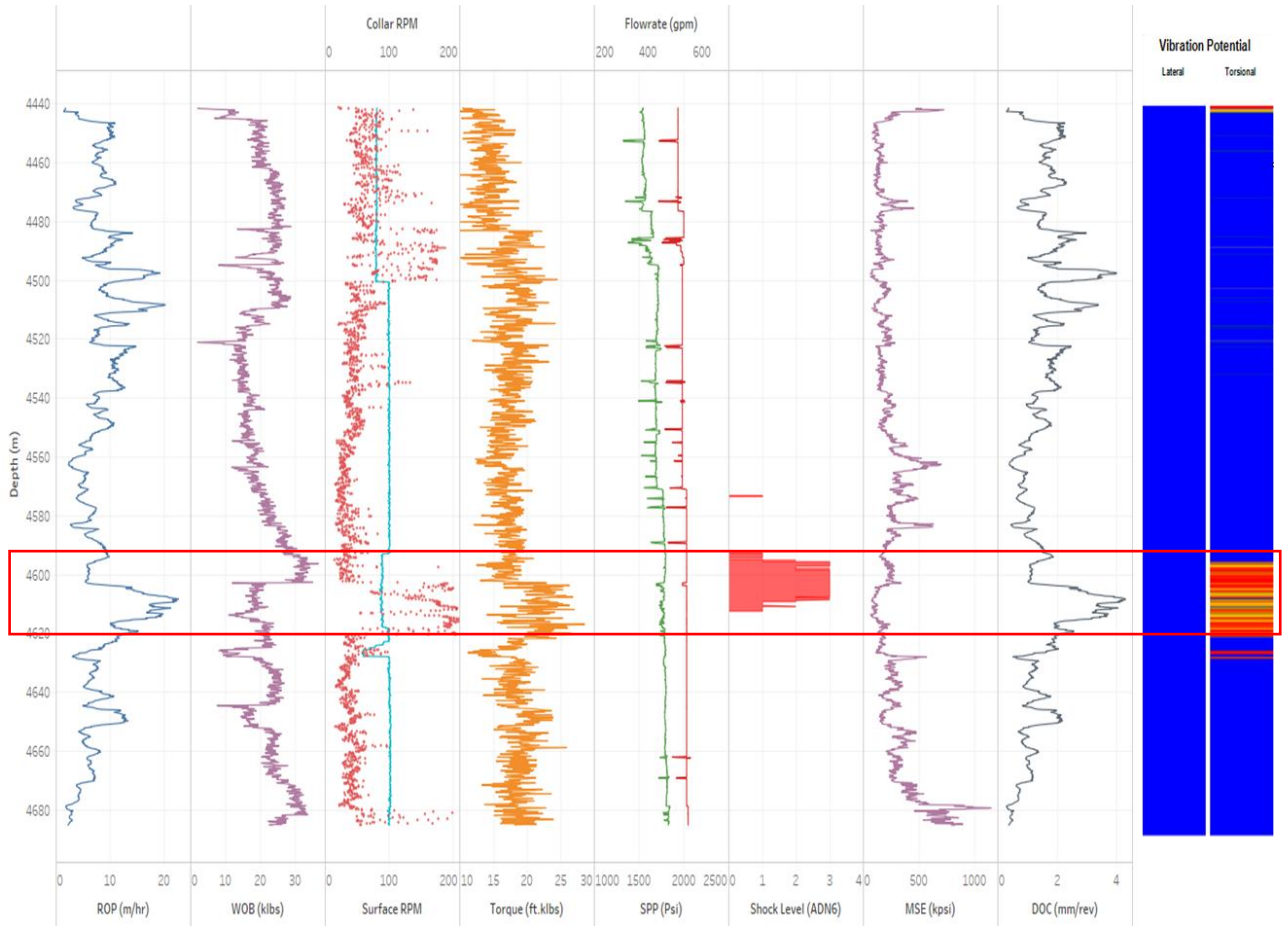


Figure 8. Drilling parameters with downhole vibration sensor in conjunction with VibraScope critical speed analysis

At an estimated 4,600 m MD, severe shock was observed on the LWD tool. It was suspected that bit whirl had propagated into BHA whirl, which the LWD tool then detected. To mitigate the shock, a variety of RPM adjustments were made. These adjustments resulted in an increased ROP to more than 20 m/hr with a lower WOB, indicating the presence of a softer formation, as also noted by the directional driller in the slide sheet.

At approximately 4,650 m MD, the ROP began to decrease despite an increase in WOB. Additionally, we noticed that as the WOB increased, the torque remained steady, suggesting that the cutters were no longer properly engaging the formation. Simultaneously, the MSE started to rise, indicating inefficient energy transfer.

As the ROP continued to decline and the MSE increased sharply, we observed erratic behavior in the drill collar, further indicating operational inefficiencies and potential equipment issues. The accuracy of VibraScope was validated in correspondence with downhole vibration sensor data, confirming the presence of the anticipated downhole vibrations and the issues with energy transfer efficiency.

Field Test 2 – Well Y

The 8½-in. bit was selected to drill the remaining section of the well, using an RSS. This operation followed a previous run that had been pulled out of the hole (POOH) to change the Bottom Hole Assembly (BHA). During the drilling process, several instances of torsional vibration were encountered. The client noted that the formation was harder than they had initially anticipated, contributing to these vibrations. Ultimately, the bit was pulled out due to a low penetration rate.

Table 3. First run on 8½-in. Hole section Well Y.

Start Depth (m)	5,520	Bit Hours	N/A
End Depth (m)	5,620	On Bottom ROP (m/hr)	N/A
Interval (m)	100	Inclination In (degrees)	42
Well Profile	Tangent	Inclination Out (degrees)	40

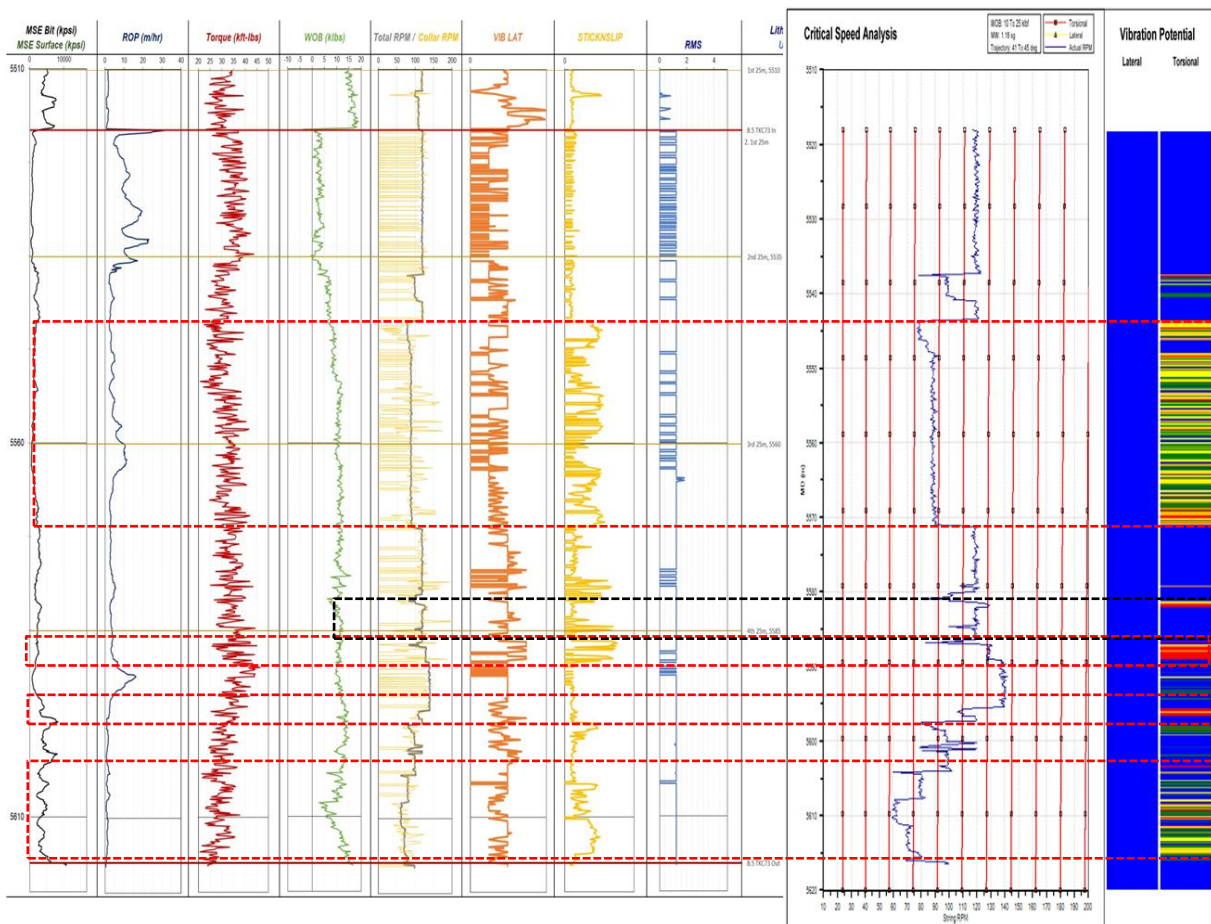


Figure 9. Drilling parameters with downhole vibration sensor in conjunction with VibraScope critical speed analysis

The VibraScope modeling accurately predicted all severe stick-slip experienced during this run, which persisted throughout most of the operation. This demonstrates that the

ReedHycalog software is highly precise, indicating that the vibration issues were avoidable. Consequently, future runs will show significant improvements in ROP, stability, and durability if BHA harmonics are managed and surface parameters are better controlled.

When aligning the modeled tendencies for torsional vibration with the stick-slip sensor readings, only one instance (indicated by a black box) shows a discrepancy between stick-slip readings and string/collar RPM relationships not predicted by the model. The intensity/risk color bars from the VibraScope model also align with the model's predictions. Given the high risk of BHA-induced stick-slip in this application, it is crucial that downhole modeling is prepared and provided to the operator. Additionally, the drilling service provider should be aware of such modeling and the RPMs to avoid at specific depths. This approach ensures longer, faster runs with lower levels of MSE, resulting in better return on investment (ROI) and improved bottom hole quality.

Field Test 3 – Well Z

Table 4. Run on 12¼-in. hole section Well Z

Start Depth (m)	1,960	Bit Hours	20.12
End Depth (m)	2,280	On Bottom ROP (m/hr)	15.9
Interval (m)	320	Inclination In (degrees)	63.17
Well Profile	Build and tangent	Inclination Out (degrees)	84.5

A 12¼-in. 6-blade with 16-mm bit was used to drill a sidetrack from the 12¼-in. section of Well Z off a cement plug in open hole and drilled the Well Z ST1 sidetrack until the casing point. The BHA included an RSS and LWD tool with a geosteering system. The 6-blade, 16-mm bit featured an alternating dual-row design with a shaped cutter as primary on all blades and chisel shaped cutters in the secondary element positions behind them.

The bit drilled through the Investigator, Upper Fan, and Middle Fan sands. Drilling proceeded smoothly throughout the run with minimal stick-slip and low lateral vibrations. In the soft formations, parameters were kept light, with WOB mostly under 10 Klbs and RPM maintained between 90 and 140. The average ROP on the bottom was 15.9 m/hr, including the controlled and time drilling performed during the sidetrack.

Both the directional and geosteering objectives were successfully achieved. Upon inspection at the surface, the bit was in good condition with minimal damage, exhibiting only mild abrasive wear on the shoulder and nose.

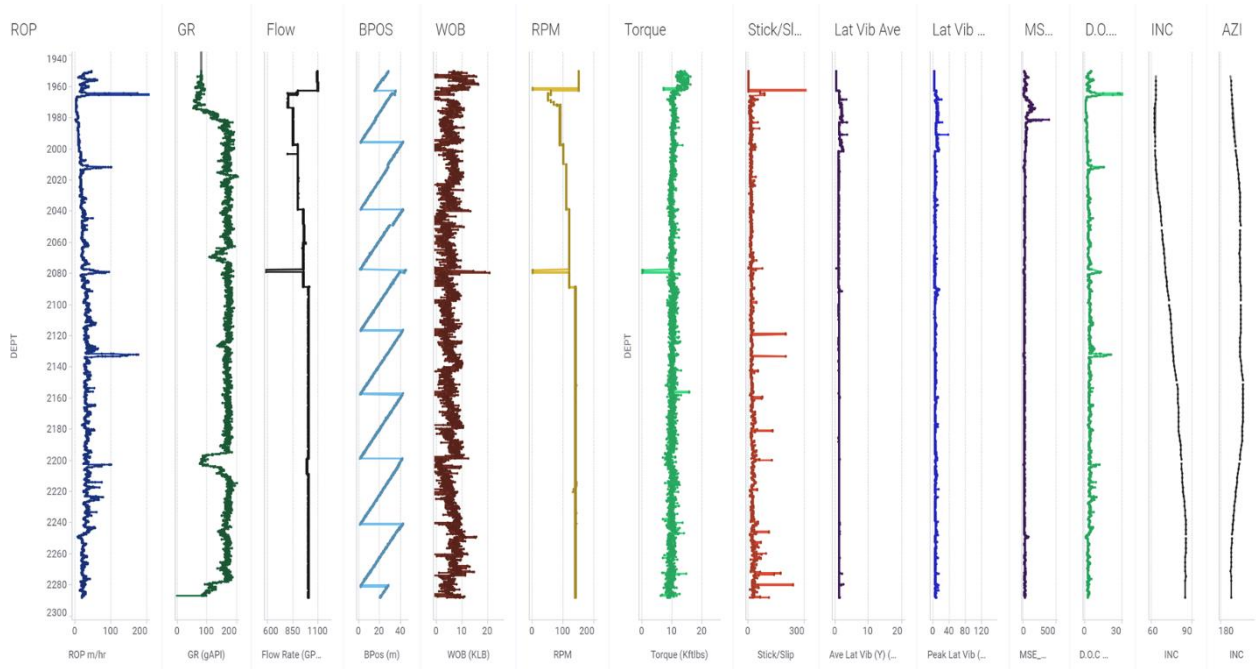


Figure 10. Drilling parameters with downhole vibration sensor in Well Z

In this sidetrack well, cement was dressed using low WOB and RPM. As drilling progressed, the ROP was controlled while kicking off from the cement plug, fine-tuning the RSS tool face. Torque remained steady. The ROP increased with the official sidetrack point being reached.

Low to medium lateral vibrations were observed while drilling with light WOB and RPM. Shock peaks mostly remained within the low range, which corresponded to lateral harmonics predicted by the VibraScope software. Then RPM increased, and the ROP responded positively to this increase: at 100 RPM, ROP was around 10-15 m/hr; at 110 RPM, it ranged from 15 to 25 m/hr; at 120 RPM, it further increased to 20-35 m/hr; and from 2,088 m onward, 140 RPM was used with ROP typically between 25 and 40 m/hr.

After achieving the sidetrack, WOB was maintained at 5-10 Klbs for most of the run. Between 2,078 and 2,080 m, there was a false spike in ROP, accompanied by a block position adjustment, likely due to re-logging off bottom as RPM and torque were at 0 and gallons per minute (GPM) dropped below 600. Torque was generally smooth, and stick-slip indicators remained in the low range, typically below 100 as per directional company limits.

From 2,123 to 2,134 m, a drop in WOB to 3 Klbs at 140 RPM and 1000 GPM was observed, resulting in an increase in ROP up to 60 m/hr, corresponding with a drop in gamma ray through a sandier bed (2,123-2,127 m). The drill break reached up to 175 m/hr when WOB was increased to 9 Klbs, with depth of cut up to 20 mm/rev, while torque remained around 11-12 kft-lbs. Between 2,197 and 2,204 m, the formation seemed softer, characterized by a drop in gamma ray log. ROP initially was at 30 m/hr, but it spiked to 96 m/hr after increasing WOB to 10 Klbs.

From 2,204 to 2,247 m, ROP ranged from 30 to 74 m/hr while drilling through a relatively soft interval with 5-7 Klbs WOB and 140 RPM. The depth of cut increased significantly to 11.5 mm/rev, up from 3 to 5 mm/rev. At 2,247-2,250 m, the formation became

firmer, requiring an increase in WOB to 15 Klbs and torque to 14 kft-lbs. From 2,250 to 2,277 m, ROP decreased to 20-35 m/hr with similar parameters of 140 RPM and 10 Klbs WOB.

Between 2,277 and 2,288 m, the gamma ray dropped off as the formation became sandier and softer, requiring a WOB of 5 Klbs to maintain a 20-35 m/hr ROP. Torque remained at 10-11 kft-lbs with 140 RPM. After 2,001 m, low lateral vibrations were observed throughout the run, with an average lateral vibration of less than 2G in the low range per Sperry limits. Lateral shock peaks never exceeded 15g, also within the low range (less than 30g) as per Sperry Shock and Vibration limits.

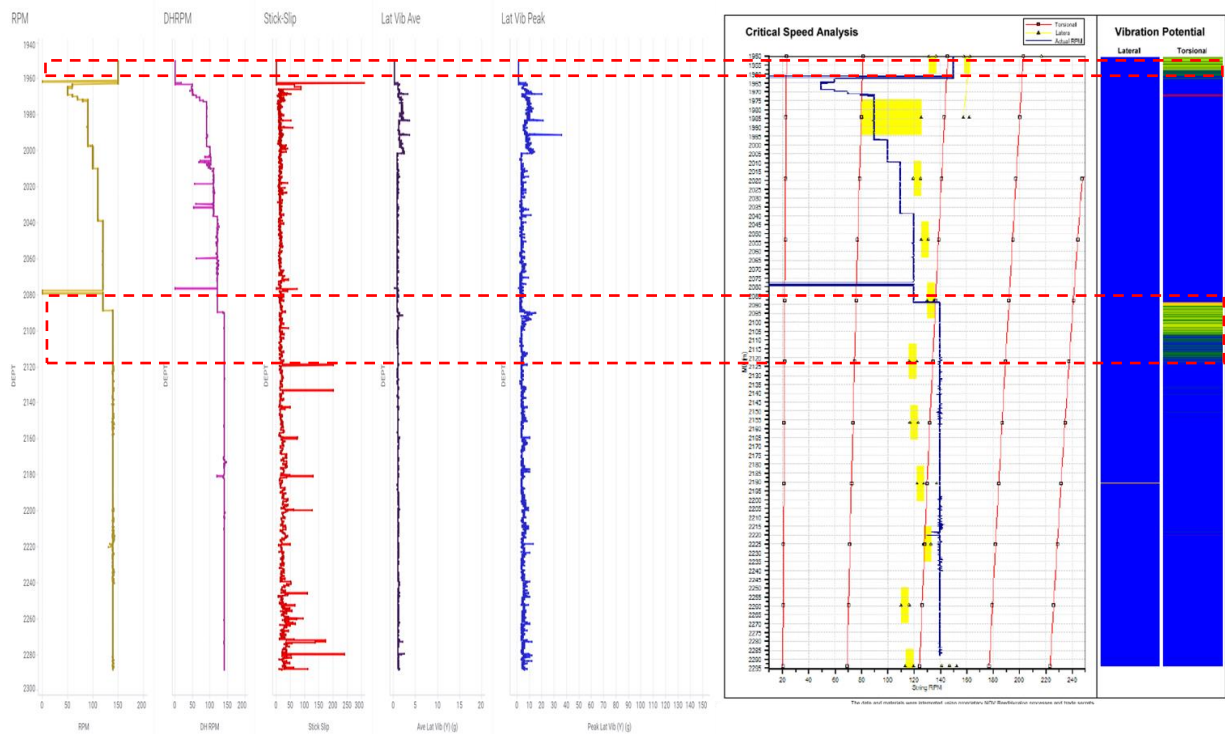


Figure 11. Drilling parameters with downhole vibration sensor in conjunction with VibraScope critical speed analysis in Well Z

As shown in **Figure 11**, VibraScope detected potential torsional vibration while no lateral vibrations were observed. According to the Critical Speed Analysis, the risk of vibration was low. However, downhole sensors, such as those from the MWD tool, recorded short intervals of vibration. This discrepancy could be due to several factors:

- Differences between actual and estimated drilling parameters
- Actual BHA configuration (OD, ID, length, and material)
- Trajectory differences (planned vs. actual trajectory)

It is also worth noting that VibraScope does not account for formation factors. These elements collectively explain the discrepancy in the observed output. The VibraScope data was used as supplementary input to better understand the conditions during the drilling process.

Forward Plan

NOV's ReedHycalog business unit has developed a sophisticated sensor called BitIQ™ designed to record drilling parameters. The primary objective of BitIQ is to establish a correlation between bit wear and at-bit vibrations. This sensor measures, records, and consolidates summaries of:

- Downhole vibrations (axial, lateral, and tangential)
- Downhole temperature
- RPM (using a gyroscope)

After a drilling run, the recorded data can be downloaded via a mobile device or laptop and then uploaded to a cloud-based system for processing. The proprietary algorithms used in the system accurately capture vibration modes, enabling a rapid generation of a statistical vibration summary report for post-run analysis. This allows for a detailed understanding of the drilling conditions and helps in optimizing future drilling operations.

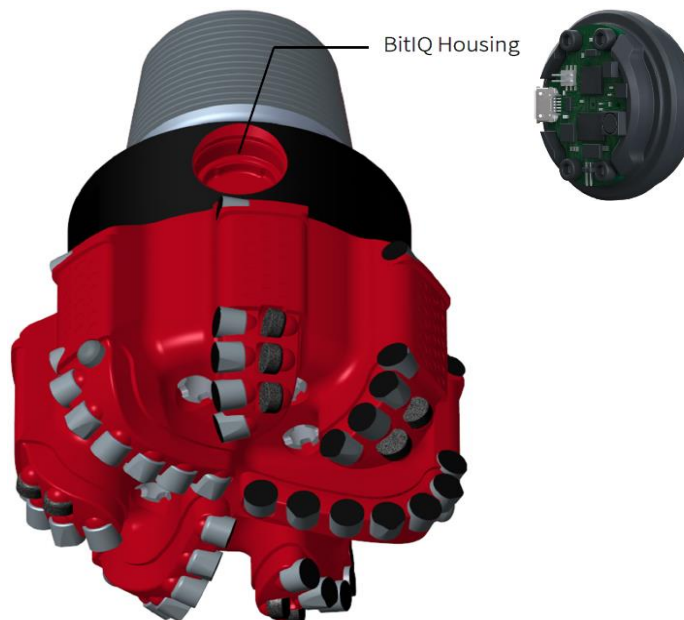


Figure 12. BitIQ sensor that is placed inside the bit housing

5. CONCLUSION

This paper evaluates the output of VibraScope Critical Speed Analysis and its correlation to downhole sensor data, typically obtained via MWD tools. The analysis indicates that the VibraScope algorithm is relatively accurate, as validated by the MWD downhole sensors. Consequently, the Critical Speed Analysis output can be used as a drilling roadmap to avoid parameters that could potentially induce vibrations. This approach enhances drilling operations by improving safety and efficiency, ensuring that drilling is conducted in a safe manner. By integrating these insights into the planning and execution phases, operators can anticipate and mitigate issues related to vibration, leading to smoother operations and extended equipment lifespan. The validation provided by MWD tools reinforces the reliability of VibraScope's predictive capabilities, making it a valuable tool for optimizing drilling strategies.

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CHAPTER 3

The Risk of Fintech Implementation in Indonesian State-Owned Banks

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ABSTRACT

Financial technology, commonly known as Fintech, represents the convergence of finance and technology. While Fintech offers numerous advantages and significant opportunities for implementation and growth, it also presents various risks that should not be overlooked. This research aims to investigate whether Fintech risks—specifically cyber, outsourcing, operational, and systemic risks—negatively impact the performance of state-owned banks in Indonesia. The performance is measured using the Balanced Scorecard approach. Employing quantitative methods, this study analyzes state-owned banks in Indonesia, with a sample selected through purposive sampling. Data were collected via questionnaires from 109 respondents and processed using SPSS 25 with multiple regression models. The findings reveal that cyber risk has a negative and significant impact on banking performance, while outsourcing risk has a positive and significant impact. In contrast, operational risk and systemic risk do not significantly affect banking performance. This research provides valuable insights for banking decision-makers to recognize the potential drawbacks of adopting Fintech.

Keywords: Fintech, cyber risks, Outsourcing risks, Operational risks, Systemic risks, Bank performance.

1. INTRODUCTION

Performance can be seen as either a process or the outcome of work. It involves undertaking tasks to achieve specific results, and these results themselves also reflect performance (Wibowo et al., 2017). Performance is crucial for companies because it not only measures success but also serves as a foundation for the company's reward system. Evaluation results can offer valuable feedback to management about the strategies employed. Typically, company performance assessments are derived from historical financial data (Wahyudin, 2020). The banking industry, in particular, is vital for economic and national development. Strong performance in this sector is essential for maintaining investor confidence and promoting overall economic growth.

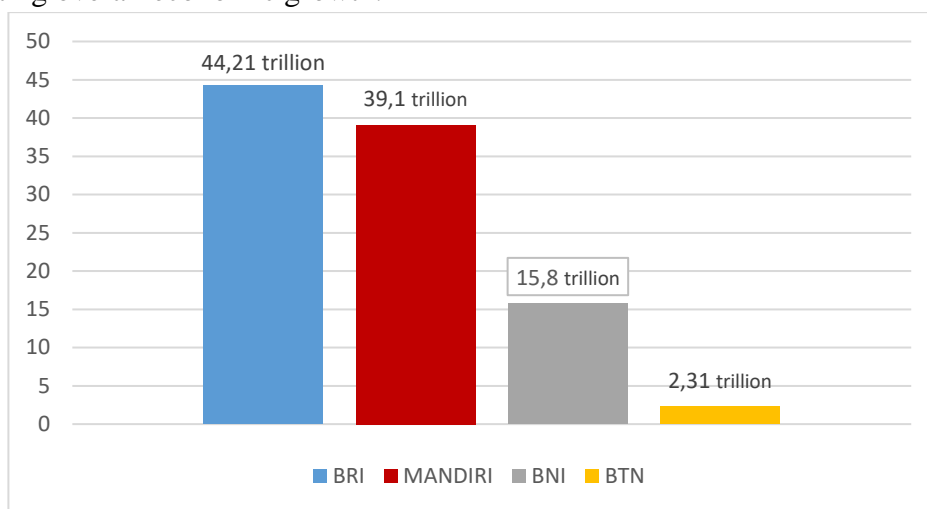


Figure 1. State-owned bank net profit (Quarter III 2023)

In 2023, the performance of State-Owned Enterprises (BUMN) in Indonesia continued to improve. There are four state-owned banks: Bank Mandiri, Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), and Bank Tabungan Negara (BTN). Among them, BRI achieved the highest net profit in the third quarter of 2023, amounting to IDR 44.21 trillion. During the same period, Bank Mandiri reported a net profit of IDR 39.1 trillion, BNI IDR 15.8 trillion, and BTN IDR 2.31 trillion. Despite BRI having the largest earnings, its profit growth rate was slower compared to Mandiri. In the third quarter of 2023, Bank Mandiri's net profit grew by 27.4% year-over-year (yoy), BNI by 15.1% (yoy), BRI by 12.47% (yoy), and BTN by 1.67% (yoy). This growth is closely linked to the banks' digital transformation strategies.

Technology is advancing rapidly, driving the development of various industries worldwide, including the banking sector. A significant aspect of this technological evolution in financial institutions is financial technology (Fintech). Fintech refers to the integration of finance and technology. Several researchers (Blakstad & Allen, 2018; Cortina & Schmukler, 2018; Gomber et al., 2018) describe it as a fintech revolution due to its association with modern digital technologies like cloud computing, big data, artificial intelligence (AI), the Internet of Things, and Blockchain. The integration of these technologies into financial businesses and the emergence of FinTech companies offering digital financial services are attracting numerous customers and prompting banks to adopt and utilize them. This trend is driven by the benefits banks gain from implementing FinTech solutions. The primary goal of

Fintech is to support banking operations by merging financial programs within banking institutions with the latest technology. Fintech adoption enables banks to enhance the availability and affordability of their financial services (Anis et al., 2023).

According to data from Bank Indonesia (Jannah, 2023), the value of digital banking transactions in Indonesia reached IDR 4,264.8 trillion, or nearly IDR 4.3 quadrillion, in April 2023. This amount encompasses various types of digital banking transactions, including internet banking, SMS/mobile banking, and telephone banking, as classified by the Financial Services Authority (OJK). Over the past decade, the financial market has undergone significant changes, particularly with the rise of fintech as a key financial innovation in the digital era (Kristianti and Tulenan, 2021). Data from the Indonesian Fintech Association in 2023 shows that there are currently 352 fintech companies in Indonesia, including 11 financial institutions and 7 association partners. Fintech integrates financial programs with technology within financial institutions to support banking activities. State-owned conventional banks (BUMN) such as Bank Mandiri, Bank Negara Indonesia (BNI), Rakyat Indonesia (BRI), and Bank Tabungan Negara (BTN) are collaborating with fintech companies. According to Bisnis (2023), approximately 60.6 percent, or around 321.82 million, of public savings accounts are held in government-owned or state-owned banks.

While FinTech offers numerous positive aspects and significant opportunities for implementation and growth, it also presents risk factors that must not be overlooked (Rahmanto et al., 2019). The adoption of FinTech by banks introduces new risks (Saleem, 2021). Given the crucial role of banks in the financial system, it is vital to understand the risks and opportunities that FinTech creates for banks and their impact on the core functions of financial intermediaries within the modern financial services ecosystem (Murinde et al., 2022).

With the rapid advancement of technology, the threat of cyberattacks on the financial industry has become a serious concern. According to Krisnawati (2023), the National Cyber and Crypto Agency (BSSN) recorded over 204 million cyberattacks in Indonesia from January to June 2023. The financial sector ranked third in terms of the number of cyberattacks. In Indonesia, notable cyberattack incidents have occurred in the financial sector, affecting institutions such as BRI Life Insurance, PT BFI Finance Indonesia Tbk (BFIN), BPJS Health Indonesia, PT Bank BTPN Tbk (BTPN), and more recently, Bank BCA and BPD Bali, which resulted in substantial customer losses (CNBC Indonesia, 2023).

Information security risks including cyber risks are a major concern when banks engage with fintech. IT governance helps establish information security policies, identify cyber risks, and establish security controls to protect sensitive data and critical bank information. In research (Al-Shari and Lokhande 2023) the most important risks affecting FinTech in banks are cyber risk, outsourcing risk, operational risk and systemic risk.

This research is a replication of research by Al-Shari & Lokhande (2023) entitled "The relationship between the risks of adopting FinTech in banks and their impact on the performance". The difference between this research and previous research is the sample used. In previous research, the unit of analysis used was Bank Yemen, whereas in this research, Bank BUMN Indonesia was used.

Based on the background explained above, researchers are interested in re-examining and expanding upon similar research by investigating "The Influence of Risks of Implementing Fintech in Banking and Its Impact on the Performance of Indonesian State-Owned Banks." This study aims to determine whether fintech-related risks—including cyber, outsourcing, operational, and systemic risks—negatively affect the performance of state-owned banks. Through this research, it is hoped that banks will be better equipped to identify and understand the various types of risks that impact their performance, enabling them to take necessary preventive measures and be better prepared to manage these risks effectively.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Disruption Theory

The term "disruption" was first introduced by Clayton M. Christensen in his 1997 book, "The Innovator's Dilemma." Christensen views disruption as a form of innovation that brings significant benefits. For established companies with structured work systems capable of predicting profits, the impact of technological innovation cannot be ignored (Yurina, 2020). This technology offers enhanced performance or features at a lower price or is more accessible compared to mainstream market products or services, attracting customers seeking convenience in their lifestyles.

In the Indonesian language, disruption is defined as something that is separated from its roots. In essence, disruption describes a situation where a breakthrough with a new system displaces an existing one. This balance-disrupting system and its changes are a form of innovation. According to Hadad (2017), disruptive innovation in the financial services industry has altered the industry's landscape globally, affecting the industrial structure, intermediation technology, and consumer marketing models. These changes have led to the emergence of a new phenomenon known as financial technology.

Disruptive theory suggests that new or innovative fintech companies can challenge and transform existing financial markets, disrupting the traditional business models of conventional financial institutions such as banks and other financial firms.

2.2. Financial technology

Financial Technology (Fintech) is a general term for (IT) related to the financial industry (Kemp 2017). According to Kusuma & Asmoro (2021), financial is the use of technology in the financial system that creates new services, technology, products and business models so that it will affect financial system stability, monetary stability and security, smoothness, reliability and efficiency of the payment system. Meanwhile, according to Hiyanti et al., (2020) financial technology is a modification in the financial services sector where paper money is no longer needed, meaning that the presence of financial technology can change currency to digital to make transactions easier (Hiyanti et al., 2020).

Currently information systems and technological developments continue to produce various new innovations related to financial technology with the aim of meeting various community needs such as accessing financial services or transaction processes (Mar'atushsholihah and Tuti 2021). Fintech offers easier and more efficient payment methods. However, there are risks associated with digital economic innovation (Khiaonarong and Goh 2020). Undoubtedly, technological advances have benefited the financial industry globally

(Bhatnagar et al. 2022). However, it also carries several dangers regarding competitiveness, privacy and financial stability (Hollanders, 2020; Mishchenko et al., 2021). As a result, many people are concerned about issues of privacy, system reliability, cybersecurity, and potential vulnerability to cyberattacks.

2.3. Conceptual framework

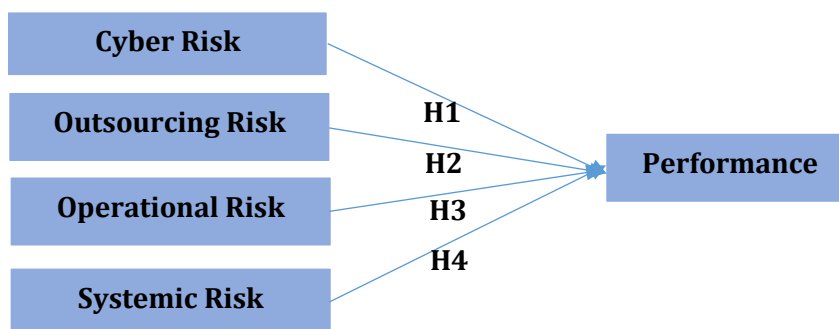


Figure 2. Conceptual framework

2.4. Hypothesis Formulation

Cyber risks can significantly impact bank performance, both financially and reputationally. A successful cyberattack can lead to a data security breach, resulting in the theft of sensitive customer data such as identity information, bank accounts, or credit card data. This can cause financial losses and a loss of customer trust. Disruption theory highlights the importance of staying vigilant regarding new innovations. In the context of cybersecurity, this means companies must continually monitor technological developments and emerging attack tactics, adjusting their security strategies as needed. Saleem (2021) and Vuřiniř (2020) show that cyber risks pose a threat to financial institutions and fintech companies that use modern digital technologies in their operations and service delivery. This attracts many digital thieves and cybercriminals who attempt to breach and damage data. Research by Giudici (2018), Kaur et al. (2021), Panetta (2018), and the Basel Committee on Banking Supervision (2018) also indicates that cyber risks affect financial institutions and fintech companies. From this explanation, the hypothesis that can be formulated is:

H1: Cyber risks negatively impact the performance of banks that adopt FinTech.

Banks that depend on third-party fintech service providers must ensure these providers meet the standards expected by banks and regulators. There are inherent risks if the quality of service from third parties falls short, potentially impacting customer experience and overall bank performance. Disruption theory underscores how traditional banks face threats from more agile and innovative fintech startups. To compete effectively, banks often opt to outsource certain services or collaborate with fintech providers. However, outsourcing introduces risks as banks rely on third parties for critical technology and services; any issues or failures on the fintech provider's part can adversely affect the bank's performance.

In research by Al-Shari and Lokhande (2023), outsourcing risk is found to have a significantly positive impact on banking performance. These findings highlight that the risks associated with outsourcing prompt banks to maintain a state of readiness, caution, and

heightened vigilance to mitigate potential threats when adopting fintech solutions. From this discussion, the hypothesis that can be formulated is:

H2: Outsourcing risk significantly influences the performance of banks that adopt FinTech.

Operational risk pertains to disruptions or failures within internal processes, systems, or personnel that can impact bank operations. This type of risk significantly affects the performance of banks that integrate fintech. Disruption theory often illustrates how fintech, as a new innovation in finance, poses a threat to banks using these technologies. This threat is closely tied to operational risk because banks must swiftly adapt to technological advancements and changes in business practices. Adopting fintech exposes banks to operational risks and introduces operational challenges (Sapian et al., 2021). Al-Shari & Lokhande (2023) elaborate in their research that effectively managing and mitigating operational risks enhances bank performance. Errors in delivering fintech services, whether by customers or employees, negatively impact bank performance. Based on this discussion, the hypothesis can be formulated as:

Operational risk influences the performance of banks that adopt fintech.

H3: Operational risk influences the performance of banks that adopt fintech.

Systemic risk within bank fintech refers to risks that not only impact the bank itself but also have repercussions for the entire financial system. In the context of bank fintech, systemic risk can originate from various sources and its effects can permeate throughout the financial sector. Since fintech operates via the internet and networks, any technical glitch or malicious attack can trigger systemic risk or widespread system failure (Yuan and Xu, 2020). This is corroborated by research from Bu et al. (2022), which demonstrates that fintech development amplifies systemic financial risks. Additionally, Vuḃiniḃ's (2020) findings indicate that while fintech offers benefits that enhance financial stability, it concurrently poses a potential negative impact on systemic risk, thereby potentially undermining financial stability. From this discussion, the hypothesis that can be formulated is:

H4: Systemic risk significantly influences the performance of banks that adopt FinTech.

3. RESEARCH METHODS

3.1. Sample and data collection

The study utilized primary data obtained through the distribution of questionnaires. Its objective was to examine the impact of implementing fintech risks in banking on the performance of Indonesian state-owned (BUMN) banks. Questionnaires were administered to employees of four Indonesian state-owned banks: Bank Mandiri, Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), and Bank Tabungan Negara (BTN). Participants in the study were employees of these banks, selected using a purposive sampling technique based on criteria including a minimum tenure of 1-5 years at the bank and a minimum education level of Diploma 3.

3.2 Variables and Measurement

Performance refers to the results of a process that is evaluated and measured over a certain period of time in accordance with previously established provisions or agreements (Edison, 2016). This variable uses a balanced scorecard perspective and is measured by 20

(twenty) indicators. Cyber risk is the combination of the likelihood of an event occurring in an organization's information assets, computers and communications resources, as well as the consequences of that event for the organization (Bank for International Settlements and International Organization of Securities Commissions 2018). This variable is measured by 3 (three) indicators. Operational risk is the possibility of failure resulting from errors and poor internal processes, workforce and technical systems implemented in Fintech. This variable is measured by 3 (three) indicators. Outsourcing risks are any potential threats or uncertainties that may arise when an organization decides to contract or provide certain services or business functions to a third party. This variable is measured by 3 (two) indicators. Systemic risk is a disruption or failure in one financial institution or part of the financial system that can cause disruption or failure in other financial institutions or throughout the financial system (Bank for International Settlements and International Organization of Securities Commissions 2018). This variable is measured by 3 (two) indicators. Research quality was assessed using a 4-point Likert Scale (1= strongly disagree; 2= disagree; 3= agree; 4=strongly agree) as well as five questions regarding participant demographic information using a nominal scale (Gender, Age, Position, Years of work, education level, and Department).

3.3 Data analysis technique

This research uses multiple linear regression data analysis techniques, where testing is carried out to see the relationship of a set of independent variables to the dependent variable, so that it can predict the average value of the dependent based on the value of the independent variable (Ghozali 2016).

Regression models in research:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Information :

Y = Performance at the Bank

α = Constant coefficient

β = Regression coefficient

X₁ = Cyber risk

X₂ = Operational risk

X₃ = Outsourcing risk

X₄ = Systemic risk

ε = Error coefficient

Tabel 1. Variabel dan Indikator

Variables	Indicators and items	Source
<i>Performance</i>	The bank's adoption of financial technology leads to an increase in market share	(Owusu, 2017)
<i>Financial Perspective</i>	The Bank seeks by adopting FinTech services to reduce costs to a minimum	
	The bank's adoption of financial technology leads to higher profits from year to year.	
	The bank's adoption of financial technology leads to maximizing shareholders' wealth.	

Variables	Indicators and items	Source
	The bank seeks by providing financial technology services to achieve higher productivity and thus increase profits.	
<i>Customer Perspective</i>	The bank seeks to improve the quality of its services to meet the wishes and needs of customers.	(Owusu, 2017)
	The Bank treats complaints submitted by customers with great care.	
	The bank lowers the price of the service provided compared to the competitive market price.	
	The bank aims to increase the number of customers from year to year.	
	The Bank seeks to retain existing customers by responding to their needs.	
<i>Internal Operation Perspectives</i>	The bank reduces the time to complete the work.	(Owusu, 2017)
	The Bank seeks to make optimal use of the available resources.	
	The bank works to reduce routine and inappropriate repetition at work.	
	The bank trends to digital technology to get rid of paperwork.	
	The bank seeks to increase the level of quality of services	
<i>Education and growth perspective</i>	The Bank is keen to hold qualitative training courses for its employees to keep pace with the era of digital technology	(Owusu, 2017)
	The Bank is keen to update the technology used constantly.	
	The Bank seeks to develop employees' skills and improve the use of modern technologies according to the era of digital technology.	
	The bank is keen to continue to develop its creativity and to reserve a higher place among banks.	
	The Bank is constantly improving and developing its services.	
<i>Risks Cyber Risks</i>	The banking system is exposed to threats and security breaches when adopting financial technology services through mobile applications.	(Kaur et al., 2020)
	The banking system is exposed to penetrations and security threats when adopting financial technology services via online platforms	
	The banking system is exposed to large amounts of implicit data for violations when adopting financial technology techniques such as (customer account numbers, financial operations, financial charges ... and others)	
<i>Operational Risks</i>	Banks face the risks of maintaining the privacy of customer data when using mobile financial technology services.	(Aldasoro et al., 2020)
	Banks face the risks of maintaining information security and data confidentiality in providing financial technology services to customers via mobile phones.	
	Banks need to take the necessary precautions and measures when adopting financial technology to combat potential cybercrimes.	
<i>Outsourcing</i>	The bank's use of outsourcing to provide FinTech services	(Supervision),

Variables	Indicators and items	Source
<i>Risks</i>	leads to risks in maintaining the confidentiality of the Bank's data and information. The bank's use of outsourcing to implement FinTech services leads to the risks of maintaining data privacy. The use of outsourcing by banks may affect the bank's reputation in the event of service disruptions or security breaches related to the service provider.	B. (Basel C. on B, 2018)
<i>Systemic Risks</i>	Bank systemic risks increase with the increasing adoption of FinTech services. When banks adopt fintech, Bank information technology risks lead to systemic risk. Banks strive to reduce losses that result in systemic risk.	(Supervision), B. (Basel C. on B, 2018)

4. RESULTS AND DISCUSSION

This research is quantitative research that uses a questionnaire as a data collection instrument. Data was collected from October 28 to 15 January 2024. In that period, 109 respondents were obtained.

4.1 Respondent Demographics

This section describes the demographics of respondents which describes the characteristics of respondents consisting of gender, age, education level, Years Experience and position of the respondent.

Table 2. Respondent characteristics

Characteristics	Frequency	Percentage
Gender		
Male	54	49,5%
Female	55	50,5%
Age		
21 – 30 Years	44	40,3%
31 – 40 Years	52	47,7%
41 – 50 Years	13	12%
> 50 Years	0	0%
Level of education		
Diploma 3 (D3)	21	19,3%
Strata 1 (S1)	83	76,1%
Strata 2 (S2)	5	4,6%
Strata 3 (S3)	0	0
Banking Name		
BRI	34	31,2%
Mandiri	40	36,7%
BNI	18	16,5%
BTN	17	15,6%
Job		
Frontliner	43	39,4%
Staff IT	14	12,8%
Supervisor	1	1%

Characteristics	Frequency	Percentage
Manager	9	8,2%
Others	42	38,5%
Years Experience		
1 - 5 years	54	49,5%
6 - 10 years	47	43,1%
11 - 15 years	8	7,3%
> 16 years	0	0%

Table 2 shows that the gender proportion of respondents between men and women is balanced. The majority of respondents were in the age range of 30 to 40 years with the highest level of education being a bachelor's degree (76.1%) with 43 frontliner positions or 39.4%. Respondents at Bank Mandiri dominated with a percentage of 36.7%. Based on length of service, respondents who had worked 1 - 5 years amounted to 54 people or 49.5%.

4.1 Hypothesis Results

The data collected has gone through a quality test to see the seriousness of the respondents in answering questions and to look at situational factors at the time the research was conducted. The tests carried out were validity tests using Pearson Correlation and reliability tests using Cronbach's Alpha. This research uses multiple regression to test the hypothesis using the coefficient of determination (adjusted R^2), model fit (F test), and partial test (t test).

**Table 3. R^2 test results
Model Summary^b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,744 ^a	,554	,537	9,268

a. Predictors: (Constant), Risiko Sistemik, Risiko Operasional, Risiko Siber, Risiko Outsourcing

b. Dependent Variable: Kinerja

**Table 4. test results f
ANOVA^a**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11089,706	4	2772,427	32,275	,000 ^b
	Residual	8933,707	104	85,901		
	Total	20023,413	108			

a. Dependent Variable: Performance

b. Predictors: (Constant), Systemic Risk, Operational Risk, Cyber Risk, Outsourcing Risk

**Table 5. t test results
Coefficients^a**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	114,860	7,445		15,428	,000
	Cyber Risk	-2,980	,756	-,354	-3,942	,000
	Outsourcing Risks	-2,435	,550	-,410	-4,430	,000
	Operational Risk	-,536	,649	-,080	-,826	,410
	Systemic Risk	-,151	,510	-,019	-,295	,769

a. Dependent Variable: Kinerja

From table 3 it can be seen that the Adj value. R amounting to 0.537, which means that 53.7% of the variables Systemic Risk, Operational Risk, Cyber Risk, Outsourcing Risk influence company performance variables while the remaining 46.3% is explained by other variables that are not in this equation. Based on the regression results in Table 4, it can be seen that the F statistical value in the model is 32.275 with a significance value of 0.000. A probability value of 0.000 is less than 0.05 indicating that the model used in the research is suitable for use. In table 5, from the results of the partial t test, it is known that cyber risk and outsourcing risk influence on banking performance. This can be seen from the significance value of $t/2$ which is smaller than 0.05

Hypothesis 1: Cyber risks negatively impact the performance of banks that adopt FinTech.

Based on the results of the hypothesis test in table 5, the cyber risk variable has a regression coefficient (β) of -2.980 and a calculated t value of -3.942. Meanwhile, the significance value is 0.000 or below the value of 0.05, so it can be concluded that cyber risk negative and significant effect on banking performance or in other words the first hypothesis **is accepted**. When cyber risks increase, bank performance also decreases. These risks spell disaster for banking, such as data and information penetration and manipulation. It comes from cybercriminals and hackers. This can be done by hacking and penetrating customer data and violating their privacy when carrying out financial transactions over the Internet or it can also be through security threats that may occur in the banking system. A large amount of implicit data may be subject to breach when providing FinTech services through banks, such as customer account numbers, financial transaction numbers, money amounts, financial charges and other financial data. The results of this research are in line with the results of previous research which shows that cyber risks negative effect on banking performance (Al-Shari and Lokhande 2023).

Hypothesis 2: Outsourcing risk significantly influences the performance of banks that adopt FinTech.

Based on the results of the hypothesis test in table 5, the outsourcing risk variable has a regression coefficient (β) of -2.435 and a calculated t value of -4.430. Meanwhile, the significance value is 0.000 or below the value of 0.05, so it can be concluded that outsourcing risk has a negative and significant effect on banking performance or in other words the second hypothesis **is accepted**. Even though outsourcing risks provide efficiency benefits and focus

on the core of the business, it still carries risks such as the risk of maintaining the confidentiality of data and strategic information that is important to the organization. Protecting data and information from leaks and security problems can cause financial institutions to lose their competitiveness, which can cause banking performance to decline.

Hypothesis 3: Operational risk influences the performance of banks that adopt fintech.

Based on the results of the hypothesis test in table 5, the outsourcing risk variable has a regression coefficient (β) of -0.536 and a calculated t value of -0.826. Meanwhile, the significance value is 0.410 or above 0.05, so it can be concluded that outsourcing risk has a negative and insignificant effect on banking performance or in other words the third hypothesis is rejected. Every risk, including operational risk, has the potential to affect the performance of a financial institution. However, in certain situations operational risk may have a more limited impact or can be managed well so that it is not significant on banking performance. Human resource training and development improves employee skills in managing operational risks.

Hypothesis 4: Systemic risk significantly influences the performance of banks that adopt FinTech.

Based on the results of the hypothesis test in table 5, the outsourcing risk variable has a regression coefficient (β) of -0.151 and a calculated t value of -0.295. Meanwhile, the significance value is 0.769 or above 0.05, so it can be concluded that systemic risk has no significant effect on banking performance or in other words the fourth hypothesis is **rejected**. This shows that systemic risk, which is the risk of information technology and software technology in the banking business, has no effect on bank performance. The rejection of this hypothesis can be explained by the fact that FinTech digital technology is the latest digital development when used by banks which can increase information technology risks. However, necessary and expected preparations can be made to avoid these risks which may not affect banking performance. In addition, digital technology such as Blockchain has high technology to maintain data confidentiality and helps not penetrate it. Artificial intelligence techniques help in detecting and identifying risks and finding predicted risks, as well as big data technologies that analyze data and help detect any data or information that may pose a risk to the organization.

5. CONCLUSIONS, IMPLICATIONS, AND FUTURE RESEARCH

This study investigates the impact of fintech risks on banking performance, focusing on four variables: cyber risk, outsourcing risk, operational risk, and systemic risk. Data for this research were collected using a questionnaire distributed via Google Forms through WhatsApp networks, completed by 109 respondents. The findings reveal a significant negative influence of cyber risk and outsourcing risk on banking performance. However, no significant impact was observed from operational risk and systemic risk on banking performance.

Several limitations of this research should be noted. First, the use of a questionnaire as the data collection tool may introduce biases, as respondents' interpretations of statement

items could vary. To mitigate this, the researcher employed simplified language and avoided technical terms to ensure clarity. Control measures were also implemented by distributing the questionnaire through trusted friendship networks to target specific respondents.

Future research could explore similar variables using secondary data to compare findings with those obtained through primary data. Additionally, investigating other risks associated with fintech implementation in banks, such as strategic risk, money laundering risk, and terrorist financing risk, could provide deeper insights into their impacts on banking performance. Further studies could also comprehensively examine systemic risks and outsourcing risks related to fintech adoption in banking, potentially expanding the sample size to better represent the Indonesian information technology banking sector.

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CHAPTER 4

The Influence of Regional Financial Performance Aspects on Inclusive Economic Development in Indonesia

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ABSTRACT

This research focuses on seeing whether regional financial performance can influence the Inclusive Economic Development Index. Regional financial performance is represented through five financial ratios, namely the Fiscal Decentralization, Dependency, Independence, Effectiveness and Efficiency.. The analysis uses panel data linear regression analysis tools for the year period from 2018-2022 and the research object uses 34 provinces in Indonesia. The results of the model selection test using Eviews9 software showed that the results were better using the Fixed Effect Model method. The research results show that aspects of regional financial performance through Fiscal Decentralization Ratio have a positive effect on the Inclusive Economic Development Index, while the Dependency Ratio and Efficiency Ratio have a negative effect on the Inclusive Economic Development Index. The test results show that the other two ratios, namely the Regional Independence Ratio and the Regional Financial Effectiveness Ratio, are not able to influence the Inclusive Economic Development Index.

Keywords: Financial Ratios, Regional Financial Performance, Inclusive, Fiscal Decentralization, Dependency, Independence, Effectiveness, and Efficiency

1. INTRODUCTION

After the Covid-19 pandemic, Indonesia's economic growth showed a positive value. The government has made various efforts to restore the national economy, starting from large-scale social restrictions, issuance of Peraturan Pengganti Undang-Undang Nomor 1 Tahun 2020 to build financial system stability and government fiscal policy during the pandemic, to fiscal stimulus packages. Based on data from Badan Pusat Statistik Republik Indonesia, Indonesia's economic growth was able to recover from the downturn during the pandemic, which was -2.07% in 2020, to 3.7% in 2021, and again to 5.31% in 2022. These results illustrate the government's success in implementing economic recovery in Indonesia due to the pandemic crisis.

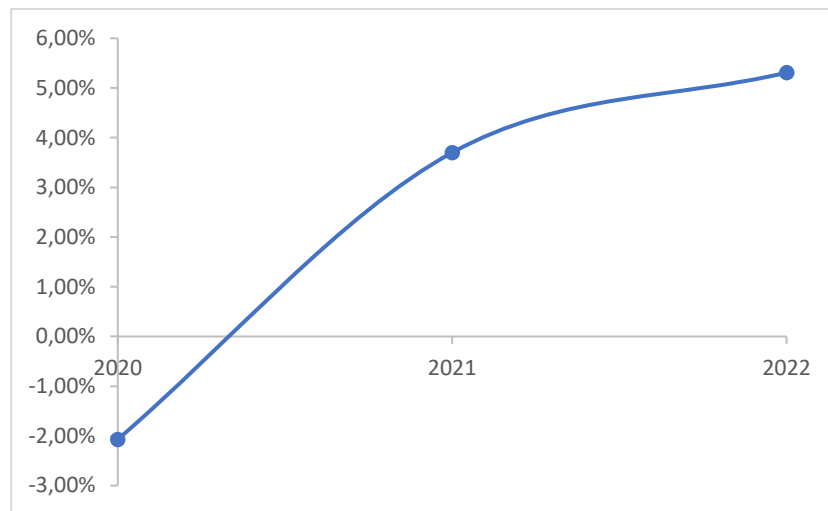


Figure 1. Indonesia's economic growth chart 2020 to 2022 (BPS processed)

Despite a positive trend, Indonesia's economic growth has not been able to reduce existing inequality. Based on data from the Badan Pusat Statistik Republik Indonesia, the country's Gini index shows a stagnant trend, namely 0.385 in 2020 and then 0.381 in 2021 and 2022. This suggests that Indonesia's economic growth must be enhanced in order to achieve not only positive growth but also to reduce inequality.

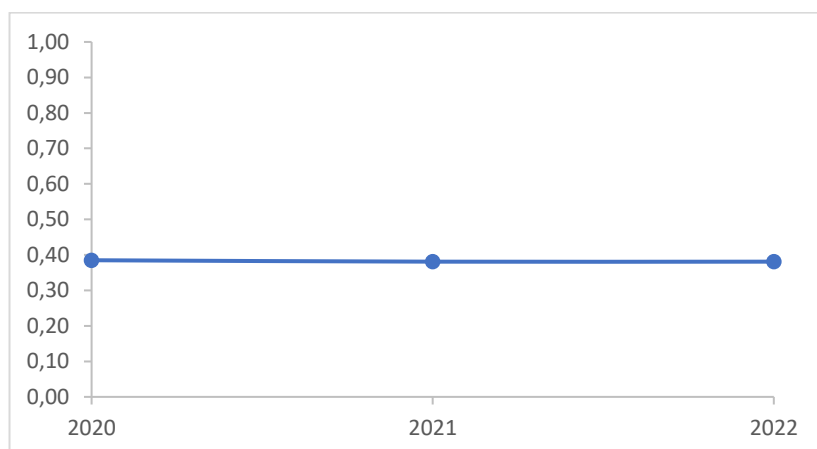


Figure 2. Indonesia's gini index chart 2020 to 2022 (BPS processed)

Positive economic growth, without a corresponding reduction in inequality, indicates that the entire population or certain segments of Indonesian society do not enjoy the benefits of economic growth. This phenomenon necessitates the Indonesian government's focus on achieving inclusive economic development, where economic progress is not solely focused on economic growth alone but also accompanied by reductions in poverty and inequality (Prasetyia, 2021).

Inclusive economic development is the creation of equal opportunities and access for all levels of society, with a reduction in disparities between groups and regions, and increases prosperity (Hartarti, 2021). Through the Badan Perencanaan Pembangunan Nasional, the Government of Indonesia promotes the creation of inclusive economic in Indonesia by issuing Keputusan Kepala Badan Perencanaan Pembangunan Nasional Nomor KEP.134/M.PPN/HK/07/2019 tentang Pembentukan Kelompok Riset Strategis tasked to enhance the quality of regional economic development in Indonesia by implementing the concept of Inclusive Economic Development Index (IEDI).

IEDI is a tool designed to calculate and monitor the extent to which inclusive development is occurring in Indonesia. This is done through the measurement of three dimensions: (1) economic growth; (2) inequality and poverty; and (3) access and opportunities. These are measured at three different levels: district/city, province, and national. This shows that realizing an inclusive economy is not only the task of the central government, but also requires the contribution of local governments. Consequently, in order to achieve an inclusive economy, both the central and local governments must demonstrate superior performance. One method of measuring the performance of a region in carrying out its functions and responsibilities is to evaluate its financial performance.

Regional financial performance is defined as the capacity of a local government to identify, procure, and administer its own local finances in a manner that meets the needs and ensures the sustainability of the local government system, public services to the community, and regional development independently, without relying entirely on funds from the central government. (Mardiasmo, 2018). Regional financial performance can be quantified in several ways, one of which is through the use of financial ratios. These ratios can elucidate the operational dynamics of the local government and can be employed as a benchmark to enhance the potential of the region. (Sari, Asaari, & Hidayah, 2021).

In light of the aforementioned explanations, it can be posited that regional financial performance plays a pivotal role in the realization of inclusive economic development, which in turn serves to reduce inequality. The objective of this study is to ascertain and evaluate the impact of regional financial performance on inclusive economic development in Indonesia, which represents a manifestation of economic inclusiveness.

2. LITERATURE REVIEW

In formulating the hypothesis, the author draws upon existing theory and the results of previous research. Each independent variable is connected to one of the variables in the two pillars that serve as the basis for calculating IEDI : namely, Economic Growth and Poverty. Economic Growth represents the first pillar, namely economic growth and development.

Poverty represents the second pillar of the IEDI, namely poverty alleviation and income equality.

2.1. Relationship between Fiscal Decentralization Ratio and IEDI

The Fiscal Decentralization Ratio is a metric that illustrates the proportion of Regional Original Income that a local government aims to obtain in relation to its total regional income. A higher value of this ratio indicates a greater contribution of local revenue to regional income, as well as a greater ability of the region to implement decentralization. One study has demonstrated that the Fiscal Decentralization Ratio has a positive effect on economic growth in Samosir Regency (Nadeak, Damanik, & Tumanggor, 2022). Another study indicates this ratio has a negative effect on poverty in East Java Province (Norsain & Rofik, 2022). This evidence leads to the following hypothesis:

H₁: Fiscal Decentralization Ratio has a positive influence on IEDI ($\beta_1 > 0$)

2.2. Relationship between Dependency Ratio and IEDI

The Dependency Ratio is a ratio used to assess the degree of dependence of local government on funds provided by the central government. A higher value of this ratio indicates a higher level of dependence. One study suggests that the dependency ratio of the provincial government in 2015-2019 has a negative effect on GRDP (Widodo, 2021). Another study has demonstrated that the regional dependency ratio has a positive effect on poverty in East Java Province (Norsain & Rofik, 2022). This evidence leads to the following hypothesis:

H₂: Dependency Ratio has a negative influence on IEDI ($\beta_2 < 0$)

2.3. Relationship between Independence Ratio and IEDI

The Independence Ratio is a measure of a local government's ability to finance its own activities. A higher ratio indicates greater independence in funding activities. One study suggests that the Independence Ratio has a positive effect on economic growth in one of Indonesia's provinces, namely Aceh Province (Azhari, Zulfa, & Murtala, 2020). Another study indicated that the independence ratio has a negative effect on poverty in Ternate City (Adam, Husen, & Muhammad, 2022). This evidence leads to the following hypothesis:

H₃: Independence Ratio has a positive influence on IEDI ($\beta_3 > 0$)

2.4. Relationship between Effectiveness Ratio and IEDI

The Effectiveness Ratio is employed to assess the efficacy of local government in attaining its previously established local revenue target or budget. A higher ratio indicates a more effective local government in achieving its local revenue target. One study posits that the regional effectiveness ratio exerts a positive effect on economic growth in Aceh Province (Azhari, Zulfa, & Murtala, 2020). Another study has demonstrated that the effectiveness ratio has a negative effect on poverty (Kumpangpune, Saerang, & Engka, 2019). This evidence leads to the following hypothesis:

H₄: Effectiveness Ratio has a positive influence on IEDI ($\beta_4 > 0$)

2.5. Relationship between Efficiency Ratio and IEDI

The Efficiency ratio is a measure of the effectiveness of local governments in the management of their finances. A lower ratio indicates greater efficiency. One study found that

the regional efficiency ratio has a negative influence on economic growth in Kotabaru Regency (Yayu & Saipudin, 2022). This evidence leads to the following hypothesis:

H₅ : Efficiency Ratio has a negative influence on the IEDI ($\beta_5 < 0$)

3. RESEARCH METHOD

3.1. Conceptual Framework

Based on the results of theoretical studies from literature and previous research, a conceptual framework for this research has been prepared as follows:

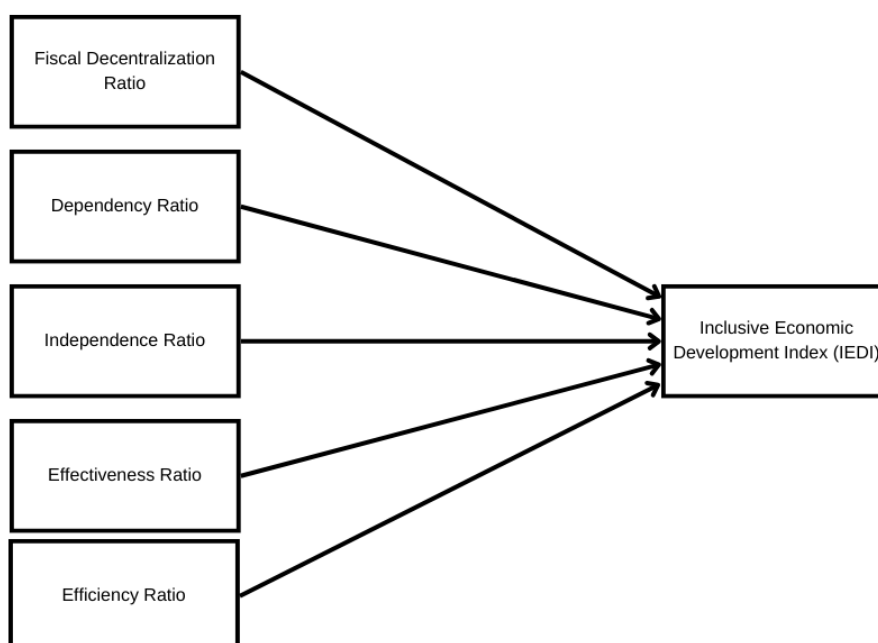


Figure 3. Conceptual framework

3.2. Research Data

The purpose of this study is to examine whether aspects of regional financial performance influence Indonesia's Inclusive Economic Development Index. Researchers aim to demonstrate that the IEDI can be influenced by regional financial performance, proxied through five financial ratios: Fiscal Decentralization, Dependence, Independence, Effectiveness and Efficiency over a period of five years from 2018 to 2022. Financial data were obtained secondarily from the Kementerian Keuangan Republik Indonesia, while IEDI data were also acquired secondarily from the Badan Perencanaan Pembangunan Nasional Republik Indonesia. The study employs cross-sectional data covering 34 provinces in Indonesia, with time-series data, spanning from 2018 to 2022.

This study uses Eviews 9 as a data analysis tool with the panel data regression method and tests the effectiveness of three models, including the common effect model (CEM), the random effect model (REM), and the fixed effect model (FEM). In addition, the regression model equations developed in this study are:

$$\text{IEDI} = \beta_0 + \beta_1 \text{Fiscal Decentralization}_{it} + \beta_2 \text{Dependency}_{it} + \beta_3 \text{Independence}_{it} + \beta_4 \text{Effectiveness}_{it} + \beta_5 \text{Efficiency}_{it} + e$$

Description:

IEDI	= Inclusive Economic Development Index
Fiscal Decentralization	= Fiscal Decentralization Ratio
Dependency	= Dependency Ratio
Independence	= Independence Ratio
Effectiveness	= Effectiveness Ratio
Efficiency	= Efficiency Ratio
B_0	= Constant
$\beta_1-\beta_5$	= Coefficient
e	= error

4. RESULT AND DISCUSSION

4.1. Model Selection Test

The following is a summary of the model selection test conducted in this study:

Table 1. Model selection test

	Probability	Result	Description
Chow Test	0.0000	Ho rejected	FEM
Hausman Test	0.0004	Ho rejected	FEM
LM Test	0.0000	Ho rejected	REM

Based on the Chow test results aimed at selecting between CEM or FEM models, the obtained probability value for the Cross-section Chi-square is $0.0000 < 0.05$, hence rejecting H_0 and accepting H_a . Therefore, it can be concluded that the FEM is chosen as the more suitable model for this study. Based on the Hausman test results to choose between REM or FEM, the probability value for the Cross-section Random is $0.0004 < 0.05$, thus rejecting H_0 and accepting H_a . Hence, the FEM is selected as the most appropriate model for use in this research.

4.2. Result

From the results of the Eviews 9 processing using FEM, the following results are obtained:

Table 2. Multiple linear regression test result

Variable	Theory	Coef	Std. Error	T-Stat	Prob.	Decision
C		5.581484	0.766204	7.284594	0.000 0	
Fiscal Decentralization	+	0.057006	0.011330	5.031586	0.000 0	H ₁ accepted
Dependency	-	- 0.012194	0.005114	- 2.384413	0.018 5	H ₂ accepted
Independence	+	- 0.004216	0.001743	- 2.418508	0.017 0	H ₃ rejected
Effectiveness	+	- 0.001067	0.002816	- 0.378875	0.705 4	H ₄ rejected
Efficiency	-	- 0.006637	0.001630	- 4.070764	0.000 1	H ₅ accepted
Goodness of Fit Test						
R-squared				0.901538		
Adjusted R-squared				0.872976		
F-statistic				31.56473		
Prob(F-statistic)				0.000000		

4.2.1. Goodness of Fit and Global Tests

The adjusted R-squared value, which is a measure of the explanatory power of a model, is 0.872976 in this case. This represents the ability of five independent variables, which are financial ratios, to explain the variable IEDI by 87.29%. Other variables not included in the model explain the remaining 12.71%. The probability value in the F test less than 0.05, indicating that at least one independent variable has an effect on the dependent variable.

4.2.2. Individual Test

IEDI = 5,581484 + 0,057006 Fiscal Decentralization – 0,012194 Dependency + -0,006637 Efficiency

4.2.2.1 The influence of Fiscal Decentralization Ratio on IEDI

The results of this study yielded a value of $\beta_1 = 0.057006$. This indicates that, on average, an increase of 1% in the Fiscal Decentralization Ratio will increase the IEDI by 0.057006. This implies that the IEDI is likely to improve with higher levels of Fiscal Decentralization Ratio.

The results are in line with the hypothesis formulated in this study ($\beta_1 > 0$), which posits that the Fiscal Decentralization Ratio has a positive effect on IEDI. The results of the test indicate that the significance value is $0.0000 < 0.05$, thereby supporting the hypothesis that H₁ is accepted. This is an indication that the ability of local governments to collect local revenues has an impact on the IEDI. This is consistent with previous research indicating that the Fiscal Decentralization Ratio has a positive effect on economic growth (Nadeak, Damanik, & Tumanggor, 2022) and a negative effect on poverty (Norsain & Rofik, 2022).

4.2.2.2 The influence of Dependency Ratio on IEDI

The results of this study yielded a value of $\beta_2 = 0.012194$. This indicates that for every 1% decrease in the dependency ratio, the IEDI will increase by 0.012194. Therefore, it can be posited that the IEDI will be more favorable when the dependency ratio is smaller.

The results are in line with the hypothesis formulated in this study ($\beta_2 < 0$), which posits that the dependency ratio exerts a negative effect on the IEDI. The results of the test indicate that the significance value is $0.0185 < 0.05$, thereby supporting the hypothesis that the dependency ratio has a negative effect on IEDI and H_2 is accepted. This finding aligns with previous research that has demonstrated a negative effect of the dependency ratio on economic growth (Widodo, 2021) and a positive effect on poverty (Norsain & Rofik, 2022).

4.2.2.3 The influence of Independence Ratio on IEDI

The results of this study yielded a value of $\beta_3 = -0.004216$. This indicates that for every 1% decrease in Independence Ratio, IEDI will increase by 0.004216. Therefore, it can be posited that IEDI will improve if Independence Ratio is smaller.

This result is not in line with the hypothesis formulated in this study ($\beta_3 > 0$), which posits that the independence ratio exerts a positive influence on IEDI. Consequently, hypothesis testing is not continued, and H_3 is rejected. This result aligns with a previous study's findings that the independence ratio has a negative effect on economic growth, which is one of the pillars of IEDI in Bitung City (Kumpangpune, Saerang, & Engka, 2019).

The results indicate that, on average, the value of IEDI in 34 provinces in Indonesia has increased, although the independence ratio has tended to decrease. This is due to the impact of the Covid-19 pandemic, so that local governments receive more transfers of funds from the central government rather than realizing their own local revenues to carry out government affairs in order to increase the value of IEDI in their regions.

4.2.2.4 The Influence of Effectiveness Ratio on IEDI

The results of this study yielded a value of $\beta_4 = -0.001067$. This indicates that for every 1% decrease in Effectiveness Ratio, IEDI will increase by 0.001067. Therefore, it can be posited that IEDI will improve if the Effectiveness Ratio declines.

This result is not in line with the hypothesis formulated in this study ($\beta_4 > 0$), which posits that the effectiveness ratio exerts a positive influence on IEDI. Consequently, hypothesis testing is not continued, and H_4 is rejected. This finding is in line with previous research indicating that the effectiveness ratio has a negative influence on economic growth, which is one of the pillars of the IEDI in Kotabaru Regency (Yayu & Saipudin, 2022).

The findings indicate that, on average, the value of IEDI in 34 provinces in Indonesia has increased, although the effectiveness ratio has tended to decrease. This is due to the impact of the Covid-19 pandemic on local governments in Indonesia. In line with the reasons that result in the independence ratio not aligning with the theory that local governments have been unable to achieve their revenue targets, yet have received funding assistance from the central government to facilitate the implementation of government programs, thereby enhancing the value of IEDI in their respective regions.

4.2.2.5 The influence of Efficiency Ratio on IEDI

The results of this study yielded a value of $\beta_5 = -0.006637$. This indicates that for every 1% decrease in Efficiency Ratio, IEDI will increase by 0.006637. Therefore, it can be posited that the IEDI will be more favorable when the Efficiency Ratio is smaller.

This result is in line with the hypothesis formulated in this study ($\beta_5 < 0$), which posits that the efficiency ratio exerts a negative influence on the IEDI. The test results indicate that the significance value is $0.0001 < 0.05$, thereby H5 is accepted. This finding is in line with previous research that has demonstrated a negative and significant impact of the dependency ratio on economic growth (Yayu & Saipudin, 2022).

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This study examines the role of regional financial performance aspects, as measured by five financial ratios, namely the fiscal decentralization, dependency, independence, effectiveness, and efficiency, in influencing IEDI in Indonesia. Secondary data were utilized in this study, with 34 provinces in Indonesia serving as the sample during the period 2018 to 2022. The results of this study indicate that:

1. Fiscal Decentralization Ratio has a positive effect on IEDI in 34 provinces in Indonesia.
2. Dependency Ratio has a negative effect on IEDI in 34 provinces in Indonesia.
3. Independence Ratio negatively affects IEDI in 34 Provinces in Indonesia, yet it is rejected due to a discrepancy between the direction of the effect and the existing theoretical framework.
4. Effectiveness Ratio has no influence on IEDI in 34 Provinces in Indonesia.
5. The Efficiency Ratio has a negative effect on IEDI in 34 Provinces in Indonesia.

5.2. Recommendations

In light of the author's findings and conclusions, the following recommendations are offered for consideration:

- a. For the local government, it is necessary to undertake the following actions in order to maintain the current level of financial ratios and to enhance IEDI:
 - a. Increasing the potential of regional income.
 - b. Effectively and efficiently conducting local tax and levy collection.
 - c. Making thorough and measured expenditure planning.
 - d. Achieving efficiency in budget usage, for example, by reducing unproductive or inefficient expenditures.
 - e. Conducting strict oversight and control over expenditures.
 - f. Further research would be enhanced by the use of additional financial ratios as independent variables to ascertain the impact on the Inclusive Economic Development Index, thereby achieving more comprehensive results.

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CHAPTER 5

The Impact of Enterprise Resource Planning and Critical Factors on Financial Reporting Quality

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ABSTRACT

The quality of financial reporting is crucial for transparency and corporate accountability, significantly impacting investment decisions. Although instances of poor financial reporting have been noted, the integration of advanced information technology, such as Enterprise Resource Planning (ERP) systems, can enhance financial reporting quality by reducing business complexity and improving decision-making processes.

This research aims to examine the impact of enterprise resource planning (ERP) implementation, top management support, and user competence on the financial reporting quality. The samples were obtained through purposive sampling method, selecting 175 ERP users involved in financial reporting within Indonesian companies that have implemented ERP systems for a minimum of 2 years. The research method used is Structural Equations Model - Partial Least Squares (SEM-PLS). The results indicate that top management support and user competence have a positive and significant effect on ERP implementation, and ERP implementation, in turn, has a positive and significant impact on the quality of financial reporting. This study can contribute to a better understanding for practitioners, academics, and regulators regarding critical factors influencing the success of ERP implementation, thereby facilitating the creation of high-quality financial reporting.

Keywords: Financial reporting quality, Enterprise resources planning, Top management support, User competence.

1. INTRODUCTION

The quality of financial reporting is a key aspect of transparency and corporate accountability. Around the world, there are demands for a clear and comprehensive definition of financial reporting quality. Financial reporting quality is essential because it can influence users' investment decisions, and increase market efficiency (Herath et al., 2017).

The phenomenon of financial reporting quality is an intriguing subject for further study. Recently, there has been a significant increase in cases related to poor financial reporting quality. Association of Certified Fraud Examiners (ACFE 2022) revealed 2,110 cases of fraud in 133 countries, resulting in losses totaling more than US\$ 3.6 trillion. According to the report, fraud schemes in financial reports are the most infrequent incidents (accounting for 9.00%), but they had the most significant average financial loss, amounting to US\$ 593,000.00. The low quality of a report can stem from a lack of accounting understanding from the financial report producer or whether the system is not yet optimal in terms of financial accounting information (Yuliani et al., 2010). Correspondingly, Paula et al. (2021) show that the quality of financial information depends on the accounting information system and internal control.

In the new era of Industry 5.0, the use of information technology is an important aspect that cannot be ignored by business companies in order to make quick and accurate decisions. Organization environment that accomodates innovation technology would maximize change successfully for comprehensive integration (Bradford et al., 2014). On a company scale there is tendency of business complexity, therefore, an integrated system is needed that connects various function and business units. Generally, companies face difficulty in integrating various function organization in order to make the right decisions. In situation like this, there is ERP systems that can manage the entire company's information system so that it can facilitate decision maker which appropriate for continuity organization (Chofreh et al., 2014).

Enterprise Resource Planning (ERP) is a soft package that integrates module-based components including finance and accounting, supply chain management, human resources, and other modules, into a single unit (Elbardan & Kholeif, 2017; Romney & Steinbart, 2018). ERP system capable reduce the complexity of business processes because it integrates functional areas, data, and processes along the value chain (Caserio & Trucco, 2018).

One of the factors for the successful implementation of ERP is user competence (Sastrodiharjo & Khasanah, 2023). Employee expertise as end-users plays an important role in this aspect because, in practice, information technology systems often fail to present accurate information, resulting in less-than-optimal benefits for the company. This issue occurs because users may lack proficiency in system operation. As technology advances, users must upgrade their expertise in operating systems. Enhancing user competence can be achieved through various methods, including specialized education and training in accounting information systems, particularly ERP.

ERP implementation involves changing system software use and transforming entire business practices. Therefore, top management must fully support (financially and non-financially) to emphasize the priority of ERP implementation (Somers and Nelson, 2004). Management must recognize the project's importance and ensure both financial and morale

support for the team (Barth & Koch, 2019). In addition, management needs to ensure that the plan is communicated to and understood by the entire company (Dezdar & Ainin, 2011).

Based on numerous research findings, there is a positive linkage between top management support and ERP implementation (AL-Shboul, 2019; Oliveira et al., 2014). Conversely, many projects fail due to resistance from organizational management (Kuo, 2011). Top management support has been validated as a key element to overcome organizational obstacles and ensure the effective application of IT. This occurs because full support from top management allows for better visibility and control over IT projects (Elbanna, 2013). Additionally, the dedication and support of top management help maintain employee motivation (Francoise et al., 2009). Jayeola et al. (2022) stated that top management support in the form of resources provision and change management may be the best mechanism for successfully implementing ERP. Furthermore, the success of the implementation can lead to reduced operational costs, increased return on investment, and improved profitability. This aligns with findings that the quality of financial reporting is associated with investment efficiency (Yo et al., 2013) and company profitability (Ardianto et al., 2021).

Sastrodiharjo and Khasanah (2023) revealed that personal competence significantly influences ERP implementation. Similarly, AlMuhayfith and Shaiti (2020) show the linkage between the successful use of ERP systems and business performance. Youssef and Mahama (2021) confirm the positive impact of using ERP systems on management accounting, including budgeting, cost determination, and performance evaluation.

From the explanation above, we highlight the relationships between accounting information systems and financial performance. However, there remains a gap in the related literature concerning ERP implementation's impact on the quality of financial reporting due to lack of research. This study aims to contribute by integrating several variables from previous studies: top management support, user competence, ERP, and financial reporting quality. Additionally, it will involve adjustments and developments in several indicators, using samples of companies that utilize ERP systems in Indonesia.

This research aims to test whether ERP implementation, top management support, and ERP user competence influence the quality of financial reporting. Furthermore, this study contributes to the conceptual development of the topic in the fields of accounting information systems and financial reporting, providing insights and a deeper understanding. This research also highlights managerial implications, offering practical suggestions and guidelines for organizations to improve the quality of financial reporting through ERP.

2. LITERATURE REVIEW

2.1. Theoretical Study and Conceptual Framework

The agency theory posits that an agency relationship occurs when one or more individuals (owners or principals) hire another individual (agent) to provide a service and subsequently delegate decision-making authority to that agent (Jensen and Meckling, 1976). The agency theory emphasizes the importance of company owners (shareholders) delegating the management of the company to professionals known as agents. These agents possess a deeper understanding of managing business operations (Tandiontong, 2015). Consequently,

agents have the freedom to take actions in managing the company. With this autonomy, professionals (agents) with personal interests may strive to optimize their own management profits, while the company owners bear the burden of the company's responsibilities. This situation is triggered by an information imbalance between management and stakeholders, including company owners, who do not have access to or information about all management activities (Sutedi, 2011).

High-quality financial reporting is crucial for principals as it influences investment decision-making (Herath et al., 2017). Financial reports are considered high-quality when the information presented in the report is well-organized, accurate according to accounting principles, and easily understood by information users. To generate relevant and reliable information, it is influenced by the quality of the accounting information system within the company (Sacer & Oluic, 2013). The implementation of ERP is believed to reduce information asymmetry within an organization managed by agents.

Several studies have revealed that the success of ERP implementation depends on various factors, including top management support (Jayeola et al., 2022; Al-Shboul, 2018; Oliveira et al., 2014). Because the most crucial stage for the success of system planning is the early stage, which involves obtaining full support from top management (Wilkinson, 2009). ERP enhancement projects not only incur significant costs but also often involve substantial changes in organizational and technical aspects (Barth & Koch, 2019). Meanwhile, ERP implementation is significantly influenced by the competence of the employees using it (Sastrodiharjo & Khasanah, 2023).

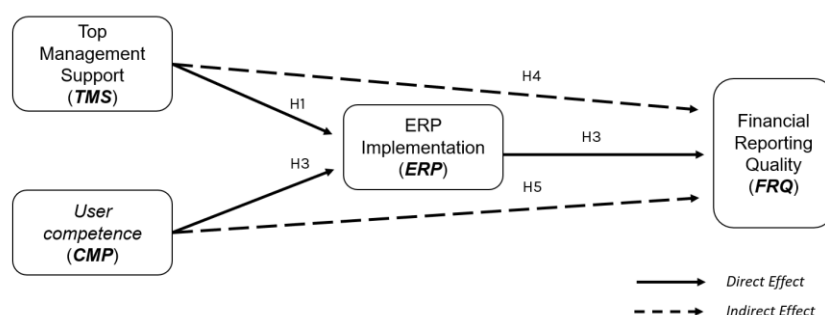


Figure 1. Conceptual framework

2.2. Hypothesis Development

2.2.1. Top Management Support on ERP Implementation and Financial Reporting Quality

The top manager is the person responsible for making decisions and establishing plans and goals that impact the entire organization (Robbins & Coulter, 2016). Jin (2002) argues that the extent of support provided by top management will influence improvements in the performance of the accounting information system. Top management support can also be interpreted as the understanding held by company leaders regarding computer systems, as well as their level of interest, support, and knowledge about information systems (Lee & Kim, 1992). Ngai et al. (2008) argue that support from top management plays a crucial role in the success of ERP implementation. This is because the implementation of ERP systems generally involves large-scale efforts and requires significant resource allocation.

Agency theory indicates that there is a potential conflict of interest between the owners (principals) and the managers or employees (agents) responsible for ERP implementation. Principals typically desire optimal results from ERP investments, while agents may have different personal motivations. Support from top management (acting as principals) can help mitigate these conflicts of interest by providing clear guidance for the successful implementation of ERP.

Consistent with these studies, Darma et al. (2018) demonstrated the significant role of management support in the quality of financial accounting information systems. Research by AlMuhayfith and Shaiti also successfully indicated that management support, user satisfaction, and training have a significant impact on ERP usage. Shao et al. (2017) assessed that top management leadership, both in transactional and transformational forms, influences the ERP system assimilation process.

On the other hand, Rashid (2020) concluded that top management consisting of accounting experts has a positive and significant impact on the quality of financial reporting. Based on the presentation of previous research, the hypotheses can be formulated as follows:

H1: Top management support has a positive effect on ERP implementation.

H4: Top management support has a positive effect on financial reporting quality through ERP as an intervening variable.

2.2.2. User Competence on ERP Implementation and Financial Reporting Quality

The use of ERP systems needs to be supported by users who are competent in information technology, especially in ERP systems. The success of an implementation is influenced, among other factors, by the personal competence of those involved (Sastrodiharjo & Khasanah, 2023). Less competent employees can increase the risk of ERP projects, such as implementation failures, delays, or data security issues. Agency theory emphasizes the importance of reducing agency risks through incentives and monitoring. By having competent employees, the risks associated with ERP projects are expected to be minimized. The presence of users with a thorough understanding of ERP system operations will facilitate the execution of tasks. Consequently, the presentation of accounting information will be more optimal, as it is carried out by individuals who are experts in their field.

Research by Mardiah (2013) and Evania (2016) demonstrates that the quality of accounting information is influenced by the competence of its users. Evicahyani & Setiawina (2016) indicate that human resource competence positively and significantly impacts the quality of financial reports. Improvements in human resource quality enhance the reliability of financial reports and vice versa (Anggadini et al., 2021). Thus, hypotheses can be formulated as follows:

1: User competence has a positive effect on ERP implementation.

2:

1: User competence has a positive effect on financial reporting quality

5: through ERP as an intervening variable.

2.2.3. ERP Implementation on Financial Reporting Quality

Romney & Steinbart (2018) state that a company's business processes require controlled accounting processes that can provide quality and reliable information. The sophistication of

information technology and internal control systems has a positive impact on the quality of financial reports (Putra et al., 2021). By using ERP systems, optimal integration in accounting processes can be achieved, resulting in accurate information (Granlund, 2011). The implementation of ERP systems in a company impacts accounting processes (Widyaningdyah, 2019). This impact is more focused on non-financial performance indicators, internal audit functions, and profitability analysis methods per product. The implementation of ERP systems also provides opportunities for companies to improve and modify the information systems and accounting practices they follow (Spathis and Constantinides, 2004).

The implementation of ERP is expected to improve the quality of the company's financial reports, reduce the closing period, accelerate the presentation of financial reports, and enhance the decision-making process. As found in Kuntum's research (2019), the implementation of ERP systems significantly influences the quality of accounting information. Barna et al. (2021) highlight the crucial role of ERP systems in an organization in terms of performance and improvement of financial and non-financial reporting. Additionally, Youssef & Mahama (2021) found a positive impact of using ERP systems on budgeting practices, cost determination, and performance evaluation. Thus, a hypothesis can be formulated as follows:

H₃ ERP implementation has a positive effect on the quality of financial reporting.

3. RESEARCH METHOD

3.1. Data and Sample

This research employs primary data collected through a questionnaire method. The population comprises all ERP users involved in financial reporting within Indonesian companies. Sample selection utilizes a purposive sampling method, involving the selection of samples based on specific characteristics and criteria. The sample size consisted of 175 respondents, selected based on the following criteria:

- 1) ERP users actively involved in the financial reporting process (including both financial statements and supporting financial reports) within Indonesian companies.
- 2) Users employed in companies that have utilized ERP systems for a minimum of two accounting periods.

3.2. Variables Definition

Top Management Support (TMS)

According to Mulyana & Wasitowati (2015), benchmarks for top management support (TMS) include understanding, endorsement, leadership, motivation, and identity. Laudon and Laudon (2017) emphasize that management support must ensure adequate funding and resources for the successful implementation of system projects. Darma et al. (2018) further categorize top management support into four aspects: provision of human resources, hardware, software, and necessary funds. Therefore, the indicators for the TMS variable in this study include infrastructure provision (TMS1), human resources (TMS2), funds (TMS3), and policies supporting ERP implementation (TMS4). Measurement is conducted using a Likert scale ranging from 1 to 6.

User Competence (CMP)

Competence refers to the ability to perform a job based on skills and knowledge, supported by the necessary work attitudes (Wibowo, 2016). It is developed through acquired knowledge and skills gained from work experience (Yasin, 2021). Competence encompasses various aspects including knowledge, understanding, skills, values, attitudes, and interests (Sugiyanto & Sanntoso, 2018), as well as the proactive initiative to support implementation (Sastrodiharjo & Khasanah, 2023). The Competence (CMP) variable in this study includes the following indicators: skills (CMP1), experience (CMP2), training (CMP3), and the initiative attitude to support implementation (CMP4). Measurement is conducted using a Likert scale ranging from 1 to 6.

ERP Implementation (ERP)

ERP (Enterprise Resource Planning) is a software package designed to integrate the core business processes of a company (Romney & Steinbart, 2018). ERP encompasses all internal functions of a company, run by a set of integrated software modules to support the company's business processes (O'Brien and Marakas 2010). The ERP indicators (Sastrodiharjo & Khasanah, 2023) consist of accuracy (ERP1), integration (ERP2), comprehensiveness (ERP3), accessibility (ERP4), and availability of completed processes (ERP5). Measurement is conducted using a Likert scale (1-6).

Financial Reporting Quality (FRQ)

The quality of financial reporting refers to the preparation of financial statements in accordance with standards to accurately depict the actual situation. In this study, financial reporting quality (FRQ) is evaluated using six indicators derived from the FASB conceptual framework (Herath et al., 2017): relevance (FRQ1), faithful representation (FRQ2), understandability (FRQ3), comparability (FRQ4), verifiability (FRQ5), and timeliness (FRQ6). Measurement is conducted using a Likert scale ranging from 1 to 6.

3.3. Economic Modeling

This research adopts a causal study design with a quantitative approach used to test hypotheses. Causal research aims to identify the influence between at least two or more variables and seeks cause-and-effect relationships (Peter and Olson, 2014). In causal studies, researchers are interested in explaining one or more factors that cause a problem (Sekaran and Bougie, 2017).

Based on the variables mentioned, the model can be applied as follows:

$$ERP = \beta + \beta_1 TMS + \beta_2 CMP + \varepsilon$$

$$FRQ = \beta + \beta_1 ERP + \varepsilon$$

Explanation:

FRQ : Financial Reporting Quality

TMS : Top Management Support

CMP : User Competence

ERP : ERP Implementation

3.4. Data Analysis Method

Data analysis involves descriptive statistical analysis and Structural Equation Modeling (SEM-PLS). Descriptive statistics are employed to profile the sample data before applying

statistical analysis techniques for hypothesis testing (Ghozali, 2018). Meanwhile, Structural Equation Modeling (SEM) enables researchers to model and estimate complex relationships among several dependent and independent variables simultaneously (Hair et al., 2021). SEM-PLS specifically involves the linear combination of measurement model indicators to create composite variables (Hair & Sarstedt, 2019).

4. RESULT AND DISCUSSION

4.1. Descriptive Analysis

The questionnaire was distributed to 240 ERP system users in Indonesia through various social media platforms. A total of 211 questionnaires were returned, with only 175 from 116 different companies meeting the criteria.

The demographic data of respondents (Table 1) show that respondents who participated in the research consisted of male as much as 56.57%, while female were 43.43%. In terms of age groups, most research participants fall within the 26-30 age range, reaching 34.29%, followed by the 31-40 age group at 31.43%. Regarding educational attainment, the majority of respondents have a bachelor's degree (75.43%). In terms of job positions, the majority of respondents hold staff-level positions (44%), followed by supervisors (27.43%). The highest number of respondents comes from the finance & accounting department (71.43%). The company's sector classification is predominantly within the Consumer Non-Cyclicals/Primary and Consumer Cyclicals/Non-Primary sectors, each accounting for 22.29% of the respondents. The Industrials sector also had significant representation, with 18.86% of the total respondents. The majority of respondents have been using ERP for 2-5 years, totaling 47.43%. Regarding ERP brands, SAP (S/4HANA/Business One) dominates with a percentage of 31.43%, followed by Oracle with a percentage of 26.29%.

Table 1. Demography of respondent

	<i>Frequency</i>	<i>Percentage</i>
Gender		
Male	99	56,57%
Female	76	43,43%
Age		
20-25 year	39	22,29%
26-30 year	60	34,29%
31-40 year	55	31,43%
41-50 year	15	8,57%
> 50 year	6	3,43%
Education		
Senior high school	5	2,86%
Diploma	13	7,43%
Bachelor's degree	132	75,43%
Master's degree	25	14,29%
Position		
Staff	77	44,00%
Supervisors	48	27,43%

	<i>Frequency</i>	<i>Percentage</i>
Team Leader	4	2,29%
Assistant Manager	13	7,43%
Manager	23	13,14%
Assistant Director/ Head /General Manager	6	3,43%
Director	2	1,14%
Others	2	1,14%
Division/ Department		
Finance & Accounting	125	71,43%
IT	15	8,57%
Tax	13	7,43%
Procurement/Purchasing	7	4,00%
Audit	4	2,29%
Production/ Manufacturing	3	1,71%
Cost Control Management/ Costing	2	1,14%
Others	4	3,43%
Sector Classification		
Energy	10	5,71%
Basic Materials	5	2,86%
Industrials	33	18,86%
Consumer non-cyclicals/primary	39	22,29%
Consumer cyclicals /non-primary	39	22,29%
Healthcare	13	7,43%
Technology	10	5,71%
Infrastructures	20	11,43%
Transportation & logistic	3	1,71%
Others	3	1,71%
Duration Implementation ERP		
2 – 5 years	83	47,43%
> 5 - 10 years	42	24,00%
> 10 years	50	28,57%
Brand ERP		
Oracle (EBS/Fusion/Netsuite)	46	26,29%
SAP (S/4HANA/ Business One)	55	31,43%
Infinity	11	6,29%
JASPER	9	5,14%
Microsoft Dynamics	12	6,86%
Odoo	9	5,14%
Others ERP	33	18,86%

The descriptive analysis (Table 2) indicates that respondents tend to provide relatively high ratings for each measured aspect in this study. The average values range from 4.811 to 5.206, with a median value of 5.000. This suggests that, overall, respondents have a positive perception of the measured aspects. The standard deviation for the variables tends to be in the range of 0.866 to 1.128, indicating a relatively homogeneous distribution of values.

Table 2. Descriptive statistics

Item	Indicator	Mean	Median	Min	Max	Std. deviation
TMS1	Infrastructure	5.206	5.000	1.000	6.000	0.903
TMS2	Human resource	5.086	5.000	1.000	6.000	1.019
TMS3	Funds	5.063	5.000	1.000	6.000	0.945
TMS4	Policy	5.149	5.000	1.000	6.000	0.888
CMP1	Skill	4.977	5.000	1.000	6.000	0.868
CMP2	Experiences	4.846	5.000	1.000	6.000	1.123
CMP3	Training	4.937	5.000	1.000	6.000	0.998
CMP4	Initiative	5.114	5.000	1.000	6.000	0.919
ERP1	Accuracy	4.903	5.000	1.000	6.000	1.024
ERP2	Integrated	4.909	5.000	1.000	6.000	1.128
ERP3	Comprehensive	4.903	5.000	1.000	6.000	1.057
ERP4	Easily Accessible	4.949	5.000	1.000	6.000	1.076
ERP5	Availability of completed	4.811	5.000	1.000	6.000	1.092
FRQ1	Relevance	5.029	5.000	1.000	6.000	0.884
FRQ2	Faithful representation	5.126	5.000	1.000	6.000	0.866
FRQ3	Understandability	5.011	5.000	1.000	6.000	0.926
FRQ4	Comparability	5.120	5.000	1.000	6.000	0.921
FRQ5	Verifiability	5.149	5.000	1.000	6.000	0.920
FRQ6	Timeliness	5.040	5.000	1.000	6.000	0.946

4.2. Results Analysis

4.2.1. Measurements Model (Outer Model)

In the validity test, the results indicate that the outer loading factor values of all items (Table 3) are > 0.70 , confirming the convergent validity of all items (Hamid & Anwar, 2019; Savitri et al., 2021). The Average Variance Extracted (AVE) values after bootstrapping are as follows: TMS is 0.748, CMP is 0.727, ERP is 0.839, and FRQ is 0.832 (Table 4). These AVE values, all > 0.50 , confirm the discriminant validity of all items (Hamid & Anwar, 2019; Savitri et al., 2021).

In the reliability test, the values of Cronbach's Alpha and Composite Reliability for all variables are > 0.70 . Therefore, all items of the variables are considered reliable (Hamid & Anwar, 2019; Savitri et al., 2021).

Table 3. Cross loading and outer loading

Construct	Items	Cross Loading				Outer Loading (> 0.7)	Results
		TMS	CMP	ERP	FRQ		
TMS	TMS1 Infrastructure	0.881	0.529	0.655	0.672	0.881	Accept
	TMS2 Human resources	0.838	0.433	0.590	0.584	0.838	Accept
	TMS3 Funds	0.863	0.467	0.556	0.610	0.863	Accept

Construct	Items	Cross Loading				Outer Loading (> 0.7)	Results
		TMS	CMP	ERP	FRQ		
CMP	TMS4 <i>Policy</i>	0.877	0.481	0.604	0.666	0.877	Accept
	CMP1 <i>Skills</i>	0.481	0.892	0.570	0.596	0.892	Accept
	CMP2 <i>Experiences</i>	0.426	0.841	0.502	0.530	0.841	Accept
	CMP3 <i>Training</i>	0.440	0.883	0.450	0.577	0.883	Accept
	CMP4 <i>Initiative</i>	0.544	0.791	0.462	0.524	0.791	Accept
ERP	ERP1 <i>Accuracy</i>	0.648	0.524	0.915	0.734	0.915	Accept
	ERP2 <i>Integrated</i>	0.652	0.489	0.909	0.659	0.909	Accept
	ERP3 <i>Comprehensive</i>	0.635	0.509	0.916	0.717	0.916	Accept
	ERP4 <i>Easily Accessible</i>	0.625	0.634	0.909	0.750	0.909	Accept
	ERP5 <i>Availability of completed</i>	0.636	0.524	0.933	0.739	0.933	Accept
FRQ	FRQ1 <i>Relevance</i>	0.663	0.632	0.809	0.902	0.902	Accept
	FRQ2 <i>Faithful representation</i>	0.680	0.614	0.702	0.937	0.937	Accept
	FRQ3 <i>Understandability</i>	0.618	0.567	0.659	0.879	0.879	Accept
	FRQ4 <i>Comparability</i>	0.721	0.600	0.709	0.929	0.929	Accept
	FRQ5 <i>Verifiability</i>	0.676	0.597	0.703	0.924	0.924	Accept
	FRQ6 <i>Timeliness</i>	0.652	0.560	0.704	0.899	0.899	Accept

Table 4. Validity and reliability on construct

	Cronbach's Alpha (> 0.7)	Composite Reliability (> 0.7)	Average Variance Extracted (> 0.5)
TMS	0.888	0.922	0.748
CMP	0.874	0.914	0.727
ERP	0.952	0.963	0.839
FRQ	0.959	0.967	0.832

4.2.2. Structural Model (Inner Model)

The R Square value for the ERP variable is 0.544, indicating that the CMP variable and the TMS variable can explain the ERP variable by 54.4%. Therefore, the model is considered moderate (capable of explaining a significant portion of the variation in the ERP variable). Meanwhile, the R Square value for the FRQ variable is 0.619, indicating that the ERP variable can explain the FRQ variable by 61.9%. Therefore, the model is also considered moderate.

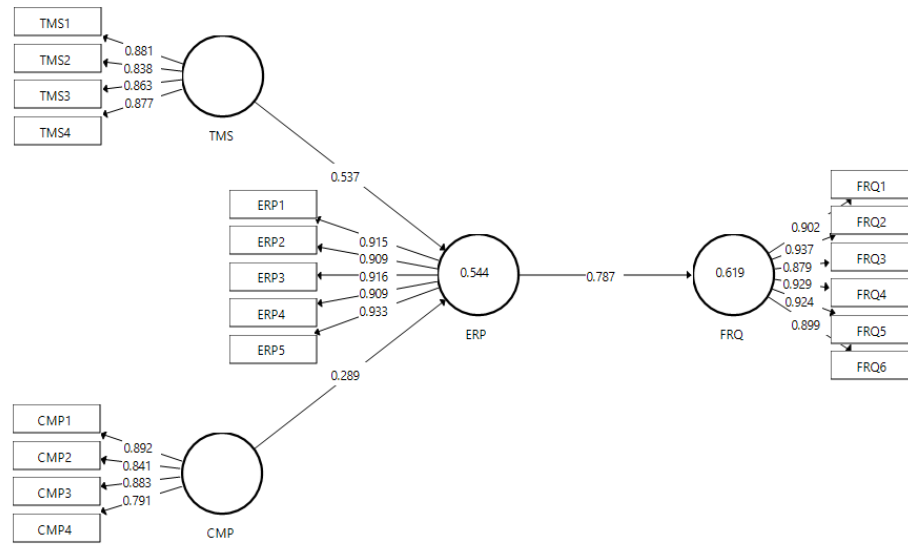


Figure 2. Structural equation model - PLS

Tabel 5. Path Coefficient - Mean, STD Dev, T Values, P values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics	P values	Result
<i>Direct Effect</i>						
H1: TMS → ERP	0.537	0.534	0.077	7.004	0.000	Significant
H2: CMP → ERP	0.289	0.296	0.081	3.564	0.000	Significant
H3: ERP → FRQ	0.787	0.790	0.057	13.919	0.000	Significant
<i>Indirect Effect</i>						
H4: TMS → ERP → FRQ	0.422	0.425	0.083	5.102	0.000	Significant
H5: CMP → ERP → FRQ	0.227	0.233	0.064	3.577	0.000	Significant

The path coefficient value of 0.537 from TMS to ERP indicates a positive relationship between top management support (TMS) and ERP implementation (ERP). The high t-statistics value (7.004 > 1.96) with a very low p-value (0.000 < 0.05) confirms that this influence can be considered significant based on statistics. Therefore, it can be concluded that there is strong evidence to support H1.

The path coefficient value of 0.289 from CMP to ERP indicates a positive influence of user competence (CMP) on ERP implementation. The t-statistics value of 3.564 (> 1.96) and a very small p-value (0.000 < 0.05) indicate that the influence of the CMP variable on ERP is considered statistically significant. Therefore, it can be concluded that H2 is accepted.

The path coefficient value of 0.787 from ERP to FRQ, indicates a positive relationship between ERP implementation and Financial Reporting Quality (FRQ). The t-statistics value (13.919 > 1.96) with a p-value (0.000 < 0.00) confirms that this influence is considered

statistically significant. Therefore, it can be concluded that there is strong evidence to support H3.

The path coefficient value for TMS \rightarrow ERP \rightarrow FRQ is 0.422, indicating a positive indirect influence of top management support on financial reporting quality (FRQ) mediated by ERP implementation. The t-statistics value (5.102 > 1.96) with a p-value (0.000 < 0.05) confirms that this influence is considered statistically significant, thus supporting H4. Similarly, the path coefficient value for CMP \rightarrow ERP \rightarrow FRQ is 0.227, showing a positive relationship between user competence and financial reporting quality (FRQ) with ERP as an intervening variable. The t-statistics value (3.577 > 1.96) with a p-value (0.000 < 0.05) confirms the statistical significance of this influence. Therefore, it can be concluded that there is strong evidence to support H5.

4.3. Discussion

4.3.1. Impact of Top Management Support on ERP

The results of the hypothesis testing indicate a significant positive effect of top management support (TMS) on ERP implementation. Therefore, these findings support the first hypothesis (H1), which states that top management support has a positive effect on ERP implementation. In other words, the greater the support from top management, the more successful the ERP implementation is likely to be.

The empirical evidence in this study strengthens the findings from previous research emphasizing the positive relationship between top management support and ERP implementation (AL-Shboul, 2019; Oliveira et al., 2014). Similarly, the findings of Jayeola et al. (2022) state that top management support in resource provision is a key mechanism for the success of ERP implementation. This support includes the provision of human resources, IT infrastructure, funds, and policy formulation that encourages the success of ERP system implementation (Darma et al., 2018; Laudon & Laudon, 2017). These results are consistent with the literature highlighting the importance of financial and non-financial support from top management to ensure the success of ERP implementation (Somers & Nelson, 2004; Barth & Koch, 2019).

4.3.2. Impact of User Competence on ERP Implementation

The results of the analysis in hypothesis 2 testing indicate a positive and significant influence between user competence (CMP) and ERP implementation. Therefore, these results support the second hypothesis (H2), stating that user competence has a positive effect on ERP implementation. In other words, the greater the user competence in ERP, the more successful the ERP implementation will be.

The findings from previous research support these results. Sastrodiharjo & Khasanah (2023) state that the success of ERP implementation is influenced by the competence of individuals involved. Noor & Qureshi (2022) emphasize the importance of user competence in mitigating ERP project risks. Employees with skills and knowledge about ERP systems can minimize risks and make implementation more efficient (Wibowo, 2016; Qureshi, 2022). This competence includes skills, user experiences, training undertaken by users, and their initiatives to ensure the success of ERP implementation (Yasin, 2021; Sastrodiharjo &

Khasanah, 2023). These results also strengthen the understanding that user readiness and capability in operating ERP systems play a crucial role in achieving successful implementation.

4.3.3. Impact of ERP Implementation on Financial Reporting Quality

The analysis results for hypothesis 3 (H3) show that ERP implementation significantly influences the quality of financial reporting. This aligns with the literature and previous research findings that support the positive relationship between these two variables. ERP systems are implemented to integrate organizational functions, including financial and accounting modules, with the goal of increasing efficiency and accuracy of financial information (Elbardan & Kholeif, 2017; Romney & Steinbart, 2018). This system can also improve internal control and provide quality information (Putra et al., 2021). Consistent with the findings of Kuntum (2019), which showed that ERP system implementation positively affects the quality of accounting information.

This research shows that the success of an ERP implementation is identified by the accuracy in presenting data and the seamless integration capabilities among functional units. This allows the system to cover all aspects needed in financial reporting, accompanied by ease of access to the required information (Sastrodiharjo & Khasanah, 2023). Consequently, high-quality financial reporting can be achieved.

4.3.4. Impact of Top Management Support and User Competence on the Financial Reporting Quality with ERP Implementation as a Mediator

Path analysis proves that there is a positive and significant effect from top management support (TMS) on the quality of financial reporting through ERP implementation (H4) and from user competence (CMP) on the quality of financial reporting through ERP implementation (H5). These results confirm the concept that top management support and user competence not only have a direct impact on ERP implementation but also, through ERP implementation, can enhance the quality of financial reporting.

These findings are consistent with previous research highlighting the crucial role of top management support in enhancing internal control and financial information accuracy (Putra et al., 2021; Sastrodiharjo & Khasanah, 2023). On the other hand, the results also align with previous studies emphasizing the importance of human resource quality in improving the reliability of financial reports (Anggadini et al., 2021; Evicahyani & Setiawina, 2016). ERP implementation can act as a mediator connecting these two critical factors (TMS & CMP) to the quality of financial reporting. This insight provides further understanding of the significant role of ERP implementation in enhancing financial aspects of a company.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This research makes a significant contribution in understanding the relationship between ERP implementation and financial reporting, and also the factors that influence the implementation of Enterprise Resource Planning (ERP) in a specific context. Using the SEM-PLS approach, hypothesis testing indicates a positive and significant influence of Top Management Support (TMS) and User Competence (CMP) on ERP implementation and a

positive and significant influence of ERP implementation on financial reporting. These results also highlight the role of ERP implementation as a mediator in the indirect effect of top management support and user competence on the quality of financial reporting.

The findings of this research have strategic implications, where top management support and user competence emerge as critical factors that can enhance the chances of ERP implementation success. Management strategies should continually prioritize open communication and financial support to facilitate ERP implementation. Meanwhile, investments in user competence development, including training and ERP skills development, can strengthen organizational adaptability to the new system.

5.2. Limitations and Recommendations

This study acknowledges certain limitations. Firstly, the research was conducted with a sample size of 175 respondents, which may not encompass all possible variations that could occur in an organization. Therefore, further research could expand on this with a larger and more diversified sample. Secondly, this study focused on the variables of top management support and user competence as key factors in ERP implementation, without considering other variables that might influence implementation outcomes, such as organizational policies, company culture, and technological infrastructure. Further research could explore the role of potential moderating variables that might moderate the relationships between top management support, user competence, ERP implementation, and the quality of financial reporting.

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CHAPTER 6

Technology for Using Vegetable Oil Surfactant in Facing Future Challenges in Indonesia

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ABSTRACT

Oil and natural gas are energy sources that still dominate for daily needs such as transportation, electricity generation, household needs, etc. Indonesia is one of the oil and natural gas producing countries. However, so far only 50% of oil and natural gas in Indonesia have been produced, therefore there are still many reserves remaining. The solution that can be made to increase oil and natural gas production are enhanced oil recovery (EOR) technology. One method of EOR technology is injection using chemicals or chemical flooding. This research was conducted to develop surfactants made from vegetable oil, namely palm oil, as a substitute for chemicals in enhanced oil recovery (EOR) technology. The development uses surfactants based on palm oil because it wants to utilize the large natural resources of palm oil in Indonesia. And it can be a solution to the challenge of making the environment better in the future because this surfactant is made from biodegradable vegetable oil. The method used to prove that palm oil surfactants can be a solution for chemical EOR technology

is core flooding. In this research, core flooding was carried out in the enhanced oil recovery (EOR) laboratory using berea sandstone cores as reservoir rock samples, crude oil 33 API and palm oil surfactant with a concentration of 1.5%. Recovery factor (RF) is the ratio of the amount from oil or gas that can be recovered to the initial amount of oil or gas in the reservoir. This RF value can indicate the success of EOR technology. The RF of palm oil surfactant concentrated 1.5% after flooding trials obtained results of 4.4%. The development of technology for using surfactants made from vegetable oil from palm oil can be applied as a substitute for chemicals in EOR technology. This is because these surfactants have been proven to increase petroleum production.

Keywords: Enhanced oil recovery (EOR) technology, Chemical flooding, Vegetable oil surfactants, Palm oil methyl ester sulfonate (MES) surfactants, Core flooding, Recovery factor (RF).

1. INTRODUCTION

Indonesia is one of the countries that still relies heavily on fossil energy (petroleum, natural gas and coal) for daily activities or electricity generation and so on. Indonesia is also a country that produces petroleum from its natural wealth, but the petroleum produced is not sufficient for the country's needs due to high demand (Firmansyah & Bagus Indrajaya, 2022). In fact, based on data from the Indonesian Ministry of Energy and Mineral Resources, currently only 50% of oil has been produced from the total reserves in Indonesia. So there are still a lot of oil and natural gas reserves in Indonesia but there has not been exploration or optimization of production from existing wells. Optimizing petroleum production can be hampered because petroleum cannot flow due to decreased reservoir pressure (Eni et al., 2017). This can be overcome by implementing enhanced oil recovery (EOR) technology.

2. LITERATURE REVIEW

A reservoir is a place where hydrocarbon fluids consisting of oil and gas are accumulated and stored. Reservoirs are found in rocks below the earth's surface which have different rock characteristics and fluid characteristics (Afif & Firsandi, 2018). In petroleum, the production process of petroleum in wells in oil and gas fields is greatly influenced by the natural pressure of the reservoir (Ahmed, 1946). Natural flow in production wells occurs when reservoir pressure is able to push oil to the surface. However, as time goes by and naturally the pressure of this reservoir will decrease so that it is no longer able to push petroleum to the surface. This results in the reservoir still having oil remaining that has not been produced. Enhanced oil recovery (EOR) technology is a technology that can be applied to increase oil recovery by producing the remaining oil in the reservoir (Majidaie et al., 2011). The quantitative amount of oil recovery in a reservoir is called the recovery factor (RF) in percentage (Dandekar, 2013). RF is a comparison between the amount of petroleum that has been produced and the total reserves found in the reservoir.

Enhanced oil recovery (EOR) technology is a method used to increase oil recovery using one or several methods originating from energy outside the reservoir (Ansyori, 2018). EOR is the tertiary stage of the production of a petroleum well and when EOR technology is implemented it is hoped that it will increase RF. One of the EOR technologies is chemical injection. Chemical injection is a method carried out by injecting chemicals into the injection water so that it will increase oil recovery (Kristanto & Wibowo, 2010). The chemicals used for EOR are surfactants, polymers and alkalis. Surfactants are chemicals commonly used for EOR technology.

Surfactant (surface active agent) is a surface active material which functions to reduce the interfacial tension between oil and water in the reservoir thereby increasing the mobility of the remaining oil (Green & Willhite, 1998). The surfactants commonly used for the EOR process are petroleum-based surfactants. This research aims to develop a new technology for surfactants, namely methyl ester sulfonate (MES) surfactants made from palm oil. The palm oil farming industry in Indonesia is very large. Palm oil is a vegetable oil that contains high levels of fatty acids so it has the potential to become a methyl ester sulfonate (MES) surfactant (Nuryanto, 2014). This palm oil MES surfactant is also more environmentally friendly compared to commercial surfactants. With research into the development of MES

surfactant technology with palm oil, it is hoped that it will be able to increase the selling value of palm oil in Indonesia and maintain environmental stability for Indonesia's future.

3. RESEARCH METHOD

The methodology used for this research was experimental, carried out on a laboratory scale. For the EOR process, the core flooding experiment is an experiment carried out to determine the increase in the RF (Recovery Factor) value with the selected injection method. This research uses sandstone reservoir rock core samples, intermediate crude oil 33 API, formation water salinity of 10,000 ppm and at a temperature of 60C. With these reservoir characteristics, this research aims to prove the performance of palm oil MES surfactant development technology with a concentration of 1.5% for the EOR process.

The first step is to saturate the core with 10,000 ppm brine to ensure that the core is filled with water. Sample weight and volume were measured before the core was saturated. The rock samples are then soaked in 10,000 ppm brine for at least 24 hours until no air bubbles come out of the core sample. After the brine saturation process is complete, the core sample is weighed again and the difference with the dry weight of the rock sample is calculated to determine the total brine contained in the rock sample.

After brine saturation and calculations are complete, the next step is to perform oil saturation on the core sample. This process aims to represent the core with actual reservoir conditions which, apart from being filled with water, are also filled with petroleum itself. Oil saturation is carried out by injecting oil into the core using a core holder. Then observe the amount of brine that comes out at this stage and this value indicates the amount of oil reserves or original oil in place. After the saturation process is complete, the test continues to the core flooding stage using the slug method with a volume of 3 PV (pore volume). This test consists of two stages, namely water injection and surfactant injection. After the water injection process is complete, the test continues with the surfactant injection process. From the results of core flooding, it will be seen the amount of remaining oil added using palm oil MES surfactant. The diagram flow of the core flooding experiment can be seen in Figure 1 below.

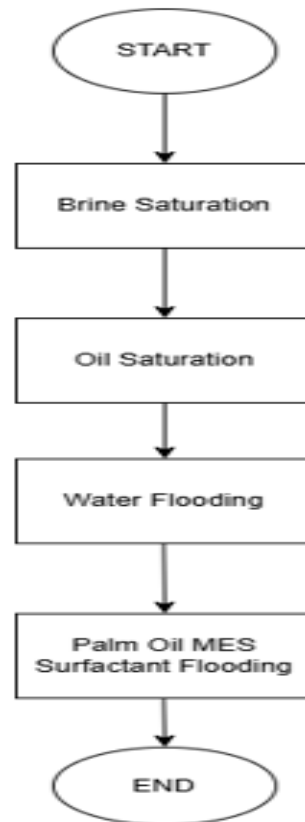


Figure 2 Flowchart of core flooding test

4. RESULT AND DISCUSSION

a. Result

The technology for developing MES surfactants based on palm oil is said to be successful if there is an increase in oil recovery when injecting the core. Core is a reservoir rock sample that is also carried out work procedures to represent the actual condition of the reservoir. When the core is saturated with brine and crude oil, core flooding experiments can be carried out and the oil reserves in the sample core will be known. The oil reserve in the core sample is the total oil in the core sample and in this study the OOIP was 2.5 ml. From these total reserves, it will be seen that there will be a large increase in oil recovery if surfactant injection is carried out.

Core flooding is divided into two stages, the first stage is water flooding. Water flooding is secondary recovery when primary recovery (natural flow) cannot be carried out (Belhaj). Water flooding was carried out at 3 PV, the pore volume of the core sample was 2.9 ml and the volume of oil obtained was 1.57 ml. The recovery factor from water flooding can be calculated by comparing the oil recovered with the total oil reserves. With the obtained volume of 1.57 ml when compared with the total oil reserves of 2.5 ml, the RF amount in water flooding is 62.8%.

After water flooding, the next step is the injection of palm oil MES surfactant with a concentration of 1.5%. The injection was carried out at 1 PV and obtained oil yield of 0.11 ml. In the same way to calculate RF in water flooding. So the RF of surfactant flooding is 4.4%. Total RF during core flooding is 67.2%.

b. Discussion

The petroleum production process is divided into three, namely the primary phase (natural flow), the secondary phase (water flooding, and the tertiary phase (EOR) (Sheng, 2011). When the natural reservoir pressure is no longer able to push the oil, then water flooding is carried out. As is done In this study, water flooding was carried out first and a good RF was obtained, namely 62.8%. Water flooding was carried out until no more oil was produced. When this condition occurs, EOR can then be carried out. In this study, surfactant flooding was used.

The surfactant used in this injection is MES surfactant based on palm oil with a concentration of 1.5%. The use of surfactants in the EOR process aims to reduce the IFT of the oil and water in the sample core. It is very important to reduce the IFT value because when the IFT is high there is tension between the oil and water so it is difficult for the oil to flow. Low oil mobility has a negative impact on oil production. It is hoped that when surfactant is injected the IFT value will be low and increase oil production. Palm oil MES surfactant 1.5% after being injected into rock sample cores was proven to be able to increase the recovery factor (RF) by 4.4% from the original value of 62.8% to 67.2%. The RF increase in injected PV can be seen in Figure 2 below.

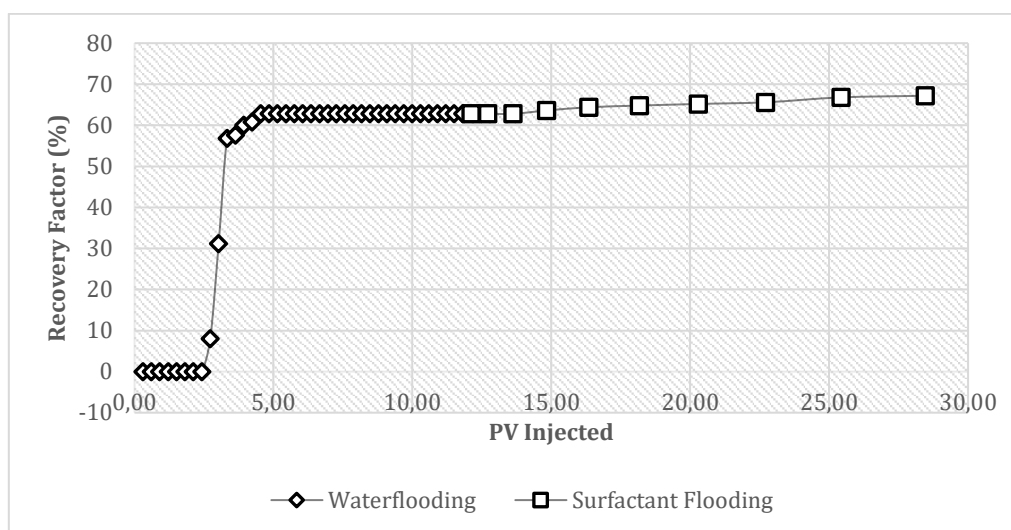


Figure 3 Recovery factor increased on the amount of PV injection

5. CONCLUSION AND RECOMMENDATION

a. Conclusion

Based on the results of experiments regarding the development of MES surfactant technology using palm oil as a base material, it was found that there was an increase in the recovery factor. Therefore, palm oil has great potential to be a substitute for commercial surfactants for the EOR process. So, using palm oil MES surfactant can make the surrounding environment better because of its biodegradable nature.

b. Recommendation

Suggestions for further research are the development of a formula for palm oil MES surfactant to increase the RF of the oil by adding co-surfactants. With palm oil MES surfactant reformulation, it is hoped that the RF after surfactant injection can be higher.

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CHAPTER 7

Antecedents and Consequences of Work-Family Conflict of Women Employees in Private Bank in South Jakarta

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ABSTRACT

This study specifically analyzes the antecedents, such as job insecurity and emotional exhaustion, and consequences, including reduced organizational commitment, of work-family conflicts among female employees in private banks in South Jakarta. The primary data used in this study is based on the distribution of questionnaires online. The sample was drawn using the purposive sampling method, and as many as 138 respondents were collected. The technique used in this research is a test instrument consisting of validity and reliability tests. The regression method using SmartPLS was used to analyze the data. The results of this study show that job insecurity and emotional exhaustion have a positive and significant effect on work-family conflicts. These findings suggest that HR professionals and policymakers should focus on reducing job insecurity and emotional exhaustion among female employees to mitigate work-family conflicts. Furthermore, the work-family conflict has a negative effect on organizational commitment but has not been proven to affect job satisfaction.

Keywords: Job insecurity, Emotional exhaustion, Work-family conflict, Job satisfaction, Organizational commitment.

1. INTRODUCTION

Work and family are the main areas for building a career in life, which allows them to play dual roles, roles at work (as employees or workers) and roles in the family (as wives, husbands, and parents). Therefore, balancing both roles become essential for working adults to minimize conflict. For instance, a woman may have to miss her child's school event due to work commitments, leading to a conflict between her role as a mother and an employee. Especially for women, their role as the backbone of the family can undoubtedly increase their burden and the possibility of extending work conflicts into the family (Ghao et al., 2013). As time goes by, earning a living in a household is done by men and women. Equal status between men and women is no longer an obstacle to a woman's career development. Therefore, it cannot be denied that the female workforce is increasing because some women have been able to develop their work abilities and skills. This shows that there are several reasons why women want to work, namely, to provide financial support, additional knowledge, and insight, to realize their abilities, and to provide independence in life. Women who are wives and work often live-in sharp conflict between roles inside and outside the family (Netemeyer, 1996).

Afrilia and Utami (2018) stated that in the modern era, women with careers are considered normal. In the past, women were only housewives who took care of their husbands and children at home. The phenomenon in society is that more and more women are helping their husbands to earn additional income, apart from being driven by the family's economic needs, women are also increasingly able to express themselves in the family and society. The family's economic status influences women's tendency to leave the house to improve the family economy, and it is no longer taboo for women to take over the task of supporting their family. Many women are the backbone of the family and become leaders of organizations or companies. Conventional roles that require women to stay at home and take complete care of household affairs are no longer relevant today. In modern life, married couples can share their household duties. However, the demands of family and work still mean that women can face work-family conflict as housewives and career women, two roles requiring attention, leading to dual role conflict.

According to Hall et al. (2010), the higher the job demands in a workplace or an organization, the greater the work and emotional pressure, which drives the level of work-family conflict to be higher, thus hampering an individual's role in the family or household. Nauman et al. (2020) researched work-family conflict and the resulting impacts. Meanwhile, Batur and Nart (2014) and Hall et al. (2010) examined the factors that cause work-family conflict. Work-family conflict can be high due to job insecurity, emotional exhaustion, and work withdrawal. In terms of job insecurity, the mechanism related to work-family conflict is a potential threat to eliminating valuable resources for employees in the form of loss of work and income to fulfill an individual's survival (Kazmi et al., 2017). The negative impact of prolonged job insecurity causes work-family conflicts to emerge. Emotional exhaustion can also affect an individual's physical and psychological health, so the emergence of emotional exhaustion felt by an individual or worker can cause severe problems and hinder the worker's attitude in work activities or the productivity of different jobs (Kerse et al., 2018).

Greenbaum et al., (2014) explained that emotional exhaustion is not just temporary emotional exhaustion but also encourages exhausted employees to distance themselves psychologically and physically from their workplace. A common way for employees to overcome emotional exhaustion is to get out of the situation. Apart from that, Wang et al. (2015) argue that if employees feel discomfort at work, then they decide to leave the company. Hall et al. (2010) explained that there is evidence of a reciprocal relationship between emotional exhaustion and work-family conflict. The higher the job demands, the greater the work and emotional pressure, which drives the higher work-family conflict. According to Liao et al. (2019), changes in family characteristics, such as increased income, couples, or single parents, can hinder life with employees having less energy and time available to do work tasks. Thus, people may experience work-family conflicts more often than before. Based on the explanation above, it is known that several things can cause work-family conflict and have a negative impact. The impact is more skewed towards female employees where the majority of them have multiple roles both at work and in the family, this situation makes it difficult for these individuals to devote their full time to the family because of the responsibilities and pressures in the office. Work-family conflict can trigger a decrease in satisfaction and commitment to the organization. Female employees with high work-family conflicts are predicted to have low job satisfaction and organizational commitment, impacting the company's success (Richter et al., 2010; Emilisa, 2018).

2. LITERATURE REVIEW

2.1. Job Insecurity

According to Riana et al. (2020), job insecurity is a form of fear and anxiety that arises from subjective perceptions about a situation where there is a possibility of losing one's job and other undesirable situations for the person or individual concerned. In the context of our research, job insecurity refers to the perceived threat of losing one's job or the uncertainty about the continuity of employment. This can be due to various factors such as economic downturns, organizational restructuring, or technological advancements that may make certain job roles obsolete. Nauman et al. (2020) explained that job insecurity is one of the causes of a person's stress in their work environment because insecurity at work can threaten the psychological and economic well-being of the employee's family. According to Darvishmotevali et al. (2017), job insecurity is also known as a condition of work stress, where job insecurity is negatively related to employee role performance, job satisfaction, job involvement, and trust and commitment of an organization or company. Pienaar et al. (2013) explained that job insecurity has two forms, namely: (1). Cognitive job insecurity, which is an employee's fear of losing his job based on his thinking that there is a possibility of losing his job, (2). Affective job insecurity is in the form of fear of losing a job as a result of anxiety that arises within the individual or employee themselves.

2.2. Emotional Exhaustion

Nauman et al., (2020) define emotional exhaustion as a condition of frustration for an individual or employee due to excessive stress and dissatisfaction with work performance. According to Churiyah (2011), emotional exhaustion is an individual's fatigue which is

related to the individual's personal feelings, characterized by a feeling of helplessness and also levels of depression. Such situations continuously accumulate and can drain an individual's energy resources. Individuals who receive relatively high levels of conflict are a source of stress and give rise to a sense of dissatisfaction with the performance or results of their work (Wittmer & Martin, 2010). According to Christianto and Putra (2016), emotional exhaustion has two characteristics: (1). An individual feels tired and has no energy, loses energy, feels frustrated and stressed until he loses his enthusiasm so that he is unable to provide suitable work services or in other words, work productivity decreases and (2). An individual feels that he has felt a decrease in his desire to achieve personal achievements.

2.3. Work-Family Conflict

According to Choi and Kim's (2012) work, family conflict can generally be defined as the emergence of stimuli from two role pressures. The presence of one role will cause difficulties in fulfilling the demands of the other role. This results in individuals having difficulty dividing their time and finding it difficult to carry out one role because of other roles. Wirakristama (2011) states that work-family conflict arises because of an imbalance in two roles, namely between the role of an employee and the role of a member of the family. Energy, time, and attention are needed to be successful in one role (be it a work role in the office or a role in the family), this will of course, this leads to a lack of energy, time, and attention for other roles, resulting in a conflict between the two roles. According to Natalia and Suharnomo (2015), several factors influence work-family conflict, including (1). Time pressure is the amount of time required to complete a role or job, which will significantly influence the time required to complete another job role. The more pressure or time spent, the less time is shared or spent with his family, (2). Family size and family support are the numbers of members or individuals in a family. The more family members you have, the more likely it is that new conflicts will occur or arise. Meanwhile, family support is a motivation and encouragement, or in other words, a reinforcement given by the family to the individual, especially women, whose roles are divided into two, namely in office work and in their duties of taking care of the household or family, the more moral support from the family allows the less the emergence of a conflict, (3). Job satisfaction is a general attitude towards a person's work which shows the difference between the amount of reward received and the amount believed to be received. The higher the job satisfaction, the less conflict is felt, (4). Marital satisfaction means the extent to which a married couple feels they are fulfilled or fulfilled in their current relationship. There is an assumption that the view of women who work or prioritize their careers has negative consequences for their marriage.

2.4. Job Satisfaction

Emilia (2018) explains job satisfaction as a positive mood resulting from an evaluation of an employee's work and work experience. Owais (2015) also explains that job satisfaction is an employee's response to their work experience and also the employee's emotional condition towards work. Emilisa (2006) explains several dimensions of job satisfaction, namely (1). Monetary and nonmonetary rewards consisting of monetary compensation, financial rewards, and promotion opportunities are factors that can increase and decrease job satisfaction (2). Job characteristics include skill variety, job significance, autonomy, and feedback, which are

factors of job characteristics that can increase job satisfaction (3). Work-environment characteristics: where the work environment can increase employee satisfaction; other things that can increase job satisfaction are office surroundings and atmosphere, relationships with co-workers, and supervision relationships (4). Personal characteristics such as gender, age, and education are obtained concerning job satisfaction.

2.5. Organizational Commitment

Mehdad and Iranpour (2013) define organizational commitment as a psychological bond between an individual and an organization, which can lead to positive results related to organizational goals and increase employee retention. Mukanzi and Senaji (2017) explain that organizational commitment is the belief in employees' acceptance of organizational goals, values, and norms. According to Li et al., (2013), organizational commitment is a measure of an employee's willingness to stay with the company in the future. Based on Rayadi, et., al. (2023), organizational commitment is a situation where an employee is in favor of a particular organization or group, besides that some goals and desires to keep himself a member of the organization or group are also called organizational commitment. Now a days, modern organizations place particular emphasis on the influence of innovation on the long-term development of the organization, so that employees with a strong psychological (committed) attachment to the organization can better demonstrate creative ways of working because of their alignment with organizational goals. Allen and Meyer (1990) stated that organizational commitment consists of three components: (1). Affective commitment is an employee's emotional attachment, employee identification, and involvement in the organization, in the form of feelings of love for the organization (2). Continuance commitment is a person's perception of the costs and risks of leaving the current organization. This means there are two aspects to continuance commitment, namely involving personal sacrifice when leaving the organization and the absence of alternatives available to the person, and (3). Normative commitment is a feeling of obligation to remain in the organization because this is an action that must be taken.

2.6. Hypothesis Formulation

According to Nauman et al. (2020), job insecurity and work-family conflict have a significant positive influence. This is also similar to research conducted by Chelariu and Stump (2011), which concluded that there was a significant favorable influence between job insecurity and work-family conflict. This research suggests that insecurity in the work role at work or in the office is an early prediction of work-family conflict; both things can threaten an employee's welfare, such as personal economic welfare or the family economy. The tension that arises from job insecurity gives an employee a sense of worry that will disrupt the psychology and work performance of individuals in the organization.

H1: There is a positive influence between job insecurity and work-family conflict

Kerse et al. (2018) explained that emotional exhaustion significantly positively affects work-family conflict. Their research supports those individual employees with dual role identities, both work roles in an organization and work roles in the family, try to maintain both roles stably and optimally. Work-family conflict will prevent an employee from fulfilling

his needs through his role in the family and work, which ultimately leads to work pressure and physical and psychological stress (emotional exhaustion). According to Nauman et al. (2020), emotional exhaustion significantly positively affects work-family conflict. Emotional exhaustion is a condition that includes physical and psychological stress on an employee and in an organization where employees do their work. However, they tend to exhaust their psychological state excessively. This behavior influences an employee to be less proactive in improving their human resources at work. In this way, a higher level of work demands is often associated with work pressure, resulting in emotional exhaustion and ultimately triggering higher levels of work-family conflict.

H2: There is a positive influence between emotional exhaustion and work-family conflict

Employees with work-family conflict can produce negative attitudes or behavior toward work, reducing job satisfaction and resulting in withdrawal behavior, such as quitting work to relieve stress (Namasivayam & Zhao, 2007). On the other hand, Anafarta (2011) explains a significant relationship between work-family conflict and job satisfaction. Gao et al. (2015) stated that work-family conflict causes reduced job satisfaction. Therefore, the hypothesis that can be put forward is:

H3: There is a negative influence between work-family conflict and job satisfaction

Literature states that work-family conflict negatively affects organizational commitment (Netemeyer et al., 1996). Research conducted by Akintayo (2010) shows a negative relationship between work-family conflict, work stress, organizational commitment, and job performance. Likewise, Rehman and Waheed (2012) found that high work-family conflict causes low levels of organizational commitment. Namasivayam and Zhao (2007) found a low correlation between work-family conflict and the organizational commitment of workers in hospitals. Work-family conflict causes an imbalance between work and family life and affects organizational outcomes, especially organizational commitment (Malik & Awan, 2013).

H4: There is a negative influence between work-family conflict and organizational commitment

3. RESEARCH METHODS

All variables were measured using a 5-point interval scale from strongly disagree to agree strongly. This research uses nonprobability sampling with a purposive sampling technique, where the population comprises female employees who are married, have children, and work at private banks in South Jakarta. According to Hair et al. (2018), regarding the ratio of observations to variables, the general rule applies a minimum of five times the total statement indicators on the variable to be analyzed, so the samples taken should be 195 samples from 39 statement indicators. However, only 138 questionnaires were successfully collected online, so the data processing method used is Partial Least Square (PLS), which will be processed using SmartPLS 3.0 software.

4. RESEARCH RESULTS AND DISCUSSION

The characteristics of the respondents in this study, namely female employees who are married and have children and work in private banks, appear to be that the majority of respondents are aged between 26 and 30, have a high school level S1 or Applied Bachelor's degree, and have worked for less than 10 years.

This research uses a factor loading analysis approach to measure the validity test. According to Hair et al. (2018), if the sample size is 138, the indicator is declared valid if it has a factor loading value between 0.45 and 0.50. Based on the results of the validity testing that has been carried out, of the four statement items used to measure the job insecurity variable, there is 1 JII item that is invalid because the factor loading is <0.45 , so it will not be used in further calculations. All items have a factor loading of > 0.45 for emotional exhaustion and work-family conflict, which means the item statement is valid. Based on the results of the validity testing that has been carried out, of the five statement items used to measure the job satisfaction variable, three statement items were declared valid, while two items were invalid because they had a factor loading of <0.45 . For the organizational commitment variable which is measured by eleven statement items, only four statements are valid with factor loadings > 0.45 and will be used in subsequent calculations.

According to Hair et al. (2018), reliability testing is seen through Cronbach's Alpha coefficient, with the criterion that if Cronbach's alpha ≥ 0.60 , then the construct is reliable, meaning that the statements in the questionnaire are acceptable and suitable for use. The reliability testing results above show that Cronbach's alpha coefficient value for all variables is > 0.60 (Hair et al., 2018), which shows that the statement items used to measure these variables are reliable.

Before entering data analysis, it is necessary to measure convergent validity (average variance extracted) which is used to measure the level of validity of each latent variable with the AVE value. The expected AVE value is more than 0.5. Moreover, based on the test results, it is known that all latent variables produce an AVE value of more than 0.5 with details of average variance extracted for job insecurity 0.741, emotional exhaustion 0.726, work-family conflict 0.694, job satisfaction 0.714 and organizational commitment 0.958, so it can be said that these variables are valid when viewed through AVE value. Next, internal consistency (composite reliability) is calculated, and this criterion is used to measure reliability based on the correlation between the observed indicator variables. The expected CR value is between 0.6-0.7. The results obtained for job insecurity were 0.895, emotional exhaustion 0.930, work-family conflict 0.931, job satisfaction 0.832, and organizational commitment 0.979.

Based on the processing results, the CR values produced from all variables are very high, namely above 0.6. This means that the reliability between all the latent variables is high. The next stage looks at the outer loading value to find out the relationship between the indicators in the latent variable (construct). The expected outer loading value is more than 0.7 or at least equal to 0.5. During processing, indicators are removed until all indicators have a value of ≥ 0.7 , which means that all indicators have a relatively high level of reliability. The coefficient of determination describes the level of accuracy between the actual value and the predicted value for the endogenous latent variable so that it can be seen whether the prediction accuracy is good enough; in other words, the model used is good enough.

Table 1. The coefficient of determination

Model	R Square	R Square Adjusted
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Job Satisfaction	0.019	0.012
Organizational Commitment	0.087	0.081
Work Family Conflict	0.369	0.359

Data Processing Results

Next is hypothesis testing which aims to test the proposed hypothesis. The results of this test are based on processing research data using Partial Least Square (PLS) analysis and Path diagrams from the results of hypothesis testing output using Smart-PLS software version 3.0 are presented below.



Figure 1. Diagram path

Table 2 Hypothesis testing result

Hypothesis	Beta	ρ -Values	Result
H1: JI → WFC	0.384	0.000	Supported
H2: EE → WFC	0.358	0.000	Supported
H3: WFC → JS	0.138	0.152	Not Supported
H4: WFC → OC	-0.296	0.000	Supported

Data Processing Results

From Table 2, the results for hypothesis one show that there is a positive influence of job insecurity on work-family conflict with a significance value of $0.000 < 0.05$ and a β value of 0.384. These results are supported by previous research conducted by Nauman et al. (2020), Fan et al. (2015), and Darvishmotevali et al. (2017). Job insecurity is a form of fear and anxiety that arises from a subjective perception of a situation where there is a possibility that a female employee who works in a private bank will lose her job due to a situation that is undesirable for the individual concerned because female employees feel that there is a role imbalance, namely between roles. as an employee with the role of mother in the family.

From the results of data processing for the second hypothesis, a ρ -value of $0.000 < 0.05$ was obtained with a beta value of 0.358, indicating that there is a positive influence of emotional exhaustion on work-family conflict. The emotional exhaustion in doing work felt by female employees who have children and have to do work from home and complete their responsibilities at work causes increased individual role conflict. Kerse et al., (2018) support this research's results.

Furthermore, the results for the third hypothesis, the work-family conflict coefficient value is 0.358, and the ρ -value is $0.152 > 0.05$, so statistically, the results show no positive influence of work-family conflict on job satisfaction. It can be interpreted that the work-

family conflict felt by female employees does not reduce their job satisfaction. This result is different from previous research conducted by Gao et al. (2013); this could be because the respondents studied were different.

Furthermore, finally, for the fourth hypothesis, it is known that the work-family conflict coefficient value is -0.296 with a p -value of $0.000 < 0.05$; there is a negative influence of work-family conflict on organizational commitment. This means that female employees who work at private banks in the South Jakarta area who have the burden of family responsibilities make it often difficult for them to concentrate at work and waste much time completing work, making female employees unable to take care of their household fully, but this does not reduce their commitment. They are bank employees. This research's results are similar to those of Akintayo (2010) and Mukanzi & Senaji (2017).

5. CONCLUSION

Based on the evaluation and analysis results presented, this research concludes that job insecurity and emotional exhaustion are proven to be antecedents of work-family conflict. Meanwhile, only organizational commitment is a consequence of work-family conflict, while job satisfaction is not proven to be a consequence of work-family conflict in female employees of private banks in the South Jakarta area.

6. MANAGERIAL IMPLICATIONS AND SUGGESTIONS

The managerial implication is that managers can create a comfortable working atmosphere that can make their female employees not feel afraid of losing their jobs. This can also reduce work stress levels because they have to divide tasks between family and work. The workload for female employees can also be reduced so that the work-family conflict they feel can be reduced, and female employees can balance work in the office and work at home as housewives in order to create higher job satisfaction and commitment to the organization.

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CHAPTER 8

Impact Protégé Career Optimism and Person Organization Fit: Study from e-Commerce Employees in Jakarta

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ABSTRACT

This study aims to analyze the effect of Protégé career optimism and person organization fit on Intention to Stay, which mediated by organizational commitment. The research was conducted using a quantitative approach and survey method, using samples from employees in several electronic commerce (e-commerce) locations in Central Jakarta. The design of this study was carried out through hypothesis testing. Data collection took place cross-sectionally. Data is primary data and was collected by distributing questionnaires via g-form filled out by 230 e-commerce employees in Central Jakarta. The data processing technique used is instrument testing, such as validity and reliability tests, structural equation modeling (SEM), and descriptive statistical tests. The results showed that Protégé career optimism and personal organization fit mediated by Organizational Commitment significantly affect intention to stay. It is with great hope that this research can inspire future companies to increase Protégé career optimism, person organization fit, organizational commitment, and intention to stay of employees by fostering a more positive work environment.

Keywords: Protégé career optimism, Person organization fit, Organizational Commitment, Intention to stay.

1. INTRODUCTION

Rapid changes in the global economy, primarily through the Electronic Commerce (e-commerce) phenomenon, have fundamentally changed the business paradigm (Noraidarayanti, 2022). The phenomenon of e-commerce in Indonesia, as one of the manifestations of modern business, has had a significant positive and negative impact on societal dynamics (Ministry of Finance, 2022). The rapid advancement of information and communication technology, supported by widespread internet connectivity, has allowed the birth of the e-commerce phenomenon, also known as the marketplace.

This phenomenon not only creates a dynamic global market but also causes a change in the human resource management (HR) paradigm of e-commerce companies paradigm of e-commerce companies (Vidita, 2023). The use of information and communication technology in daily life has significantly increased efficiency and effectiveness, helping to save people's time and energy (BPS, 2019). Electronic Commerce (e-commerce) has become the face of modern business in Indonesia, where people increasingly turn to online shopping. The price gap, cheaper than direct purchases, encourages public interest in online transactions (Grego-Planer, 2020). This is reflected in the prediction that the number of e-commerce users in Indonesia is projected to reach 189.6 million by 2024, a rapid increase from 70.8 million users in 2017 (Tempo. co, 2020).

During the success of e-commerce, the role of the workforce becomes crucial in maintaining business continuity. Behind these achievements, the workforce faces high pressure to adapt to rapid changes in the e-commerce industry. Therefore, e-commerce companies must have a management strategy to maintain employee Protégé career optimism and organizational commitment, leading to intention to stay (Efendi and Hardiyanto, 2021). This research focuses on Central Jakarta as Indonesia's leading business and economic activity center, considering the dynamics of e-commerce development in a diverse and intense urban context (Grego-Planer, 2020).

Factors such as organizational commitment, Protégé career optimism, and person-organization fit are the center of attention in maintaining employee intention to stay. In the competitive era of the e-commerce industry, companies and HR departments must make maximum efforts to create a positive work atmosphere and motivate employees (Silva et al., 2023). Organizational commitment, as an indicator of employee loyalty and engagement, is a predictive factor in determining the length of time employees stay at work (Nimri et al., 2020; Suliman and Iles, 2000). Support for Protégé career optimism and person organization fit is vital to increase employee commitment, ultimately influencing intention to stay (Wayan et al., 2023). Understanding these factors in the context of innovation and change in the e-commerce industry is critical to creating a stable and productive work environment in the long term (Kamel, 2022).

2. LITERATURE REVIEW

2.1. Theoretical Background

2.1.1. Protege Career Optimism

Protégé career optimism is a concept that refers to an individual's optimistic view of career development, primarily through a mentor-protégé relationship, where a protégé or subordinate receives guidance and promotion from more experienced individuals. Career

optimism, as the hope to achieve the best achievements and focus on positive aspects in career planning, encourages individuals to actively learn, plan the future carefully, and feel satisfied with career choices. This positive view of career achievement is also considered important in reflecting employees' perceptions of their career conditions, bringing positive energy to the work environment, and potentially influencing commitment to the company and reducing intentions to change jobs (Eva *et al.*, 2020; McIlveen *et al.*, 2013).

2.1.2. Person Organisation Fit

Person organization fit is a concept that combines individual characteristics and company characteristics. Based on several studies, when individual characteristics match the company's characteristics, the individual tends to have more positive attitudes and behavior, ultimately resulting in positive job satisfaction, commitment, and performance (de Almeida *et al.*, 2013; Silva *et al.*, 2023). In the same context, the views of other experts, as expressed by Khaola and Sebotsa (2016) also define person organization fit as a good relationship between the company and the individual, where both fulfill each other's needs to help each other or have similar characteristics. To strengthen and improve the fit between individuals and companies, companies must pay attention to various aspects such as individual values, career optimism, and plans aligning with company culture (Grobler, 2016).

2.1.3. Organizational Commitment

Ametepe and Otuaga (2023) and Dewi & Nurhayati (2021) describe organizational commitment as individual recognition and participation in their company. They emphasize that employees who are committed to the company are willing to contribute and establish long-term relationships with their superiors. This reflects their willingness to invest in the company's future and their loyalty to coworkers and leadership. The importance of organizational commitment in achieving company success is becoming increasingly clear, as emphasized by Bank and Siwela (2021). They suggest that organizational commitment must be instilled early in an employee's career journey. That way, employees will develop the skills, knowledge, and abilities needed to support the company's vision and goals more quickly. Thus, organizational commitment reflects the extent to which individuals want to remain in their company, their level of belief in the company's vision and mission, and their desire to contribute actively to achieving common goals.

2.1.4. Intention to Stay

According to Shahid (2018), intention to stay measures the extent to which an employee feels bound to undertake a work trip with a company, reflecting their level of loyalty and commitment to the company. This is supported by Al Yahyaei A *et al.* (2022), who found that intention to stay is an indicator that can be relied on in increasing employee effectiveness and upbeat performance. According to Chew and Chan (2008), how a company manages human resources can also influence whether employees want to continue working.

2.2. Conceptual Framework

is illustrated in Figure 1 as follows:

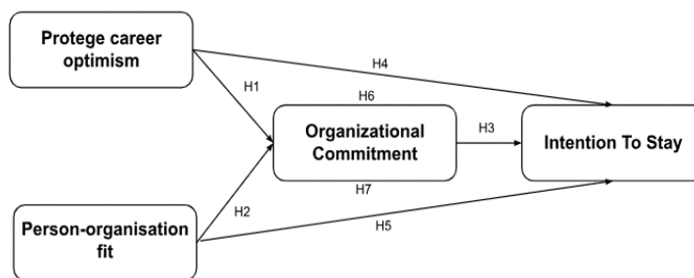


Figure 1. The conceptual framework

2.3. Hypotheses Development

Protégé Career Optimism and Organizational Commitment

According to research by Kurniawan et al. (2023) conducted on minimarket employees in South Jakarta, the greater the level of optimism an employee has, the higher the level of organizational commitment they have. Protégé career optimism helps improve employee performance while encouraging the emergence of creativity and innovative ideas, which are very important, especially in a competitive work environment. This means that if performance increases, it will also create job satisfaction, and you will tend to have motivation and commitment to the company. So, the first hypothesis is proposed as follows:

H1: There is a positive influence of Protégé career optimism on organizational commitment.

Person Organization Fit and Organizational Commitment

Numerous studies have suggested that when individual characteristics align with company characteristics, individuals are more likely to exhibit more positive attitudes and behavior. This contributes to higher levels of job satisfaction, solid organizational commitment, and positive performance (de Almeida et al., 2013; Oh et al., 2014; Pee, 2012). Thus, the suitability of these characteristics plays a very significant role in creating a positive work environment and contributes to high levels of employee organizational commitment. From the explanation above, the second hypothesis is:

H2: There is a positive influence of person organization fit on organizational commitment

Organizational Commitment and Intention to Stay

According to Allen and Meyer (1990), organizational commitment positively influences employees' intentions to remain at work and negatively impacts intentions to leave the organization. Employees with a high level of organizational commitment tend to be reluctant to leave the company, in contrast to those with a low level of commitment (Allen and Meyer, 1990; Uraon, 2018). Employees who feel committed to the organization where they work tend to have a stronger intention to stay with the company. This underlines the importance of building robust organizational commitment to retain employees. Therefore, the third hypothesis is:

H3: There is a positive influence of organizational commitment on intention to stay

Protégé Career Optimism and Intention to Stay

Optimism refers to employees' positive attitudes and hopes for future career development (Eva et al., 2020). A study found that the relationship between mentoring influences

organizational commitment through Protégé career optimism and protean career orientation, as documented in (Gong et al., 2020). Thus, it can be concluded that employees with a positive view of their career development tend to show a more substantial commitment to the organization where they work and a higher intention to remain in the company (IcoMS, 2016). Based on the above description, the fourth hypothesis is :

H4: There is a positive influence of Protégé career optimism on intention to stay.

Person Organization Fit and Intention to Stay

The results of research conducted on employees in Malaysia revealed that when employees have a strong level of fit with the company, they tend to show various positive attitudes regarding their work, and person organization fit is proven to be related to intention to stay (Kakar et al., 2023). In addition, Kaothan (2018), who researched employees in Bangkok, identified that person organizational fit and organizational commitment act as mediators in the relationship between a supportive work environment and reduced employee retention, indicating that when employees feel fit with their company, they tend to have a more substantial commitment to the organization and lower retention rates. So the fifth hypothesis is:

H5: There is a positive influence of person organization fit on intention to stay

Protégé Career Optimism on Intention to Stay Mediated by Organizational Commitment

Evidence shows a positive correlation between optimistic attitudes and intention to stay. People who have an optimistic outlook tend to see career opportunities as possible, face work events with a positive attitude, and have positive beliefs about their ability to succeed in their careers (Eva et al., 2020). Optimism is also related to adaptability, flexibility, and resilience, essential characteristics in today's dynamic work environment (Higgins et al., 2010). Based on the explanation above, the sixth hypothesis is:

H6: There is a positive influence of Protégé career optimism on intention to stay mediated by organizational commitment

Person's Organizational Fit on the Intention to Stay Mediated by Organizational Commitment

Compatibility between an employee and the company where he works refers to the extent to which the employee feels compatible with the company's values, goals, and culture (Kakar et al., 2023). Several studies conducted on employees in Istanbul show that person organization fit has a quite significant role, especially in increasing intention to stay (Ucar et al., 2021). Therefore, companies may need to consider methods to improve their personal and organizational fit when they recruit and select new employees and provide opportunities for employees to align with the company's values and goals. Therefore, the seventh hypothesis that emerges is:

H7: There is a positive influence of person organizational fit on intention to stay mediated by organizational commitment

3. RESEARCH METHOD

3.1. Research Design

This research applies a quantitative descriptive approach. Next, data analysis was carried out through hypothesis testing, applied to assess the correlation between variables, including whether there were significant differences between two or more groups, under the guidelines suggested by Sekaran and Bougie (2016). This research adopts a correlational approach, which explains the relationship between variables related to the issue being researched. The data analyzed in this study is cross-sectional and was collected only at a specific time. The unit of analysis for this research includes individuals who work as employees in an e-commerce company located in Jakarta.

3.2. Variable and Measurement

There are 11 statement items to measure Protégé Career Optimism which adopted from Rottinghaus et al. (2005). To measure person organization fit using 3 indicators adopted from Chatman (1989). Meanwhile, measurement of organizational commitment using 6 items from Yudhaputri et al. (2021) and intention to stay with 3 statement items developed from research Cammann et al. (1979). The scale used is a Likert scale with alternative answers of 5 points from strongly disagree - strongly agree.

3.3. Population and Sample

In this research, the snowball sampling method focuses on networks and references in the data collection. Researchers usually start with a few initial contacts (seeds) that fit the research criteria (Parker, 2019). With the snowball sampling method, using their social networks, researchers build initial relationships and develop sampling momentum. The main goal is to capture a growing chain of participants. The sampling process is usually stopped after reaching the target sample size. Samples will be taken by distributing questionnaires to e-commerce companies located in Central Jakarta. According to Hair et al. (2019), when taking samples, the minimum number of samples that can be used should be five times the number of question items or a maximum of 10 times the number of question items.

3.4. Research Instrument Testing

The research instrument testing results show that all constructs are valid because they have a factor loading of more than 0.4. All variables are also reliable because they have a Cronbach alpha of more than 0.6

3.5. Data Analysis Method

The analysis uses descriptive statistics in the form of mean and hypothesis testing using the Structural Equation Model with AMOS software.

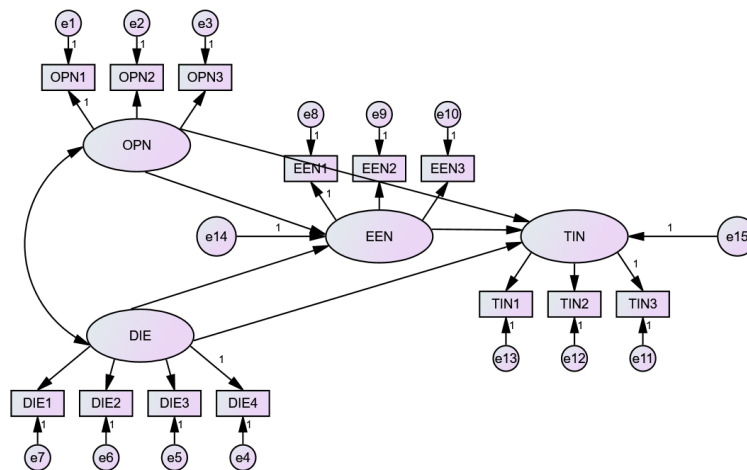


Figure 1: Structural Equation Model

4. RESULT AND DISCUSSION

4.1. Respondent Demographic Characteristics

A total of 230 respondents were part of this research sample. Of this number, 147 respondents or 63%, were women, while the rest were men. This phenomenon can be explained by the fact that the research was conducted in several divisions, such as Finance, Corporate Secretary, Commercial, Human Resources, and others, but respondents were dominated by divisions with a predominance of female participation.

Based on age distribution of respondents, 198 respondents or 86% were aged 17 to 25 years. This is because younger individuals tend to have just entered the world of work or have shorter work experience. Based on level education, Bachelor dominates (178 respondents or 77% of the total sample). One of the reasons that can explain why the bachelor's level of education is the most common among e-commerce employees is the different work culture in this industry. E-commerce attracts many young people with enthusiasm, energy, and interest in getting involved in the digital and technological world. A bachelor's degree education tends to be the minimum requirement for many e-commerce companies look for when recruiting employees.

As explained in the background, it is also necessary to remember that e-commerce continues to change with many developing demands, making companies need employees with relevant education and still burning enthusiasm.

4.2. Descriptive Statistics Analysis

The average value given for Protege career optimism at 3.78 shows that the majority of respondents are optimistic about the careers they are pursuing. This shows that employees are enthusiastic and feel optimistic about their work. Several statements with the highest average scores include the first statement; I feel excited when thinking about my career and the seventh statement, I am enthusiastic about pursuing my dream career. Shows the intense enthusiasm and motivation of employees. Meanwhile, the lowest score was 3.61, with the statement that thinking about my career frustrates me. This shows that it is possible that some of the respondents experienced difficulties when thinking about their career path.

Based on the test results, a fairly high value was obtained for the average of person organization fit variable. The value of 3.83 indicates that most respondents tend to feel that they are in line with the values they have with the company's values. This means that e-commerce employees in Central Jakarta feel that their values align with the values adhered to by the company. Standout statements such as the first statement, namely the things I value in life are very similar to what my company values, meaning respondents agree with this alignment. Meanwhile, the lowest score was 3.67, which is the statement that my company's values and culture match what I value in life. This could indicate that some respondents feel similar but do not match the company's values. This can happen if certain elements do not fully match what employees value.

Based on the test results of organizational commitment variable, it can be concluded that the respondents' commitment level is sufficient. The overall average is 3.71, indicating that in general, respondents have a good level of commitment to where they work. This means that employees feel comfortable and confident in their work. One of the prominent statements with an average of 4.00 is in statement two, which means that employees have a relatively high level of attachment and responsibility towards their workplace. The last statement got the lowest score at 3.31. This value shows that some employees feel that the problems faced by the company are not their business or responsibility. This means those who feel this are not fully involved or attached to the company where they work.

The average result for intention to stay shows a sufficient figure of 3.85, indicating that many respondents feel that they will stay or work with the company for quite a long time. This is supported by the high average for the third statement, which discusses plans to stay at the company for the next 2-3 years. This will build positive desires among employees, creating stability in the human resources department. The statement that have the lowest average score was the initial statement that talked about maintaining a company presence for a long time. Even so, the value of 3.78 obtained is still relatively high, indicating that most respondents still intend to stay in their current jobs.

4.3. Hypotheses Testing Result and Discussion

After conducting the hypothesis test, it was found that there was a positive influence that could be felt significantly, namely that there was an influence from Protégé career optimism on organizational commitment in e-commerce companies in Central Jakarta. In other words, the average employee working in e-commerce in Central Jakarta has an optimistic view of their career development. This creates a positive impact on their level of commitment to where they work. In addition, these positive findings indicate that Protégé career optimism can be a key driver in increasing employee loyalty to e-commerce companies. The implication is that efforts to increase employee confidence and optimism regarding careers can be considered an effective strategy to strengthen the relationship between employees and companies. This is supported by previous research by Gong et al. (2022), which explains that Protégé career optimism can be characterized by an employee's confidence and commitment to success.

Table 1. Hypotheses testing result

Hypotheses				Estimation (β)	ρ value	Decision
Protégé	carrer	Optimism	→	0.208	0.002	Supported
Organizational Commitment						
<i>Person</i>	<i>Organisation</i>	<i>Fit</i>	→	0.322	0.000	Supported
<i>Organizational Commitment</i>						
<i>Organizational Commitment → Intention to Stay</i>				0.293	0.007	Supported
Protégé	carrer	Optimism	→	0.557	0.000	Supported
<i>Intention to Stay</i>						
<i>Person</i>	<i>Organisation</i>	<i>Fit</i>	→	0.261	0.003	Supported
<i>Intention to Stay</i>						
<i>Protégé</i>	<i>Career</i>	<i>Optimism</i>	→	2.032	0.042	Supported
<i>Organizational Commitment → Intention to Stay</i>						
<i>Person</i>	<i>Organisation</i>	<i>Fit</i>	→	2.226	0.025	Supported
<i>Organizational Commitment → Intention to Stay</i>						

Source: Data processed (2024)

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This opinion aligns with research results, which show that Protégé career optimism is considered a factor that supports and strengthens an employee's attachment to the company where they work. It is essential to understand that career optimism does not just come naturally but as a result of considerable effort. To maintain or increase career optimism, a person must remain enthusiastic and committed to their work. This understanding is strengthened by previous research from Eva et al. (2020), which emphasizes that we must continuously try to be more optimistic regarding careers. This research also explains that optimistic individuals about their careers have a favorable attraction and need social interaction. This can increase their sense of engagement with the work environment. This study's findings support previous research showing that Protégé career optimism can help strengthen organizational commitment to the company where they work. This can be linked to the Protégé career optimism variable, which states that e-commerce employees in Central Jakarta generally have an optimistic attitude regarding their career development. The results also show evidence of organizational commitment variable, namely that employees feel the

highest level of commitment to the organization when they feel responsible for the company. This means that it is not only career success that influences Protégé career optimism but also the efforts individuals invest in maintaining and increasing organizational commitment within themselves. This Protégé career optimism not only creates personal attraction but also contributes positively to the individual's relationship with the company, helping to strengthen their attachment to the company.

The second hypothesis proposed is that person organization fit positively influences organizational commitment in e-commerce companies in Central Jakarta. The results of data analysis show that on average, e-commerce employees who work in Central Jakarta feel that they are in harmony with the characteristics and values of the company. The success of this research shows that the better the match between individual characteristics and organizational culture, the higher the level of employee commitment to the company. This indicates that employees who feel their alignment with company values and culture is better tend to be more involved and committed to providing maximum contribution. These findings are supported by other research conducted in Jakarta, such as No et al. (2023), who found that personal organization fit positively affected organizational commitment, especially among health workers. Meanwhile, a study by Putri and Parmin (2022) also concluded that the higher the person organizational fit between employees and organizational values, the stronger the level of organizational commitment that employees have. This can also be related to person organization fit and organizational commitment variables. The results of organizational commitment illustrate that employees feel the highest commitment to the organization when they feel responsible for the company. Meanwhile, person organization fit variable reflects that employees in e-commerce feel they identify the level of conformity with organizational values and culture as an essential element in forming their level of commitment to the company. This means that alignment between individual characteristics and organizational values is crucial in forming a solid basis for increasing organizational commitment among e-commerce employees in Central Jakarta. This finding is also in line with Sabbatho (2020), which confirms that this conformity significantly impacts the level of organizational commitment. Thus, person-organization fit is an essential factor that needs to be considered in organizational commitment efforts in the e-commerce industry in this region.

The third hypothesis in this research states that the level of organizational commitment has a positive effect on intention to stay in e-commerce companies in Central Jakarta. The data obtained shows that e-commerce employees in Central Jakarta have high organizational commitment and intention to stay. These findings indicate that the higher the level of organizational commitment, the greater the possibility that employees have the intention or desire to continue working at the company. This finding is in line with the study conducted by Ghazali et al. (2018), which states that organizational commitment can impact intention to stay of employees in an organization or company. Apart from that, the results of this research also receive support from research by Mahfouz et al. (2022). These findings state that organizational commitment can be formed when the company treats employees fairly, and this experience can be felt directly by employees, which increases the intention to stay. This is also in line with research findings conducted by Xu et al. (2022), which explain that the quality of life can influence organizational commitment in employees they experience working at the company. If employees feel a good quality of life, their intention to stay will

also remain high. This result can also be linked to organizational commitment, which reflects that e-commerce employees feel the highest commitment to the organization when they feel responsible for the company. On the other hand, intention to stay variable results indicate that employees have a firm intention or desire to continue working for a more extended period.

The fourth hypothesis in this research proposes that the level of Protégé career optimism positively impacts intention to stay in e-commerce companies in Central Jakarta. The results of data analysis show that e-commerce employees in Central Jakarta have career optimism, and this impacts their intention to stay at the company. This indicates that the higher the level of Protégé career optimism, the greater the likelihood that employees will have the desire or intention to remain at the company.

This finding is supported by the results of research by Higgins et al. (2010), who highlighted that Protégé career optimism is related to the ability of flexibility, adaptability, and resilience, which are essential factors in facing a dynamic career environment. Overall, this research confirms the critical role of Protégé career optimism in increasing intention to stay among employees.

Research by Aria et al. (2019) provides additional support by showing that optimism in an organizational context correlates with organizational commitment and high productivity and positively contributes to intention to stay. These findings confirm that an optimistic attitude towards organizational environment influences employee commitment to the company and creates conditions that support their desire to remain in the organization. This can also be related to the Protégé career optimism variable, which indicates that e-commerce employees in Central Jakarta generally have an optimistic attitude regarding their career development. Furthermore, intention to stay shows the employee's tendency to maintain a working relationship for longer. Thus, company efforts to increase employee career optimism can be considered an effective strategy to stimulate employees' desire to continue their careers.

The fifth hypothesis in this research states that person organization fit positively impacts intention to stay in e-commerce companies in Central Jakarta. The results of the data analysis show that e-commerce employees in Central Jakarta feel that they are in harmony with the company culture and intend to stay with the company. These findings indicate that the better the match between individual characteristics and organizational culture, the more likely employees are to have the intention or desire to remain at the company. This finding is supported by research by Islam et al. (2014), which states that intention to stay negatively correlates with turnover because intention to stay refers to an employee's desire to continue working in an organization. In other words, the higher the level of intention to stay, the lower the employee's tendency to leave the company. Swastasi and Sartika (2021) conducted other research that supports these findings, which showed a direct relationship between person organization fit and intention to stay. This research confirms that the match between individual employee characteristics and organizational culture directly contributes to the desire to remain working at the company. This can also be related to person organization fit and intention to stay variables, which show that e-commerce employees in Central Jakarta align with the company's values and culture. This means that employees feel that the things they value in life are very similar to what the company values, so they have a high intention

or desire to continue working there. In addition, in term person organization fit, employees feel the highest level of conformity with the company culture. On the other hand, in term intention to stay variable, employees have a high intention or desire to continue working for a more extended period.

The sixth hypothesis in this research indicates that the level of Protégé career optimism positively affects intention to stay, with organizational commitment as a mediator. The data shows that employees with high career optimism tend to survive and have intention to stay in the company, especially when accompanied by a high organizational commitment. These findings show that career optimism is directly related to intention to stay in the company and through organizational commitment. This finding is in line with Kurniawan et al. (2023), who found that Protégé career optimism had a significant positive impact on the level of organizational commitment. A positive attitude towards career development reflects an individual's belief in the opportunities that may open in the future. When employees have an optimistic view of growth and progress in their careers, it can create a higher level of commitment to the organizations where they work. Employees with high optimism tend to see challenges as opportunities and are willing to give their best effort in personal development. In addition, research by Saraswati et al. (2023) concluded that organizational commitment plays a vital role in forming an intention to stay among employees in an organization or company.

This commitment involves emotional, normative, and continuous attachment to the organization where the employee works. When employees are highly committed to their current job and organization, it creates a strong foundation for their intention to stay. Companies can consider increasing employee career optimism levels. Understanding and strengthening the factors that influence organizational commitment can be a practical approach to retaining employees who firmly intend to continue their careers at e-commerce companies in Central Jakarta. This can be related to the Protégé career optimism variable, which shows that e-commerce employees in Central Jakarta have the highest level of career optimism due to their positive view of personal career development and progress. On the other hand, intention to stay variable shows that employees have a high intention or desire to continue working for a more extended period at the company. In organizational commitment term, employees show the highest level of commitment related to their sense of responsibility towards the organization where they work. These findings confirm that the level of Protégé career optimism and the level of organizational commitment play an essential role in shaping employees' desire to remain at e-commerce companies in Central Jakarta.

The last hypothesis in this research states that person organization fit positively impacts intention to stay, which is mediated by organizational commitment in e-commerce companies in Central Jakarta. Data analysis shows that employees who conform to organizational culture tend to have an intention to stay, especially when accompanied by high organizational commitment. These findings indicate that the better person organization fit with the organizational culture, the greater the likelihood that employees will have the intention or desire to remain in the company. This means that employees who align with the company's values and culture tend to have high organizational commitment, contributing to their intention to continue their career at an e-commerce company in Central Jakarta. Astuti's research (2010) supports that person organization fit significantly influences organizational

commitment. These findings indicate that matching individual characteristics and organizational culture is critical in maintaining employee commitment. This compatibility creates a strong foundation for maintaining employees' emotional and normative bonds with the organization, encouraging their desire to contribute and engage in joint activities actively. By proving compatibility between individuals and organizations, companies create a work environment that integrates employee needs and aspirations and builds a solid foundation for sustainable and productive relationships. Radite's research (2021) supports that person organizational fit positively influences intention to stay. An individual's alignment with the organization's values, culture, and goals provides the impetus to maintain engagement with the organization. This compatibility creates a strong bond, where individuals feel connected and aligned with the work environment. The positive relationship between person organizational fit and intent to remain indicates the importance of organizations understanding and maintaining this fit as a key to increasing employee retention and continued engagement over the long term. Shalihah and Azzuhri's (2018) research shows that organizational commitment influences intention to stay. Affective, continuous, and normative attachments to volunteers are integral to organizational commitment. This attachment is a significant factor in influencing intention to stay of volunteers in TurunTangan Malang. In conclusion, volunteers' commitment directly contributes to maintaining their intention to remain active and involved in organizational activities. This confirms that the development of personal commitment at the personal level plays a vital role in maintaining engagement and desire to remain in the organization. This can also be related to employee variables in the e-commerce sector in Central Jakarta, such as employees who feel that their person organization fits with the company culture.

This shows that employees identify themselves with the company's values and culture. Apart from that, intention to stay variable shows that employees have a high desire and intention to remain with the company for longer. Furthermore, organizational commitment variable shows that employees are highly committed to the organization where they work. This means that employees feel they have a high responsibility towards the organization, creating a solid foundation to mediate the relationship between person organizational fit and intention to stay. Thus, it can be concluded that a high level of person organization fit positively impacts a high level of intention to stay, and commitment to the organization plays a mediating role in this relationship among e-commerce employees in Central Jakarta. The match between employees' individual characteristics and company culture creates an emotional and normative attachment, encouraging their desire to continue contributing and being involved in joint activities with the organization.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

From descriptive statistical analysis, it shows that there is an attitude of optimism embedded in e-commerce employees in Central Jakarta. Person Organization Fit of e-commerce employees is also quite high, which indicates that the employees feel comfortable and compatible with the company where they work. The results also show that there is commitment or a sense of attachment of employees to the company where they work and there is quite a high interest in staying with the company where they work.

All hypotheses proposed are supported. The level of career optimism possessed by employees contributes positively to their level of engagement and commitment to the company. The existence of Protégé career optimism can provide encouragement for employees to be more committed and involved in their work environment. Employees feel that there is a compatibility between individual values and culture and organizational values and culture which can be an important factor in shaping the level of employee commitment to the company. Strong person organization fit strengthens employee commitment and fuels their involvement in achieving company goals. Then the level of employee commitment to the e-commerce company they work for is an important factor that motivates their desire to stay. Organizational Commitment creates strong emotional and normative ties, encouraging the desire to maintain a work position. e-commerce employees in Central Jakarta have a fairly high level of career optimism and most employees feel they are suitable and in line with the company's values and culture, so these will lead to their choice to stay at the company. Organizational commitment can fully mediate Protégé career optimism and person organization fit to intention to stay.

5.2. Recommendations

For future research, exploring e-commerce companies in different regions or other industry sectors is recommended to produce innovative and diverse findings. It could enrich variability by adding other factors that can potentially influence intention to stay, such as organizational culture and work-life balance (Silva et al., 2023).

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CHAPTER 9

The Influence of Regional Competitiveness Aspects on Inclusive Economic Development in Indonesia

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ABSTRACT

The competitiveness aspect has attracted the attention of policy makers and academics, especially in the economic aspect. As an effort to realize regional competitiveness, there are several variables that can reflect comparative advantage, economic growth, and independence of a region. This research aims to see the influence of Exports, Imports, Foreign Investment, Domestic Investment, Gross Regional Domestic Product per Capita, Human Development Index, and Tourism on Inclusive Economic Development in Indonesia. This research uses Panel Data Multiple Linear Regression analysis tools, with a research period from 2018-2022 in 34 provinces in Indonesia. Based on the results of model selection, it is concluded that it is better to use the Fixed Effect Model. The results of data processing show that Exports, Imports, Domestic Investment, Gross Regional Domestic Product per capita, and the Human Development Index have a positive influence on Inclusive Economic Development in Indonesia, while Foreign Investment and Tourism have no influence on Inclusive Economic Development in Indonesia.

Keywords: Competitiveness, Inclusive, Economy.

1. INTRODUCTION

Indonesia was again granted status by the World Bank as an upper-middle-income country. The World Bank release stated that Indonesia first received the status in 2019, but again experienced a decline for two years due to the covid-19 pandemic. Indonesia successfully restored the status in 2022 with a gross national income per capita of US\$4,580 or an increase of 9.8% from 2021 (Kementerian Keuangan, 2023). As Indonesia's status rises, it must ensure that economic growth benefits everyone.

Policies related to inclusive growth are also echoed by prominent international organizations. The Organization for Economic Co-operation and Development (OECD) has a policy framework for inclusive growth. It measures the benefits of economic growth, how they are shared, and how policies and institutions affect them. In addition, the World Bank sees inclusive growth to indicate the speed and pattern of economic growth, which are interrelated and assessed simultaneously.

Indonesia is committed to inclusive economic development as signaled by the theme of Rencana Kerja Pemerintah (RKP) 2023, namely "Productivity Enhancement for Inclusive and Sustainable Economic Transformation". The Government of Indonesia's commitment is also reflected by the Kementerian Perencanaan Pembangunan Nasional atau Badan Perencanaan Pembangunan Nasional (Bappenas), which created a tool to measure and monitor the extent of development inclusiveness in Indonesia through the Inclusive Economic Development Index (IEDI). In measuring the IEDI, there are 3 pillars that become the dimensions of the calculation, namely: 1) economic growth and development, 2) income equality and poverty alleviation, and 3) expansion of access and opportunities (Kementerian PPN/Bappenas, 2023).

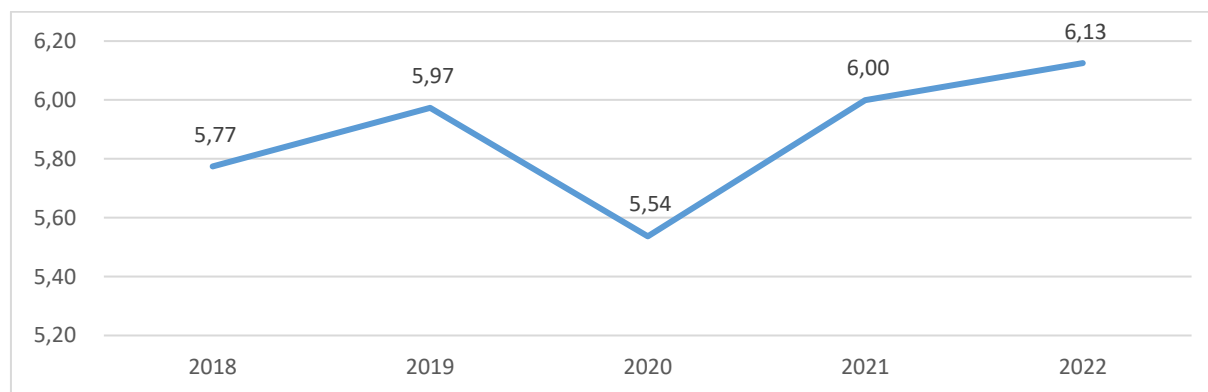


Figure 1. Indonesia's inclusive economic development index (Kementerian PPN/Bappenas, 2018-2022 (processed))

In the implementation of achieving the goal of inclusive economic development, there are consequences that can result in policy trade-offs to address certain issues, for example, policies related to competitiveness. Competitiveness is primarily defined by economic variables that can be represented as increased productivity, market share, and independence of a region (Andreoni & Miola, 2016).

Competitiveness has attracted the attention of policymakers and academics, particularly in economics. The concept of competitiveness has a number of definitional debates. Classical economics links competitiveness to international trade associated with comparative advantage. In the neoclassical approach, competitiveness has an expanded concept related to

economic growth. If a country is able to maintain or improve its capacity to achieve sustainable economic growth in the global environment, then it is considered as competitive (Mulatu, 2016).

Based on Undang-undang No.17 tahun 2007 tentang Rencana Pembangunan Jangka Panjang Nasional Tahun 2005-2025, An independent nation is a society that can live in line with other developed nation by relying on its own capabilities and strengths. Therefore, to build independence, economic progress must be built. The ability to be competitive is the key to achieving progress as well as independence. In addition, the consideration of Undang-undang No. 23 tahun 2014 tentang Pemerintah Daerah states that the implementation of regional government is directed at encouraging regional competitiveness that takes into account the principles of equality, democracy, justice, and the distinctiveness of a region with regard to the system of the Republic of Indonesia.

In realizing competitiveness in the region, there are several variables that can reflect the comparative advantage, economic growth, and independence of a region. These variables are exports, imports, Foreign Investment (FI), Domestic Investment (DI), Gross Regional Domestic Product (GRDP) at constant prices per capita, Human Development Index (HDI), and number of tourist trips. These statistical indicators are able to form aspects of the competitiveness of a region in Indonesia which is reflected by various dimensions such as macroeconomics, education, and tourism.

2. LITERATURE REVIEW

Some studies that have been conducted to look at aspects of the competitiveness of a region that affect inclusive economic development, including by (Ginting, 2017), which concluded from the results of his study that exports and FI have a positive effect on economic growth which is in accordance with the World Bank publication (Anand, Mishra, & Peiris, 2013). Meanwhile imports, according to Ginting (2017), have a negative effect on economic growth. Furthermore, there are studies which looks at trade openness as measured by the sum of exports and imports on inclusive economic growth (Hernando, Andres, & Wirjo, 2015) and (Bacchetta, Cerra, Piermartini, & Smeets, 2021). In addition, studies in Indonesia indicate that HDI has a positive influence on the IEDI (Ilyas & Prasetya, 2023). Study conducted in Indonesia also concluded that FI and HDI have a positive effect on the IEDI (Fitrianasari, 2021). Analysis performed (Amalia, 2023) concluded that GRDP per capita has a positive influence on the IEDI. Based on the study (Rahmawati, Purwanti, & Ramadhani, 2021) there are results that DI has a positive effect on the IEDI. Furthermore, (Andres, Cheok, & Othman, 2016) in their report explains the positive effect of traveler variables on inclusive growth.

2.1. The Relationship between Exports and the IEDI

Based on Undang-undang No. 17 tahun 2006 tentang Kepabeanan, as well as related economic theories, export is the activity of removing goods and services from the customs area or the territory of the Republic of Indonesia. Export activities are regulated by the Government through the Direktorat Jenderal Bea dan Cukai, which is an agency unit under the auspices of the Ministry of Finance. Study conducted by (Ginting, 2017) within the scope of Indonesia and (Anand, Mishra, & Peiris, 2013) in the scope of emerging markets found that

the export variable has a positive influence on economic growth. Thus, the research formulated the following hypothesis:

H₁ : Exports have a positive influence on the IEDI ($\beta_1 > 0$)

2.2. The Relationship between Imports and the IEDI

The definition of import is an inversion of export, where import is defined as the activity of entering goods and services into the customs area or the Republic of Indonesia. Research results of the Asia-Pacific Economic Cooperation (APEC) (Hernando, Andres, & Wirjo, 2015), which is also in line with the International Monetary Fund working paper (Bacchetta, Cerra, Piermartini, & Smeets, 2021), found that inclusive economic growth is positively affected by increasing import variables. Trade integration increases growth in emerging markets such as Indonesia, which reduces inequality at the aggregate level. Thus, the following hypothesis was formulated based on this research:

H₂ : Imports have a positive influence on the IEDI ($\beta_2 > 0$)

2.3. The Relationship between Foreign Investment (FI) and the IEDI

Based on Undang-undang No. 25 tahun 2007 tentang Penanaman Modal, FI is defined as an investment activity in the Republic of Indonesia by inbound foreign investors. Based on the findings of studies conducted in Indonesia (Ginting, 2017) and in the East Kalimantan region (Fitrianasari, 2021), both concluded that economic growth, which is also specifically denoted by the IEDI, is positively affected by FI. Thus, the research formulated the following hypothesis:

H₃ : FI has a positive influence on the IEDI ($\beta_3 > 0$)

2.4. The Relationship between Domestic Investment (DI) and the IEDI

In addition to investment with FI status, there is DI status which is an investment activity in the Republic of Indonesia by domestic investors using domestic capital. A study conducted in cities and districts in East Java found that the IEDI is positively influenced by DI (Rahmawati, Purwanti, & Ramadhani, 2021). Thus, the research formulated the following hypothesis:

H₄ : DI has a positive influence on the IEDI ($\beta_4 > 0$)

2.5. The Relationship between GRDP Per Capita and the IEDI

Kuznets through his hypothesis states that an increase in per capita income at a certain turning point will reduce income inequality, which will implicitly increase the inclusive economic development of a country. The results of research in Indonesia state that the IEDI is positively influenced by the GRDP per capita variable of a region (Amalia, 2023). Thus, the research formulated the following hypothesis:

H₅ : GRDP has a positive influence on the IEDI ($\beta_5 > 0$)

2.6. The Relationship between HDI and the IEDI

HDI is the result of a composite index based on three main dimensions, namely health, education, and a decent life as a means of measuring and evaluating the level of community development in a region that will lead to development outcomes. There is a research conclusion conducted in East Java that HDI is one of the factors that has a positive and significant influence on the IEDI (Ilyas & Prasetya, 2023). In addition, it is explained that by

increasing HDI, it can reduce various economic problems that are rampant in a country. Thus, the research formulated the following hypothesis:

H₆ : HDI has a positive influence on the IEDI ($\beta_6 > 0$)

2.7. The Relationship between Tourism and the IEDI

The findings of a study conducted by APEC showed that tourist arrivals can increase inclusive economic growth in a region (Andres, Cheok, & Othman, 2016). This is also an indicator that inclusive economic development can touch the tourism sector where many communities play an active role in advancing their respective tourism competitiveness. Thus, the research formulated the following hypothesis:

H₇ : Tourism has a positive influence on the IEDI ($\beta_7 > 0$)

3. RESEARCH METHOD

3.1. Conceptual Framework

The research objective is to analyze whether there is an expected influence between the seven quantitative indicators on inclusive economic development in Indonesia. The result of this study is to reveal the influence of various independent variables, which are exports, imports, foreign investment, domestic investment, GRDP per capita, HDI, and tourism, on the dependent variable, namely the IEDI, in 34 provinces throughout Indonesia during 2018-2022.

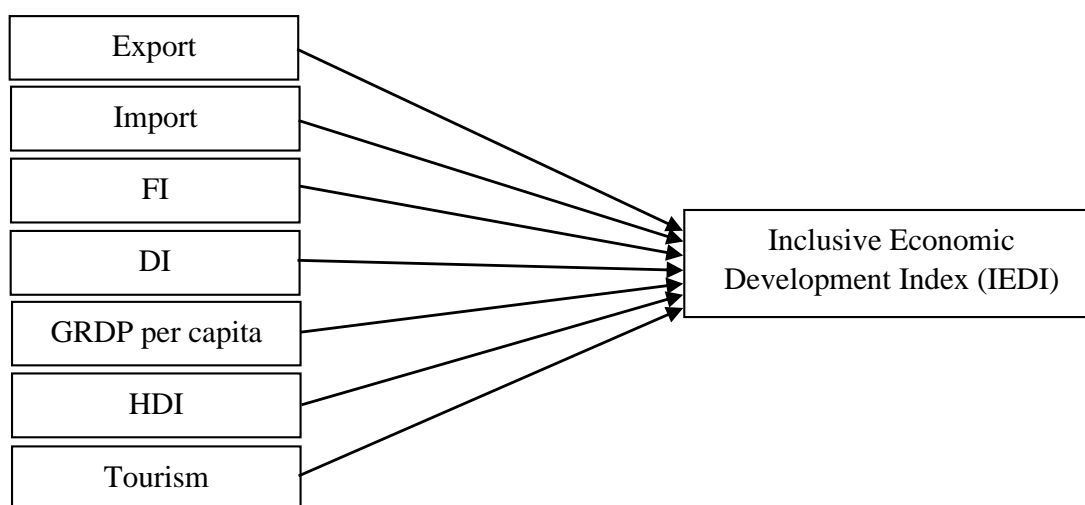


Figure 2. Conceptual framework

3.2. Research Data

The analytical data were obtained secondarily from several ministries and agency in Indonesia, namely Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional (Kementerian PPN/Bappenas), Kementerian Perdagangan, Kementerian Investasi/Badan Koordinasi Penanaman Modal (BKPM), and Badan Pusat Statistik (BPS). The processed panel data contains both cross section and time series data. The cross-section data is derived from 34 provinces in Indonesia, while the time series data is for the period 2018-2022.

Table 1. Indicators in research on the effect of competitiveness aspects on the IEDI in Indonesia

Indicator	Source	Unit
IEDI	Bappenas	Percentage
Export (non-oil and gas)	Kementerian Perdagangan	Million US\$
Imports (non-oil and gas)	Kementerian Perdagangan	Million US\$
FI	BKPM	Million US\$
DI	BKPM	Billion Rupiah
GRDP Per Capita	BPS	Billion Rupiah
HDI	BPS	Percentage
Tourism	BPS	Travel

The analytical tool used is the EViews 9.0 application with a panel data regression method that tests the use of 3 models, namely the Common Effect Model (CEM), Random Effect Model (REM), and Fixed Effect Model (FEM). Furthermore, selection of the most suitable model test will be carried out using LM, Chow and Hausman tests. The last stage of this study will analyze the theoretical fit and significance based on the goodness of fit test and panel data regression test. Thus, the regression equation formed in this study is:

$$\text{IEDI}_{it} = \beta_0 + \beta_1 \text{EXPORT}_{it} + \beta_2 \text{IMPORT}_{it} + \beta_3 \text{FI}_{it} + \beta_4 \text{DI}_{it} + \beta_5 \text{GRDP}_{it} + \beta_6 \text{HDI}_{it} + \beta_7 \text{TOURISM}_{it} + e_{it}$$

Notes:

IEDI = Indonesia Economic Development Index

β_0 = Constant

$\beta_1 - \beta_7$ = Regression Coefficients

e = error

i = 1, 2, 3, ... ,n (Total 34 Provinces in Indonesia)

t = 1, 2, 3, ... ,t (Number of Years Observed)

4. RESULT AND DISCUSSION

This study uses a sample of 34 provinces in Indonesia, while the time series used is the period 2018-2022, so it can be concluded that a total of 170 samples were used in this study. Furthermore, there are a series of statistical tests carried out on the variables in this study. The first stage is the model selection test, the second stage is the goodness of fit test, and the last stage is the panel data regression test results along with the interpretation of each independent variable on the dependent in this study.

4.1 Model Selection Test for Research on Inclusive Economic Development in Indonesia

Testing the model selection in this study resulted in the FEM being the most accurate model to choose. The results that support this decision are summarized in the panel data regression through 3 tests in the following table:

Table 2. Model selection test

	Probability	Results	Description
LM Test	0.0000	Ho rejected	Fixed effect
Chow Test	0.0000	Ho rejected	Fixed effect
Hausman Test	0.0000	Ho rejected	Fixed effect

Source: Data Processed (EViews 9.0)

Determining the appropriate model between the CEM or FEM in estimating data is done through the Chow test. The probability value or commonly referred to as the P-value of the Cross Section Chi-square is $0.0000 < 0.05$ which reflects an alpha or significance level of 5%, so H_0 is rejected, it implies that FEM is chosen as the model that can estimate the data and the test proceeds to the Hausman test.

Furthermore, the most appropriate model selection between FEM or REM used in estimating data is done through the Hausman test. The probability value is $0.0000 < 0.05$ (significance level 5%), then H_0 was rejected. In connection with the rejection of H_0 in these results, it is concluded that the FEM is the best and most appropriate model to use in estimating data.

4.2. Goodness of Fit Test

Courtesy of the table 3, it shows that the goodness of fit test results come from the significance of the coefficient of determination and the global test. The coefficient of determination is represented by the Adjusted R^2 value of 0.893521. This indicate the capability of the independent variables (competitiveness aspects) in explaining the dependent variable (IEDI) is 89%. In another sense, the influence of 89% of variations in provincial inclusive economic development variables in Indonesia is influenced by exports, imports, FI, DI, GRDP Per Capita, HDI and tourism, while the other 11% is affected by other variables that are not included in the research model.

In addition, the global test is represented by an F-statistic probability value of $0.0000 < 0.05$ as the significance level. These results provide an analytical conclusion that there is at least one independent variable (competitiveness aspect) that affects the IEDI as a dependent variable.

Table 3. Goodness of fit test results

Goodness of Fit	
R-squared	0.919812
Adjusted R-squared	0.893521
F-statistic	34.98557
Prob(F-statistic)	0.000000

Source: Data Processed (EViews 9.0)

4.3. Model Estimation of the Effect of Competitiveness Aspects on Inclusive Economic Development in Indonesia

In this study, the author proposes a hypothesis that the Inclusive Economic Development of Provinces in Indonesia is positively influenced by exports, imports, FI, DI, GRDP Per Capita, HDI and tourism. The test results based on table 4, show that at the appropriate level of significance, the variables that have a significant effect and have a positive influence on the IEDI or according to the hypothesis are exports, imports, DI, GRDP Per Capita and HDI. Thus, it is reasonable to conclude that H_1 , H_2 , H_4 , H_5 , and H_6 accepted, while the FI and Tourism variables have no effect on Indonesia's inclusive economic development, thus H_3 and H_7 rejected.

Table 4. FEM output estimation results

Variables	Theory	Coefficient	Std. Error	T-Stat	Prob. (1 Tail)	Decision
-----------	--------	-------------	------------	--------	----------------	----------

C		-14.08731	4.824575	-2.919908	0.0021	
EXPORT	+	2.57E-05	1.87E-05	1.373290	0.0861	H ₁ accepted*
IMPORT	+	1.51E-05	7.72E-06	1.956074	0.0263	H ₂ accepted**
FI	+	-7.22E-06	2.68E-06	-2.699352	0.0039	H ₃ rejected
DI	+	9.38E-05	3.89E-05	2.411368	0.0087	H ₄ accepted***
GRDP	+	1.87E-06	1.44E-06	1.296649	0.0986	H ₅ accepted*
HDI	+	0.269396	0.073234	3.678580	0.0002	H ₆ accepted***
TOURISM	+	-4.29E-09	1.21E-09	-3.547614	0.0003	H ₇ rejected

Notes: *, **, and * indicate significance at the 10%, 5% and 1% levels, respectively.**

Source: Data Processed (EViews 9.0)

The panel data processing of the variables in this study, using FEM, resulted in the following regression equation:

$$\text{IEDI} = -14.08731 + 2.57\text{E-}05 \text{ EXPORT} + 1.51\text{E-}05 \text{ IMPORT} - 7.22\text{E-}06 \text{ FI} + 9.38\text{E-}05 \text{ DI} + 1.87\text{E-}06 \text{ GRDP} + 0.269396 \text{ HDI} - 4.29\text{E-}09 \text{ TOURISM} + e$$

4.3.1. The Influence of Exports on the IEDI

This study found that Inclusive Economic Development in Indonesia is influenced by the export variable. It can be seen based on table 4 that with a significance level of 10%, the probability of export is $0.0861 < 0.10$ as the significance level. Thus, it is reasonable to conclude that the level of inclusive economic growth in Indonesia will increase if the value of exports also increases. This is in accordance with the study conducted in Indonesia (Ginting, 2017) and in emerging market (Anand, Mishra, & Peiris, 2013), which proves that statistically, economic development, especially in relation to an inclusive economy, is positively influenced by an increase in exports.

4.3.2. The Influence of Imports on the IEDI

This study found that IEDI is influenced by the Import variable. It can be seen based on table 4, that the probability of imports is $0.0263 < 0.05$ as the significance level. Thus, it is reasonable to conclude that the inclusive economic development rate in Indonesia will increase if the value of imports also increases. This is supported by research from the APEC (Hernando, Andres, & Wirjo, 2015), which is also in line with the International Monetary Fund working paper (Bacchetta, Cerra, Piermartini, & Smeets, 2021), the study found that inclusive economic growth is positively influenced by an increase in import variables.

4.3.3 The Influence of Foreign Investment (FI) on the IEDI

This study found that the negative FI coefficient is not in accordance with the hypothesis, which states that FI has a positive influenced on Inclusive Economic Development. This can occur because the amount of FI that comes, has not been able to be evenly distributed to improve the living standards of all its citizens. This is in line with research (Ramadhania, Mire, & Muliadi, 2018) which examines economic growth in East Kalimantan and working paper (Kang & Martinez-Vazquez, 2021) states that FI has a negative influence on inclusive economy of a region.

4.3.4 The Influence of Domestic Investment (DI) on the IEDI

This study found that Inclusive Economic Development in Indonesia is influenced by the DI variable. It can be seen based on table 4 that with a significance level of 1%, the

probability of DI is $0.0087 < 0.01$ as the significance level. Thus, it is reasonable to conclude that the rate of inclusive economic development in Indonesia will increase if DI also increases. This is supported by the research findings that IEDI positively influenced by the DI in cities and districts in East Java (Rahmawati, Purwanti, & Ramadhani, 2021).

4.3.5 The Influence of GRDP Per Capita on the IEDI

This study found that Inclusive Economic Development in Indonesia is influenced by the GRDP Per Capita variable. This can be seen based on table 4 that with a significance level of 10%, the probability of GRDP is $0.0986 < 0.1$ as a significance level. Thus, it is reasonable to conclude that the rate of inclusive economic development in Indonesia will increase if the GRDP per capita of a region also increases. This is supported by the study results which state that IEDI is positively influenced by the GRDP per capita variable of a region (Amalia, 2023).

4.3.6 The Influence of HDI on the IEDI

This study found that Inclusive Economic Development in Indonesia is influenced by the HDI variable. It can be seen based on table 4 that with a significance level of 1%, the probability of HDI is $0.0002 < 0.01$ as the significance level. Thus, it is reasonable to conclude that the inclusive economic development rate in a region will increase if the HDI of a region also increases. These results are in accordance with the conclusions of research conducted in East Java where HDI is a factor that influences positively on IEDI (Ilyas & Prasetya, 2023)

4.3.7 The Influence of Tourism on the IEDI

This study found that the coefficient of the tourist variable which is negative is not in accordance with the hypothesis that the number of tourist trips has a positive effect on Inclusive Economic Development. This can occur because the factors that influence tourist travel are quite complex and depend on the comparative advantage of a region, both in terms of natural resources, and technology as a tourist lure. In addition, tourist trips are also temporary in nature which are officially regulated in law, so that the multiplier effect of tourists cannot be evenly distributed to inclusive economic growth in the tourist destination area. This is in line with research that discusses the negative influence between tourists and economic development in Africa (Dossou, Simplicie, Emmanuelle, Dossou, & Alinsato, 2023).

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This study aims to see the effect of competitiveness on inclusive economic development in 34 provinces in Indonesia. The secondary data in this study used 34 provinces in Indonesia during the period 2018-2022 with panel data regression analysis method with the best estimation results using FEM. The results of this study indicate that:

1. Exports have a positive influence on the IEDI
2. Imports have a positive influence on the IEDI
3. FI has no influence on the IEDI

4. DI has a positive influence on the IEDI
5. GRDP per capita has a positive influence on the IEDI
6. HDI has a positive influence on the IEDI
7. Tourism has no influence on the IEDI

The influence of FI and tourism on the IEDI is not statistically accepted. This is not in accordance with the theory, which based on the results of statistical tests, both variables have a negative effect on inclusive economic development in Indonesia.

5.2. Recommendations

This study shows that in the regression model of inclusive economic development, the HDI variable is the variable that has the greatest significance for inclusive economic development in Indonesia. Thus, the researcher suggests that there is a need for commitment to increase HDI to enhance the competitiveness of the region, which in turn is able to increase inclusive economic development in a province and Indonesia. Furthermore, there is a need to harmonize the implementation of Foreign Investment (FI) in order to increase decent living standards and qualified added value in the province. In addition, there is a need to affirm sustainable tourism schemes so that Indonesia's natural preservation is maintained which will increase the attractiveness of tourism and improve the quality of life of a province in Indonesia.

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CHAPTER 10

Case Study: The Advantage of Combinable Magnetic Resonance to Recognize Potential Zone Concurring Mud Log with High Gamma Ray

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ABSTRACT

Combinable Magnetic Resonance (CMR) Logging is an alternative method for permeability detection in subsurface formations, comparing to traditional Gamma Ray Logging techniques. CMR Logging identifies pore space in rock formations by measuring the magnetic response of hydrogen nuclei in pore fluid from neutron magnetic resonance log. CMR focuses on Longitudinal and Transverse relaxation times which indicates pore size distribution and fluid types, which then to calculate the porosity, effective porosity, and bound fluid volume. Meanwhile, Mud logging provides a real-time information on lithology, hydrocarbon shows, and formation fluid

content; which indicating the presence of porosity as well as permeability, as Mud logging shows the present of methane, ethane, propane. The Mud logging concurs the presence of permeability and fluid types given by CMR.
Keywords: Combinable magnetic resonance logging, Porosity, Gamma ray logging, Mud logging.

1. INTRODUCTION

In the oil and gas industry, logging is a means to obtain reservoir parameter by running logging tool in a well, during well drilling. Logging is run in an open hole well. There are logging tool for cased hole well, but in this case, only logging in open hole well is discussed.

In the conventional logging is supposed to obtain gamma ray log of reservoir which indicates reservoir permeability or reservoir ability to transmit fluid in track one; resistivity of reservoir which indicate the content of reservoir in track two; and neutron density log to obtain reservoir porosity track three. This logging tool is named as triple combo logging.

In the track one, high gamma ray indicates low or no permeability, since gamma ray measures the radio activity of the formation. The high radio activity of the formation, the dense the formation, which means there is no space for formation fluid to flow in the formation.

During drilling formation is chipped by the drilling bit, this chipped of formation or rock is called cuttings. The cuttings indicate the existence of hydrocarbon fluid. The indicator is the existence of methane or CH_4 , ethane or C_2H_6 , and propane or C_3H_8 ; or briefly they are called C1, C2, and C3; respectively. The existence of C1, C2, and C3, definitely the presence of hydrocarbon in the reservoir, either oil or gas. In the case oil bearing formation, the readings of C1, C2, and C3 from cuttings is not obvious, but the cutting will have what is called oil show. In the case of gas bearing formation, sometime the cutting does not show any existence of C1, C2, C3; since those gases are evaporated during transportation to the surface from the formation. The shows of hydrocarbon in the formation is called mud log. In this paper, we have formation with C1, C2, and C3 shows.

Sometime the reading from gamma ray and cutting sample description does not agree to each other; in this paper the higher gamma ray exists in the same zone as C1, C2, and C3 shows.

To solve the contradiction between gamma ray and mud log readings; the combined magnetic resonance (CMR) will help to confirm the presence of hydrocarbon in certain reservoir.

CMR is an advance and more sophisticated technology as compared to triple combo log, that enhances reservoir characterization. CMR utilizes the principles of nuclear magnetic resonance to directly detect and quantify of hydrogen nuclei in pore fluids. CMR allows for a more accurate determination of porosity, permeability, and fluid types within the formation. Logging tool with additional nuclear magnetic resonance log is called quad combo.

2. LITERATURE REVIEW

Literature cited are mostly related to conventional triple combo log interpretation, the description of mud log, and CMR interpretation, in order to have best reservoir characterization. Sri Rizky et. al. in "Estimation of prospective hydrocarbon zone based on log interpretation in "Z" area south Sumatera basin", shows in detail that gamma ray log is used as a permeability indicator. M. Subhan et. al in "Application of real time mud gas logging to identify additional pay zone in the randegan field, northwest java basin", explains that mud log will show the existence of potential hydrocarbon-bearing zones. R. Freedman et. al in "Combining NMR and density logs for petrophysical analysis in gas-bearing

formations”, explains CMR will further definitely define the existence of hydrocarbon bearing zone.

Othe pertinent publications mentioned in the references are also important for this paper.

3. RESEARCH METHOD

The first step to be done is interpreting the triple combo log. Figure 1 is an example for common triple combo log readings. In the first tract is the gamma ray log. The high gamma ray reading indicating dense rock, which might be thought as shale, the low gamma ray in indicating that presence of permeability in the rock. This log is the main topic of the paper. Second track is resistivity log, high resistivity indicates the presents of hydrocarbon. The third track is neutron porosity and bulk density log.

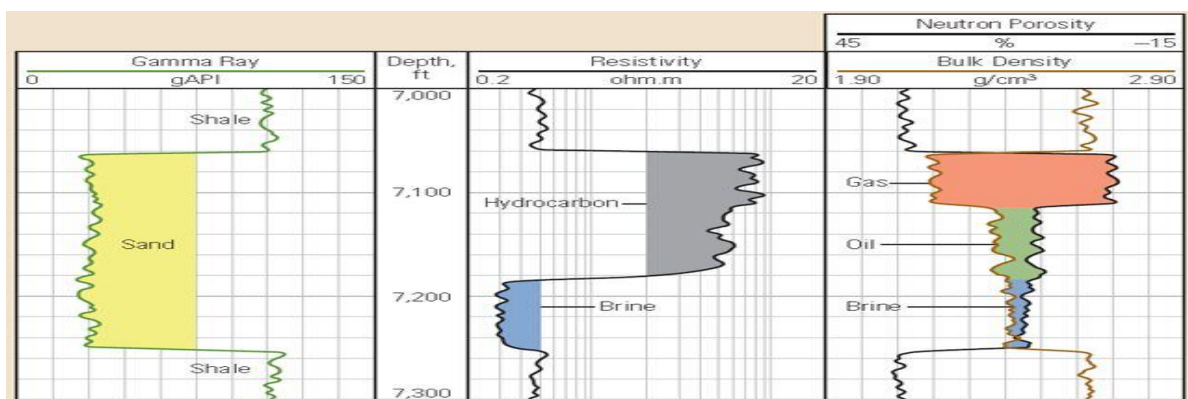


Figure 1. Common triple combo log

However, in this paper, emphasising track one has to be taken in order to see the from the high gamma reading. The second step is obtaining the mud log from the field, from the reading of cutting description due to drilling. Example for mud log is presents in the figure under results and discussions topic. The third step is to interpret nuclear magnetic resonance log in order to obtain the CMR log. CMR log will be presented in results and discussion topic.

4. RESULT AND DISCUSSION

The triple combo log, in this case from track one and two only, are gamma ray and resistivity log. Figure 2 is part of triple combo log, which only shows gamma ray and resistivity log. In this log, gamma ray log shows high gamma ray on the zones with high resistivity, which should not be the normal case. Normally, low gamma ray will have high resistivity. Around the depth of 2700 feet, resistivity log indicates the presence of hydrocarbon, however, gamma ray, on the other hand is indicating no or low permeability in the zone by having high gamma ray reading. This phenomenon occurs also in the depth of around 2740 feet, 2750 feet, and other zones in the bottom of the well.

Figure 3 shows the mud log of the same well with the same interest depth with graph in Figure 2. The left track of the log shows the presence of isobutane (IC4), isopentane (IC5), and n-butane (NC4) which are the high carbon chain of hydrocarbon. On the right tract shows the presence of C1, C2, and C3. Comparing the log2 in Figures 2 and 3; around the depth of 2700 feet, the shows of C1 through IC5 increase, indicating the presence of hydrocarbon. At a depth of around 2740 feet, 2750 feet, and other zones in the bottom of the well, the increase

of C1 through IC5. However, as mentioned earlier and depicted in Figure 2. The presence of hydrocarbon from show of C1 through IC5 is not supported by gamma ray log.

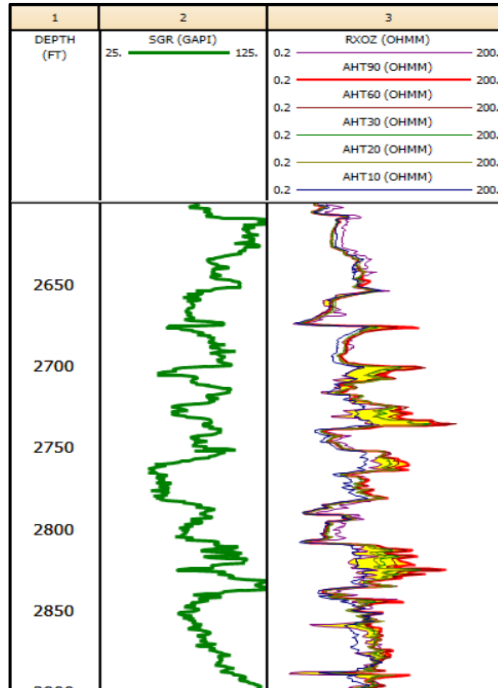


Figure 2. Gamma ray and resistivity log

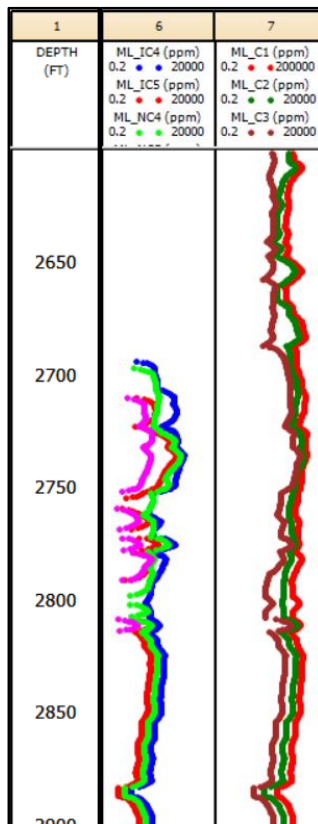


Figure 3. Mud log

Referring to the result of log interpretation from Figure 2 and Figure 3, it needs to confirm the presence of hydrocarbon, in this paper, from CMR log interpretation, which is from NMR log of quad log.

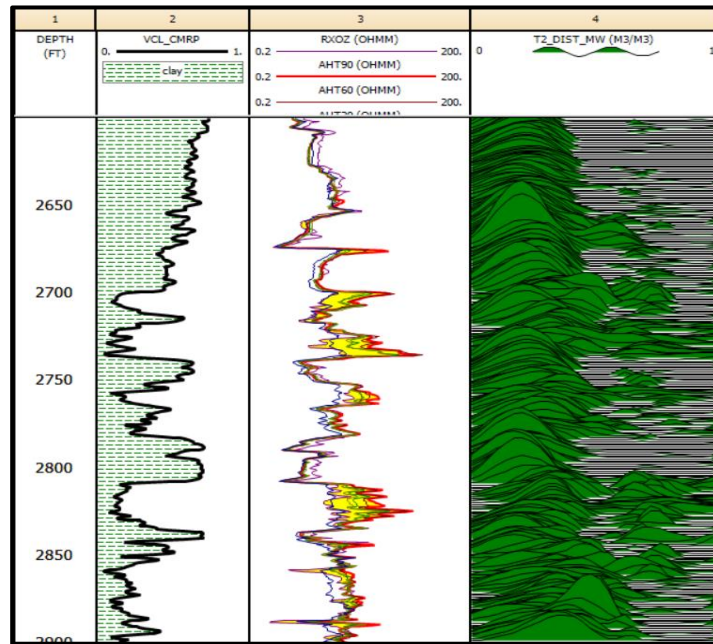


Figure 4. CMR log

Figure 4 is CMR log interpretation from NMR log in track one, track two is the interpretation from resistivity log, track three is the figure bound fluid in the rock formation from NMR log to obtain the CMR log. There are mountains in track three; the lower the mountain, the higher the bound fluid, the lower the CMR log in track one. The lower the CMR the higher the resistivity in track two. It is concluded that track one and track 3 agree to each other, higher permeability, higher hydrocarbon bearing in the reservoir.

Combining all of the log interpretation we have composite log without porosity and density log, which is depicted in Figure 5.

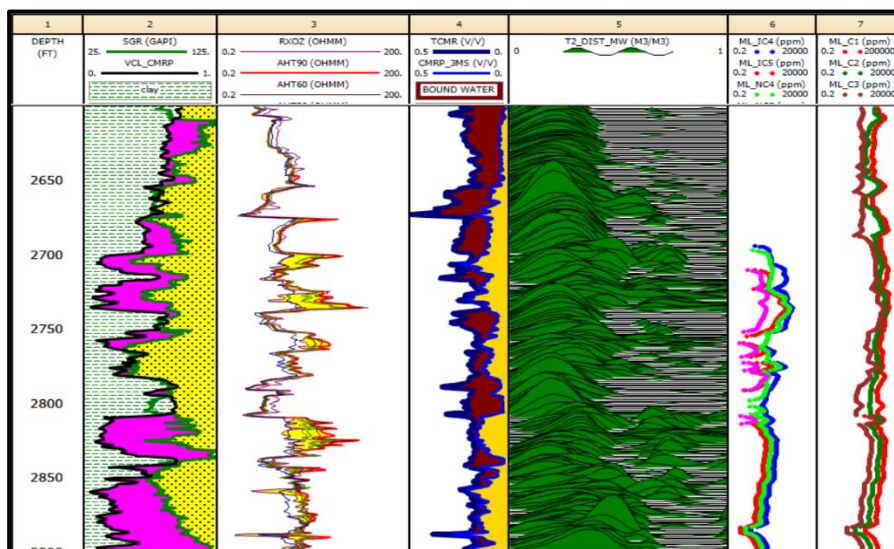


Figure 5. Composite log (with no porosity and density log)

Figure 5 is the complete presentation of log analysis of quad log. In the first track, it shows gamma ray and CMR logs, the green color is gamma ray log and the black color is

CMR log, and the pink color is the difference of gamma ray and CMR log. The first track proves that gamma ray log gives an inaccurate result in this case. The second track shows the presence of hydrocarbon. Take an example in a depth of around 2700 feet, the yellow color indicating the presence of hydrocarbon. Track three supports track two and one, in a depth of around 2700 feet, there is no dark red color for zona with permeability and oil bearing zone. In track 5 and 6 of mud log also support the presence of hydrocarbon.

5. CONCLUSION AND RECOMMENDATIONS

It can be concluded that:

1. High gamma ray reading in the subject well logging indicates low permeability, but at the same time the mud log indicates hydrocarbon potential at the same zone.
2. CMR interpretation validates hydrocarbon zone obtained from mud log.
3. It is recommended that the result of this method should be utilized the signature of log interpretation in the field or area. Thus, without running NMR log, or only running triple combo log, the hydrocarbon bearing potential should be able being recognized from resistive log, porosity and density log, and mud log; knowing that the gamma ray in this area give wrong interpretation of permeability.

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CHAPTER 11

Enhanced Oil Recovery Technology Disruption as Navigation Towards Global Challenges

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ABSTRACT

The changing business environment and direction changes, such as in facing the challenges of climate change that require reducing the use of fossil fuels and diversifying into green energy that aims to limit global temperature rise below the 2C threshold require a reduction in oil production of almost 20 million barrels per day by 2030 will disrupt the global industrial, particularly within the oil and gas sector. Industry 5.0 prioritizes the welfare of people in industrial processes and utilizes innovative technology to provide prosperity that goes beyond employment and economic progress, while also ensuring the sustainability of the world. This strategy enhances the existing sector 4.0 framework by focusing on research and innovation that support a sustainable transition in the sector. The Oil and Gas Industry is adapting to the advancements of Industry 4.0 and Industry 5.0 in order to sustain its business, ensure profitability, competitiveness, market leadership, and the exploration of new market opportunities in the energy sector. This is achieved by embracing technology disruption, which focuses on meeting three key requirements: Good enough, Simpler and More affordable. By simplifying, making complex and costly processes more accessible. This paper will specifically examine the role of technology and sustainable management systems in improving reservoir Recovery Factors through Enhanced Oil Recovery, which is critical for companies. When selecting appropriate enhanced oil recovery (EOR) method for a reservoir, advanced EOR screening differs from conventional screening methods. Advanced EOR is a more sophisticated data mining approach that leverages artificial intelligence to provide better screening criteria. This is achieved by examining a simultaneous combination of many reservoir and fluid parameters.

Keywords: Technology disruption, Enhanced oil recovery, Managements system.

1. INTRODUCTION

In the industrial realm, particularly within the oil and gas sector, there are four primary obstacles commonly encountered in managing the industry. These issues encompass business environment changes, direction changes, resource changes (time, capability, money) and ineffective processes. Every era presents unique issues; thus, the sector must possess the ability to adapt by formulating diverse tactics in order to find appropriate solutions.

The changing business environment and direction changes, such as in facing the challenges of climate change that require reducing the use of fossil fuels and diversifying into green energy that aims to limit global temperature rise below the 2C threshold require a reduction in oil production of almost 20 million barrels per day by 2030. Nevertheless, the graph of Global oil production and energy transition investment and spending demonstrates that oil use remains dominant. By 2023, a record-breaking \$1.8 trillion was invested in green energy technologies. However, global oil production has attained an all-time high of 96.5 million barrels per day, marking three consecutive years of growth, figure 1. According to the baseline scenario of energy agencies, such as the International Energy Agency and OPEC, the global oil supply will remain at its present level until 2030, the threshold of 2C global temperature rise will be exceeded.

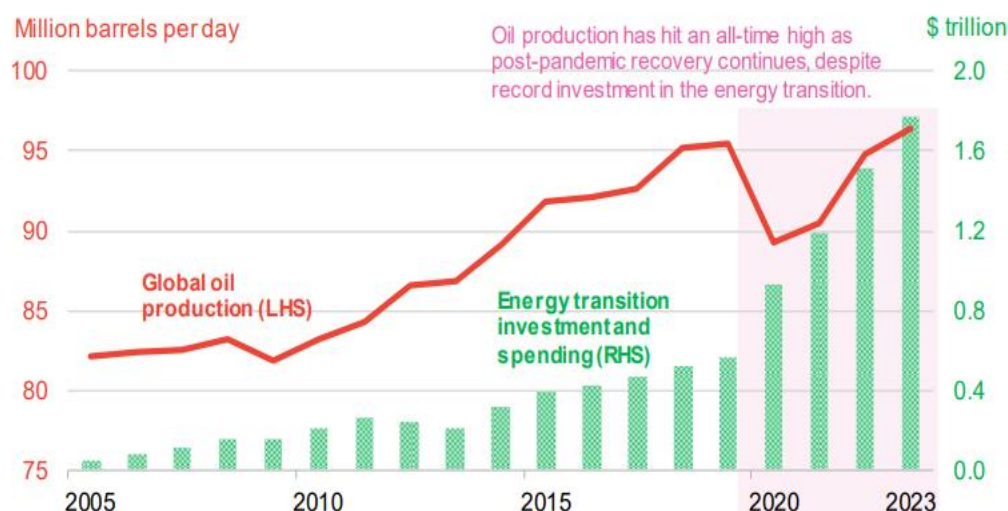


Figure 1. Global oil production and energy transition investment and spending (BloombergNEF , 2024)

In the present period, significant transformations in the industrial sector have led to the Industrial Revolution 4.0 and Industrial Revolution 5.0. The key distinction between industry 4.0 and 5.0 lies in the change of focus, which encompasses:

1. Industry 4.0 is centered around the automation of tasks, whereas Industry 5.0 is centered around the optimization of working hours required to accomplish a task.
2. Industry 4.0 emphasizes the efficiency of automating machines and technology, whereas industry 5.0 prioritizes the optimization of human expertise through the assistance of artificial intelligence.

- Industry 4.0 is centered around automated systems, whereas Industry 5.0 is centered around enhancing job efficiency through the use of machines to promote human well-being and long-term viability. (source:<https://www.djkn.kemenkeu.go.id/kpkn-lahat/baca-artikel/16023/Mengenal-Revolusi-Industri-5.0>, Hendra Fridolin 2023).

Industry 5.0 prioritizes the welfare of people in industrial processes and utilizes innovative technology to provide prosperity that goes beyond employment and economic progress, while also ensuring the sustainability of the world. This strategy enhances the existing sector 4.0 framework by focusing on research and innovation that support a sustainable transition in the sector. The goal is to develop individuals who are resilient, agile, flexible, and adaptive to technology. Figure 2 Industry 5.0 Human-centric, sustainable and resilient.



Figure 2. Industry 5.0 Human-centric, sustainable and resilient (Directorate-General for Research and Innovation, 2024)

The Oil and Gas Industry is adapting to the advancements of Industry 4.0 and Industry 5.0 in order to sustain its business, ensure profitability, competitiveness, market leadership, and the exploration of new market opportunities in the energy sector. This is achieved by embracing disruptive innovation, which focuses on meeting three key requirements: Good enough, Simpler and More affordable. By simplifying, making complex and costly processes more accessible, the industry aims to cater to a broader user base. (Source: timschindele@outlook.com, Lean Six Sigma Black Belt).

Data collection, converting unorganized data into organized data, and utilizing artificial intelligence (AI) to make crucial data-driven analyzes and decisions are essential in the oil and gas sector to maintain competitiveness, resilience, agility, flexibility, and technological adaptability. This approach enables the industry to achieve:

1. Real-time reporting.
2. Faster decision-making.
3. More detailed examinations.
4. Reducing Failures in the field.
5. Analyzing risks faster and quicker.
6. Increased efficiencies.
7. Reduction of human error.
8. Completing time-consuming tasks.
9. Providing human more time for analysis.
10. Increased potential with scaling.

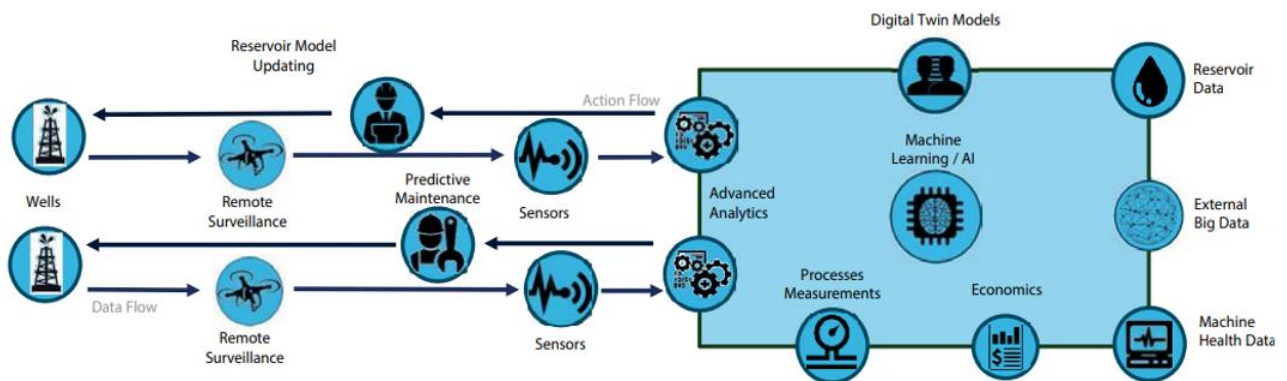


Figure 3. How Industry 4.0 can transform the upstream production stack (Marcos Stuart Fraser., et all. 2018)

This study will specifically examine the role of technology and sustainable management systems in enhancing the Recovery Factor from reservoirs through Enhanced Oil Recovery, which is crucial for enterprises. When selecting the appropriate enhanced oil recovery (EOR) method for a reservoir, the conventional screening approach is commonly employed. This strategy involves using a lookup table that determines the validity interval based on engineering considerations. The table is created by gathering "expert opinions" or analyzing data from successful field cases.

The most probable scenario involves the integration of various methodologies. Typically, the average characteristics of the fluid and reservoir in a certain field are assessed and compared to an interval lookup table in order to determine the most suitable enhanced oil recovery (EOR) technique for the reservoir. The commonly employed screening method, extensively discussed in literature such as Taber-Martin (1997), Aladasani-Baojun (2010) and other screening literature, fuzzy logic utilizes indications ranging from 0 to 1. This approach facilitates the ranking assessment for selecting the most suitable Enhanced Oil Recovery (EOR) method.

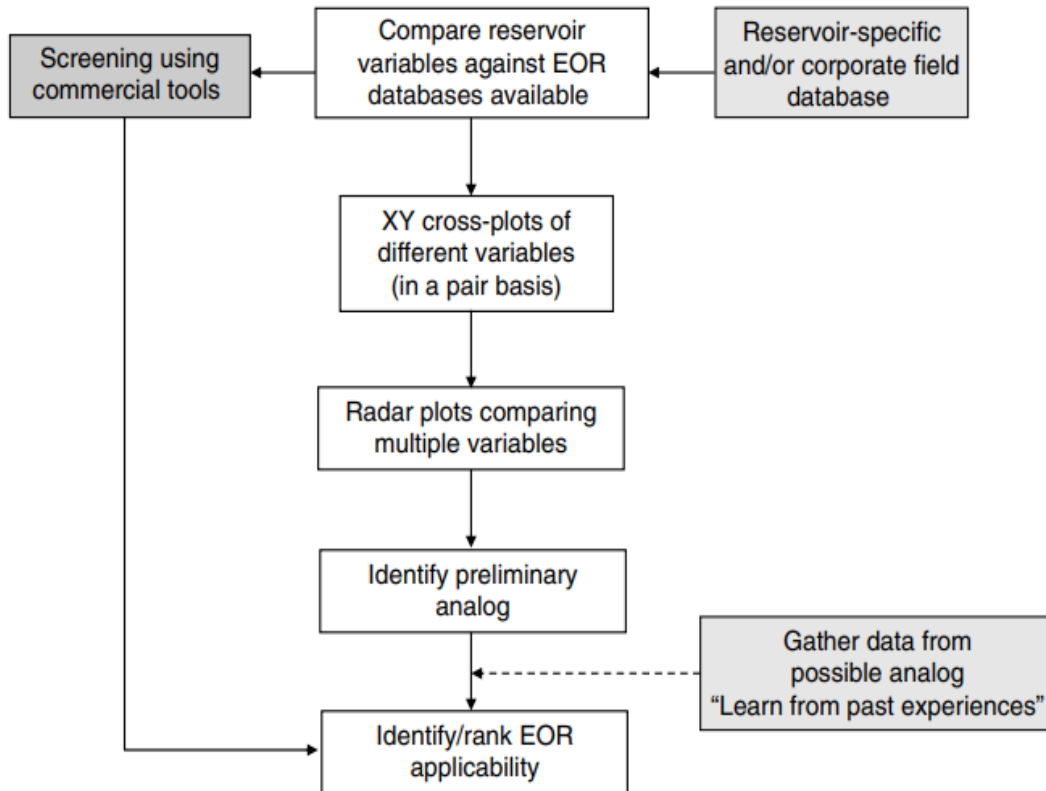


Figure 4. EOR Screening workflow

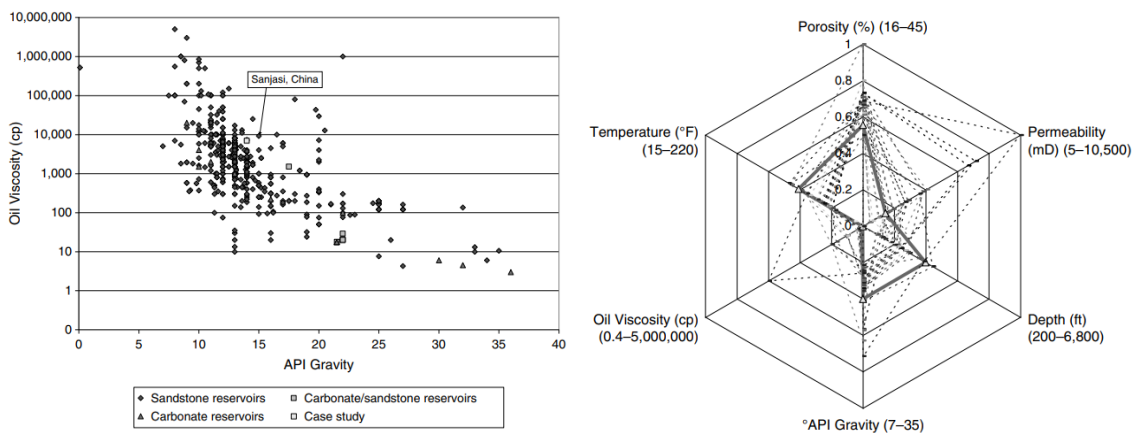


Figure 5. XY cross plots and radar plots of variables analyzed (Alvarado, Vladimir., et all 2010)

Advanced EOR screening, as opposed to conventional screening methods, is a more sophisticated data mining approach that utilizes artificial intelligence to provide improved screening criteria. This is achieved by examining the simultaneous combinations of many reservoir and fluid parameters, rather than just two.

Artificial intelligence, specifically neural networks, fuzzy logic, and expert systems, have been widely proposed and used for supporting multiple applications in oil and gas operations (Abdulraheem et al., 2009; Alegre et al., 1993; Ali, 1994; Allain and Houze, 1992; Balch et al., 2000; Hamada and Elshafei, 2009; Hutchin et al., 1996; Mohaghegh, 2000; Peden and Tovar, 1991; Weiss et al., 2000). Berbagai teknik kecerdasan buatan telah digunakan untuk

mengembangkan screening dan pemilihan metode EOR (Alvarado et al., 2006; Chung et al., 1995; Elem and Elmtalab, 1993; Gharbi, 2000; Guerillot, 1988; Ibatullin et al., 2002; IRIS, 2007; Jian and Wenfen, 2006; Shokir et al., 2002; Surguchev and Li, 2000).

(Source: Alvarado, Vladimir., et all 2010 Elsevier Inc. Enhanced Oil Recovery, Field Planning and Development Strategies.)

Technology service providers offer a variety of digital products that are equipped with all of their benefits to assist the oil and gas industry in operating its business in a competitive, resilient, agile, and flexible manner, while also adapting to technological advancements.

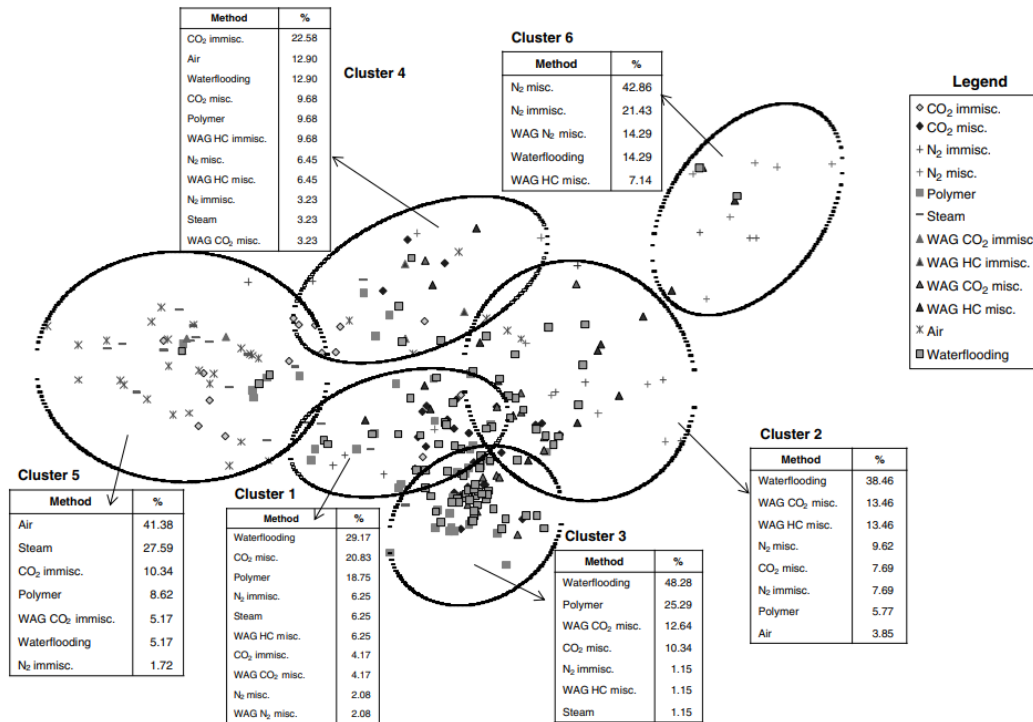


Figure 6. Advance screening (expert) map. 2-D representation of multidimensional analysis of six reservoir variable (Alvarado, Vladimir., et all 2010)

1. LITERATURE REVIEW

The Oil and Gas Industry, particularly advanced oil and gas exploration and recovery, is one of the 12 industries that are experiencing disruptive technologies, as illustrated in Figure 7, according to the Mckinsey Global Institute in "Disruptive technologies: Advances that will transform life, business, and the global economy."










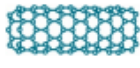


	Mobile Internet	Increasingly inexpensive and capable mobile computing devices and Internet connectivity
	Automation of knowledge work	Intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgments
	Internet of Things	Networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process optimization
	Cloud technology	Use of computer hardware and software resources delivered over a network or the Internet, often as a service
	Advanced robotics	Increasingly capable robots with enhanced senses, dexterity, and intelligence used to automate tasks or augment humans
	Autonomous and near-autonomous vehicles	Vehicles that can navigate and operate with reduced or no human control
	Next-generation genomics	Fast, low-cost gene sequencing, advanced big data analytics, and synthetic biology ("writing" DNA)
	Energy storage	Devices or systems that store energy for later use, including batteries
	3D printing	Additive manufacturing techniques to create objects by printing layers of material based on digital models
	Advanced materials	Materials designed to have superior characteristics (e.g., strength, weight, conductivity) or functionality
	Advanced oil and gas exploration and recovery	Exploration and recovery techniques that make extraction of unconventional oil and gas economical
	Renewable energy	Generation of electricity from renewable sources with reduced harmful climate impact

Figure 7. Twelve potentially economically disruptive technologies (Mckinsey Global Institute, 2013)

The "Twelve potentially economically disruptive technologies" have the capacity to affect billions of consumers, hundreds of millions of workers, and economic activity. Figures 8 and 9 display key indicators that assess the speed, extent of influence, and potential economic worth that any technology could have. The numbers depicted in these charts are used to broadly assess the ability of a technology to have an economic impact and cause

significant changes in the industry. These statistics are approximate and do not encompass all potential applications or impacts for each technology.


		Illustrative rates of technology improvement and diffusion	Illustrative groups, products, and resources that could be impacted¹	Illustrative pools of economic value that could be impacted¹
	Mobile Internet	\$5 million vs. \$400² Price of the fastest supercomputer in 1975 vs. that of an iPhone 4 today, equal in performance (MFLOPS) 6x Growth in sales of smartphones and tablets since launch of iPhone in 2007	4.3 billion People remaining to be connected to the Internet, potentially through mobile Internet 1 billion Transaction and interaction workers, nearly 40% of global workforce	\$1.7 trillion GDP related to the Internet \$25 trillion Interaction and transaction worker employment costs, 70% of global employment costs
	Automation of knowledge work	100x Increase in computing power from IBM's Deep Blue (chess champion in 1997) to Watson (Jeopardy winner in 2011) 400+ million Increase in number of users of intelligent digital assistants like Siri and Google Now in last 5 years	230+ million Knowledge workers, 9% of global workforce 1.1 billion Smartphone users, with potential to use automated digital assistance apps	\$9+ trillion Knowledge worker employment costs, 27% of global employment costs
	Internet of Things	300% Increase in connected machine-to-machine devices over past 5 years 80-90% Price decline in MEMS (microelectromechanical systems) sensors in last 5 years	1 trillion Things that could be connected to the Internet across industries such as manufacturing, health care, and mining 40 million Annual deaths from chronic diseases like Type 2 diabetes and cardiovascular disease	\$36 trillion Operating costs of key affected industries (manufacturing, health care, and mining) \$4 trillion Global health care spend on chronic diseases
	Cloud technology	18 months Time to double server performance per dollar 3x Monthly cost of owning a server vs. renting in the cloud	2.7 billion Internet users 50 million Servers in the world	\$1.7 trillion GDP related to the Internet \$3 trillion Enterprise IT spend
	Advanced robotics	75-85% Lower price for Baxter ³ than a typical industrial robot 170% Growth in sales of industrial robots, 2009-11	320 million Manufacturing workers, 12% of global workforce 250 million Annual major surgeries	\$6 trillion Manufacturing worker employment costs, 19% of global employment costs \$2-3 trillion Cost of major surgeries
	Autonomous and near-autonomous vehicles	7 Miles driven by top-performing driverless car in 2004 DARPA Grand Challenge along a 150-mile route 1,540 Miles cumulatively driven by cars competing in 2005 Grand Challenge 300,000+ Miles driven by Google's autonomous cars with only 1 accident (which was human-caused)	1 billion Cars and trucks globally 450,000 Civilian, military, and general aviation aircraft in the world	\$4 trillion Automobile industry revenues \$155 billion Revenue from sales of civilian, military, and general aviation aircraft
	Next-generation genomics	10 months Time to double sequencing speed per dollar 100x Increase in acreage of genetically modified crops, 1996-2012	26 million Annual deaths from cancer, cardiovascular disease, or Type 2 diabetes 2.5 billion People employed in agriculture	\$6.5 trillion Global health-care costs \$1.1 trillion Global value of wheat, rice, maize, soy, and barley
	Energy storage	40% Price decline for a lithium-ion battery pack in an electric vehicle since 2009	1 billion Cars and trucks globally 1.2 billion People without access to electricity	\$2.5 trillion Revenue from global consumption of gasoline and diesel \$100 billion Estimated value of electricity for households currently without access
	3D printing	90% Lower price for a home 3D printer vs. 4 years ago 4x Increase in additive manufacturing revenues in past 10 years	320 million Manufacturing workers, 12% of global workforce 8 billion Annual number of toys manufactured globally	\$11 trillion Global manufacturing GDP \$85 billion Revenue from global toy sales
	Advanced materials	\$1,000 vs. \$50 Difference in price of 1 gram of nanotubes over 10 years 115x Strength-to-weight ratio of carbon nanotubes vs. steel	7.6 million tons Annual global silicon consumption 45,000 metric tons Annual global carbon fiber consumption	\$1.2 trillion Revenue from global semiconductor sales \$4 billion Revenue from global carbon fiber sales
	Advanced oil and gas exploration and recovery	3x Increase in efficiency of US gas wells between 2007 and 2011 2x Increase in efficiency of US oil wells between 2007 and 2011	22 billion Barrels of oil equivalent in natural gas produced globally 30 billion Barrels of crude oil produced globally	\$800 billion Revenue from global sales of natural gas \$3.4 trillion Revenue from global sales of crude oil
	Renewable energy	85% Lower price for a solar photovoltaic cell per watt since 2000 19x Growth in solar photovoltaic and wind generation capacity since 2000	21,000 TWh Annual global electricity consumption 13 billion tons Annual CO ₂ emissions from electricity generation, more than from all cars, trucks, and planes	\$3.5 trillion Value of global electricity consumption \$80 billion Value of global carbon market transactions

Figure 8. Speed, scope and economic value at stake of 12 potentially economically disruptive technologies (Mckinsey Global Institute , 2013)

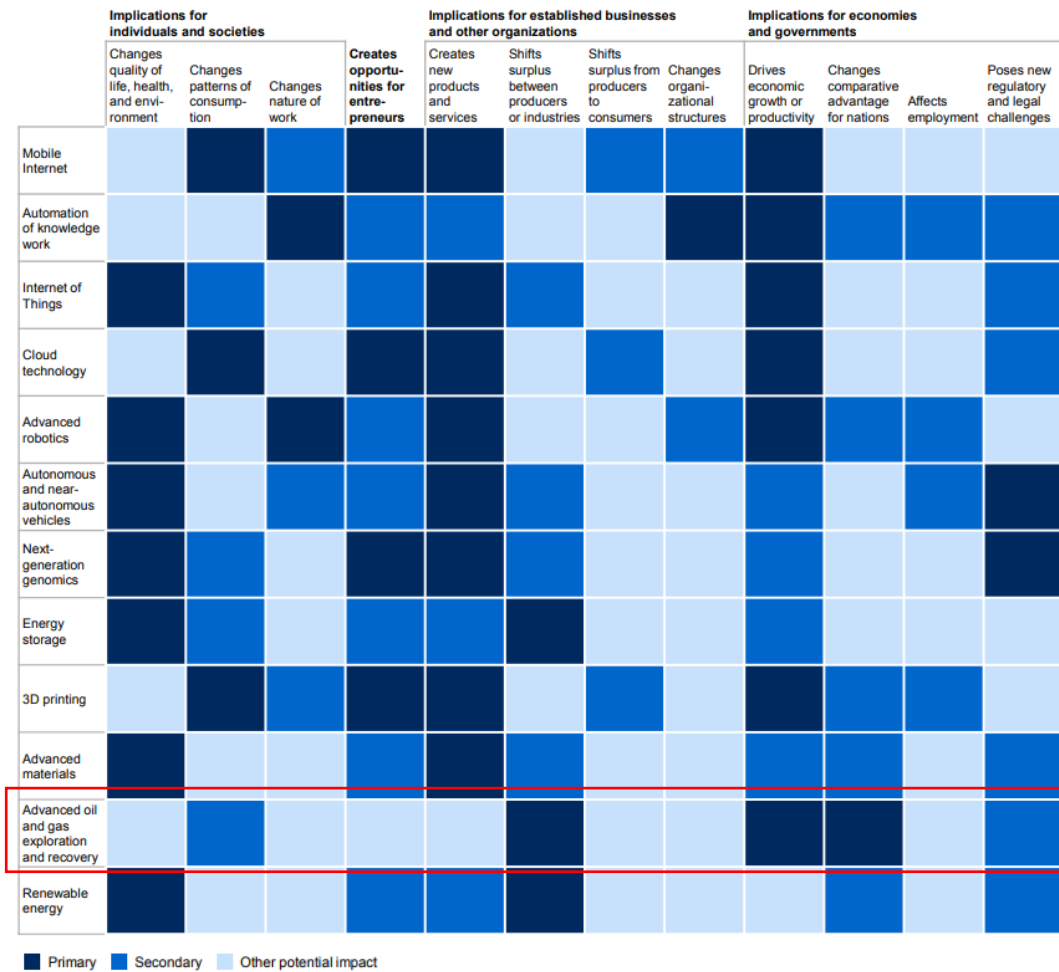


Figure 9. How disruptive technologies affect society, businesses and economies (Mckinsey Global Institute, 2013)

Advance oil-gas exploration and recovery. Oil and Gas Companies are concerned with enhancing the recovery value of the reservoir. To augment their reserves, firms can enhance the Recovery Factor of the reservoirs they are now exploiting, as the process of exploring and adding new deposits involves substantial expenses and risks. The implementation of the Reservoir Management program is essential to facilitate the efficient, sustainable, and cost-effective production of an oil and gas company, while also considering environmental and safety throughout the production life cycle.

The primary components integrated into Reservoir Management include:

1. Identify the existing best practices used inside the firm.
2. Identify discrepancies between current processes within the organization and best practices in similar industries.
3. Develop a set of optimal guidelines to be universally implemented by all asset teams within a sustainable framework.
4. Incorporating five contributors into reservoir management, specifically:
 - a. Well design and management.
 - b. Reservoir Characterization.
 - c. Reservoir modeling.
 - d. Surface Facilities design.

e. Economic.

(Source: F. Kalaydjian., B. Bourbiaux., 2002. Integrated Reservoir Management: A Powerful Method to Add Value to Companies' Assets. A Modern View of the EOR Techniques)

Evaluating the Enhanced Oil Recovery (EOR) technique employed in a reservoir is a crucial aspect of enhancing the company's asset value. It is an integral part of reservoir management, enabling the design and implementation of more efficient and effective methods for reservoir production, as depicted in Figure 10.

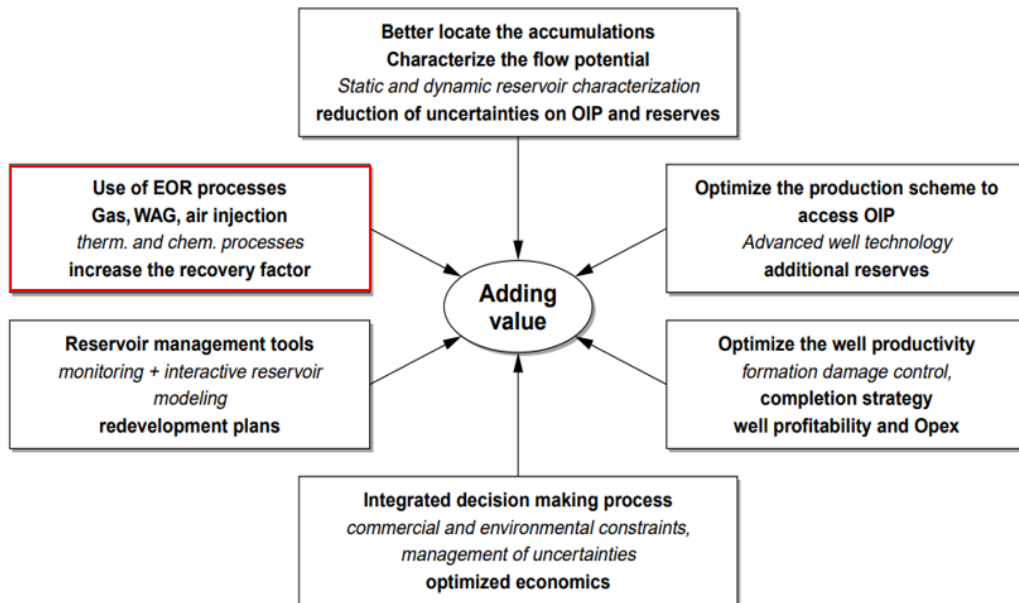


Figure 10. Adding value to company’s assets

Company X, an Indonesian company operating in multiple working area with brown/mature fields and diverse reservoir characteristics, conducted a study on increasing the Recovery Factor. The purpose of the study was to maintain production levels by exploring the application of Enhanced Oil Recovery (EOR) methods.

Company X's estimation of Original Oil in Place (OOIP) exceeds 12 billion barrels of oil (BBO). Approximately 7.99 billion barrels of oil (BBO), which accounts for 65% of the original oil in place (OOIP), is derived from the 10 structures with the highest OOIP, as measured by Pareto analysis. The average estimated Recovery Factor (RF) for the examined reservoir structures is 3.6%. By multiplying this RF with the Estimated Ultimate Recovery (EUR) number of 5078 MMSTB, we obtain an estimated Enhanced Oil Recovery (EOR) potential of 183 MMSTB. As illustrated in Table 1 and Figure 11.

(Source: Laporan screening metode EOR struktur-struktur di Perusahaan X, 2023).

Table 1. Projected tertiary recovery potential for work area A, Company X

No	Structure	In Place Best (x10 ⁶ STB)	Cum Prod (x10 ⁶ STB)	Current RF (%)	Remaining Oil In Place (x10 ⁶ STB)	EUR Best (x10 ⁶ STB)	EURF (%)
1	A	2658	692	26	1966	699	26
2	B	1705	938	55	767	988	58
3	C	651	149	23	502	166	25
4	D	491	56	11	435	202	41
5	E	553	201	36	352	71	13
6	F	417	87	21	330	244	59
7	G	478	228	48	250	204	43
8	H	424	182	43	242	133	31
9	I	269	67	25	202	84	31
10	J	150	21	14	129	31	21

The objective of the study is to identify the most suitable Enhanced Oil Recovery (EOR) method for an oil field reservoir that has been in the primary and/or secondary recovery phase. This will be achieved by conducting a literature review and screening process, both manually and using EOR software. The study will focus on a candidate reservoir within Company X's oil field, and the top 5 EOR methods will be determined.

2. RESEARCH METHODE

In the 1920s, Walter A. Shewhart introduced the PDCA work method, which is designed to perpetually enhance performance. W. Edwards Deming advocated for Shewhart's concept and expanded it into a four-step cycle, Plan-Do-Check-Act (PDCA), as illustrated in Figure 3.1.

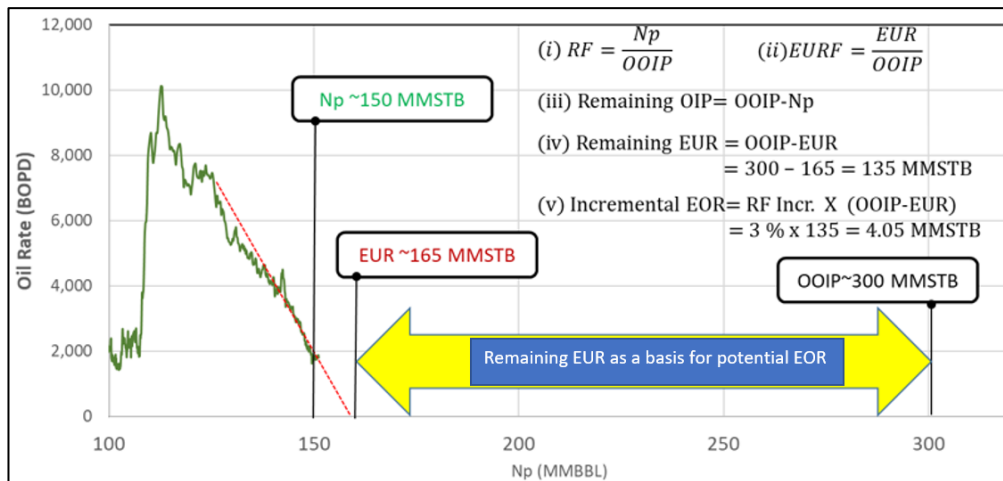


Figure 11. Illustration of Cumulative Production (Np), Estimate Ultimate Recovery (EUR), Estimate Ultimate Recovery Factor (EURF) dan Remaining EUR

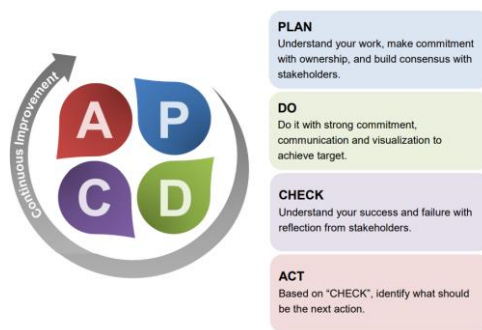


Figure 12. PDCA framework method

Advantages of using the Plan Do Check and Act approach:

- a. Continuous improvement in work.
- b. Enhancing work efficacy and minimizing resource and time waste.
- c. Mitigating communication-related conflicts.
- d. Establishing accomplishment standards.
- e. Enhancing the quality of labor outcomes.

The EOR screening method incorporates the implementation of the Plan Do Check and Act approach:

2.1 Plan

During the planning phase of the Enhanced Oil Recovery (EOR) screening process, a total of 10 reservoirs were chosen for analysis. These reservoirs were prioritized based on their estimated Original Oil in Place (OOIP), with a minimum threshold of 12 billion barrels of oil (BBO). Approximately 7.99 billion barrels of oil (BBO) or 65% of OOIP is derived from the 10 reservoirs with the highest OOIP, according to Pareto analysis. The average estimated Recovery Factor (RF) from the analysis of many reservoir structures is 3.6%. By multiplying this RF value with the Estimated Ultimate Recovery (EUR) number of 5078 MMSTB, the estimated Enhanced Oil Recovery (EOR) potential is calculated to be 183 MMSTB. This information can be found in Figures 2.5 and 2.6.

Planning is a crucial procedure for developing a sequence of action activities aimed at accomplishing a specific outcome. If executed proficiently, it has the potential to decrease the amount of time and energy needed, as depicted in Figure 13.

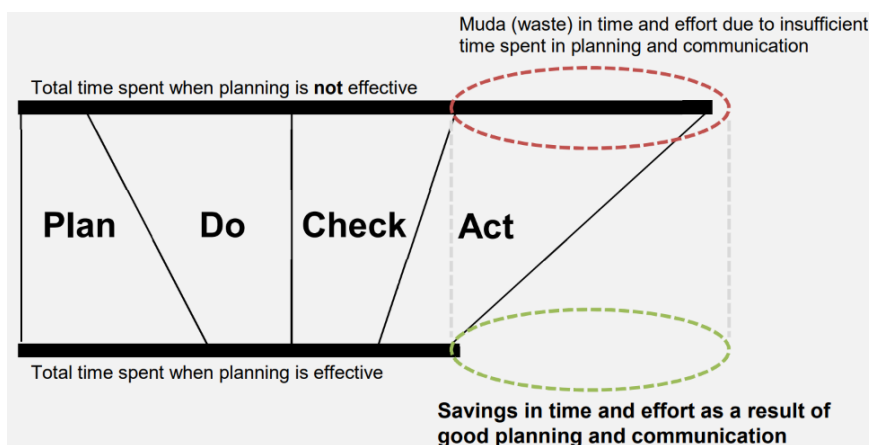


Figure 13. Total time spent on effective and ineffective planning

2.2 Do

3.2.1 Achieve the aim by demonstrating strong commitment, effective communication, and clear visualization within the asset team organization.

During the monitoring process, the implementation phase frequently necessitates modifying the plan in response to issues that arise. Possible modifications could include changes to the timeline, the execution procedure, or even the objective. In certain circumstances, this can lead to changes in the intended result.

The EOR workflow in Figure 16 is able to clearly identify the parameters that can impact the value of revenue, opex, and capex. This allows for the modification of the NPV, which is the final objective in relation to the profitability of an EOR project. The industry is characterized by numerous challenges, such as changes in the business environment, changes in direction, changes in resource availability (time, capability, and money), and ineffective processes.

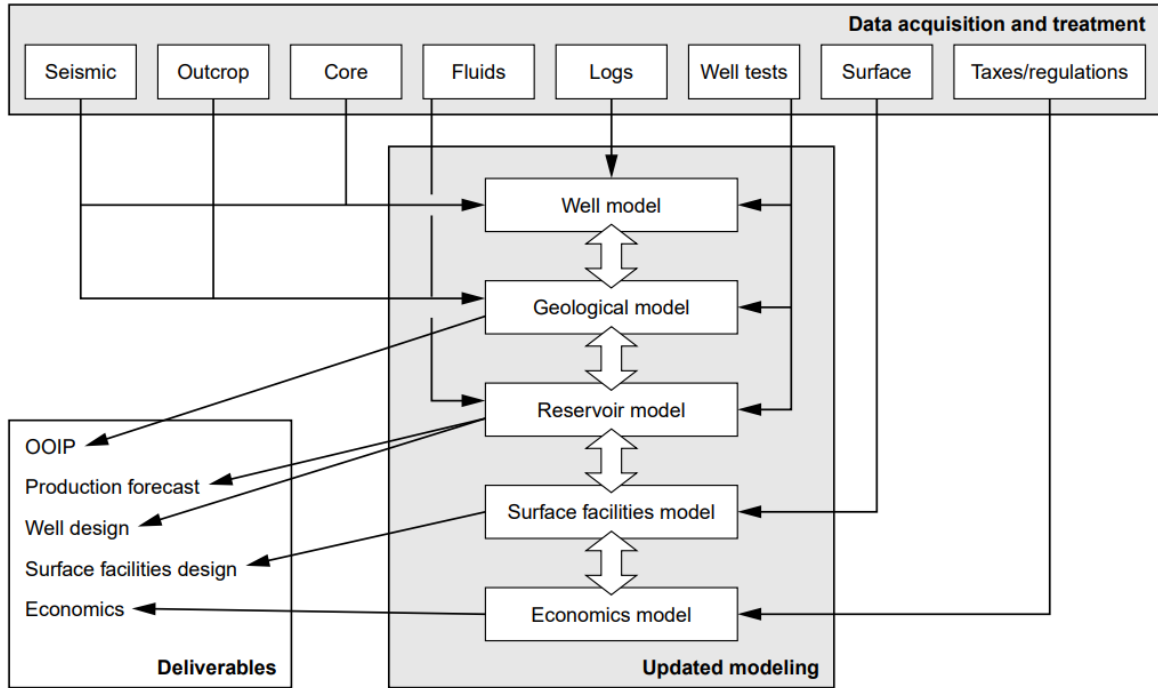


Figure 14. Organization scheme, integrated reservoir management.
(F. Kalaydjian., B. Bourbiaux., 2002)

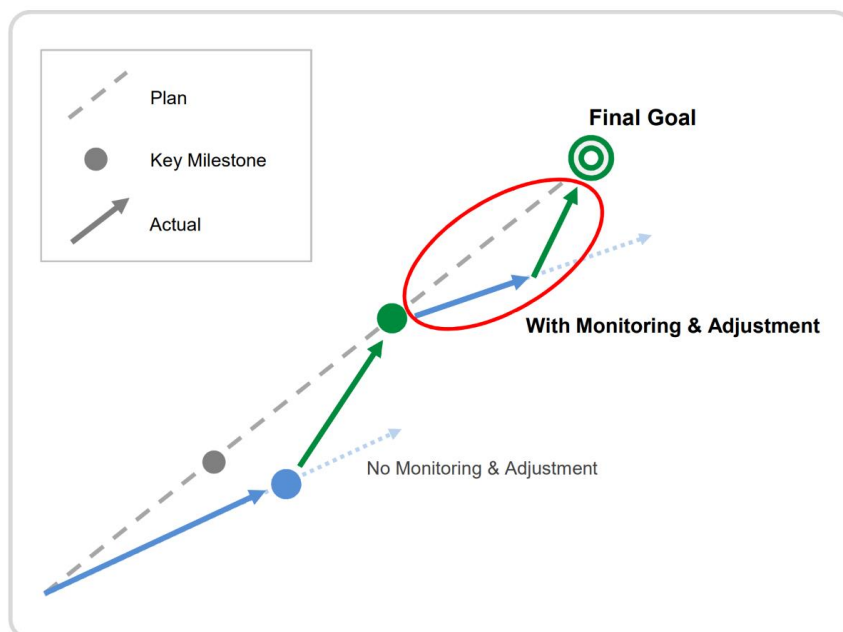


Figure 15. Monitoring and adjustment process to achieve the goal

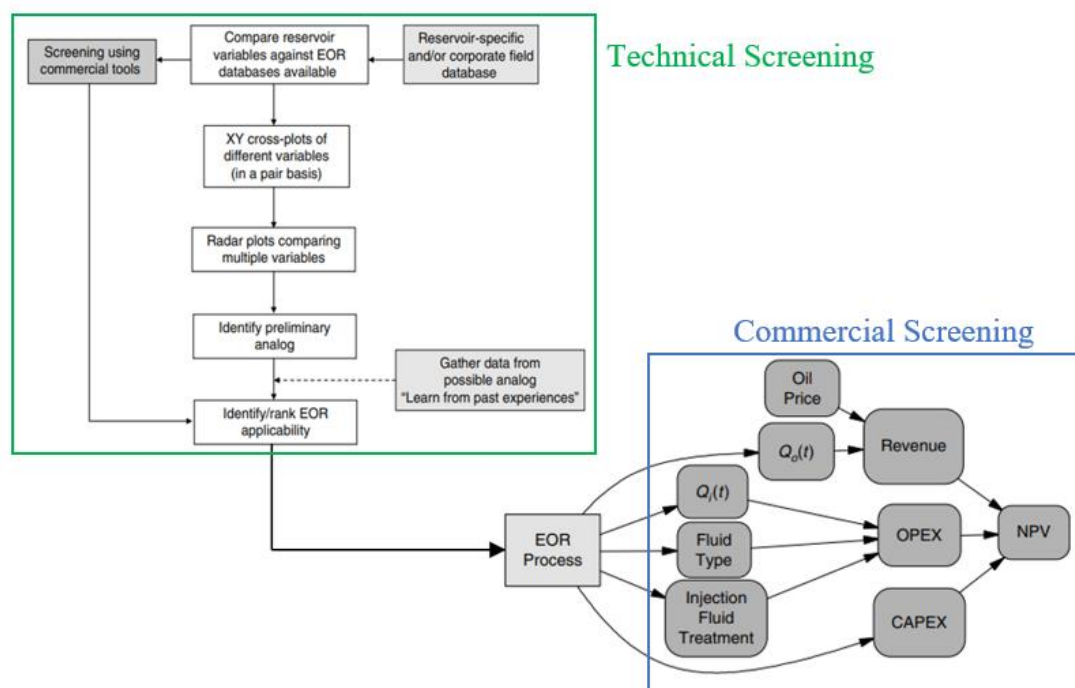


Figure 16. EOR workflow, modified from Alvarado, Vladimir., et all (2010)

2.3 Check

3.3.1 Process 1 Evaluate Result and Process.

Comprehending success and failure through stakeholder perspectives, assessing outcomes and procedures based on key performance indicators (KPIs), and obtaining feedback from stakeholder insight. Figure 17 displays the feedback questions.



Figure 17. The feedback questions

3.3.2 Process 2 Understand the reasons of success and failure.

- Analyze the underlying factors and circumstances of both successful and unsuccessful cases. The results may differ even in successful cases that occur under specific circumstances, and if the circumstances change.
- The same principle is applicable to cases that are unsuccessful. Consequently, it is imperative that we comprehend the underlying causes of a process's success or failure and accumulate this information as knowledge and expertise.

3.3.3 Process 3 Share the outcome with stakeholders.

Disseminate comprehensive assessments of both results and procedures, encompassing achievements as well as shortcomings, to the individuals involved through the Final Report. Simultaneously, it is necessary to deliberate on the subsequent actions.

During the check phase, it is necessary to communicate and discuss the EOR screening results with stakeholders or relevant departments in order to provide feedback on various

aspects of the screening process, ranging from the technique used to the final results. This includes the process illustrated in Figures 18 to 20.

Properties	Nitrogen and flue gas	Hydrocarbon	Carbon Dioxide	Immiscible Gases	Miscellar/polymer, ASP, and alkaline flooding	Polymer flooding	Combustion	Steam
Oil API Gravity	> 35 Average 48	> 23 Average 41	> 22 Average 36	> 12	> 20 Average 35	> 15, < 40	> 10 Average 16	> 8 to 13.5 Average 13.5
Oil Viscosity (cp)	< 0.4 Average 0.2	< 3 Average 0.5	< 10 Average 1.5	< 600	< 35 Average 13	>10, <150	< 5,000 Average 1200	< 200,000 Average 4,700
Composition	High % C1-C7	High % C2-C7	High % C5-C12	Not critical	Light, intermediate Some organic acids for alkaline floods	Not critical	Some asphaltic components	Not critical
Oil Saturation (PV fraction)	> 0.40 Average 0.75	> 0.30 Average 0.80	> 0.20 Average 0.55	> 0.35 Average 0.70	> 0.35 Average 0.53	> 0.70 Average 0.80	> 0.50 Average 0.72	> 0.40 Average 0.66
Formation Type	Sandstone or Carbonate	Sandstone or Carbonate	Sandstone or Carbonate	Not critical	Sandstone preferred	Sandstone preferred	High porosity sandstone	High porosity sandstone
Net Thickness (ft)	Thin unless dipping	Thin unless dipping	Wide range	Not critical if dipping	Not critical	Not critical	> 10 feet	> 20 feet
Average Permeability (md)	Not critical	Not critical	Not critical	Not critical	> 10 md Average 450 md	> 10 md Average 800 md	> 50 md	> 200 md
Depth (ft)	> 6000	> 4000	> 2500	> 1800	< 9000 Average 3250	< 9000	< 11500 Average 3500	< 4500
Temperature (deg F)	Not critical	Not critical	Not critical	Not critical	< 200	< 200	> 100	Not critical

Figure 18. An illustration, EOR screening of Reservoir B using EORgui software from Petroleum Solution

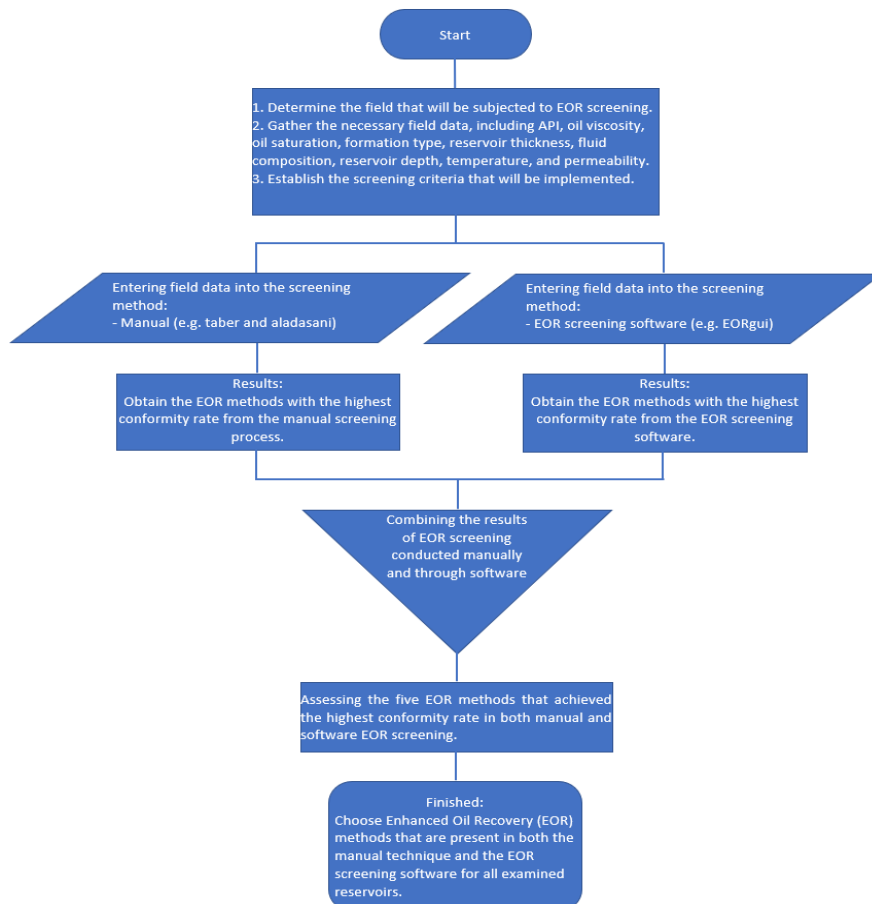


Figure 19. EOR screening workflow for work area A, Company X

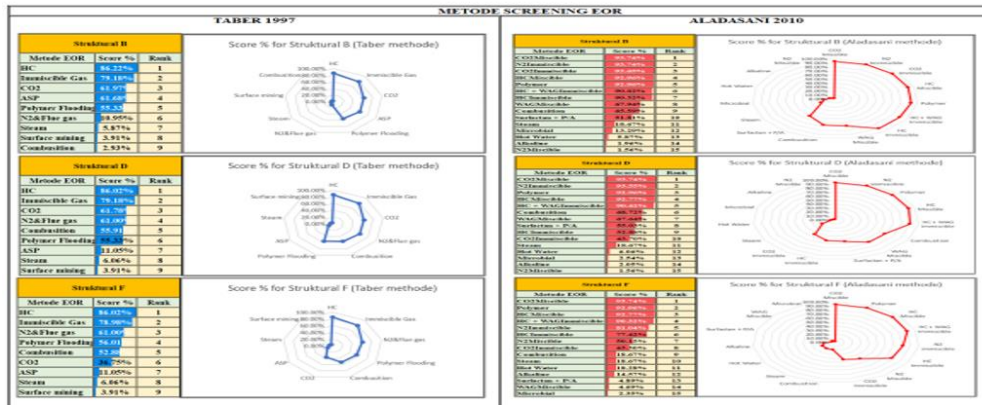


Figure 20(a). The reservoir's enhanced oil recovery (EOR) is evaluated using conventional methods

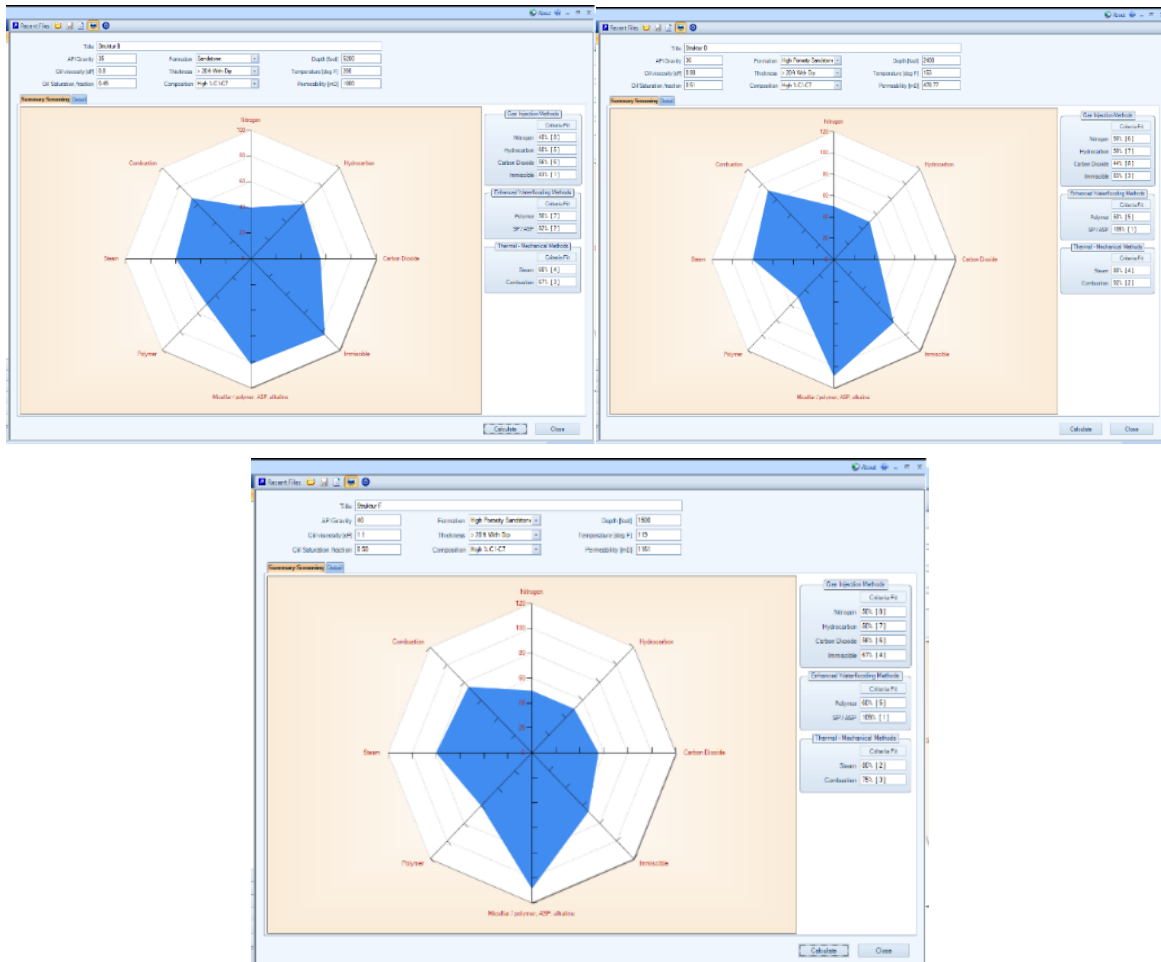


Figure 20(b). The reservoir's enhanced oil recovery (EOR) is evaluated using both conventional methods and software through radar chart screening

2.4 Act

During the ACT process, input values such as reviews and feedback from stakeholders or associated departments are transformed into output values that serve as enhancements for the next round of the project. It is important to consider the reflection of the ACT round when initiating the PLAN phase in the subsequent PDCA round. Table 2 and 3 facilitate the selection of two approaches, based on their highest percentage of appropriateness, that can potentially be used to reservoir structures B, D, and F.

Table 2. Assessing the five EOR methods that achieved the highest conformity rate in both manual and software EOR screening

Struktur B								
Taber			Aladasani			EORgui software		
Metode EOR	Score %	Rank	Metode EOR	Score %	Rank	Metode EOR	Score %	Rank
HCMiscible	86.22%	1	CO2Miscible	93.74%	1	Immiscible Gas	83.00%	1
Immiscible Gas	79.18%	2	N2Immiscible	93.74%	2	ASP	82.00%	2
CO2Miscible	61.97%	3	Immiscible Gas	93.65%	3	Combustion	75.00%	3
ASP	61.68%	4	HCMiscible	92.96%	4	Steam	70.00%	4
Polymer Flooding	55.33%	5	Polymer Flooding	92.96%	5	HCMiscible	60.00%	5

Struktur D								
Taber			Aladasani			EORgui software		
Metode EOR	Score %	Rank	Metode EOR	Score %	Rank	Metode EOR	Score %	Rank
HCMiscible	86.02%	1	CO2Miscible	93.74%	1	ASP	109.00%	1
Immiscible Gas	79.18%	2	N2Immiscible	93.55%	2	Combustion	92.00%	2
CO2Miscible	61.78%	3	Polymer Flooding	92.96%	3	Immiscible Gas	83.00%	3
N2&Flue gas	61.00%	4	HCMiscible	92.77%	4	Steam	80.00%	4
Combustion	55.91%	5	HC + WAGImmiscible	90.42%	5	Polymer Flooding	50.00%	5

Struktur F								
Taber			Aladasani			EORgui software		
Metode EOR	Score %	Rank	Metode EOR	Score %	Rank	Metode EOR	Score %	Rank
HCMiscible	86.02%	1	CO2Miscible	93.74%	1	ASP	109.00%	1
Immiscible Gas	78.98%	2	Polymer Flooding	92.96%	2	Steam	80.00%	2
N2&Flue gas	61.00%	3	HCMiscible	92.77%	3	Combustion	75.00%	3
Polymer Flooding	56.01%	4	HC + WAGImmiscible	90.32%	4	Immiscible Gas	67.00%	4
Combustion	52.88%	5	N2Immiscible	81.04%	5	Polymer Flooding	60.00%	5

Table 3. Applied potential conformity reservoir for Immiscible gas and polymer flooding technologies

EOR Metode	Reservoir B	Reservoir D	Reservoir F
	Quantity	Quantity	Quantity
N2&Flue gas	0	1	1
HCMiscible	2	1	1
Immiscible Gas	3	2	2
CO2Miscible	1	1	1
ASP	2	1	1
Polymer Flooding	2	2	2
N2Immiscible	1	1	1
HC + WAGImmiscible	0	1	1
Combustion	1	2	2
Steam	1	1	1

3.4.1 Process 1 Resolve issue if did not achieve the target.

Issues with the results or processes may have been identified during the "CHECK" phase. If the objective is not accomplished, it may be necessary to implement preventative measures in order to accomplish it. Or, additional issues have been identified that necessitate countermeasures and are included in temporary improvements and long-term matters. Figure 21 illustrates the distinction between short-term and long-term. Implementation of countermeasures in the event that an issue is identified.

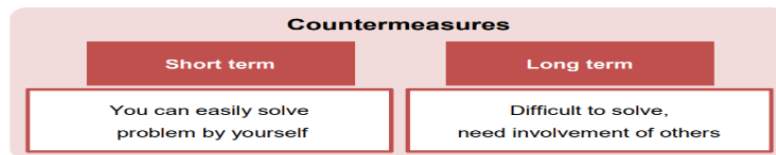


Figure 21. Countermeasures

3.4.2 Process 2 Set successful processes as new standards.

Establishing successful practices should be implemented as the new benchmarks. It is imperative to streamline the process to ensure that anyone, at any given time, may get identical outcomes by reducing inefficiency, inconsistency, or unnecessary workload. Standardizing a job does not necessarily guarantee exceptional results. The standards may fluctuate, contingent upon the proficiency and expertise of the worker. There are numerous efficacious methods to accomplish this, commencing with instructing staff on the necessary actions.

The standards should be presented in user-friendly formats, such as manuals, checklists, flowcharts, or guidelines, to facilitate their utilization by workers. Having a standard in place does not signify the completion of the task. Continual improvement of work can be achieved by timely modifying the standards in response to environmental changes.

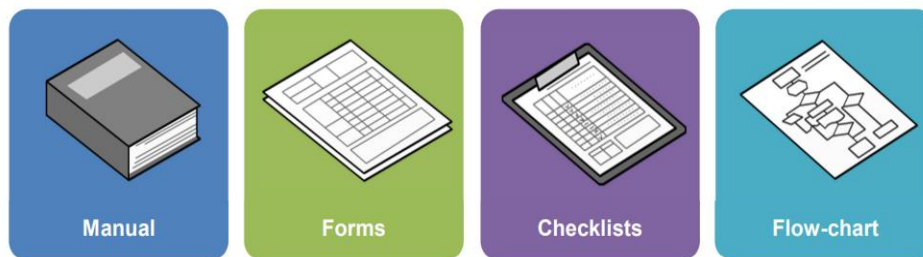


Figure 22. A standard that's easy to use by workers

3.4.3 Process 3 Start the next round.

Process of increasing the level and/or value of output. When a task has been successfully completed, there are always some unresolved issues or remaining issues that need to be addressed. Therefore, when we start the next round of the project, consider the reflection of the ACT round to start the PLAN for the next PDCA round. Sharing experiences of success and failure (YOKOTEN) from methods and procedures including decision-making perspectives is very important to do.

Successful processes must be standardized and shared openly within the company. Applying the process in various situations and environments has an impact on the overall improvement of the process itself and as a result will help support the growth of the company. In addition, it is necessary to share mistakes made during its implementation.

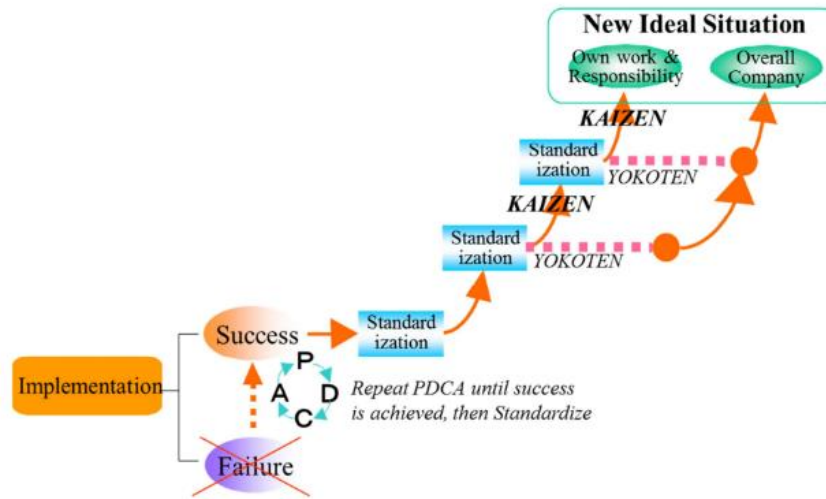


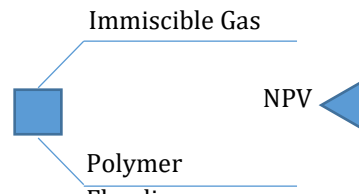
Figure 23. Sharing experiences of success and failure (YOKOTEN)

3. RESULT AND DISCUSSION

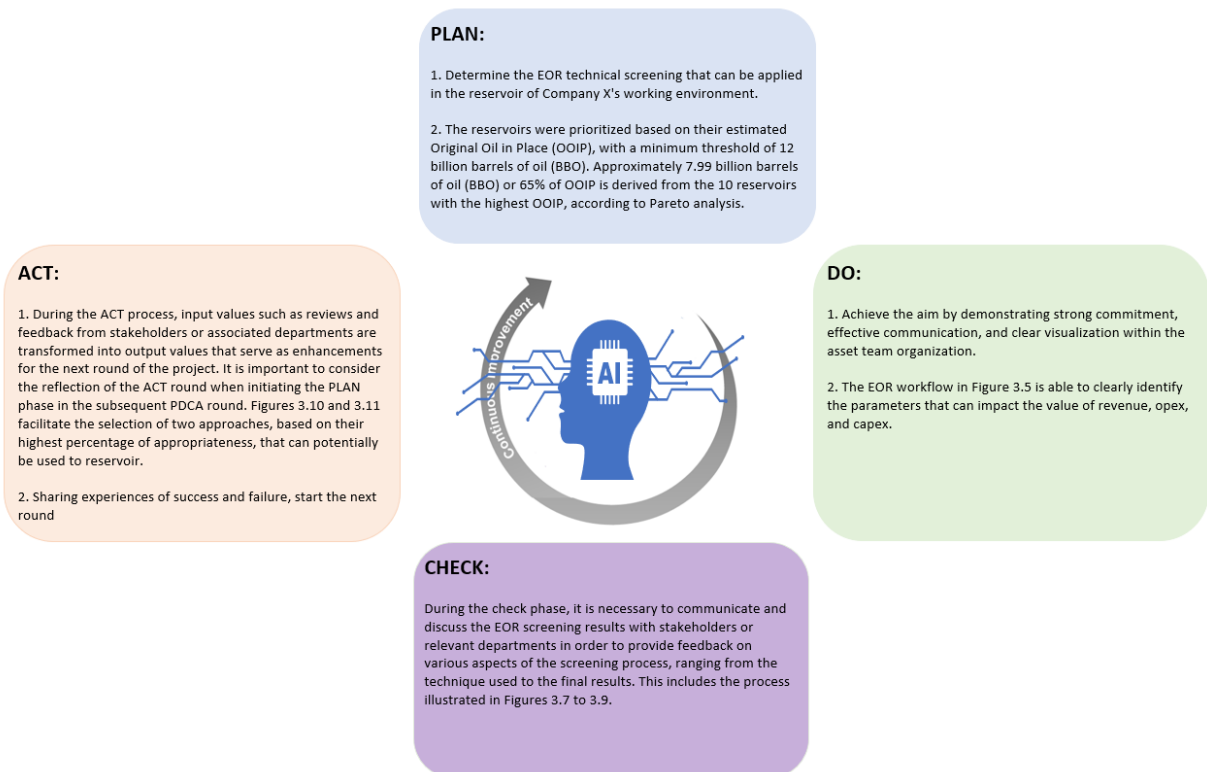
This study highlights numerous crucial insights on how to effectively embrace and adjust to the constant emergence of disruptive technology during different stages of the Industrial Revolution.

1. The primary obstacles encountered by the industry during each Industrial Revolution include changes in the business environment, changes in direction, changes in resource availability (time, capability, and money), and ineffective processes.
2. The business environment is undergoing a transformation because of the global challenges posed by climate change. This has necessitated the diversification of the oil and gas industry into renewable energy and gradually reducing the use of fossil fuels, which necessitates the adaptability and efficiency of the industry.
3. Disruptive technology, in a beneficial sense, refers to the technology now being developed that can assist the oil and gas industry in consolidating all its business process systems into a single unit. This integration would enable the industry to establish a comprehensive management system that:
 - a. Real-time reporting.
 - b. Faster decision-making.
 - c. More detailed examinations.
 - d. Reducing Failures in the field.
 - e. Analyzing risks faster and quicker.
 - f. Increased efficiencies.
 - g. Reduction of human error.
 - h. Completing time-consuming tasks.

- i. Providing human more time for analysis.
 - j. Increased potential with scaling.
4. For smaller management systems like reservoir management, where enhanced oil recovery (EOR) techniques are being considered, a thorough investigation must be conducted using both manual methods and software integration. This will ensure an efficient and timely decision-making process for implementing the EOR method in the field. An illustration of a reservoir within a working environment X company. According to the EOR screening results, the methods that have the potential to be applied are:



The PDCA cycle is the management system employed in this paper, which is designed to promote sustainable performance and perpetually enhance performance over time. Applications of this cycle are applicable to all sorts of projects or work processes.



5. This study utilizes the EOR screening methodology software to assess technical screening and obtain a potentially viable approach for the reservoir within a working environment X company. while commercial screening is not discussed on this occasion.

4. CONCLUSIONS AND RECCOMENDATIONS

Conclusion:

1. **Adaptation to Disruptive Technologies:** The oil and gas industry must continuously adapt to disruptive technologies to maintain competitiveness and sustainability. The integration of advanced technologies can streamline operations, improve efficiency, and support the transition to green energy.
2. **Industry 5.0 Focus:** Emphasizing human-centric, sustainable, and resilient practices is crucial for the industry's future. This involves leveraging AI and innovative technologies to enhance decision-making and operational efficiency.
3. **Enhanced Oil Recovery (EOR):** The use of advanced EOR screening methods, incorporating AI and data mining, can significantly improve reservoir management and recovery factors, leading to more effective and efficient oil production.
4. **PDCA Cycle Implementation:** The Plan-Do-Check-Act (PDCA) cycle is an effective management system for continuous improvement in EOR processes, ensuring sustainable performance and adaptability to changing industry conditions.

Recommendations:

1. **Invest in Technology:** Companies should invest in AI, data analytics, and other advanced technologies to enhance EOR screening processes and overall operational efficiency.
2. **Focus on Sustainability:** Embrace Industry 5.0 principles by prioritizing sustainable and human-centric practices, ensuring long-term viability and adaptability in the face of global challenges like climate change.
3. **Continuous Improvement:** Implement the PDCA cycle for ongoing performance enhancement and to address any issues promptly, ensuring a robust and resilient operational framework.
4. **Comprehensive Management Systems:** Develop integrated management systems that consolidate all business processes, enabling real-time reporting, faster decision-making, and improved risk analysis.
5. **Training and Development:** Invest in training programs to develop employees' skills in using advanced technologies and adapting to new processes, fostering a culture of innovation and continuous improvement.

These conclusions and recommendations can guide the oil and gas industry in navigating global challenges and leveraging technology disruption for sustainable growth.

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CHAPTER 12

Performance Analysis, Evaluation, and Optimization of Hydraulic Pumping Unit Enhancements in the RNB-08 Field and NLWT Well

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ABSTRACT

The RNB-08 field in Bojonegoro, East Java, features several oil wells utilizing artificial lift methods, including the "NLWT" well, which has experienced a decline in reservoir pressure and production flow rate over time. This well employs a Hydraulic Pumping Unit (HPU). The decline was analyzed using the Inflow Performance Relationship (IPR) curve method, revealing a volumetric efficiency below 45%. Optimization was carried out by adjusting pump parameters such as pump speed and Stroke Length (SL). Initially, the well operated with a production rate of 88.7 BFPD, pump speed of 5 SPM, SL of 83 inches, and volumetric efficiency of 39.61%. Post-optimization, with a pump speed of 31.8 SPM and SL of 45.3 inches, the production rate increased to 670 BFPD, and volumetric efficiency rose to 93.45%. This study underscores the significant impact of optimizing HPU operational parameters on improving volumetric efficiency and production rates. The findings suggest that such optimizations can enhance oil production performance not only for the "NLWT" well but also for other wells facing similar issues. Improved volumetric efficiency and production rates are crucial for effective and sustainable oil well management.

Keywords: Artificial lift, Hydraulic pumping unit, Volumetric efficiency, Optimization, Inflow performance relationship.

1. INTRODUCTION

The NLWT field, located in the Pertamina KSO operated by PT. Sarana GSS Trembul, employs four types of artificial lift methods: Electrical Submersible Pump (ESP), Hydraulic Pumping Unit (HPU), Progressive Cavity Pump (PCP), and Sucker Rod Pump (SRP). In the RNB-08 field, there are 100 production wells, with 46 wells currently active and 64 wells shut in. The active wells include 16 using ESP, 8 using HPU, and 22 using Pumping Unit Jack (PUJ). Additionally, the field has seven wells designated for water injection to enhance production rates.

Despite these efforts, production decline over time necessitates optimization. The "NLWT" well in the "RNB-08" field faces operational challenges that impact its oil productivity. This reservoir is characterized as saturated, with reservoir pressure (P_r) lower than the bubble point pressure (P_b), directly affecting oil production (Guo et al., 2007). The high water cut of 86.7% indicates that the well produces more water than oil, reducing overall efficiency. The current fluid production rate is 88.7 barrels of oil per day (BOPD), indicating untapped production potential. The well's productivity index of 1.111621903 BOPD/psi reflects moderate efficiency, but the pump's volumetric efficiency being below 45% signifies suboptimal performance. Consequently, actual production rates are low, causing operational losses. Optimizing these wells is crucial for enhancing productivity.

To increase the production rate of the "RNB-08" well and maximize the capacity of the Hydraulic Pumping Unit (HPU), optimization efforts should focus on pump design parameters such as Stroke Length (SL) and pump speed (N). Adjusting these parameters will directly affect pump displacement, impacting the well's production rate. The goal is to significantly improve the pump's volumetric efficiency, enabling the "RNB-08" well to reach its maximum production potential. This process will involve an in-depth analysis of well characteristics and operational conditions, using appropriate simulation techniques and software to predict the impact of parameter adjustments.

2. LITERATURE REVIEW

Pumps are used to increase the pressure within the reservoir, enabling fluids to be lifted from the reservoir to the surface. The pumping unit is one of the most efficient and cost-effective methods for lifting oil from reservoirs. These pumps can also be modified to handle corrosive fluids and can be used in wells with high temperatures ((Goswami Jagdishprasad Jhabarmal et al., 2015). According to Brown K.E., the Hydraulic Pumping Unit (HPU) is a flexible artificial lift method because the subsurface pumping rate can be adjusted over a wide range by controlling the surface fluid column. The HPU serves as an artificial lift method that replaces surface equipment for Pumping Unit Jack (PUJ) systems (Petro, 2022). HPUs are particularly suitable for use in horizontal or inclined wells (Rehman & Abdelbary, 2021). They offer several advantages, including a simple structure, minimal space requirements, and easy installation, which reduces production costs and significantly enhances oil production efficiency (Popescu et al., 2022).

The working principle of the Hydraulic Pumping Unit (HPU) is as follows (Fitrianti, 2013):

1. High-pressure hydraulic fluid from the power pack is pumped into the hydraulic cylinder through hydraulic hoses, converting the hydraulic fluid pressure into an up-and-down motion.
2. This hydraulic motion is then transmitted by the polished rod to the sucker rod and then to the plunger, causing the plunger to move up and down as the working stroke of the pump.
3. During the upward movement of the plunger (up-stroke), the pressure below the plunger decreases, making the pressure at the well bottom higher than the pressure inside the pump, which opens the standing valve and allows fluid to enter the pump.
4. At the end of the up-stroke, the volume below the plunger is filled with fluid. As the plunger moves downward (down-stroke), the standing valve closes due to the plunger pressing the fluid, and simultaneously, this fluid pressure opens the traveling valve, allowing fluid to exit the plunger and enter the tubing.
5. This process repeats continuously, causing the fluid in the tubing to move up to the surface and flow toward the separator through the flow line.

3. METHOD

This research methodology adopts a case study approach with quantitative data analysis. The initial step involves conducting a literature review from various sources, such as papers and handbooks, along with interviews and direct observations at the relevant company. After identifying the wells to be studied based on production issues, an evaluation is carried out by creating Inflow Performance Relationship (IPR) graphs and calculating volumetric efficiency. Well parameters are collected for further analysis, which are then used as the basis for redesigning the pump, specifically the Hydraulic Pumping Unit (HPU), with the aim of increasing the production flow rate. This comprehensive effort aims to optimize the production process in this study.

4. RESULT AND CONCLUSION

The "NLWT" well, located in the RNB-08 field, is produced using an artificial lift method with a Hydraulic Pumping Unit (HPU). This research involves calculating the production capacity of the "NLWT" well by evaluating the performance of the installed HPU. The purpose of this evaluation is to understand the pump's volumetric efficiency and identify factors that may affect its performance. The evaluation results will then serve as the basis for optimizing the pump to increase the production flow rate of the "NLWT" well. By taking these steps, it is expected that the efficiency and overall performance of the artificial lift system in the "NLWT" well can be significantly improved. A detailed explanation of the evaluation methodology and optimization plan will be discussed in this chapter.

Tabel 5. Reservoir data for well "NLWT"

Reservoir data	Value	Unit
Reservoir Pressure (Pr)	805,5509	Psi
<i>Bubble Point</i> Pressure (Pb)	1208	Psi
<i>Pressure Well Flowing</i> (PWF)	725,7576	Psi
Static Fluid Level (SFL)	725,06	Ft
Dynamic Fluid Level (DFL)	914,05	Bfpd

Table 6. Well and Pump Data for Well "NLWT"

Well and pump data	Value	Unit
Steel Elastic Modulus (€)	25*10 ⁶	Psi
<i>Service Factor (SF)</i>	1,1	-
Tubing Cross-Sectional Area (At)	1,812	in ²
<i>Diameter Rod (dr)</i>	7/8	In
<i>Diameter Tubing</i>	2 7/8	In
Panjang Rod String (L)	1980	Ft
Berat rod (M)	2,22	lb/ft
<i>Area Plunger (Ap)</i>	3,976	in ²
<i>Diameter Plunger</i>	2,25	In
Stroke Length (SL)	83	In
Pump Speed (N)	5	SPM
Pump Depth (PSD)	2412,2	Ft
Pump Constant (k)	0,590050005	-

Table 3. Production Data for Well "NLWT"

Production data	Value	Unit
Specific Gravity Fluida (G)	0,9710733	
Test flow rate (Qt)	88,7	Bfpd
°API	15	-
Qmax	720,39479	Bfpd
Qoptimum	576,31583	Bfpd
SG Oil	0,943	-
SG Water	0,98	-
Water Cut	86,7	%
Qo max	150,9648	Bfpd
Qw max	569,43	Bfpd

To determine whether the production rate of the pump installed in the "NLWT" well is optimal, it is essential to assess the production capacity and volumetric efficiency of the pump. The production capacity of the "NLWT" well in the MY Field is calculated using the Wiggins three-phase equation, considering that both the reservoir pressure and the bottom hole flowing pressure are lower than the bubble point pressure, along with a very high water cut of over 86.7% (as shown in Table IV.3). In this calculation, the oil production rate and the water production rate are separated, while the total production rate is the sum of both rates. The equation used to calculate the well's production capacity is as follows:

$$\frac{21,4}{Q_{max}} = (1 - 0,519167 \times (\frac{725,76}{805,55}) - 0,481092 \times (\frac{725,76}{805,55})^2)$$

$$Q_{o \max} = 150,9648032 \text{ Bopd}$$

$$\frac{67,3}{Q_{max}} = (1 - 0,722235 \times (\frac{725,76}{805,55}) - 0,284777 \times (\frac{725,76}{805,55})^2)$$

$$Q_{w \max} = 569,4299833 \text{ Bwpd}$$

$$Q_t \max = 150,9648032 + 633,689 \text{ 0847}$$

$$Q_t \max = 720,3947866 \text{ Bfpd}$$

This table helps in understanding the relationship between Pwf and the production rates of oil, water, and total fluids, thereby aiding in the evaluation of the well's production performance.

Table 2. calculation of the ipr curve for the "NLWT" Well

No	pwf	Qo	Qw	Qf
1	725,7576	0	0	0
2	636,2519	26,45261	87,46452	113,9171287
3	546,7463	50,70094	170,079	220,7799384
4	457,2406	72,74501	247,8434	320,5884292
5	367,735	92,5848	320,7578	413,3426009
6	278,2293	110,2203	388,8221	499,0424537
7	189,7236	125,4914	451,3569	576,8482887
8	100,218	138,743	509,7753	648,5183177
9	58,23	144,1999	535,5087	679,7086129
10	0	150,9648	569,43	720,3947866

After calculating the target production rate (Q target) as 80% of the maximum production flow rate, the target value is 576.31583 BFPD, derived from 80% of the maximum Q value.

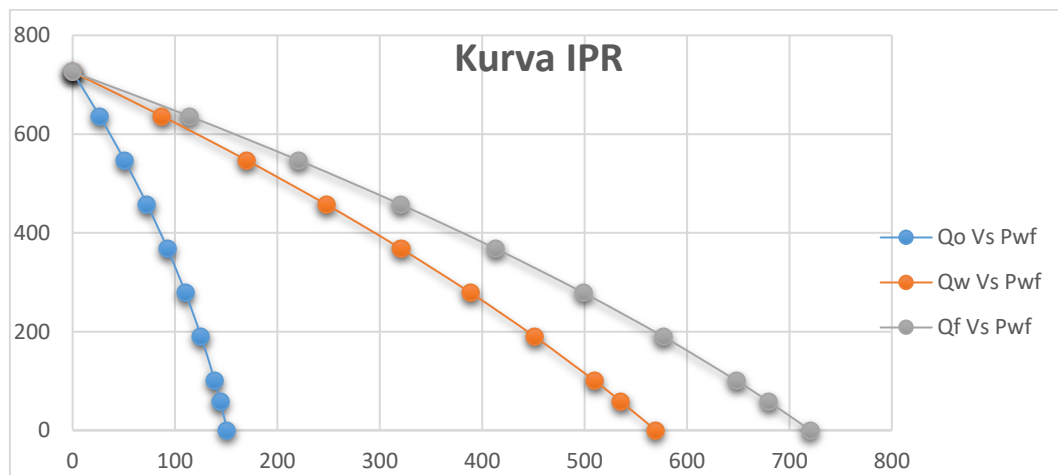


Figure 1. IPR curve

After evaluating and optimizing the Hydraulic Pumping Unit (HPU) for the "NLWT" well, Table shows a striking comparison of results. Initially, optimization was carried out using a pump configuration with a series of 3 and a pump diameter (D) of 1 3/4 inches. The pump speed (N) was set at 31.8 SPM, and the stroke length (SL) was set at 43.5 inches, resulting in a volumetric efficiency of 93.45%. To achieve higher Pump Displacement (PD) and better volumetric efficiency, changes were made to the pump speed (N) and stroke length (SL) parameters of the Hydraulic Pumping Unit (HPU). This optimization effort aimed to improve operational efficiency and enhance well production output.

The optimization results showed a significant increase in volumetric efficiency, reaching above 45%, and a corresponding increase in production rate. The Table below highlights the clear differences between the results before and after optimization. The significant

improvement in production output was due to changes in the pump speed (N) and stroke length (SL) parameters made during the optimization process.

Overall, these results confirm that adjusting operational parameters such as pump speed and stroke length can lead to substantial improvements in pump performance and well production efficiency. By making relatively simple operational parameter adjustments, significant efficiency gains and better production outcomes can be achieved, providing considerable benefits in oil well production operations.

Table 3. The result of actual and optimizing data

Parameter	Aktual	Optimizing
Q, Bfpd	51,10	670
N, SPM	4	31,8
S, In	82	45,3
PD, Bfpd	223,96	716,98
EV, %	39,61	93,45

5. CONCLUSION AND RECOMMENDATIONS

The conclusions drawn from the research titled “Performance Analysis, Evaluation, and Optimization of Hydraulic Pumping Unit Improvement in the RNB-08 Field and NLWT Well” are as follows:

1. The production capacity calculation for the "NLWT" well using the Inflow Performance Relationship (IPR) curve shows a maximum Q of 720.3947866 BFPD, while the target Q obtained from the same calculation is 576.3158293 BFPD.
2. The evaluation of the "NLWT" well using a 1 ¾ inch plunger, pump speed (N) of 5 SPM, and stroke length (SL) of 83 inches, resulted in a production rate of 88.7 BFPD with a volumetric efficiency of 39.61%. This indicates that optimization is necessary as the pump's performance efficiency is not yet optimal.

After optimization by changing the pump design parameters to a pump speed (N) of 31.8 SPM and stroke length (SL) of 45.3 inches with a 1 ¾ inch plunger, the volumetric efficiency increased to 93.45%, and the production rate increased to 670 BFPD.

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CHAPTER 13

Audit Delay in Indonesia: An Examination of the Impact of Profitability and Solvency on Audit Timeliness with Moderation Key Audit Matters

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ABSTRACT

This study uses a quantitative approach to determine the factors influencing audit delay. We use listed noncyclical consumer companies as samples. The observation period is 2022-2023. The total sample of this study was 180 sample. We use moderating regression to test the hypotheses. The results of this research show that solvency's positive effect on audit delay and key audit matters strengthens the positive impact of Solvency on audit delay, and there is no effect of profitability on audit delay and key audit matters, which weakens the impact of profitability on audit delay. The implication of this research is to test the moderating role of key audit matters, which is a new topic in auditing. The results show that key audit matters moderate solvency and provide new insights into how communication between auditors and shareholders can affect audit timeliness. Moreover, as a new obligation, key audit matters can extend the time the auditor needs to develop audit reports.

Keywords: Audit delay, Indonesia, Profitability, Solvency, Key audit matters.

1. INTRODUCTION

Companies are very concerned about publishing financial reporting on time. Because financial reports function as a communication tool between management and external parties and contain important information about the company's performance and prospects, which will be used as a consideration in making decisions (Anggraini & Mulyani, 2022). Because delays in submitting financial reporting will cause investors to not be able to get the report when they need it, which can reduce investor confidence and have an impact on the selling price of shares in the capital market. This means that businesses must help auditors complete financial audits so that audited financial reports are published quickly.

Delays in the completion of the auditor's financial statements are often referred to as audit delay. This delay is the time required to complete the financial statements calculated from the closing date of the financial year to the date of issuance of the audit report. This can occur because auditors need to be careful and collect the evidence needed for the audit process. This is based on the Public Accountant Examination Standards, so it can take longer and involve negotiating with management about the outcome so that the auditor can delay the issuance of financial statements.

A phenomenon related to audit delay occurred on Wednesday (10/05/23), where the Indonesia Stock Exchange (IDX) gave written sanctions and a fine of IDR 50 million to 61 issuers that did not submit their 2022 financial reports on time. The deadline for submitting audited financial statements ends on December 31, 2022, falls on March 31, 2022, until May 2, 2023, there are 61 issuers that have not submitted audited financial reports as of December 31, 2022. The regulation is related to several regulations, one of which is the Regulation of PT Indonesia Stock Exchange (IDX) Number Kep-00057/BEI/03-2023 dated March 30, 2023. Regarding the amendment to the revocation of the policy of relaxation of the deadline for the presentation of financial statements and annual reports of listed companies and issuers. In accordance with Exchange regulation No. I-H Penalty Regulation II. Referring to provision II.6.2 of Exchange Regulation Number I-H regarding sanctions, the IDX will give a written warning II and a fine of IDR 50 million if from the 31st calendar day to the 60th calendar day since the deadline for submitting financial reports has passed, the listed company still does not fulfill its obligation to submit financial reports.

Solvency is an indicator that can describe the ability of a company to fulfill all its obligations, both short and long term (Indriyanto & Cahyani, 2022). The debt-to-equity ratio (DER) compares the company's debt and equity to determine solvency. A larger capital structure is funded by investors, not debt, so the solvency is low. High solvency indicates financial risk. Management stops publishing financial statements and asks auditors to evaluate accounts payable, which can extend the audit (Rochmah et al., 2022).

Profitability has the ability of the company to earn profits. Profitability is a financial tool to compare the results and achievements of company ownership. Profitability is an indicator that can describe the company's ability to make a profit, be able to maximize economic potential and expenditure efficiency (Endiana & Apriada, 2020). The profitability ratio measures whether the company is efficient in operating wealth assets as seen from the profits earned. The profitability variable can be proxied by Return On Asset (ROA) where ROA is obtained by calculating the company's total assets and net profit. A company is said to be healthy if it has a high profitability ratio. High profitability conditions are good news that

must be immediately conveyed to the public. Therefore, the company will accelerate the inspection process and immediately publish its financial statements.

Based on the background that has been stated above, the authors decided to conduct research by not ignoring but will develop previous research, especially the importance of information about audit delays that occur in a company. Therefore, there are several factors that are examined in the factors that affect audit delay, including "Solvency, Profitability". The difference between this research and previous research is by adding the Key Audit Matters variable as a moderator, because Key audit matters are the disclosure of the most significant issues based on auditor considerations in the audit process and this KAM is still newly applied in Indonesia in its audit reports.

ISA 701 defines KAM as: "matters that, in the auditor's judgment, are of most significance in the audit of the financial statements of the current period" (Al Lawati & Hussainey, 2022). However, the main purpose of an expanded audit report is to communicate KAMs to provide an improvement in investors' perception of the auditor's function and authority. Therefore, it is difficult for unsophisticated investors to extract the right information from financial statements and traditional forms of audit reports (Velte & Issa, 2019), leading to information asymmetry. By reducing information asymmetry between investors and auditors and providing context to investors regarding a company's financial reporting, KAMs are anticipated to increase the trust and legitimacy of financial reporting, as are changes to other auditing and accounting standards (Holm & Zaman, 2012; Shavazipour et al., 2021). The reporting of KAMs (or "critical audit matters", CAMs) is a relatively new issue, and there is currently no empirical data on the impact of KAMs. Test results show that disclosures made by CAMs seem to focus users' attention on financial statements (Gimbar et al., 2016).

Research on audit delays has been carried out by many previous researchers. However, there is diversity and differences in research results, so research on the factors that influence audit delay can still be re-examined in this study. This study intends to further study the factors that are expected to cause audit delay and the factors used in this study are the development of previous research, name (Riana et al., 2023) on The Effect of Solvability and Profitability on Audit Delay in Property and Real Estate Companies. Based on the explanation above, the research "Audit Delay: An Examination of the Impact of Profitability and Solvency on Audit Timeliness with Moderation Key Audit Matters". This research is also expected to help investors analyze a company as a basis for making investments and is useful for management to overcome the problem of delays by considering the internal factors that cause audit delays.

2. LITERATURE REVIEW

2.1. Agency Teory

Agency theory is a relationship between the owner of a company or shareholder (principal) and company management (agent) which aims to adjust interests in carrying out the activities of a company. The company owner has an obligation to provide facilities and funds that will be used to meet the needs of the company. According to the statement of Jensen & Meckling, 1976 the company owner assigns the company management to run the

company and gives the authority to make decisions to fulfill the interests of the company principal. Meanwhile, the agent's obligation is to provide benefits to the company owner. This relationship does not escape the conflict of interest that is influenced by information between the company and management.

Conflicts of interest can occur due to management's inability to investor wealth which causes agency problems. According to the statement (Alfiani & Nurmala, 2020) states that problems can arise because one of them is more selfish. Broadly speaking, company owners and company management have contractual ties that contain obligations and rights to develop company value. Companies that quickly report financial reports are good news for the company and have a big influence on the company's value as the basis for investors' decisions to invest. To minimize information asymmetry, a third party is needed, namely the auditor. The auditor must be responsible for examining the financial statements so that the principal believes that the information presented is not intervened by the agent.

Audit Delay

Audit delay is the time to complete the audit, which is measured quantitatively in days, and uses a ratio scale. To calculate it starting from the closing date of the book until the date stated in the audit report, Verawati and Wirakusuma in (Astuti & Puspita, 2020).

Profitability

The ability of a company to generate profits from sales, total assets, and total equity is called profitability. According to (Rochmah et al., 2022) using profitability ratios has objectives for internal and external parties of the company, including being able to calculate the profit obtained by the company in a certain period, assess the development of profits at any time, assess net profit after tax with own capital, and measure the productivity of all capital used.

Solvency

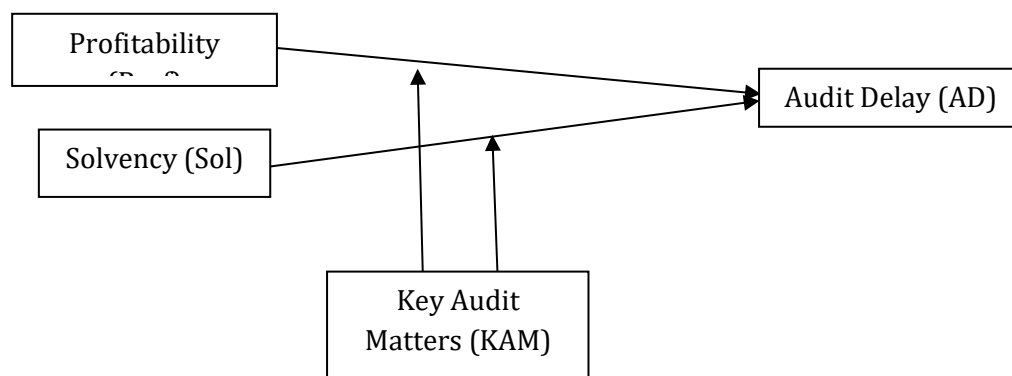
According to Sunyoto, 2014 Solvency or leverage ratio is the entity's ability to ensure that all obligations of the entity, both long-term and short-term, can be repaid both when the company is in liquidation and when the company is running normally. One of the ratios when measuring solvency is the debt to equity ratio (DER). The DER ratio will move in a straight line with the company's financial risk level, meaning that if the company's financial risk is high, the DER ratio will also be high. In addition to the debt to equity ratio, solvency can also be measured using the debt to asset ratio, tangible asset debt coverage, debt ratio, times interest earned ratio. This solvency has been studied by many previous researchers, among others: (Karina & Kusumawardhani, (2023), Devi, (2022), Bahri & Amnia, (2020)).

Key Audit Matters

According to the International Auditing and Assurance Standards Board (IAASB) (2015, dalam Eriksson & Thunell, 2023) KAMs are valuable information in audit reports that have been enhanced by standard setters and regulators in recent times. KAM disclosure is considered the greatest risk factor for substantial misstatements disclosed to users (Svanström et al., 2020).

Conceptual Framework

The conceptual framework for this study assumes that the audit delay factor, referred to as the dependent variable, is determined by the following independent variables which include profitability and solvency and the moderating variable is key audit matters.



Hypothesis Development

Profitability on Audit Delay

This study uses ROA to measure the profitability ratio. Profitability ratio is a ratio to assess the effectiveness of a company's management. With profits generated from sales and investment income. The use of profitability ratios can be done by comparing various components in the financial statements, especially the balance sheet and income statement. A high level of company profitability will tend to experience a shorter audit delay, so that the good news can be immediately conveyed by interested parties (Alfiani & Nurmala, 2020). Conversely, if the company's low level of profitability affects the length of the audit delay so that it causes bad news which can make the company's image decline. Based on this explanation, the hypothesis in this study is as follows:

H1: profitability has a negative effect on audit delay

Solvency to Audit Delay

This study uses DAR to measure the solvency ratio. The solvency ratio is to measure the company's ability to pay all its obligations, both short and long term if the company is liquidated (Hari Purnama, 2017). If the company has a high solvency ratio, this has an impact on the risk of large losses. Conversely, if the solvency ratio is lower, it has a small risk of loss. Solvency can have a positive and significant effect on audit delay, because any increase in DER will extend audit delay. This research is in line with research ((Cahyati & Anita, 2019);(Saputra et al., 2020)). Based on this explanation, the hypothesis in this study is as follows:

H2: Solvency has a positive effect on audit delay

Profitability on Audit Delay Moderated by Key Audit Matters

AM disclosure can be an early warning sign of where misstatements may exist and can reduce the auditor's liability assessment when misstatements are revealed (Sirois et al., 2018). As there is a correlation of key audit matters and audit delay, (Alhawamdeh et al., 2024) observed a 19% increase in the time required to release the auditor's report after the inclusion of KAM in the audit report, it also found no evidence of a significant relationship between

KAM and audit report delay in their study of UK companies. In addition, the implementation of KAM can have a positive effect on audit delay by improving the efficiency, quality, and transparency of the audit process. By identifying key issues early on and ensuring effective communication, auditors can complete audits more quickly and accurately.

The hypotheses in this study are:

H3: Key Audit Matters strengthens the negative effect of profitability on audit delay

Solvency on Audit Delay Moderated by Key Audit Matters

KAM reporting in audit reports can alert users of financial statements and audit reports that there are risks in the financial statements and thus protect auditors (Kachelmeier et al., 2020). Principles-based standards are seen as imprecise standards, which involve more skill and judgment by auditors. They found that KAM reporting increases auditor liability more appropriately than imprecise standards. On the other hand, (Kachelmeier et al., 2020) found that the disclosure of KAM in the auditor's report warns users about potential misstatements in the financial statements if there is high measurement uncertainty. According to (Yoga & Dinarjito, 2021) The disclosure of key audit matters is what makes auditors try to discuss in more detail with company management so that there is no misscommunication, this can improve audit quality and can extend audit delay because auditors and client management and audit committees must discuss more clearly regarding these key audit matters.

The hypotheses in this study are:

H4: Key Audit Matters strengthen the positive effect of solvency on audit delay

3. RESEARCH METHOD

3.1. Sample and Data Collection Technique

This study focuses on audit delay which is influenced by several factors which are used as independent variables by researchers. The population used is the Consumer Noncyclical sector companies listed on the Indonesia Stock Exchange in 2022-2023, companies listed on the IDX. The financial statements studied are financial statements published during the study period. The sample selection in this study used purposive sampling method, which is a type of sampling that is not randomized and researchers may have specific goals or objectives (Sekaran & Bougie, 2017). The data used in this study is secondary data, namely data obtained indirectly from the source or object of research, which uses intermediary media obtained from other parties. In this case the data obtained comes from the annual financial statements or annual reports of Consumer Noncyclical sector companies listed on the Indonesia Stock Exchange (IDX).

The sample criteria used in this study are:

1. Noncyclical Consumer sector companies on the Indonesia Stock Exchange.
2. Noncyclical Consumer sector companies that have published consecutive financial reports during the period 2022 to 2023.
3. Noncyclical Consumer sector companies that do not present financial statements that use rupiah as the financial unit in the financial statements.

Based on the sample criteria used, the companies that qualify for research in the Noncyclical Consumer sector companies are 92 companies, for 2 times the publication of financial statements in 2022-2023. The data analysis technique in this study is to use a

descriptive quantitative analysis technique using an analytical tool in the form of panel data regression. And using the help of the Eviews 10 application program to process the data. So that it can see whether there is a significant influence between Probability and Solvency on Audit Delay which is moderated by Key Audit Matters.

3.2. Operational Definition and Measurement Scale

This research uses quantitative methods, because quantitative techniques are more suitable for addressing research problems empirically, which requires data collection and a series of analyses at various stages to answer research questions. This study uses secondary data on profitability, solvency, KAM, and audit delay collected manually from data on companies listed on the Indonesia Stock Exchange (IDX). The four variables will be quantified in the following way:

1. Audit Delay is the length of time for audit completion measured from the closing date of the financial year to the date the audit report is issued. Audit delay is measured as of December 31 to the date of the independent auditor's report. This variable uses a quantitative scale in the form of days.

$$\text{Audit Delay} = \text{Audit Report Date} - \text{Financial Report Date}$$

2. Profitability is the entity's ability in a certain period to make a profit from activity sources such as trade, number of employees, amount of wealth or capital it self (Sartono, 2010) in (Fitri & Gunarto, 2023). High profitability is characterized by the Company's ability to generate higher profits for the Company (Amalia & Sugianto Yusuf, 2023). This profitability ratio will produce a measure of the effectiveness of the entity's management, profitability can be measured using the Return on Equity (ROE) method. This profitability has been studied by many previous researchers, including: (Santoso, EB, & Salim, SN (2023, January), Aydoğmuş, M., GÜLAY, G., & ERGUN, K. (2022), Forero-Quintero, J. F et al., (2022) Kamarudin, Ismail, Yaacob and Abu Bakar (2018).

$$ROE = \frac{\text{Net Profit}}{\text{Total Equity}} \times 100$$

3. Solvency or leverage ratio is the entity's ability to ensure that all obligations of the entity, both long-term and short-term, can be paid off both when the company is running normally (Sunyoto, 2014). ne of the ratios to measure solvency is the debt to equity ratio (DER). The DER ratio will move in a straight line with the level of the company's financial ratios, meaning that if the company's financial risk is high, the DER ratio will also be high. This solvency has been studied by many previous researchers, among others: (Karina, A., & Kusumawardhani, F. (2023) Devi, CM (2022). Bahri, S., & Amnia, R. (2020).

$$DER = \frac{\text{Total Debt}}{\text{Equity}} \times 100$$

4. Key Audit Matters (KAMs) are matters that require significant judgment from the auditor to evaluate or areas that show great difficulty in evaluating or obtaining evidence during

the audit process (Kawamoto et al., 2021). Key Audit Matters (KAMs) are measured by looking at the number of KAMs in the company's audit report (SAKIN & KUZU YILDIRIM, 2022).

$$KAM = \text{Number of KAMs in the audit report}$$

Regression Equation:

$$AD = \alpha + \beta_1 \text{Prof} + \beta_2 \text{Sol} + \beta_3 \text{KAM} + \beta_4 \text{Prof} * \text{KAM} + \beta_5 \text{Sol} * \text{KAM} + e \dots\dots\dots (1)$$

Where:

AD : *Audit delay*

Prof : *Profitability*

Sol : *Solvency*

KAM : *Key audit matters*

α : *Konstanta*

β : *Regression coefficient*

4. RESULTS AND DISCUSSION

4.1. Respondent Characteristics

The object of this research is Consumer nonsylical companies listed on the Indonesia Stock Exchange (BEI) during 2022-2023. Where the sample is obtained through selection based on purposive sampling criteria. The results obtained by the total sample obtained in this study are illustrated in table 1 below:

Table 1. Sample selection criteria

No	Criteria	Number of Samples
1	Consumer Non-Cylical Sector Companies Listed on the Indonesia Stock Exchange	125
2	Consumer Non-Cylical Sector companies listed from 2022-2024 on the IDX	-28
3	Consumer Non-Cylical Sector companies that have not published financial statements for 2022-2023	-3
4	Consumer Non-Cylical Sector Companies that publish 2022-2023 Financial Statements in dollars	-2
5	Number of companies sampled	92
6	Research Year Data (Year)	2
Research Sample		184
Outlier Data (companies that do not publish financial reports in a particular year)		-4
Total Research Sample		180

4.2. Descriptive Statistical Analysis

Descriptive statistical analysis aims to describe the state of data such as average, standard deviation, minimum data, maximum data and the amount of data. The results of the analysis that has been done can be seen in table 2.

Table 2. Descriptive statistical analysis

Variabel	Minimum	Maksimum	Mean	Std. Deviasi
AD	38.00000	304.0000	83.80000	22.64751
Prof	-1947.237	216.9985	-9.428294	163.6053
Solv	-330.9594	5497.976	213.2511	597.7740
Prof*KAM	-1947.237	216.9985	-10.62085	166.5355
Solv*KAM	-330.9495	7634.424	273.4117	782.8259

EvIEWS 10

Based on Table 2, it can be seen that from 2022 to 2023 the average audit delay is 83.8, the maximum value is 304 and the minimum value is 38 with a standard deviation of 22.6475. Profitability has a minimum and maximum value of -1947.237 and 216.9985 respectively with an average value of -9.428294 and a standard deviation of 163.6053. Solvency has a minimum value of -331 and a maximum value of 5498 with an average value of 213.2511, Key audit Mater moderates Profitability has a minimum and maximum value of -1947.237 and 217, respectively, with an average value of -10.62085 and a standard deviation value of 166.5355. while KAM moderates Solvency has a minimum and maximum value of -330.9495 and 7643.424 respectively with an average value of 273.4117 and a standard deviation of 782.8259.

4.1 Pemilihan Model Regresi Data Panel

Based on the results of the three panel data regression estimation models, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), it will be selected which model is most appropriate to estimate the desired regression equation model with the Chow Test, Hausman Test, and Lagrange Multiplier (LM) test as follows:

1) Chow Test

The Chow test is used to determine the choice of model that is better to use, namely between CEM or FEM in estimating Panel Data. According to Gujarati and Porter (2012: 361) the basis for decision making is as follows:

- a. If the probability value for cross section $F >$ a significant value of 0.05 then H_0 is accepted, so the most appropriate model to use is the Common Effect Model (CEM).
- b. If the probability value for cross section $F <$ 0.05 significant value then H_0 is rejected, so the most appropriate model to use is the Fixed Effect Model.

Table 3. Chow test

Redundant Fixed Effects Tests			
Pool: MODEL1			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.639063	(91,83)	0.0115
Cross-section Chi-square	185.14144	91	0.0000

Eviews 10

The Chow test results show that the Cross Section F probability value of $0.0000 < 0.05$ means it is rejected. So, the most appropriate model used in estimating the regression equation is the Fixed Effect Model (FEM).

2) Hausman Test

The Hausman test is a test used to choose the best approach between the Random Effect Model (REM) approach and the Fixed Effect Model (FEM) in estimating panel data. According to Gujarati and Porter (2012: 451) the basis for decision making is as follows:

- a. If the probability value for cross section random $>$ significant value of 0.05 then H_0 is accepted, so the most appropriate model to use is the Random Effect Model (REM).
- b. If the probability value for random cross section < 0.05 significant value then H_0 is rejected, so the most appropriate model to use is the Fixed Effect Model (FEM).

Tabel 4. Hausman test

Correlated Random Effects - Hausman Test			
Pool: MODEL1			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.014663	4	0.9076

Eviews 10

The results of the Hausman test show that the Cross Section Random probability value is $0.9076 > 0.05$, meaning that H_0 is accepted. Thus, the most appropriate model in estimating the regression equation is the Random Effect Model (REM).

3) LM Test

The Lagrange Multiplier (LM) test is a test used to choose the best approach between the Common Effect Model (CEM) and Random Effect Model (REM) approaches in estimating panel data. The Random Effect Model was developed by Breusch-Pagan which is used to test significance based on the residual value of the Ordinary Least Squares (OLS) method. According to Gujarati and Porter (2012: 481) the basis for decision making is as follows:

- a. If the Breusch-Pagan cross section value $>$ 0.05 significant value then H_0 is accepted, so the most appropriate model to use is the Common Effect Model (CEM).
- b. If the Breusch-Pagan cross section value < 0.05 significant value then it is rejected, so the most appropriate model to use is the Random Effect Model (REM).

Tabel 5. LM test

Lagrange multiplier (LM) test for panel data	
Date: 06/15/24	Time: 05:06

Sample: 2022 2023			
Total panel observations: 180			
Probability in ()			
Null (no rand. effect)	Cross-section	Period	Both
Alternative	One-sided	One-sided	
Breusch-Pagan	4.450035 (0.0349)	0.235255 (0.6277)	4.685290 (0.0304)

Eviews 10

The Lagrange Multiplier test results show that the Breusch-Pagan cross section probability value is 0.0349 < 0.05, meaning that H0 is rejected. Then the most appropriate model used in estimating the regression equation is the Random Effect Model (REM).

The results of the three model tests show:

1. Test between the Common Effect Model (CEM) and the Fixed Effect Model (FEM), then the Fixed Effect Model (FEM) is more appropriate to use the regression equation estimation model. Test between the Fixed Effect Model (FEM) and the Random Effect Model (REM), then the Random Effect Model (REM) is more appropriate to use the regression equation estimation model.
2. Test between the Common Effect Model (CEM) and the Random Effect Model (REM), then the Random Effect Model (REM) is more appropriate to use in the regression equation. From the three test results, it shows that there are 2 tests that produce the Random Effect Model (REM) model, namely the LM Test and the Hausman Test. Based on this, it can be concluded that the best model approach used to determine the effect of the variables tested is the Random Effect Model (REM) model.

4.2. Moderated Regression Analysis

Tabel 6. Moderated regression

Dependen Variabel: AD			
Metode Pooled Least Square			
Variabel	Coefficient	Prob. (2 tailed)	Prob. (1 tailed)
C	92.65778	0.0000	
Prof	-0.028579	0.7696	0.3847
Solv	0.008692	0.0548	0.0274
KAM	-6.638003	0.0517	0.02582
Prof*KAM	0.006817	0.9405	0.47025
Solv*KAM	0.003693	0.0512	0.0256
Adjusted R-Square: 0.032442			
Prob. (F-Statistik): 0.368942			
Log Likelihood: -813.7016			

Then the following equation is obtained:

$$AD = 92.65778 - 0.028579(\text{Prof}) - 0.008692(\text{Solv}) - 6.638003(\text{KAM}) + 0.006817 (\text{Prof} * \text{KAM}) + 0.003693 (\text{Solv} * \text{KAM}) \dots\dots\dots(2)$$

The results of the equation with panel data linear regression above show that the audit delay proxied by audit delay has a constant value of 92.65778, meaning that if the other independent variables are constant, the audit delay value measured by AD is 92.65778.

The regression coefficient of -0.028579 means that every increase of 1 profitability (Prof) ratio will reduce the audit delay by 0.022331 assuming the condition of the other independent variables is constant. The more profitability increases, the more audit delay will decrease and vice versa. The solvency regression coefficient of 0.008692 means that every increase of 1 Solv ratio will increase the audit delay by 0.008692 assuming the condition of the other independent variables is constant. The more Solv increases, the more audit delay will increase and vice versa.

The KAM regression coefficient of -6.638003 means that every increase of 1 KAM ratio will decrease the audit delay by -6.638003 assuming the condition of the other independent variables is constant. The more KAM increases, the more audit delay will decrease and vice versa.

The interaction of profitability and KAM show regression coefficient of 0.006817 means that every increase of 1 Prof * KAM ratio will reduce the audit report lag by 0.006817 assuming the condition of the other independent variables is constant. The more Prof * KAM increases, the more the audit report lag will decrease and vice versa.

The Solv * KAM regression coefficient of 0.003693 means that every 1 increase in the Prof * KAM ratio will increase the audit report lag by 0.003693 assuming the condition of the other independent variables is constant. The more Prof * KAM increases, the more audit report lag will decrease and vice versa.

4.2. Hypothesis Test

Hypothesis testing in this study has three stages, namely, determination test (t-test) and partial test (R²) as follows:

Table 7. Result

Variabel	Sign Prediction	Coefficient	t-test	Sig	
(constant)		92.65778	19.55538		
Prof	-	-0.028579	-0.293381	0.3847	H ₁ reejceted
Solv	+	0.008692	0.591776	0.0274	H ₂ accepted
Prof*KAM	+	0.006817	0.074765	0.47025	H ₃ rejected
Solv*KAM	+	0.003693	0.403130	0.0256	H ₄ accepted
R-Squared: 0.030307					
Adjusted R-Square: 0.032442					
F-Statistik: 1.087639					
Prob. (F-Statistik): 0.368942					
Durbin Watson: 1.998190					

1) Parsial Test (t-test)

This test is used to show how far the influence of one independent variable individually in explaining the variation in the dependent variable, and to explain the effect of moderation

variables in explaining the effect of the independent variable on the dependent. Based on table 8, it can be concluded that:

H₁: profitability has a negative effect on audit delay

According to the test results, the coefficient value (beta) is -0.0028579, the t-statistic value is -0.293381 and the prob value is 0.3874. from these results H1 is rejected and shows that although probability has a negative relationship direction, it does not significantly affect audit delay. This finding indicates that the audit process in companies with a low probability level is the same as the audit process in companies with a high probability level, so that a low probability level does not affect the duration of the audit process. The results of this study are in line with research conducted by (Ramadhani & Rochmatullah, 2024), (Gustiana & Rini, 2022), and (Wisesa, 2020), where the research states that ROE has no effect on audit delay.

H₂: Solvency has a positive effect on audit delay

According to the test results, the coefficient value (beta) is -0.008692, the t-statistic value is -0.591776 and the prob value is 0.0274. from these results H2 is accepted and shows that solvency has an effect on audit delay. This is because the size of the debt owned by the company can result in many confirmations that must be made, this many confirmations cause a long audit process and affect the delay in completing the audit. This will also make auditors careful about the financial statements to be audited because it involves the survival of the company. The results of this study are in line with research conducted by (Gustiana & Rini, 2022) and (Ginting, 2019) where in their research it states that Solvency as measured using DER has a positive influence on audit delay.

H₃: Key Audit Matters strengthens the negative effect of profitability on audit delay.

According to the test results, the coefficient value (beta) is 0.006817, the t-statistic value is 0.074765 and the prob value is 0.47025. from these results H3 is rejected because the disclosure of key audit matters can extend the audit delay because auditors and company management must carry out increased complexity, more in-depth testing, intense communication with management, expert involvement and emphasis on audit quality, which makes auditors allocate more time and resources to deal with issues identified as KAM, which can extend audit delay. The results of this study are in line with research conducted (Abdullatif et al., 2023) where the results of the study state that key audit matters have no effect on audit delay.

H₄: Key Audit Matters strengthens the positive effect of solvency on audit delay.

According to the test results, the coefficient value (beta) is 0.003693, the t-statistic value is 0.403130 and the prob value is 0.0256. from these results H4 is accepted because solvency can extend the audit delay, this is also supported by the disclosure of KAM by a company because auditors must perform additional testing and in-depth analysis of areas identified as KAM, which requires additional time and resources this can extend the audit delay. The results of this study are supported by research (Al Lawati & Hussainey, 2022) where the

results of their research state that KAM can strengthen the positive effect of solvency on audit delay.

2) Uji Determination Test (R^2)

This test is conducted to see the effect or contribution of the independent variable on the dependent variable. The coefficient of determination is 0 to 1, meaning that if the coefficient of determination is close to 0, it shows the weaker the relationship between the independent variable and the dependent variable. Conversely, if the coefficient of determination is close to 1, it shows a strong relationship between the independent variable and the dependent variable. According to Kuncoro (2013:247), every additional independent variable, R^2 will increase, regardless of whether the variable has a significant effect on the dependent variable or not. The coefficient of determination for regression with more than two independent variables is recommended to use adjusted R^2 . Therefore, in this study, researchers used adjusted R^2 to measure the percentage effect of the independent variable on the dependent variable. The results of the coefficient of determination test are as follows:

The results obtained from the coefficient of determination test with an adjusted R^2 value of 0.002442 mean that 3.24% of the audit delay variable can be influenced by Prof, Solv, KAM, Prof * KAM, and Solv * KAM. The remaining 96.76% can be influenced by other factors that are not included in this study.

5. CONCLUSION, LIMITATION AND SUGGESTION

The purpose of this study was to determine the factors that affect audit delay in consumer nonsylcal companies. This study uses profitability and solvability variables and KAM as moderating variables, then the dependent variable is audit delay. By involving 92 noncylical consumer companies from 2022-2023 with a total sample of 180. Profitability and Profitability factors moderated by KAM have no effect on audit delay, then Solvability and KAM which moderate Solvability on audit delay have a positive and significant effect.

Based on the results of this study, there are several limitations, the first is that the sample in this study is limited because some companies in Indonesia still have not published annual and financial reports in 2023. The second is that there are other factors not examined in this study that can also affect audit delay. And there are external influence factors that can affect audit delay that are not taken into account in this study. Future research is expected to further expand the range of research and add and develop other indicator variables such as operating complexity, corporate governance, or interaction with external auditors. And it is hoped that future research can provide a more comprehensive and in-depth insight into the factors that influence audit delay in Indonesia.

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CHAPTER 14

To What Extent is the Role of Women in Inclusive Economic Development?

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ABSTRACT

Women's involvement in workforce is not as large as men's involvement. Even women in parliament in Indonesia in the 2019-2024 period are only 21 percent. Women face many challenges when entering the professional space. In Indonesia, the inclusive economic development index (IEDI) is used to measure the level of economic development across the dimension of economic growth and development, income distribution and poverty reduction, as well as expanding access and opportunities. This research objective is to measure the role of women in inclusive economic development through the gender development index, the proportion of women working in managerial positions, the proportion of women in parliament, the proportion of women in managerial positions, and life expectancy. This research uses Panel Data Multiple Linear Regression analysis tools, with a research period from 2018-2022 in 34 provinces in Indonesia. According to the model selection test, it is concluded that Fixed Effect Model is the best estimation model for this study. The results of data processing show that the gender development index (GDI) and women's life expectancy have a positive influence on IEDI in Indonesia. Conversely, the proportion of women working in managerial positions and the proportion of women's involvement in parliament as the proxy of women's role have no significant impact on IEDI in Indonesia.

Keywords: Women's role, Inclusive economic development, Gender development index.

1. INTRODUCTION

Women's involvement in the workforce is not as large as men. In fact, the proportion of women in Indonesia's parliament in 2019 – 2024 are only 21 percent. Women have to deal with numerous challenges in profesional space. The stereotype of women will not performed in their work once they become mothers also contribute as an inhibiting factor for women's career development (Abdulrahman, 2020). Women's participation in workforce, gender equality, and women's participation in politics are variables that used to measure women's role on economic development. Women's roles are very vital to develop a nation. Eventhough women's involvement in workforce already increase significantly in recent years, however there is still a substantial gap compared to men. Reinforcing women's involvement in managerial position is an effort to achieve gender equality in the workforce and decision-making process at any level of government (Ussyarovi, 2023).

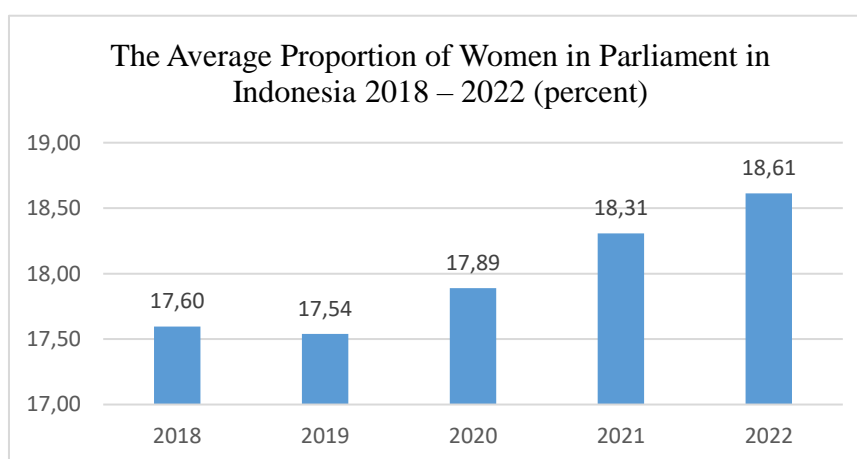


Figure 1. The average percentage of women in parliament in Indonesia 2018 – 2022 (BPS, 2018-2022)

Women's life expectancy, women's average years of schooling, and women's per capita expenditure have a positive impact to inclusive economic development index especially when compared to men (Adika, 2021). Firmansyah (2021) found that women's empowerment, women's life expectancy, and the percentage of women's population have a positive impact to Regional Gross Domestic Bruto (RGDP). Eventhough there are a lot of previous study that stated women's roles in various sector could positively affect economic growth, however women often face challenges that make them in a disadvantages position particularly in poverty dimension. Women face a barrier to access education, health, life standard, environment, autonomy, and social relationships (Biswal, 2020).

Women's roles in bulding a nation should be recognized by society because it is a crucial component to develop a civilization to ensure sustainable progress by 2030 (Batool, 2021). The Indonesian government have tried several ways to increase women's empowerment in various economic sectors. Women's role has been proven to promote the increase of household income and economic growth (Sulisto, 2023).

The increase of RGDP that used to measured economic growth does not necessarily have the same impact to society's welfare (Hapsari, 2019). Therefore inclusive economic

development concept exist as a modern paradigm in order to achieve a better improvement for a country that benefits the entire population (Popova, 2020). In Indonesia, inclusive economic development measured by inclusive economic development index (IEDI). IEDI used to examine the economic development in the dimensions of economic growth and development, income distribution and poverty reduction, as well as expanding access and opportunities.

According to this description and previous empirical study, this research objective is to examine the extent of women's roles in relation to Indonesia's inclusive economic development in 34 provinces in Indonesia from 2018 to 2022. Women's roles measured by four variables as the proxy, that are the Gender Development Index (GDI), the proportion of women in managerial positions, women's involvement in parliament, and women's life expectancy. Based on this description, this research hypothesis is that women's roles have a positive impact on inclusive economic development significantly.

2. LITERATURE REVIEW

2.1. Inclusive Economic Development Index (IEDI)

Bappenas (Badan Perencanaan Pembangunan Nasional) Indonesia use IEDI to measure the level of economic performance. The index indicating the level of economic opportunities and prosperity, as well as providing broad access to all levels of society. There are 21 indicators, eight sub-pillars, and three pillars that account for the index. Economic growth and development; income distribution and poverty reduction; as well as the expansion of access and opportunities are the three pillars constituting the index.

The index ranges from 0 to 10, which higher values means a greater the inclusivity development level. IEDI scores shows a positive trend. Indonesia's IEDI was 6.13 in 2022 that is increase from 6.00 in 2021. IEDI concept suggest that economic growth should be benefit society from all level particularly the poor and marginal group. When the economic growth only benefit the rich, this only result in greater income inequality. The increase in extreme income equality can cause economic inefficiency, as well as weaken social stability and solidarity. Indonesian government has a mission to improve economic growth not only in terms of quantity but also in the matter of quality. Many developing countries trapped in the ambition to achieve economic growth particularly in manufacturing industry (secondary sector) and service sector (tertiary sector). These two sectors have a high contribution to GDP. However only a small number of labors are absorbed (Renie, 2019).

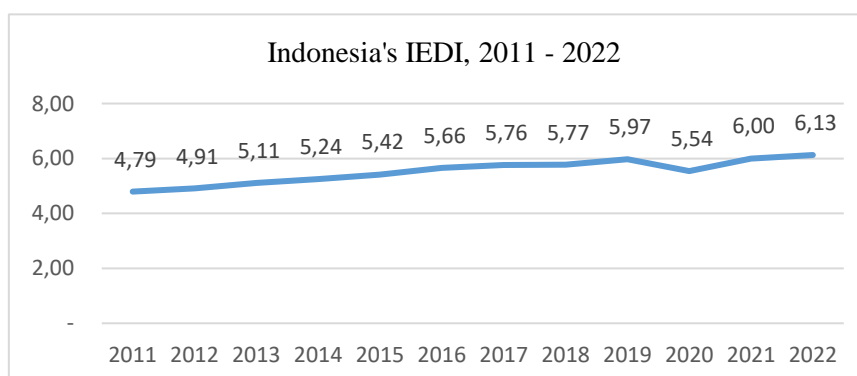


Figure 2. Indonesia's IEDI, 2011 – 2022
(Bappenas, 2011-2022)

The idea of IDEI align with the 8th goal of Sustainable Development Goals (SDGs) which is to increase economic growth that are inclusive and sustain. Reducing gender wage gap is important to encourage a decent job for all. Women often paid lower compared to men for the same job. There are a lot of women work in informal sector that is inadequate without social security. To accelerate inclusive economic growth the government required to formulate a policy that can accomodate society as a whole. This can be achieve by investing in education, health, and infrastructure that raise the incomes distribution. Previous empirical study shows that gender inequality in education will hinder economic development, thus strengthen social inequality. Expanding the educational opportunities for women play an important role to achieve the SDGs (Todaro, 2015).

2.2. The Influence of Gender Development Index (GDI) on IEDI

Gender development index is used as an indicator to examine the level of development accomplishment that has accommodated gender issues. According to Badan Pusat Statistik Indonesia (BPS), GDI describe the ratio that compared women's human development index (HDI) and men's human development index (HDI). Women's education level as one of the element that constitute the HDI play a crucial role to increase inclusivity. When the mother have a high education level, it will potentially help child to survive, have a better nutrition and education in addition for making higher earning (Todaro, 2015). A study conducted in Kediri using the Pearson Product Moment Correlation method, found that there was a significant relationship between GDI and poverty reduction, which indicated that when IPG increased, the poverty level would decrease significantly (Suharnanik, 2023). In contrast to research conducted in European countries which found that there was no direct relationship in general between the level of the gender development index and GDP per capita (annual) growth regardless of their level of development (Podolchak, 2023).

H1: The gender development index has a significant and positive effect on IEDI.

The Relationship Between the Proportion of Women in Managerial Positions and IEDI Female director shows a positive impact to corporate sustainability and social responsibility. Women's unique perspective play an important role to manage the company's sustainable activities and encourage the implementation of ethical policies (Gulzar, 2019). This study align with Rastogi (2015) findings which stated that women's entrepreneurship has the potential to contribute directly to the national economy through empowering women and creating jobs. Women entrepreneurs are known for their unique perspective that promote innovation and collaborative work environment. Therefore, women empowerment will lead to work culture transformation and create more job opportunities. In contrast, a study conducted by Ajaz (2020) and Loukil (2019) found that gender diversity in board position has no effect on sustainability.

H2: The proportion of women working in managerial positions has a significant positive effect on IEDI.

The Relationship Between Women's Participation in Parliament and IEDI A study that examine the influence of women empowerment in public services to economic growth in Middle Asia and Europe countries show that women participation in parliament have a positive impact to economic improvement. Particularly, the 10% point increase of the proportion of women in parliament will increase GDP growth 0.74% point (Mirziyoyeva,

2023). Therefore women's participation in politic needed to bring broader perspective in decision-making process so that it will lead to a more innovative and effective solution (Mojapelo, 2019). Women's involvement in parliament will promote economic growth which is a pillar that contribute to increase the IEDI (Dahlum, 2022). Meanwhile, the lack of women's involvement in politic and social empowerment cause a barrier for women to access resources such as financial resources and opportunity (Unanam, 2020).

H3: The proportion of women in parliament has a significant and positive effect on the IEDI.

The Relationship Between Women's Life Expectancy and IEDI

The relationship between women's life expectancy and economic growth is a complex issue. Women's empowerment resulted in a better health because women in general will prioritize their own health and their families. Since human is one of the primary resource for economic development, women's empowerment will contribute to a workforce that is more productive (Mohamed, 2022). It is not only have a positive impact on productivity but also result in immensely improved child health and subsistence, hence benefiting the next generation as well (Todaro, 2015). Conversely, a study by Anggraeni (2022) discovered that women's life expectancy has an adverse impact to economic growth. These conflicting findings indicating that a further research is required to explore the relationship between women's life expectancy and economic growth.

H4: Women's life expectancy has a significant positive effect on the IEDI.

3. RESEARCH METHOD

This research uses secondary data from Badan Pusat Statistik Indonesia (BPS) and Bappenas which consist of cross section data from 34 provinces and time series data from 2018 to 2022 with 170 total observations. There are four independent variables as the proxy to measure women's roles in inclusive economic development.

Tabel 1. Variables in this research

Variable Name	Variable Type	Description	Unit	Data Source
GDI	Independent	Gender Development Index, the ratio of women's HDI to men's HDI	Index	BPS
MANAGERIAL	Independent	Proportion of women in managerial positions	Percent	BPS
PARLIAMENT	Independent	Proportion of women in parliament	Percent	BPS
LIFE_EXP	Independent	Women's life expectancy as a health indicator	Years	BPS
IEDI	Dependent	Inclusive economic development index	Index	Bappenas

The study will examine the correlation between Gender Development Index (GDI), proportion of women in managerial positions (MANAGERIAL), proportion of women in

parliament (PARLIAMENT), and women’s life expectancy (LIFE_EXP) on the Inclusive Economic Development Index (IEDI).

The data is analyzed using the panel data regression method (Gujarati, 2004) The general econometric equation in this study is:

$$IEDI = \beta_0 + \beta_1GDI_{it} + \beta_2MANAGERIAL_{it} + \beta_3PARLIAMENT_{it} + \beta_4LIFE_EXP_{it} + \varepsilon_{it}$$

Where β_0 is the constant, β_1 , β_2 , β_3 , and β_4 are the regression coefficients. GDI is the Gender Development Index, MANAGERIAL is the proportion of women in managerial positions, PARLIAMENT is the proportion of women in parliament and LIFE_EXP is women’s life expectancy.

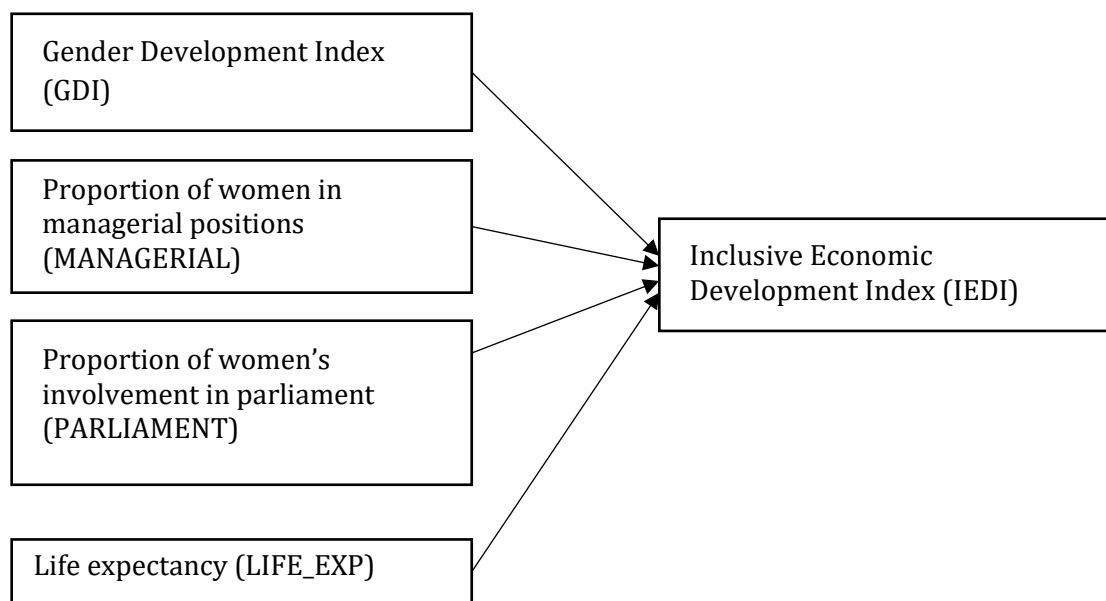


Figure 3. Research framework

4. RESULT AND DISCUSSION

Table 4 shows the result of the LM test with a probability value of 0.0000, which is less than 5%. Therefore, the best model is the Fixed Effects Model (FEM). The Chow test was subsequently conducted, yielding a probability value of 0.0000, which is less than 5%. Thus, the FEM is confirmed as the best model. Based on the Hausman test, with a probability value of 0.0000, which is less than 5%, it is concluded that the FEM is the best estimation model to answer the hypotheses in this study.

Table 2. Model selection test

Statistical Test	Probability	Decision
LM Test	0.0000	FEM
Chow Test	0.0000	FEM
Hausman Test	0.0000	FEM

Data Processed (Eviews 9.0)

The adjusted R-squared value of 0.860332, indicating that the independent variables (GDI, MANAGERIAL, PARLIAMENT, and LIFE_EXP) in this study explain 86.03% of the variation in the IEDI variable, while the rest 13.97% is unraveled by other variables not

included in the model. This model meets the principal of goodness of fit. In the global test, the F-statistic probability value is 0.000000, which is not greater than 5%. Therefore it can be concluded that at least one independent variable in this model (GDI, MANAGERIAL, PARLIAMENT, and LIFE_EXP) has a significant effect on IEDI. Table 5 provides the detailed regression output using the FEM.

Table 3. FEM output estimation results

Variable	Coefficient	t-Statistic	Probability (one tail)	Hypothesis
C	-247.2956	-8.372483	0.0000	
LOG(GDI)	21.65088	2.811506	0.00285	H ₁ accepted
LOG(MANAGERIAL)	-0.227848	-1.390043	0.08345	H ₂ rejected
LOG(PARLIAMENT)	-0.092247	-1.009528	0.1573	H ₃ rejected
LOG(LIFE_EXP)	36.65432	6.098562	0.0000	H ₄ accepted
R-squared	0.890910			
Adj R-squared	0.860332			
F-statistic	29.13553			
Prob F-stat	0.000000			

Data Processed (Eviews 9.0)

The panel data regression equation using the FEM is as follows:

$$\text{IEDI} = -247.2956 + 21.65088 \cdot \text{LOG(GDI)}_{it} - 0.227848 \cdot \text{LOG(MANAGERIAL)}_{it} - 0.092247 \cdot \text{LOG(PARLIAMENT)}_{it} + 36.65432 \cdot \text{LOG(LIFE_EXP)}_{it} + \text{Eit}$$

4.1. The Impact of the Gender Development Index on IEDI

Based on the statistical analysis, the coefficient value is 21.65088 which means there is a significant positive relation between GDI and IEDI. The probability value is 0.0057 which is less than 5% means the H₁ accepted. Therefore it can be concluded that GDI has a positive impact to promote inclusive economic development index in Indonesia. This findings align with the study conducted by Rahayu (2019) which found the increase of GDI will promote economic growth. Uzoamaka (2016) which stated that countries with high Human Development Index will resulted in reducing gender inequality between women and men related to labor market, employment, education, and wage issues, as well as full cultural equality in society. This will lead to enhancement of economic growth. Another study conducted in West Sumatera province, Indonesia, found that gender equality in the health sector has a positive affect to economic growth (Nabiel, 2021). This result also align with a study in France (Perrin, 2021).

4.2. The Impact of the Proportion of Women in Managerial Positions on IEDI

According to panel data regression estimation output the coefficient value is -0.227848. The negative sign is contradictory with the theory. The probability value is 0.08345 which is greater than 5% means that H₂ rejected. Therefore, it can be concluded that the proportion of women in managerial positions does not influence the Inclusive Economic Development Index of Indonesia. This finding aligns with previous studies conducted by Ajaz (2020) and Loukil (2019).

4.3 The Impact of Women's Representation in Parliament on IEDI

The estimation output result shows the coefficient value is -0.092247 with a probability value 0.1573. The negative sign in coefficient is contradicting with the theory, which means H3 is rejected. Therefore, it can be concluded that the level of women's representation in parliament does not influence the Inclusive Economic Development Index of Indonesia. This could happen because the women involvement in Indonesia's parliament not even reach 30 percent as stated in law number 22 of 2007 about the implementation of elections. The low level of women's participation makes it difficult to actually measure women's role in enhancing inclusive economic development. The stereotype of women, society expectation of women, and cultural norms can be attributed as a barrier for women to participate in politic (Tsangari, 2020).

4.4 The Impact of Women's Life Expectancy on IEDI

Women's life expectancy variable in this study shows a positive impact to inclusive economic development with coefficient value 36.65432 and probability value 0.0000. Women's life expectancy can contribute to economic development through the increase of labor force productivity. The better women's health promote a positive economic impact for poor countries due to its contribution for more productive labor force (Jalili, 2021). The life expectancy at age 60 can be used as a health indicator. Thus, a higher life expectancy value will generate a greater economic benefit. As countries develop, the life expectancy values increase. This indicating the improvement of people overall health and potentially contribute to sustainable economic development (Toropoc, 2022).

5. CONCLUSION AND RECOMMENDATIONS

This study found that women's role in Indonesia's inclusive economic development from 2018 – 2022 influenced by gender development index (GDI) and women's life expectancy (LIFE_EXP). This research limited to the period from 2018 to 2022 in 34 provinces in Indonesia with the level of women's involvement in parliament and managerial positions relatively low. Further research is needed in the region with high level of women's role in managerial position and politic to measure more comprehensive correlation of women's role in promoting inclusive economic development. The inequality between women and men to access education, health services, and opportunities, should be addressed as a barriers to fully realize the potential of women's empowerment. Society's expectation and stereotype againts women also contribute as a hindering factor for enhancing women's empowerment. It is essential for government, NGOs and other stake holders to invest in programs and policies that elevate women's empowerment. Hence, the prosperous societies can be achieved.

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CHAPTER 15

Rock Typing of Carbonate Rocks Using the Hydraulic Flow Unit Method in Basin X

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ABSTRACT

A Hydraulic Flow Unit (HFU) represents a volume of reservoir rock with consistent petrophysical and geological properties. In this study, samples were taken from a field with four wells and 104 core data points, though lacking log data. Through the analysis, seven distinct reservoir rock types were identified, which serve as references for the distribution of reservoir properties. Permeability was then estimated using the Kozeny-Carman method and correlated with core data permeability results. The permeability estimates from the HFU approach demonstrated promising accuracy. This was evidenced by the plot of calculated permeability data points against measured permeability, forming a best-fit line with a correlation constant (a) of 1.1746 and a correlation coefficient (R^2) of 0.6569. Although these results show a reasonably good fit, the R^2 value suggests the need for further research to improve the study's accuracy. These findings indicate that the HFU approach can effectively estimate permeability in reservoir rocks, providing valuable insights for reservoir characterization and management. The study emphasizes the importance of detailed petrophysical and geological analysis in understanding reservoir properties and optimizing hydrocarbon extraction. By refining the HFU method, future research can enhance the precision of permeability predictions, contributing to more efficient and sustainable reservoir development strategies.

Keywords: reservoir rock type, hydraulic flow unit, carbonate rock.

1. INTRODUCTION

The term "rock typing" in reservoir engineering and hydrogeology involves categorizing reservoir rocks according to their petrophysical characteristics like porosity, permeability, and fluid saturation. This classification helps in comprehending how fluids (oil, water, gas) behave within the reservoir and is essential for effective reservoir management and production.

Hydraulic Flow Units (HFUs) provide a more detailed classification of rock typing by grouping reservoir rocks based on their pore size distribution and petrophysical properties that influence fluid flow under specific reservoir conditions. HFUs are utilized to forecast and simulate fluid flow properties such as permeability, relative permeability, and capillary pressure.

2. LITERATURE REVIEW

A literature review on rock typing and hydraulic inflow units (HFUs) encompasses a wide range of studies and exploration in force engineering, petrophysics, and hydrogeology. Then's an overview of crucial themes and findings generally covered in similar reviews.

- **Rock Typing Styles**

Approaches for rock typing are bandied, including deterministic and probabilistic styles. Deterministic styles involve bracket grounded on core analysis, porosity- permeability connections, and capillary pressure data.

Probabilistic styles use statistical analysis and clustering algorithms to classify force jewels grounded on multiple parameters.

- **Petrophysical Properties**

Studies frequently concentrate on the petrophysical parcels that define gemstone types, similar as porosity distribution, severance throat size, grain size, mineralogy, and connectivity. The relationship between these parcels and fluid inflow geste (permeability, relative permeability, capillary pressure) is completely delved .

- **Operations of HFUs**

Practical operations of HFUs in force characterization, simulation, and product optimization are considerably reviewed. Exemplifications include using HFUs to prognosticate force performance, pretend fluid inflow dynamics, and design enhanced oil painting recovery(EOR) ways.

- **Case Studies and Field Applications**

Literature reviews frequently include case studies from different geological settings and force types. These case studies illustrate how HFUs have been successfully applied to real-world force operation challenges, similar as water flooding, hydraulic fracturing, and well placement optimization.

3. RESEARCH METHOD

Carry out a hydraulic flow unit analysis using the Amaefule approach as follows :

1. Calculate the RQI (Reservoir Quality Index) price for each core data.

Calculation example:

Sample core T-37, where it is known that $K_{core} = 6.70$ and $\phi_e = 0.08$

$RQI = 0.0314 \times \sqrt{(6.70/0.08)} = 0.295$

2. Calculate the value of the pore matrix ratio (PMR) or ϕ_z

Calculation example:

Sample T-37 where it is known $\phi_e=0.08$ (fraction)

$$\phi_z = [0.08 / (1 - 0.08)] = 0.082$$

3. Calculating the price of FZI (Flow Zone Indicator)

Calculation example:

in the T-37 sample it is known that RQI = 0.295 mD and $\phi_Z = 0.082$ (fraction)

$$FZI = 0.295 / 0.082 = 3.584$$

4. Calculating discrete FZI for each data core:

$$[FZI]_d = 2 \times \ln(FZI) + 10.6 = 2 \times \ln(3.584) + 10.6 = 18$$

5. Determining the distribution of hydraulic flow units.

The highest discrete FZI value obtained from all core data is 18 and the lowest is 6, so the HFU distribution for all core data can be seen in Table 1 below.

Table 1. HFU distribution for all core data

FZI discrete	HFU
18	1
16	2
14	3
12	4
10	5
8	6
6	7

6. Calculate the permeability value based on HFU (Hydraulic Flow Unit):

Using the relationship between porosity and permeability for each HFU

Calculation example:

FZI d = 18 → HFU 1 (based on Table 1) $y = 11.425 \times \phi^{7.191}$, so:

$$k = 11.425 \times [0.024]^{7.191}$$

$$k = 32,749 \text{ Md}$$

4. RESULT AND DISCUSSION

The process of defining HFUs through rock typing typically includes:

- Core Analysis: Examining core samples from the reservoir in detail to determine physical characteristics such as porosity and permeability.
- Petrophysical Properties: Identifying petrophysical parameters that impact fluid flow, like pore throat size distribution, pore connectivity, and grain size.
- Laboratory Tests: Carrying out laboratory experiments to measure capillary pressure curves, relative permeability, and other pertinent properties.
- Data Integration: Incorporating geological, geophysical, and engineering data to describe the reservoir rock types and their hydraulic flow behaviors.
- Modeling and Simulation: Creating numerical models and simulations based on HFUs to forecast reservoir performance and optimize production strategies.

Hydraulic Flow Unit (HFU) analysis is divided into several calculation stages. The first stage is to calculate the reservoir quality index (RQI) of each sample. Then the second stage is to calculate the normalized porosity index (ϕ_z). Next, the third stage is calculating the flow zone indicator (FZI) and the final stage is determining the hydraulic unit groups from the results of the previous FZI calculation.

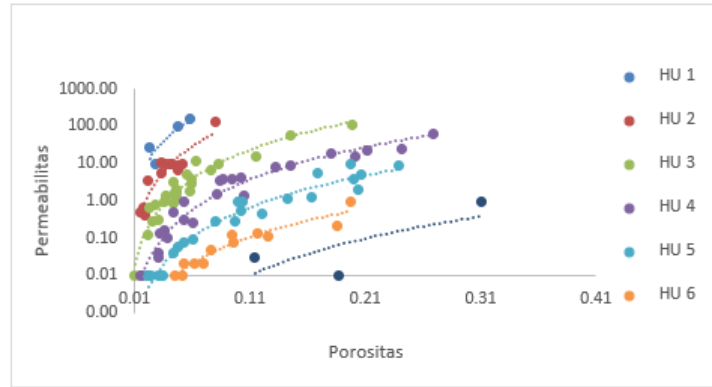


Figure 1. Porosity vs permeability relationship for each HFU

In Figure 1 above, it can be seen that the reservoir being analyzed consists of seven different rock types or hydraulic flow units (HFU). Each HFU is represented by an empirical equation that states the relationship between porosity and permeability

Table 2. Empirical Equations of Permeability and Porosity for Each HFU

HFU	Persamaan Empiris
1	$y = 3835x - 79.241$
2	$y = 1541x - 41.601$
3	$y = 519x - 20.22$
4	$y = 157.77x - 7.6726$
5	$y = 31.823x - 1.6863$
6	$y = 4.0902x - 0.2528$
7	$y = 5.0872x - 0.7011$

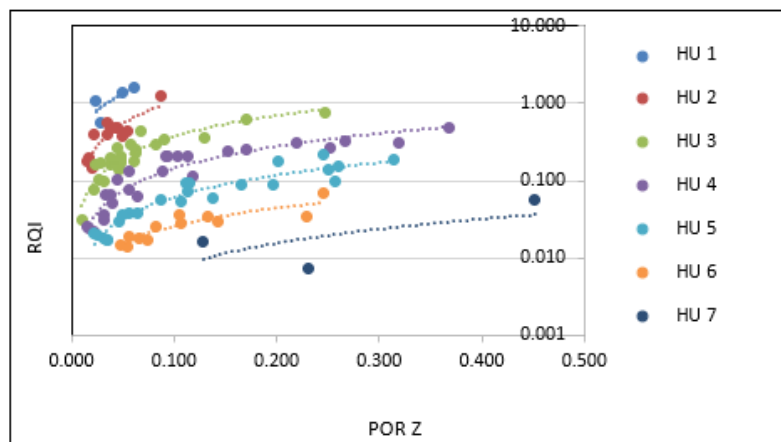


Figure 2. Relationship between ϕ_z and RQI for each HFU

The HFU value has been obtained, then the estimated value of permeability can also be determined using the equation in Table 2 above. Then a relationship was also made between \emptyset_z and RQI for each hydraulic flow unit which can be seen in Figure 2 that shows the relationship between \emptyset_z and RQI for each HFU. The image above is in accordance with Amaefule's (1993) statement, meaning that, in the log-log plot between RQI and \emptyset^2 , all data with the same FZI value will fall on a line with a certain slope and other data with different FZI will fall on another parallel line. Therefore, it can be seen that data that have the same FZI value have the same pore channel attributes and will form a hydraulic unit itself.

Testing the accuracy value of the permeability estimation results obtained, the permeability value was calculated based on the equation for each HFU. The results of the permeability calculations are then compared with the permeability values from the core data

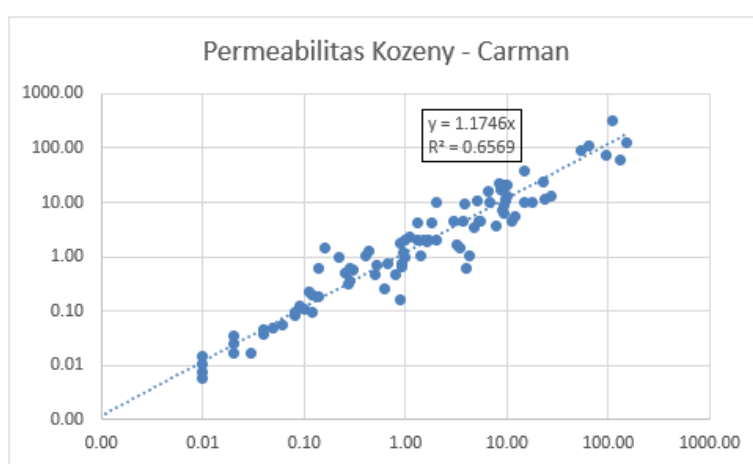


Figure 3. Validation of permeability based on the kozeny - Carman approach to core data

5. CONCLUSION AND RECOMMENDATIONS

Based on the discussion carried out, several conclusions can be drawn as follows:

- From the results of the Flow Zone Indicator (FZI) grouping, 7 hydraulic flow units were obtained, namely
 HU 1 unit with an FZI range of 32,744 - 24,998, HU 2 unit with an FZI range of 11,642 - 10,944, HU 3 unit with a range of 4,037 - 3,429, HU unit 4 with FZI range 3.976 - 0.001, HU unit 5 with FZI range 0.678 - 0.579, HU unit 6 with FZI range 0.264 - 0.217 and HU unit 7 with FZI range 0.084 - 0.076
- From the HU grouping, each unit gets the HU estimated permeability equation as follows: unit 1 = $11.425x^{0.7191}$, unit 2 = $9.484x^{0.951}$, unit 3 = $2.9991x^{0.9042}$, unit 4 = $1.2906x^{0.9509}$, unit 5 = $0.5264x^{0.9302}$, unit 6 = $0.1637x^{0.8078}$ and unit 7 = $0.0831x^{1.039}$.

The plot result between the estimated Hydraulic Flow Unit (HFU) permeability and the core permeability is the equation $y = 1.1746x$ with a value of $R^2 = 0.6569$.

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CHAPTER 16

Optimizing Job Commitment, Job Satisfaction toward Perceived Organizational Support and Work Life Balance of RCTI Employee Jakarta

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ABSTRACT

The purpose of this research is to determine the effect of perceived organizational support on job commitment and job satisfaction and its relationship to mediation through work life balance on RCTI employees in Jakarta. The unit of analysis used in this research is individuals who are employees of the RCTI television station in Jakarta. The time dimension used is cross sectional. The data collection technique used in this research is the non-probability sampling method. The data in this research was obtained through a questionnaire using 22 indicators which were distributed online to 117 respondents via Google Form. This research uses the structural equation modeling (SEM) analysis method as a statistical analysis tool for processing research data. The research data processing uses tools in the form of software, namely SPSS version 21 and AMOS version 22. The results of this research show that the influence of perceived organizational support on job commitment and job satisfaction has a positive effect on work life balance mediated by RCTI employees in Jakarta.

Keywords: Perceived organizational support, Work life balance, Job commitment, Job satisfaction.

1. INTRODUCTION

Recently, media industry has growing rapidly. It faces the technological shift to the era of digitalization and the arrival of the media convergence era. Thus, the convergence of television with digital media is also growing, which requires television to enter the age of television content free of schedule or post-network3 (Mulyadi, 2019). The history of television in Indonesia itself began in 1962, when the Television of the Republic of Indonesia (TVRI) began its first television broadcasting debut. The development of the television industry in Indonesia brings the opportunity of the presence of new television stations (Gultom, 2018). The government's decision to abolish the TVRI broadcasting monopoly set forth in Ministry of Enlightenment Decree No. 167B/MENPEN/1986 was a wise step because it was launched by the RCTI television station. Competition in industry media has recently emerged as a result of the emergence of alternative television channels, which give consumers more choice than previously. (Setio, 2004).

Employees have a strategic role within the company, the role of employees in planning and managing the company's activities required by the company to long-term goals (Pratiwi & Muzakki, 2021). In addition, the role of human resource management is to plan, develop and manage policies and programmes designed to make optimal use of employees. It includes managing employees in the workplace and the employee's relationship with the company to create a job satisfaction that is a psychological feeling that workers experienced at their work place. (Sunarta, 2019).

Employment satisfaction is the state that employee enjoys his job or a gets positive emotional feeling after he evaluated the job and its performance (De Simone et al., 2018). Whereas, the reality in the field employees experience fairly low of job satisfaction. In order to find out how satisfied employee with their jobs, JobStreet.com conducted a survey of 17,623 correspondents at the beginning of October 2023 based on the survey, as many as 73% of employees are dissatisfied with their jobs. This is in line with the phenomenon that occurs with RCTI Jakarta employees, reviews on the platform indeed indicate low employee satisfaction because we have to work when entering vacation, a lot of work to be completed and the length of working hours in the office. On the other hand, job satisfaction related with positive results in corporate business, including improving business profitability, corporate productivity and employee loyalty. (Chadi & Hetschko, 2018).

Apart from job satisfaction, achieving competitive advantage, company needs employees who have a high level of productivity and commitment at work (Chen, 2018), because someone with a positive attitude at work will impact on the company's success (Al Mehrzi & Singh, 2016). In terms of attitudes and behavior, highly committed employees are known to be quite involved (Sianipar & Haryanti, 2014). Employees who have a strong sense of loyalty to their superiors will be work better than expected in their work in the organization, and they will be more likely to stay in a company whose values and goals are aligned with their values and goals (Sianipar & Haryanti, 2014). Maintaining a healthy work-life balance is one of the things that keeps employees engaged and committed to their work (Badrianto & Ekhsan, 2021).

Flexible work schedule, good family allowance and other programs and efforts that help employee balancing their work and personal life is common in organization so the employee feels happy and committed to organizational goal (Agha et al, 2017). If employee succeed in

carrying out their professional and personal responsibilities, he will report to the higher level of satisfaction and involvement (Poulose and Sudarsan, 2014).

A company culture that does not support employee results in feelings of discomfort in the workplace because it creates fear of being dismissed or being misinterpreted as not contributing enough (Andra et al., 2022). Efforts to encourage work-life balance which helps foster flexibility in the workplace and reduce the prevalence of excessive inappropriate demands, relies on organizational support (Mazerolle et al., 2017). According to Hidayat & Fatimah (2019), when viewed from an employee's perspective, the perception of organizational support is the extent to which the company supports its employees and is willing to provide assistance when needed. The term perceived organizational support is described how employees feel about the company's dedication to their welfare, the company's concern for their social and emotional needs, and the resources provided to meet these needs (Linda & Fitria, 2016).

The results of previous research with this phenomena occurred in job satisfaction and commitment of RCTI Jakarta employees, make this research important to fill the gap in research. This research aims to analyze the influence of perceived organizational support on work life balance. The influence of work life balance on job commitment and job satisfaction. Also, the direct influence of perceived organizational support on job commitment and job satisfaction or through the mediation of work life balance. Thus, this research is entitled, "Optimizing Job Commitment, Job Satisfaction toward Perceived Organizational Support and Work Life Balance of RCTI Employee Jakarta".

2. LITERATURE REVIEW

Perceived organizational support is an important variable that is increasingly being considered in the business world, both in the manufacturing and service sectors (Beheshtifar & Hesani, 2013). The extent to which workers feel that their efforts and well-being are valued by their employers is a measure of perceived organizational support. The term perceived organizational support refers to how workers perceive their employers (Robbins & Judge, 2017). At the same time, work-life balance is described as a state of balance between employees' obligations outside of work, such as towards family, and the emotional, behavioral and time work (Haar & Brougham, 2022).

Referred to Aruldoss et al., (2021), one way to define work-life balance is by the ratio of an individual's working hours to his personal life hours. Having a healthy work-life balance involves more than just dividing your time between work and outside of work; it also involves a person's energy expenditure habits and the way a person uses their free time (Mishra & Bharti, 2023). Employee who feels emotionally invested in the work and the success of company is committed workers (Aruldoss et al, 2021). In other hand, work dedication is defined by Robbind and Judge (2017) as the feelings and aspirations of employee towards progress in a work. Moreover, Job commitment is defined by M0nika and Nurmaya (2021) as an attitude of loyalty to an employer's shown trough of the organization and the feeling of dislike to resign from job with various reason.

A person's emotional reaction to various parts of their work is what constitutes job satisfaction, according to (Bismala et al., 2020). Therefore, employee happiness is a measure

of how they feel about their work. Job satisfaction itself can be defined as the difference between something obtained and something expected by an employee. The lower the gap between the two, the more satisfied the individual will be with their job (Purwanto et al., 2021). Meanwhile, according to Sholikhah & Frianto (2022), job satisfaction refers to employees' perceptions and evaluations of work in relation to colleagues, the work environment, and awards received as a form of recognition for the efforts made.

3. METHODOLOGY

The study was prepared based on the results of previous research conducted by Aruldoss et al., (2021) entitled "The relationship between work-life balance and job satisfaction: moderating role of training and development and work environment". Our main purpose in conducting this research was to explore the hypothesis that there is a relationship between work-life balance as a mediator between perceived organizational support and work commitment and job satisfaction. Employees of the RCTI Jakarta television station were used as the research analysis unit. To answer the research question, the time dimension is cross-sectional, meaning that data is collected once within a certain period of time (Sekaran & Bougie, 2016).

This study has 4 (four) variables, namely perceived organizational support, work-life balance, job commitment and job satisfaction. The statement items on these variables were obtained from several previous research sources such as (Eisenberger et al., 1986); (Saks & Ashforth, 2002); (Schaufeli et al., 2002; Yen & Tsai, 2018). Using the following items of the Likert scale 1–5, the questionnaire is used to measure the indicators considered in this study:

1. Skala 1: Very Disagree (STS)
2. Skala 2: Disagree (TS)
3. Skala 3: Agree Enough (CS)
4. Skala 4: Agree (S)
5. Skala 5: Very Agree (SS)

This study used primary data collected by owned. 117 participants were surveyed online using Google Forms to provide the key data used in this study. This research data comes from a non-probability sampling technique, which means not all populations have the same chance of being selected. The data used as a sample is selected based on certain criteria, resulting in a targeted sampling strategy (Sugiyono, 2019). Participants in this study are only allowed to participate if they are current employees or former employees of RCTI television stations.

This study used a questionnaire to gather data distributed to respondents. This study used 22 indicators. Based on the theory of Hair et al (2010) that the size of a worthy sample in research ranges from 5 to 10 times the number of indicators of the statement. Since the number of indicators in this study is 22 (x5), the sample number to be collected is at least 110 respondents.

4. RESULT AND DISCUSSION

Descriptive statistical tests are performed to describe and describe data. The statistical descriptive tests in this study are reviewed on the basis of mean values and deviation standards. Average values (means) are the average of the respondent's answers, and the

standard deviation represents variations in the respondents' answers. (Sekaran & Bougie, 2016).

The results of the descriptive statistical test variable perceived organizational support, with an average (average) of 3.69, mean that the average respondent feels the support from the company to the employee is given well by the RCTI television station. This is proven from the average of the respondents that the company cares about the opinion of the employees, feels that the firm cares for the well-being of employees, feel the company considers the objectives and values of its employees, felt the company provides help when the employees are having a problem and felt the firm is willing to help the employees if the employees need certain help.

The results of the statistical analysis of the descriptive work-life balance variable, with an average (average) of 3.85, mean that the average respondent feels to have a balance in personal life and work life at the RCTI television station. This is demonstrated by average respondents who feel that they have enough time to spend with the family even though the employee is working in the company, feel that there is plenty of time to take care of children even though employees work in the enterprise, feel there is enough time for taking care of the dependents of the elderly even if employees are employed in the business, feel they do not miss important social events even though employee works in the corporation, feel like they can balance work and family with a good schedule even if the employees are working in a business and feel they have sufficient time to undertake a health check-up even though workers work in an enterprise. The results of the statistical test of the descriptive variable job commitment, with an average (average) score of 4.40, mean that the average respondent feels able to commit or have commitment to the company's RCTI television station where the employee works. The results of the statistical test of the descriptive variable job satisfaction, with an average (average) score of 4.13, mean that the average respondent is satisfied with their work at the RCTI television station. It is proven from the average of respondents feel satisfied by the employee's responsibilities in the company, feel happy with the work of employees in the enterprise, feel acknowledged for the job of employee in the corporation, feel achievement in the job in the firm and feel getting cooperation from other members or employees of the company.

After performing the goodness of fit test, it is known that the model used in this study is valid and can be submitted to the next stage of testing that is the testing of the hypothesis. The conclusion of the hypothesis test is done by comparing the p-value value with a significant level of 0.05 (the error level of $\alpha = 5\%$) and the confidence rate of 95%. The basis for the conclusion is as follows:

1. If p-value is less than 0.05, then H_0 is rejected and H_a is accepted, which means the hypothesis is supported.
2. If the p-valuation is greater than 0.05 then the H_0 is received and the H_a is refused, that means the hypothetic is not supported.

Here are the hypotheses from this study:

H1: *Perceived organizational support influences to work-life balance*

H2: *Work-life balance positively influences to job commitment*

H3: *Perceived organizational support has no influences to job commitment*

H4: *Perceived organizational support positively influences to job commitment which mediated by work-life balance*

H5: *Work-life balance influences to job satisfaction*

H6: *Perceived organizational support positively influences to job satisfaction*

H7: *Perceived organizational support positively influences to job satisfaction which mediated by work-life balance*

This study supports and consistent with previous studies such as those conducted by (Huda et al., 2023) or (Arman et al. 2022) where previous studies showed that there is a positive influence between perceived organizational support on job satisfaction through work-life balance.

5. CONCLUSION

Has been analyzed the perceived organizational support, the average employee agrees that organizational support for employees at the RCTI television station is very good. Then work-life balance, the average employee at the RCTI television station agrees that employees feel there is balance in their work life and outside of work. Apart from that, job commitment, the average employee at the RCTI television station strongly agrees that employees are responsible for the work they are given. Also, job satisfaction the average employee feels satisfied with their responsibilities in the organization and feels happy because they get recognition for their work in the organization.

There is a positive influence of work-life balance on employee job commitment at RCTI television station. then we found that there is no influence of perceived organizational support on employee job commitment at RCTI television station. There is a positive influence of perceived organizational support on job commitment which is mediated by employee work-life balance at the RCTI television station also positive influence of work-life balance on employee job satisfaction at RCTI television station, then there is a positive influence of perceived organizational support on employee job satisfaction at the RCTI television station. There is a positive influence of perceived organizational support on Job Satisfaction mediated by work life balance.

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CHAPTER 17

Accounting Information System and Employee Performance in Indonesian Banks

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ABSTRACT

The main goal of this research is to assess the impact of the internal control system (ICS) on the relationship between accounting information systems (AIS) and employee performance (EP) in Indonesian banks. The study targets employees of conventional banks in Indonesia, with a sample size of 131 respondents, which is about 70.22% of the total population of 133 participants from nine conventional bank branches. Data analysis shows a clear correlation between AIS components—information quality (IQ), system quality (SQ1), and service quality (SQ2)—and EP in these banks. Furthermore, the study finds a statistically significant relationship between AIS and EP, highlighting the strong connection between these variables. The contribution of this study lies in its exploration and empirical validation of the impact of internal control systems (ICS) on the relationship between accounting information systems (AIS) and employee performance (EP) in Indonesian banks. For bank management, the findings provide practical implications for improving employee performance by optimizing AIS and strengthening internal control systems.

Keywords: Accounting Information Systems, Employee Performance, Internal Control System, Information Quality (IQ), System Quality (SQ1), Service Quality (SQ2).

1. INTRODUCTION

Accounting Information Systems (AIS) play a crucial role in facilitating decision-making processes by overseeing, monitoring, and evaluating financial performance. With AIS in place, organizations are better equipped to provide timely information that aligns with the rapid changes in global market variables and economic conditions. Moreover, the use of AIS, including accounting software, reduces the time and effort required by financial analysts to stay abreast of developments and changes, enabling them to make informed decisions promptly.

In banking, every institution requires a robust Accounting Information System (AIS) to meticulously track incoming and outgoing funds, enabling them to achieve their objectives (Jarrah and Iskandar, 2019). AIS serves as an IT-driven solution that aids in controlling an organization's economic and financial operations. However, significant technological advancements have enabled businesses to strategically utilize AIS (Alnajjar, 2017). Decision-makers can leverage relevant information derived from AIS to inform strategic decisions and formulate strategies that enhance bank performance. Additionally, AIS is utilized within banks to process data, optimizing employee performance based on assigned roles and responsibilities (Nugroho, 2019).

Given that many banks adopt these systems to enhance efficiency and competitiveness, maintaining the qualitative attributes of AIS is paramount. Practical AIS implementations ensure operational and performance objectives are achieved (Hla and Teru, 2015). AIS also supports the administration and oversight of economic and financial matters within banks. Previously, AIS primarily focused on recording, summarizing, and validating commercial financial transaction data (Soudani, 2012).

The components of AIS, including IQ, SQ, and SQ, impact EP in Indonesian banks, with Internal Control Systems (ICS) playing a mediating role in this relationship. Modern ICS serve as crucial mechanisms for continuous monitoring, managing, verifying, and reviewing processes. AIS enhances ICS by generating timely accounting and financial reports, thereby enhancing the effectiveness and efficiency of internal control processes. Moreover, AIS serves as a vital tool for bank ICS to efficiently fulfill its duties and responsibilities, providing accounting information that aids in error detection and prevention.

AIS is commonly employed in banks to provide essential information for decision-making and support organizational and administrative coordination. Bani Ahmad's (2019) study underscores the significant positive impact of information quality and data relevance, which are critical factors driving the adoption of AIS in the banking sector. Moreover, maintaining effective ICS is essential for preserving the qualitative attributes of AIS (Albashesh et al., 2018). SIA, on the other hand, focuses on financial and non-financial data and information (Dandago and Rufai, 2014).

Furthermore, any bank's AIS must include mechanisms for tracking and managing data until users can produce accurate reports. Accountants play a crucial role in establishing and evaluating AIS controls and security standards (Jarrah and AL Jarrah, 2022). Effective internal controls within banks enable management to rely on accurate information for conducting business operations. Conversely, weak internal controls hinder banks from achieving their goals (Neogy, 2014). Therefore, appropriate ICS implementation is crucial to supporting effective AIS operations (Nugroho, 2019).

Research by Napitupulu (2020) indicates that managerial competence significantly influences the quality of financial reporting and internal controls in banks. Susanto (2016) highlights the substantial impact of internal controls on financial reporting. Maharani and Damayanthi's (2020) findings underscore how internal controls and organizational culture influence AIS and earnings quality (EP). Organizational culture's impact on EP is significant, while business culture also plays a crucial role in enhancing internal controls. Bramasto and Adiwiguna (2020) found that while the adoption of accounting systems slightly impacts EP, internal controls significantly contribute to enhancing EP.

Alnajjar's (2017) research emphasizes that top management support and accounting managers' understanding significantly impact the quality of financial reporting in organizations. Alzoubi (2011) found that integrating AIS into Enterprise Resource Planning (ERP) systems improves internal controls and accounting outputs. SQ, IQ, and SQ are crucial factors in AIS success in improving organizational performance, as noted by Ali et al. (2016). Syah et al. (2019) affirm that AIS implementation positively impacts EP. Additionally, Olufunmilayo and Hannah (2018) assert that ICS significantly influence EP in small manufacturing businesses.

2. LITERATURE REVIEW

2.1. The theory of planned behavior

The TPB posits that a person's intention to engage in a behavior is the immediate determinant of volitional behavior. Attitudes and subjective norms are theorized to influence behavior through intentions. Attitude represents an individual's overall affective and instrumental evaluation of behavior. Subjective norms gauge social pressures influencing whether individuals perform or abstain from behaviors. Additionally, the TPB extends its predictive power to behaviors not entirely under volitional control by incorporating perceived control over behavior as an additional predictor of intention and subsequent behavior (Darsono et al., 2020).

2.2. Information Quality (IQ)

Information Quality (IQ) pertains to the excellence of output generated by an AIS, crucial for banks aiming to enhance performance, gain competitive advantage, or thrive in the contemporary business landscape (Ali et al., 2016). IQ refers to the system's capability to furnish users with timely, accurate, precise, and comprehensive data essential for effective decision-making (Jarrah et al., 2023). The dimensions used in measuring information quality, as outlined by Setyo and Rahmawati (2015), include relevance, timeliness, accuracy, completeness, and conciseness. Thus, to address this research issue, the hypothesis proposed is:

H1: Information Quality (IQ) significantly impacts Employee Performance (EP).

2.3. System Quality (SQ1)

System Quality (SQ) evaluates the technical excellence of a system, encompassing overall AIS processing quality involving software and data components. SQ correlates with system reliability, user interface consistency, and usability (Gorla et al., 2010). It has the

potential to affect usage patterns, user satisfaction, individual performance, and overall bank performance (Ali et al., 2016). SQ assesses the technical efficiency of the system, including aspects like user interface consistency, ease of use, absence of programming errors, and the maintenance and support provided by the bank's IT department, all contributing to enhanced system operational efficiency and effectiveness (Jarrah et al., 2023). Therefore, to address this research inquiry, the hypothesis proposed is:

H2: System Quality (SQ1) significantly influences Employee Performance (EP).

2.4. Service Quality (SQ2)

From a service quality perspective, organizations aim to deliver high-quality service to customers, employing various processes to achieve this goal. This concept extends to information systems (IS), which function as service providers in meeting an organization's information needs (Bani Ahmad, 2019). Service quality is assessed by comparing perceived service with actual service received (Bani Ahmad, 2019). Zeithaml (2000) identifies key factors influencing expected service, including past experiences, personal needs, word-of-mouth communication, and interactions between service providers and users. System quality, information quality, service quality, and user satisfaction significantly influence the evaluation of information system success factors. Service quality in AIS delivery to the banking industry is comprehensively measured through reliability, responsiveness, dependability, usability, enhanced customer attention, and improved relationships (Masili, Lumnauw, & Tielung, 2022). Therefore, to address this research problem, the hypothesis proposed is:

H3: Service Quality (SQ2) significantly affects Employee Performance (EP).

2.5. Accounting Information System (AIS)

An Accounting Information System (AIS) is an information system that transforms business transaction data into valuable information for its users. Typically focused on financial data, AIS generates financial information crucial for decision-making within organizations. AIS functions as a subsystem of the management information system, tasked with collecting, recording, storing, and processing data in routine accounting transactions to produce relevant accounting and financial information for management (Nugroho, 2019). Key indicators used to measure AIS effectiveness include data collection, data processing, data control and security, data management, and information provision (Wijaya and Priono, 2022). Therefore, to address this research problem, the hypothesis proposed is:

H4: The Accounting Information System (AIS) significantly impacts Employee Performance (EP).

2.6. Employee Performance (EP)

A quality workforce is essential for achieving organizational goals effectively. Employees, with their talents, energy, and creativity, are crucial resources that drive a company's success. However, they also have diverse needs that motivate their actions, including their work performance (Taradipa, 2017). Employee performance is vital for

organizational success, as it can elevate a small, unknown business to a leading position in its industry (Olufunmilayo and Hannah, 2018). Employees are integral to an organization, adding value to its systems and often determining its profitability. Their performance serves as a critical indicator for organizational achievement (Aboazoum, Nimram, & Musadieq, 2015). Organizations actively seek to attract, retain, and utilize competent employees to gain a competitive edge. Various indicators gauge employee performance, including the quality of work, quantity, timeliness, effectiveness, and independence (Safitri, 2022).

3. RESEARCH METHOD

3.1. Study Population

The study involved employees currently working in Indonesian conventional banks, with a sample size of 133 respondents selected from a total population of 150 employees across various branches of Indonesian conventional banks. Data collection was conducted through a questionnaire distributed using a simple random sampling method, employing a quantitative research approach. The collected data was analyzed using SPSS version 26.

Table 1. Respondent profile

Information	
Gender	Male
	Female
Qualification	Senior High School
	D3 (Associate)
	S1 (Bachelor)
Experience	Less than 5 years
	From 6 years to less than 10 years
	From 11 years to less than 15 years

Processed data, 2023

Based on the literature review above, the researcher developed a research model as shown in Figure 1.

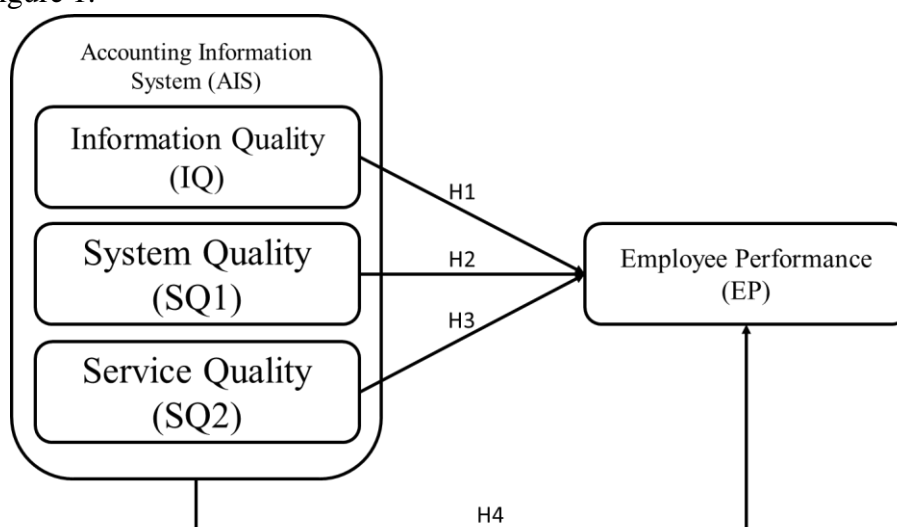


Figure 1. Research model

4. RESULT AND DISCUSSION

4.1. Normality test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		133
Normal Parameters ^{a,b}	Mean	.000000
	Std. Deviation	1.55774957
Most Extreme Differences	Absolute	.127
	Positive	.122
	Negative	-.127
Test Statistic		.127
Asymp. Sig. (2-tailed)		.088 ^c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d.

Based on the Kolmogorov-Smirnov test, it is known that the value of asym. Sig. (2-tailed) of $0.088 > 0.05$. So, it can be concluded that the data is normally distributed.

4.2. Multicollinearity Test

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	6.058	1.776		3.412	0.001		
	X1	0.177	0.077	0.165	2.299	0.023	0.881	1.135
	X2	0.414	0.097	0.317	4.284	0.000	0.826	1.210
	X3	0.176	0.088	0.171	2.009	0.046	0.621	1.610
	X4	0.201	0.076	0.212	2.629	0.010	0.691	1.446

a. Dependent Variable: Y

Based on the results of the multicollinearity test, it is known that the Tolerance value for each independent variable is >0.01 . Meanwhile, the VIF value for each independent variable is <10 . So, it can be concluded that the data does not experience symptoms of multicollinearity.

4.3. Heteroscedasticity Test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.804	1.626		1.109	.269
	x1	.047	.049	.099	.955	.342
	x2	.167	.052	.293	3.190	.072
	x3	.055	.048	.115	1.147	.254
	x4	-.156	.045	-.366	-3.442	.121

a. Dependent Variable: Y

Based on the results of the heteroscedasticity test, it is known that the Gejser test results produce a value of Sig. $0.342 > 0.05$ for the Information Quality variable (X1), Sig. $0.072 > 0.05$ for the Quality System variable (X2), Sig. $0.254 > 0.05$ for the Service Quality variable

(X3), and Sig. $0.121 > 0.05$ for the Accounting Information System (X4) variable. So, it can be concluded that the data is distributed randomly and is not homogeneous.

4.4. F Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	182.786	4	45.696	12.646	.000 ^b
	Residual	462.523	128	3.613		
	Total	645.308	132			

a. Dependent Variable: y

b. Predictors: (Constant), x4, x2, x3, x1

Based on the results of the F test, it is known that the F Statistics value is 12,646 with a significance of $0.000 < 0.05$. Based on this, it can be concluded that the independent variables together have a significant effect on the dependent variable.

4.5. T Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.196	2.978		1.073	.285
	x1	.299	.090	.322	3.341	.001
	x2	.148	.096	.132	1.549	.124
	x3	.331	.087	.351	3.782	.001
	x4	-.116	.083	-.138	-1.400	.024

a. Dependent Variable: y

Based on the results of the T test, it can be concluded the following:

- Independent variable Information Quality (X1) with Unstandardize B 0.299 and Sig. $0.001 < 0.05$ means that the independent variable Information Quality (X1) has a positive and significant effect on the dependent variable Employee Performance (Y). So, when If there is a 1 point increase in the Information Quality variable (X1), then the Employee Performance variable (Y) will increase by 0.299 points.
- Quality System Independent Variable (X2) with Unstandardize B 0.148 and Sig. $0.124 > 0.05$ can be interpreted as meaning that the independent variable Quality System (X2) does not have a positive and significant effect on the dependent variable Employee Performance (Y). So, when there is an increase of 1 point in the Quality System variable (X2), the Employee Performance variable (Y) will increase by 0.148 points.
- Independent Variable Service Quality (X3) with Unstandardize B 0.331 and Sig. $0.001 < 0.05$ means that the independent variable Service Quality (X3) has a positive and significant effect on the dependent variable Employee Performance (Y). So, when there is a 1 point increase in the Service Quality variable (X3), the Employee Performance variable (Y) will increase by 0.331 points.
- Independent Variable Accounting Information System (X4) with Unstandardize B -0.116 and Sig. $0.024 < 0.05$ means that the independent variable Accounting Information System (X4) has a negative and significant effect on the dependent variable Employee Performance (Y). So, when there is a 1 point decrease in the Accounting Information

System (X4) variable, the Employee Performance (Y) variable will decrease by 0.116 points.

4.6. Coefficient of Determination Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.532 ^a	.783	.261	1.90091

a. Predictors: (Constant), x4, x2, x3, x1

Based on the Coefficient of Determination test, it is known that the Adjusted R-Square value is 0.783. This indicates that the dependent variable Employee Performance (Y) can be explained by the independent variables Information Quality (X1), Quality System (X2), Service Quality (X3), and Accounting Information System (X4) amounting to 78.3%. Meanwhile, the remaining 21.7% is explained by other variables outside this research.

The use of Accounting Information Systems (AIS) in the banking sector is widespread and significantly influences decision-making while facilitating organizational coordination and management. According to Bani Ahmad's (2022) study, AIS's primary advantage lies in its ability to provide high-quality information and data, which is pivotal in its adoption across the banking industry. AIS focuses on both financial and non-financial information, necessitating meticulous data tracking and management to ensure accurate reporting by users. Therefore, with a robust internal control system in place, bank management can confidently rely on this information for accurate business operations. Conversely, weak internal controls can hinder management from achieving its objectives (Neogy, 2014).

Alzoubi's (2011) research highlighted that integrating AIS into Enterprise Resource Planning (ERP) systems improved internal control and accounting performance within organizations. Ali et al. (2016) emphasized that System Quality (SQ), Information Quality (IQ), and Service Quality (SQ) are critical factors in AIS's success in enhancing organizational performance. Jarah et al. (2022b) found a significant statistical correlation between internal auditing and supply chain management. Ladan Shagari et al. (2017) also demonstrated that the quality of information and systems significantly impacts AIS effectiveness. Additionally, Syah et al. (2019) concluded that implementing AIS positively and significantly affects Employee Performance (EP).

5. CONCLUSION AND FURTHER SUGGESTIONS

The primary aim of this research is to explore the correlation between Accounting Information Systems (AIS) and Corporate Performance (CP) in conventional banks in Indonesia. This study focuses on how AIS contributes to enhancing Employee Performance (EP) in banks, particularly through improved internal control and decision-making capabilities facilitated by AIS.

The findings of this research indicate that AIS positively impacts EP by enabling managers to gather and leverage accounting information for better insights into bank performance. These results have implications for the advancement of Accounting Information Systems in conventional Indonesian banks. The study recommends that banks prioritize the

adoption and enhancement of AIS to bolster their operational efficiency. It demonstrates that AIS can significantly boost EP by enhancing Information Quality, System Quality, and Service Quality.

This research contributes new insights into the relationship between AIS and EP while offering practical recommendations for the development of AIS in conventional banks in Indonesia. Implementing robust monitoring and control measures during AIS system development and deployment is crucial for its effective operation.

Collaborative efforts among banks are essential to design systems that meet control and security requirements, ensuring positive impacts on data integrity and security. Adequate resources and expertise must support AIS implementation to ensure its efficient operation, providing accurate, reliable, and secure data while safeguarding data confidentiality, validity, and availability.

Despite its significant contributions, this study acknowledges limitations that could affect result validity. Future research should encompass a broader range of banks to ensure a balanced implementation of the AIS model in Indonesian conventional banks. With a current focus on 133 respondents, there is potential for enhanced data accuracy through larger sample sizes in future studies. Exploring other aspects of IS audit, such as dependency, relevance, and verification, could provide a more comprehensive understanding.

Future studies might employ additional statistical techniques or investigate non-linear correlations to uncover deeper insights into the AIS-EP relationship. Validating the study's recommendation for banks to engage in environmentally beneficial activities could further enhance understanding of AIS implementation in traditional Indonesian banks. Addressing study limitations is crucial for interpreting results, and future research should strive to mitigate these limitations to yield more comprehensive and reliable findings.

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CHAPTER 18

Muslim Customer's Intention to Invest in Product Banking Shariah In Muslim Majority Country

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ABSTRACT

Products in Islamic banking in Indonesia are no less interesting than conventional bank products, great potential with the large majority of the Muslim population in Indonesia, can make Islamic banks normally develop better. The purpose of this study is to examine the product knowledge (PK) that exists in Islamic bank products that will affect the perceived Quality (PQ) that will be felt, the Perceived Risk (PR) that is received, and the Perceived Value (PV) that will be felt when the consumer is invest in Islamic bank products, and generate trust (TR) in the future. The sampling technique was purposive inclusive criteria, questionnaires were given to 180 questionnaires, hypothesis testing was carried out using ANOVA. The results in this study indicate that the influence of PW, PR and PV from PK on IPB so that it can cause a good TR is indeed in line with previous research, that Islamic bank products when compared with conventional banks are no less interesting, it's just that the development of Islamic banking in the next next step must be improved, because when viewed from the characteristics of the questionnaires, the number of conventional bank users is more than Islamic banks.

Keywords: Product Knowledge (PK), Perceived Quality (PQ), Perceived Risk (PR), Perceived Value (PV), Invest Product Banking (IPB), Trust (TR).

1. INTRODUCTION

The dependence on bank services is very difficult to avoid in our daily lives practices when people are living in this modern era. Without banks, it could be imagined how difficult it is to save and transfer money, get additional business capital or conduct trade transactions between countries effectively and safely. On the other hand, usury and the controversy about bank interest, make people need a solution. The solution that has been present in this case is the establishment of Islamic banks. The emergence of Islamic is a response to the anxiety of the Islamic community in Indonesia about economic traffic that is worldly-life oriented. (Sintang, 2018)

In general, a bank is an institution that carries out three main functions, including accepting deposits, lending money, and providing remittance services. Not only as a distributor of funds, but the function of the bank is also as an institution that collects funds from the public, where the collection of these funds can be in the form of demand deposits, savings or time deposits. The practices such as accepting deposited property, lending money for consumption and business purposes as well as making money transfers have been common since the period of Prophet Muhammad. Thus, the main function of modern banking is to accept deposits, channel funds and make transfers and has become an inseparable part of the lives of Muslims even since the period of Prophet Muhammad (Haron and Ahmad, 2000).

The SGIE Report as a global Islamic economic report is annually released by DinarStandard, which is an international study institution that focuses on the global Islamic economy. Included in the SGIE report, the halal product trade and industry sector. The GIEI ranking covers sharia finance, halal food/drinks, modest fashion, pharmaceuticals and cosmetics, Muslim-friendly tourism, media and recreation. Indonesia managed to enter the top three in the Global Islamic Economy Indicator (GIEI) in the State of the Global Islamic Economy (SGIE) Report 2023 released by DinarStandard, Indonesia, which was in fourth place in 2022, is now in third place, behind Malaysia and Saudi Arabia. Currently, Indonesia is ranked sixth in the sharia finance category in the world, where previously it was ranked seventh. This shows that the development of sharia finance in Indonesia has not developed compared to Malaysia and other countries.

In the economy sector of a country, especially Indonesia, the bank is a wheel of economic cycle that has a very important role in meeting economic needs. This is because banks are the beginning of the forum in providing funding for economic development and development activities. One of the alternative investments in Islamic banking products is with third party products or better known as Third Party Funds (DPK), credit and other existing investment products in banking (Haron & Ahmad, 2000). One of the interests of customers to invest in Islamic banking products is for example a fixed interest when investing long-term such as deposits.

In Indonesia, Islamic banks have developed rapidly and more banks are offering sharia products, especially after the enactment of the Sharia Banking Law Number 21 of 2008 by the Indonesian House of Representatives. This is certainly not only seen from the aspect of legal certainty and the existence of Islamic banking in a formal legal manner, but will also increase the stretching of the Islamic banking industry in general. By definition, Islamic economy means an economy based on Islamic sharia principles. Based on Islamic sharia

principles, the meaning is that the business activities carried out do not contain elements of usury, gharar, maisir, use objects that are haram and can lead to a form of tyranny. Sharia means according to Islamic teachings. For this reason, Islamic economic principles are based on the values of justice, usefulness, balance, and universality. One of the economic principles in Islam that Islamic banking continues to promote is the prohibition of usury in various forms and the use of profit-sharing principles. (Hamzah, et al 2014)

The emergence of Islamic banks is expected to be able to answer and respond so that the economic traffic of the Islamic community in Indonesia (which in fact the people in Indonesia are Muslim) brings benefits for economic improvement and equitable distribution of people's welfare, but in society there are still opinions that often state that Islamic banks in practice it is the same as conventional banks, the only difference being in terms is that in essence they both contain usury. The use of the term profit sharing, by some parties, is still considered no different from interest. For example, when a person gets a loan from an Islamic bank, nothing has been determined that the results will have to be that much. So later for the results have also been determined what percentage of the results. The reason is also very classic, it is too difficult to be able to calculate the results of a business every month. So, because it is difficult to calculate it, it has been confirmed from the start on a flat basis, so it won't be a hassle. However, this flat determination still has provisions and references, it is interest rates. Usually, the argument for promulgation in practice is that it still needs a long process to complete the application of Islamic value in Islamic banking. So even though it is not fully in line with Islamic value, it must still be supported. If it is not Moslem who support Islamic banks, then who else are expected to support them (Hossain, 2009)

Similar to conventional banks, Islamic banks rely on depositors' money as the main source of funds (Haron and Ahmad, 2000), the source of fund received by the banks will be used for business cycle in the form credit to society, but the concept of interest or fee burdened by money lender to the borrower is prohibited in Islam (Haron and Ahmad 2000). According to Islam, if a Muslim wants to use his money to make more money, then he must dare to take risks and only Allah SWT knows what the future will be, therefore Islamic bank customers especially who invest their money in the long term must be able to accept the risks that will be obtained in the investment.

In the investment in Islamic banking, for example through mudarabah, murabahah and others, depositors are known as brabbul mal, it is those who seek investment opportunities that will innovate through banks (Hamzah, et al 2014). As a substitute for interest, Islamic banks stipulate profit sharing, the profit-sharing system is the most ideal system that is fully in line with the principles of Islamic law in terms of the concept of risk which is referred to as "al-ghum bil ghrum" which means that a person has the right to benefit if he agrees with the concept of profit sharing, results and dare to take responsibility for these losses (Hossain, 2009). Profits are divided based on the risk that has been determined in Islamic banking, for example (40:60), (30:70), based on the Bank's performance (Hamzah, 2014), but the profit-sharing contract basically gives more privileges to customers, because the bank must bear the operational costs for the investment.

2. LITERATURE REVIEW

2.1. Muslim Consumer Behavior in Indonesia

Indonesia is a Muslim-majority country with the largest Muslim population in the world as many as 86.9%. (dataindonesia.id, 2022). Based on existing data, it cannot affect good growth for Islamic banking in Indonesia which is tailored to the needs Muslim customers (Pramono, 2018). The market share for Islamic banking in Indonesia is 6.65% as of February 2022, and has increased in 2019 by 5% (OJK Statistics, 2022). In addition to having a lower market share than conventional banks, this research focused more on the lack of knowledge and information about Islamic banking products to the Indonesian people who are predominantly Muslim. Thus, this research aimed to test the knowledge of Islamic banking products in the community against the customer's desire to save and invest in and believe in Islamic banking.

2.2. Trust in Islamic Banking in Indonesia

The characteristics of customers towards trust are a paradigm that characterizes the benefits and minimization of risk that will be accepted by the customer (Boonlertvanich, 2019). Trust will involve customers by having a sense of dependence on services and involving comfort that will be received by customers. Besides, that trust is also interpreted as a belief that the services and promises that will be received from sharia banking service providers can be relied on by customers, and banking service providers will be committed to fulfilling customer needs (Sumaedi et al., 2015). In Islamic banking, trust means that customers believe that the bank will run its business in accordance with what its customers will predict, the level of customer confidence is reflected in that Islamic banks will perform according to the needs of customers (Sumaedi et al., 2015). In this research, trust in Islamic banks was about banking transactions carried out based on Islamic values, banks fulfill obligations to customers according to Islamic values, and Islamic banking services with compliance systems in accordance with Islamic values.

2.3. Deposits in Islamic Banks

In Islamic finance, interest rates are considered *gharar* and usury which is prohibited in every economic transaction. *Gharar* or fraud is a fraud that interprets the quality, price and type of product (Warde, 2000). Interest can be interpreted as the act of charging rent for the use of money, interest rates are basically prohibited in Islamic finance. Islam forbids interest rates, because their use will hinder the achievement of *Maqasid al-Sharia*. *Maqasid al-Shariah* is to have a higher goal than Islamic law to maintain the faith (*din*), self (*nafs*), reason (*aql*), offspring (*nasl*) and wealth (*mal*) of Muslims to realize prosperity (*falah*) and a life that is full of good life (*hayat tayyibah*) (Meera and Larbani, 2006). *Maqashid al-Shariah* reflects the Islamic view to facilitate a normal life that has to increase public problems (*maslaha*) and avoid harmful actions ("Maqashid al-Shari'ah", 2020).

2.4. Product Knowledge

Knowledge of Islamic bank products is very important for customers. By knowing Islamic banking products, customers can find out the right product to be used to invest in Islamic banks. Besides, that reputation and image in Islamic banks are one of the factors for customers to determine which Islamic bank will be used to invest (Haron et al., 1994). The

lack of knowledge about Islamic banking products does not only occur in Malaysia, but Indonesia also has limited information in knowing Islamic bank products (Ahmad and Haron, 2002). Unclear information obtained by customers usually affects a person's interest in investing in Islamic banks, even consumers do not really know the philosophy of Islamic banks, most of them only know about interest prohibited in Islam, while they still do not understand about *mudharabah*, *ijarah*, *istisna*, and others (Ahmad and Haron, 2002). Products knowledge in Islamic banks is very important for customers, whether individual or corporate, the perceived quality of Islamic bank products, the risks to be accepted, and the value to be obtained are some of the variables that influence customers to be able to believe in investing in Islamic Banks. Trust was the end of the results in this research. Trust was obtained by the way customers feel satisfied with the product to be used that suits their needs. The information obtained about Islamic bank products was the initial key for customers to find out what investment to use that suited their needs by way of perceived product quality, risks to be accepted, and value to be enjoyed which later led to trust in being able to use the Islamic Bank products, and it is conceptualized in the Conceptual Framework.

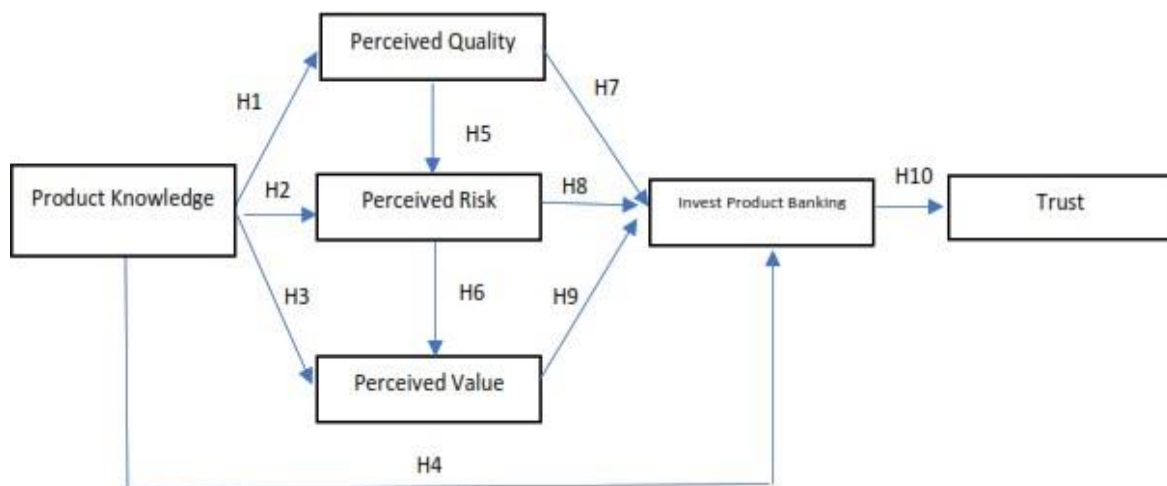


Figure 1. Conceptual model knowledge of product

Knowledge of Islamic Bank products has some conventional literature, it is information obtained through good experience from someone regarding Islamic Bank products and expertise which reflects the ability of consumers to perform effectively related to their desire to invest in Islamic Banks (Alba and Hutchinson, 1987). Knowledge of Islamic Bank products can be categorized into objective and subjective knowledge. Objective knowledge includes information obtained about Islamic Bank product information will be stored in the memory of consumers, while subjective consumers feel that they already know and understand Islamic Bank products (Rao and Monroe, 1988). Consumer perceptions of product quality are influenced by consumer knowledge, as well as the educational background of customers will affect the way consumers perceive the quality of Islamic Bank products (Eisingerich and Bell, 2008). Thus, Muslim and non-Muslim customers have the same perception in choosing bank services in terms of quality and service of Islamic Bank Products by testing hypotheses.

H1: Product knowledge has a positive impact on perceived quality

Product characteristics can be seen from visible and invisible things. Decision making in the selection of Islamic Bank Product can be seen by comparing the expected value with the risk that will be obtained (Wang and Hazen, 2016). The risk obtained by customers in Islamic bank products cannot be seen physically, and it can lead to speculation to customers that the product is risky (Laroche et al., 2003). The feelings that customers get occur because of the unavailability of physical cues from an Islamic bank product. and can have an impact on customers feeling afraid of losses due to the use of an Islamic bank product (Aghekyan-Simonian et al., 2012). Companies that are able to provide important information about good products and services to customers, and can explain well to customers will reduce customer uncertainty about certain products in Islamic banks (Eisingerich and Bell, 2008).

In the context of Islamic banks, knowledge of bank products is very important, because conventional bank products and Islamic banks have some basic differences, customers need to know that in Islam the benefit of society is prioritized, therefore interest rates are prohibited because they only benefit one party, other profit-sharing schemes are prohibited. offered can be considered in the selection of Islamic bank products (Hilman, 2016). An explanation of Islamic bank products regarding detailed information about these products is very important in addition to the risks that will be accepted by customers.

H2: Knowledge of the product has a negative impact with the risks that will be obtained

Product value refers to the consumer's overall assessment of product and services usefulness received by the customer, based on perceptions of what is received and what is provided by the bank (Zeithaml, 1988). Previous research explained that the existence of Islamic banks in regions and in urban areas generally customers have less awareness of the existence of Islamic banks. Besides, they do not know and are not aware of Islamic bank products, their advantages and differences with conventional banks (Thambiah et al., 2010). Related to this, this research examined the

H3: product knowledge has a positive impact on perceived value

There were many previous studies explained that the effect of product knowledge on a person's purchase intention was influenced by the various product variants offered (Bamber et al., 2012). Strategies that were owned by several Islamic banks such as targeting emotionally attractive market shares such as promotional programs for school-age children and adolescents, providing emotionally attractive advertisements, providing education about Islamic banking and finance education and personal selling in this tactical field could increase the penetration of Islamic bank consumers (Setyobudi et al., 2015). In addition, previous studies explained that customers who had good knowledge of banking products would understand and appreciate new products more quickly which would have an impact on increasing purchases, because they had wider information than novice customers (Wang et al., 2008). Because of that,

H4: product knowledge has a positive impact on intention to invest

Perceived Quality and perceived Risk

Perceived quality and perceived risk had a strong relationship, such as service quality could

contribute to reduce the risk perceived by consumers, for example in the context of conveying information about product and service quality to customers before or after the customer becomes a customer of a sharia bank (Snoj et al., 2004). In banking, financial risk is the main risk that is the focus of consumers because the products offered by banks are financial products (Chen and Chang, 2005) such as savings, deposits, demand deposits, credit, and other investments. Research (Snoj, 2004) explained that the quality perceived by customers had a weaker impact than the perceived risk, thus the following hypothesis was formulated:

H5: perceived quality has a negative impact on perceived risk

Perceived Risk and Perceived Value

Islam has its own legal principles in relation to the concept of risk. The Arabic expression “al-ghunm bil ghurm” means “a person is entitled to an advantage if he agrees to assume responsibility for the loss” (Hossain, 2009). Risk sharing in Islamic banks through an implication of the principle and cooperation with profit sharing in the Islamic banking system between fund providers and users (Ahmad, 2016). In previous research, perceived risk had a negative influence on perceived value, based on the above discussion, the formulation of the hypothesis was as follows:

H6: Perceived risk has a negative impact on perceived value.

Perceived Quality and Intention

The perceived quality in the service industry is known as service quality (Ali et al., 2013), which is like quality that describes the performance of services that will be received by customers and provided by the company, including in the context of Islamic banking. This research found that service quality was directly influenced by customer perception by knowing the level of performance of the bank. In the context of Islamic financial products studying the relationship between religiosity, buying attitude and purchase intention, customers were shown to be interested in product quality as seen from the quality of service received (Newaz et al., 2016).

H7: Perceived quality has a positive impact on intentions to invest in Islamic banks.

Perceived Risk and Intention

Investing is one type of behavioral intention to purchase Islamic bank products, consumers expect to get positive consequences from a product so they can feel satisfied, but consumers get negative potential from investing in purchasing Islamic bank products (Croy et al., 2010). Previous research found that consumers had the intention to save more and think they had less risk, consumers who had more than enough assets would think about investing in Islamic bank products, and this research found there was a positive relationship between risk taking and income at every consumer, thus the hypothesis could be formulated

H8: Perceived risk has a negative impact on customer intentions to invest in Islamic banks.

Perceived Value and Intention

Perceived value refers to the consumer's evaluation of the quality received, the value

received by the bank can be a determinant of one of the bank's strategies to be even better (Roig et al., 2006). The value felt by consumers of Islamic bank product could have a positive impact if the consumer was satisfied, so that the desire to buy services for Islamic bank products was higher (Kuo et al., 2009). Thus, the hypothesis could be formulated
H9: The perceived value by consumers has a positive impact on customer intentions to invest in Islamic banks.

Intention and Trust

The interest of consumers by feeling the quality of Islamic bank products, the risk that can be minimized, and the value obtained will create consumers to be interested and have a desire to invest in Islamic bank products, from this it can lead to trust that will be gained by consumers in investing and transacting using Islamic banks. In addition to being based on Islamic law that passes in transactions, Islamic banks also prioritize problems for the community (Osman and Santosa, 2013). From this, the hypothesis could be formulated

H10: Investing in Islamic bank products has a positive impact on the trust that will be received by customers.

3. DATA AND METHODOLOGY

3.1. Procedure and Sample

Statistical Method

This research used The Statistical Package for the Social Sciences (SPSS) version 20 and Lisrel version 8.80 for research purpose. The analysis process was implemented as follow: Step 1, testing the convergent validity of the model. According to Hair et al. (2018), Cronbach Alpha, factor loadings, composite reliability are the most common approaches. Step 2, testing the structural model dan hypotheses. In order to conduct the analysis, the authors used the goodness of fit model and Factor Analysis hypotheses with ANOVA.

Data analysis

In this research, the data were collected up to 180 questionnaires. After testing the validity and reliability of 121 questionnaires that could be used to be able to continue the analysis, this research was distributed in Jakarta, through the google form used to find out how many bank consumers in Jakarta could fill out the questionnaire. This questionnaire used a Likerts scale with information in the statement ranking 1 = strongly disagree and 5 = strongly agree. Table 1 was a summary of some questionnaires characteristics that were distributed. It could be clearly seen that in Jakarta, with the majority having a monthly income of Rp.11-50 million in this research, it had the highest position with a percentage of 52.1%, with the use of conventional banks also being the most dominant with a percentage of 46.3%, Bank Mix (Conventional and Islamic Banks) as much as 39.7%, and the lowest Islamic bank 17%, this was real evidence that the existence of Islamic banks did not affect people who in fact in Jakarta were Muslims who were less interested in the existence of Islamic banks.

Table 1. Sample characteristic (N = 121)

Profile	Frequency	%	Profile	Frequency	%
Gender			Marital status		
Male	56	46.3	Single	21	17.4
Female	65	53.7	Married	100	82.6
Academic Qualification			Using Bank		
Doctor	3	2.5	Bank Konvensional	56	46.3
Master degree	25	20.7	Bank Syariah	17	14.0
Bachelor degree	82	67.8	Mix (Bank Syariah & Bank Konvensional)	48	39.7
Diploma	11	9.1			
Monthly income					
Less than Rp 10 million	57	47.1			
Rp 11-50 million	63	52.1			
More than Rp51 million	1	0.8			

Authors' own research

Measure

The five factors examined in this research were product knowledge, perceived quality, perceived risk, perceived value, invest to produk bank, and trust. The scale of this research was similar to the scales and theories used in many previous studies. The questionnaire structure was formulated considering items taken from different literature sources. Product knowledge was measured by four sevens from (Nepomuceno et al., 2014b), perceived quality was measured by three from (Wang, 2017), perceived risk was measured by threes from (Agarwal and Teas, 2001), perceived value was measured by threes from (Roig et al., 2006), Intention to Invest in Islamic Bank products was measured by fives from (Amin et al., 2011) and trust was measured by six from (Gilbert and Carol, 2014).

4. RESULT AND DISCUSSION

Measurement model

First, reliability and convergent validity of the measurement model were tested. According to Hair et al. (2018), Cronbach Alpha, factor loadings, and composite reliability (CR) were the most common approaches. Additionally, Hair et al. (2018) indicated that items having a low Cronbach alpha ≤ 0.60 and a factor loading < 0.40 had to be eliminated. As shows in Table 2, the coefficient of Cronbach alpha and all item loadings achieve the expected results. Validity and reliability tests had been carried out. From the results Table 2 of the reliability test, it was known that all variable had a Cronbach's alpha value of more than 0.6. while the validity test was carried out by looking of the factor loading value of more than 0.5. Based on this, it could be concluded that all indicators used to measure variable in this research had good reliability and validity.

Table 2. Sample characteristic (N = 121)

Constructs	Cenvergency	Reliability
	Validity	Cronbach's
	Factor	Alpha
	Loading	
Product Knowledge - PK (Nepomuceno et al., 2014b)		<i>0.909</i>
– I have knowledge of Islamic bank products	<i>0.880</i>	
– I have good information and experience regarding Islamic bank products	<i>0.881</i>	
– I do not have good information and experience about Islamic bank products	<i>0.922</i>	
– In general, I have good knowledge about Islamic banking products	<i>0.885</i>	
– I get good information about Islamic bank products, if I visit Islam Banks	<i>0.922</i>	
– Compared to friends and acquaintances, I have more knowledge about Islamic bank products	<i>0.889</i>	
– Compared to other bank customers, I have good knowledge about Islamic bank products.	<i>0.888</i>	
Perceived quality - PQ (Wang, 2017)		<i>0.926</i>
– Islamic bank products are superior to other investment products.	<i>0.926</i>	
– Islamic banks offer very attractive products with superior features.	<i>0.864</i>	
The superior quality of Islamic bank products is very good.	<i>0.889</i>	
Perceived risk - PR (Agarwal and Teas, 2001)		<i>0.734</i>
– Investment considerations in Islamic bank products that have no risk is something that must be considered.	<i>0.834</i>	
– Islamic Bank products have a high risk in the investment.	<i>0.524</i>	
Investment in the Islamic bank products has very high risk.	<i>0.556</i>	
Perceived Value – PV (Roig et al., 2006)		<i>0.891</i>
– The use of Islamic bank products using a profit sharing system	<i>0.944</i>	
– The calculation of profit sharing is very clear on Islamic bank products	<i>0.781</i>	
The calculation of profit sharing on Islamic bank products is reasonable	<i>0.781</i>	
Intention ti Invest Product Banking Syariah – IPB (Amin et al., 2011)		<i>0.952</i>
– I am interested in opening an account at an Islamic Bank	<i>0.939</i>	
– I am interested in opening an account at an Islamic Bank in the long term	<i>0.939</i>	
– I will open an account at Islamic Bank one day	<i>0.943</i>	
	<i>0.935</i>	
	<i>0.946</i>	

Constructs	Cenvergency	Reliability
	Validity	Cronbach's
	Factor	Alpha
	Loading	
– I want to open an account at Islamic Bank		
I will recommend Islamic Bank products to others.		
Trust – TR (Boonlertvanich, 2019)		<i>0.868</i>
<input type="checkbox"/> I am satisfied with Islamic bank products	<i>0.828</i>	
<input type="checkbox"/> I will have more than one Islamic bank product	<i>0.848</i>	
<input type="checkbox"/> I think carefully about using Islamic bank products	<i>0.869</i>	
<input type="checkbox"/> I feel uncomfortable with Islamic bank products	<i>0.852</i>	
<input type="checkbox"/> I am satisfied with Islamic Bank products	<i>0.840</i>	
<input type="checkbox"/> I am not satisfied with Islamic bank products	<i>0.836</i>	
Authors' own research		

From the results in the table above, it could be concluded that were several measurers that were marginal fit, but the there were several measures of goodness of fit. So that the conclusion of the model produced was goodness of fit.

Table 3. Goodness of fit model

Goodness of Fit index	Result	Cut-off	Decision
CMIN	7.171	>0.05	Marginal Fit
Significant probability RMSEA	0.000	<0.08	Goodness of fit
GFI	0.219	>0.90	Goodness of fit
CFI	0.923	>0.90	Goodness of fit

Hair et al., (2018)

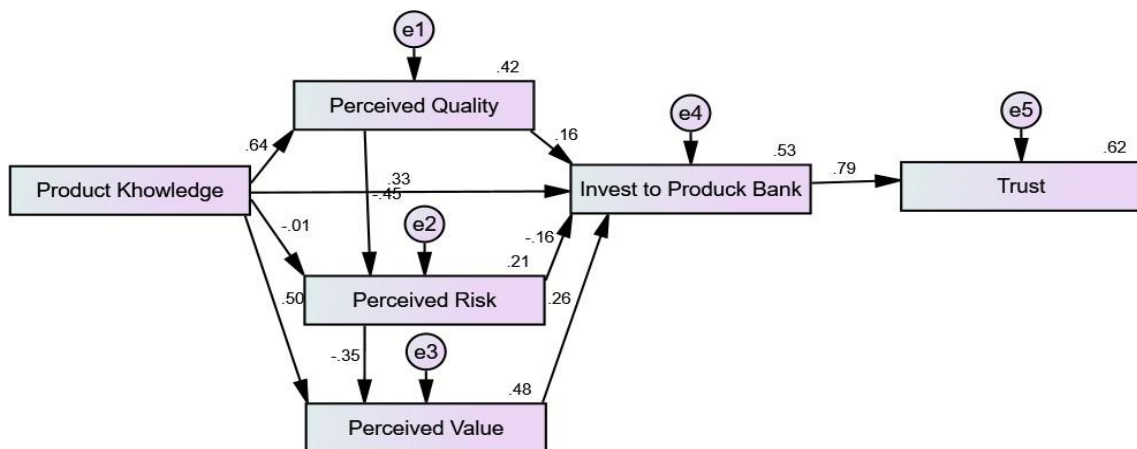


Figure 2. Model structure analysis

Finally, Table 3 presented the complete results of the structural model and hypotheses testing presented in this research. The results of the analysis showed that there were several hypotheses that were accepted and some were rejected. It could be seen that the accepted hypotheses in this research had criteria if the value was $P < 0.05$. Of the ten hypotheses that was studied, eight were accepted and two were not accepted.

In this research, the hypothesis that had a p value < 0.05 was H2 and H7 with a value of 0.927 and 0.074, this meant that the hypothesis was not accepted in this research. Hypothesis 2 had a statement that knowledge about products had a negative impact on the risks that would be obtained, in line with previous research (Hilma, 2016) which explained that knowledge of Islamic bank products meant a problem for the community, bank interest which was prohibited in Islam could not be used by the public, while profit sharing in Islamic banks is allowed. This meant that in fact, both Muslim and non-Muslim communities in Jakarta had already known the meaning of investing in Islamic banks. It's just that it had a deficiency in carrying out literacy and education to the public for information on Islamic bank products.

H7 which had a P value of 0.074 and provided a statement that perceived quality had a positive impact on the intention of customers to invest in Islamic banks. This was not accepted in this research on consumer in Jakarta. The service system received by consumers at Islamic banks was less informative in the meaning of quality and perceptions of consumers will affect the level of bank performance. If Islamic bank by standardizing the way of service to Islamic banks properly, for example by explaining Islamic bank products in detail, then consumer interest in investing would be greater, thus indirectly increasing the performance of Islamic banks themselves (Newaz et al., 2016).

Table 4. Results of hypothesis

Hypothesis	Estimation (S)	C.R	P	Conclusion
H1: Product knowledge has a positive impact on perceived quality	0.627	9.234	0.000	Accepted
H2: Knowledge of the product has a negative impact with the risks that will be obtained	-0.008	-0.092	0.927	Rejected
H3: product knowledge has a positive impact on perceived value	0.423	7.265	0.000	Accepted
H4: product knowledge has a positive impact on intention to invest	0.323	3.542	0.000	Accepted
H5: perceived quality has a negative impact on perceived risk	-0.365	-4.234	0.000	Accepted
H6: Perceived risk has a negative impact on perceived value.	-0.368	-4.985	0.000	Accepted
H7: Perceived quality has a positive impact on intentions to invest in Islamic banks.	0.158	1.787	0.074	Rejected
8: Perceived risk has a negative impact on customers' intentions to invest in Islamic banks.	-0.202	-2.125	0.034	Accepted
H9: The value perceived by consumers has a positive impact on customer intentions to invest in Islamic banks.	0.309	3.058	0.002	Accepted
H10: Investing in Islamic bank products has a positive impact on the trust that will be received by customers.	0.687	14.401	0.000	Accepted

5. CONCLUSION AND RECOMMENDATIONS

Indonesia is a country with a majority of Muslims. The existence of banking in Indonesia can help people to have transaction and provide convenience. In this research, based on several banking characteristics, conventional banks rank first in the use of banks, while mix banks rank second, and Islamic banks rank third. This proved that the development of Islamic banks is still very lacking, as evidenced by data from the results of this research. as well as data from Bank Indonesia statistics in June 2022 with a percentage of 16.35%. This data showed that the interest of the Indonesian people towards Islamic banks is still lacking. The factors that influence the slowdown in Islamic banking, it is in addition to products that are less competitive, human resources and technology for digitalization which are owned by the Islamic banking system which is very lacking are also a priority must be addressed.

The small number of Islamic banking in Indonesia is one of the reasons that Islamic banks are not experiencing good development. The government must have several important roles in the development of Islamic banking in Indonesia by issuing several regulations that can facilitate the development of Islamic banks, for example by requiring Conventional Banks to have sharia business units in each bank, as well as monitoring in each Islamic banking business unit every year. Having a large enough sharia market in Indonesia can be used as a segmentation for the government to be able to develop Islamic banking to be able to compete with conventional banks, by prioritizing Sharia First in the banking system which means that in approaching the community by providing education about the introduction of sharia in the world of banking.

POLICY RECOMMENDATIONS

This research examined the effect of Islamic bank products on perceived quality, risk accepted, and the value obtained by customers in investing in Islamic banks so as to increase trust in the use of Islamic banks with the aim of making Islamic banks more developed in the future. In this regard, it could be seen that it turned out that Islamic bank consumers in investing in Islamic bank products in reality they did not know clear information about Islamic bank products. This could be seen from the risks that would be faced by consumers as a determining factor in making decisions to invest in products. Islamic Bank.

In order to support the development of Indonesian Islamic banking in accordance with the three pillars of development direction (Strengthening Islamic Banking Identity, Islamic Economic Ecosystem Synergy, strengthening regulatory and supervisory licensing) in line

with this research, recommendations that can be made to help develop Islamic banks are by having through several phases carried out in a strategic manner.

In the building of foundation phase, which is the basis for Islamic banks to develop and exist more on Indonesian people by optimizing infrastructure, literacy, sharpening technology by strengthening digital banking and services on existing front liners. Maximizing the literacy process is not only carried out by banking actors but is encouraged by the government that focuses on the development of Islamic banks, for example through participating in Islamic bank research in the international area, in addition to following the rating of Islamic banking in the world, so it is very likely that Islamic banking often interacts. With international relations, it is possible that investors will gradually be attracted to invest in the realm of

Islamic banks in Indonesia. Building of foundation not only concentrates on literacy, but also policies from the government side, for example with the obligation to upgrade a system that is no less sophisticated than conventional banks, in addition to making it easier for Islamic bank customers to make transactions, digitizing banking is also needed for customers to transact overseas.

Governments involved in Islamic banking in Indonesia such as OJK, Bank Indonesia, and LPS (Deposit Guarantee Agency), they indirectly have the function of making policies, regulations, and monitoring the development of Islamic banks. In the future, not only these functions will be carried out, but they must have a better strategy in the next five years, for example by requiring conventional banks to have sharia business units or Islamic banks that can make faster developments in Islamic banking. In addition, the strategy through spin offs or making conventions on regional banks is also a very good strategy, because indirectly every province in Indonesia can have a sharia bank and can contribute to developing a sharia-based economy in the region.

The next phase, it is running to the goal. It is a step that must be carried out, by maximizing to get a lot of investors and can invest in the scope of Islamic banks in Indonesia. In the next five years with the reality of the Indonesian population, which is predominantly Muslim, is a segment that can be made a target to be able to develop Islamic banks. Not only in the national level, but internationally by opening branches in every continent that is abroad is a market share that must be achieved. Maximizing existing technology with banking digitalization is very important in the current era, if the Islamic banking system is better and more sophisticated then indirectly Islamic banks will develop more in the future, making it easier for customers to make transactions and the government must evaluate regularly.

For further research, it is hoped that it will not only analyze public interest in Time Deposits, Current Accounts and Savings products and credit at Islamic banks, but treasury products must also be able to be analyzed, because economic development does not only occur at the national level, but business with foreign countries is also very important to help Islamic banks to get high profits. With products such as the latter of credit, sales of bonds, foreign currency bank notes, and fixed income products, sales of SUKUK (Islamic Bond) are also very attractive products in the scope of treasury products.

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CHAPTER 19

Law and Economic Development: A Study in Indonesian Personal Data Protection

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ABSTRACT

Law defines electronic transactions as legal actions using computers, computer networks, and other electronic media. Due to consumers must submit their identification and personal data in electronic transactions, personal data privacy is a major concern. Personal data is defined in the Indonesian Personal Data Protection Law as data on an identified or identifiable individual or in combination with other information directly or indirectly through electronic or non-electronic means. The issue of personal data is an intriguing topic to examine, particularly in light of the growing importance of e-commerce and e-business as key elements of business strategy and drivers of economic growth. This scientific work raises the question of whether Indonesian legislation of the Personal Data Protection Law can protect consumers from personal data use. The study is normative, using secondary legal documents, qualitative analysis, and inductive findings. According to legal and economic development theories, the content of law must meet five conditions to promote economic development: predictability, stability, fairness, education, and the development of lawyers' specialized abilities. The results reveal that the Personal Data Protection Law have offered predictability, stability, and fairness, enabling economic development. However, consumer and business actors' education and lawyer specialization in addressing personal data breach disputes are also needed

Keywords: Law and economic development, Personal data protection, Indonesia.

1. INTRODUCTION

The advent of new technologies has facilitated the transition from physical commerce to e-commerce. E-commerce, also known as electronic commerce or online commerce, is an entrepreneurial activity that employs information and communication technology in a manner that differs from its traditional characteristics.¹ The advent of e-commerce has led to a transformation in the business model, whereby consumers no longer have to physically visit the location of purchase; instead, they can simply access the websites of online buying and selling providers. Similarly, in the context of payment transactions, buyers are able to transfer funds to sellers.² Such e-commerce activities have now risen to the top of the list of the most important and popular activities taking place in cyberspace.³

In Indonesia, the Indonesian Internet Service Providers Association has announced that the number of Indonesian internet users in 2024 will reach 221,563,479 individuals, representing 80% of the total population of 278,696,200 people in 2023.⁴ Concurrently, Bank Indonesia has indicated that the performance of digital banking transactions increased in January 2024, with a 17.19% annual growth rate and a transaction value of Rp 5,335.33 trillion. Meanwhile, the value of electronic money transactions reached IDR 83.37 trillion, representing a 149.46% increase, while payments through QRIS increased by 149.46% with a transaction value of IDR 31.65 trillion. 46.37 million users and 30.88 million merchants, primarily micro, small, and medium enterprises (MSMEs), drove this growth.⁵

Conversely, the disruption of internet technology in all sectors has resulted in data owners losing control over their personal data, which has given rise to a number of legal issues.⁶ Between 2020 and 2024, there were several instances of alleged data breaches involving the hacking of personal information in Indonesia. For instance, the purported disclosure of 91 million user records belonging to Tokopedia, an Indonesian e-commerce platform, is a case in point⁷, further, there have been allegations of hacking and the sale of personal data belonging to approximately 279 million Indonesian citizens who are members of BPJS Kesehatan.⁸ Another case is the alleged leak of personal data belonging to IndiHome customers (PT Telkom Indonesia (Persero) Tbk), including 26 million search histories, names, and identification numbers of IndiHome customers.⁹ There have also been allegations of the sale of more than 17 million State Electricity Company' (abbreviated as *PLN*) of customer data, including customer ID, customer name, energy type, KWH, address, meter number, meter type, and UPI unit name.¹⁰ The MyPertamina application reportedly suffered a

¹ Rani Adgulwar, "Consumer Protection and E-Commerce in India," *Palarch's Journal of Archaeology of Egypt/Egyptology* 18, no. 10 (2021): 990, 991, <https://archives.palarch.nl/index.php/jae/article/view/9944>.

² Niki Ratama, Munawaroh, and Sri Mulyati, "Sosialisasi Penggunaan Ecommerce Dalam Perkembangan Bisnis Di Era Digital," *Abdi Jurnal Publikasi* 1, no. 1 (2022): 7, <http://jurnal.portalpublikasi.id/index.php/AJP/article/view/3>.

³ Adgulwar, "Consumer Protection and E-Commerce in India."

⁴ "APJII Jumlah Pengguna Internet Indonesia Tembus 221 Juta Orang," *Apjii.or.Id*, 2024, <https://apjii.or.id/berita/d/apjii-jumlah-pengguna-internet-indonesia-tembus-221-juta-orang>.

⁵ Nurtiandriyani Simamora, "BI Catat Transaksi Digital Banking Naik 17,19% Jadi Rp 5.335 Triliun Pada Januari 2024," *Kontan.Co.Id*, 2024, <https://keuangan.kontan.co.id/news/bi-catat-transaksi-digital-banking-naik-1719-jadi-rp-5335-triliun-pada-januari-2024>.

⁶ Adgulwar, "Consumer Protection and E-Commerce in India."

⁷ Mohammad Bernie, "91 Juta Data Pengguna Tokopedia Bocor Dan Disebar Di Forum Internet," *Tirto.Id*, 2020, <https://tirto.id/91-juta-data-pengguna-tokopedia-bocor-dan-disebar-di-forum-internet-fNH1>.

⁸ "BPJS Kesehatan: Data Ratusan Juta Peserta Diduga Bocor - 'Otomatis Yang Dirugikan Masyarakat', Kata Pakar," *Bbc.Com*, 2021, <https://www.bbc.com/indonesia/indonesia-57196905>.

⁹ Isna Rifka Sri Rahayu and Aprillia Ika, "26 Juta Data Pribadi Pelanggan IndiHome Diduga Bocor, Kominfo Lakukan Pendalaman," *Kompas.Com*, 2022, <https://money.kompas.com/read/2022/08/21/165432126/26-juta-data-pribadi-pelanggan-indihome-diduga-bocor-kominfo-lakukan>.

¹⁰ Agustinus Mario Damar, "Kominfo Panggil PLN Terkait Dugaan Kebocoran 17 Juta Data Pelanggan," *Liputan6.Com*, 2022, <https://www.liputan6.com/teknologi/read/5047731/kominfo-panggil-pln-terkait-dugaan-kebocoran-17-juta-data-pelanggan>.

data leak in the same year, with hackers or Bjorka thought to be the culprits.¹¹ Moreover, the Indonesian Election Supervisory Agency (abbreviated as *Bawaslu*) discovered that as many as 20,565 individuals' personal data were registered without permission as members of political parties during the factual verification stage of the 2024 election participants.¹²

The aforementioned cases highlight the need for e-commerce to prioritize user data security and privacy, while also preventing data theft that irresponsible parties can exploit.¹³ If unauthorized parties obtain such information, e-commerce users may suffer financial losses and potentially experience identity theft and exploitation by irresponsible individuals.¹⁴ Therefore, the need for personal data protection is becoming increasingly clear in the context of the digital economy.¹⁵ As a result, the subject of personal data is an intriguing topic for investigation, particularly given the growing importance of e-commerce and e-business as pivotal elements of business strategy and drivers of economic growth.¹⁶

This study differs from previous research in that it examines the legal substance of Law No. 27 of 2022 on Personal Data Protection (hereinafter Indonesian Personal Data Protection Law) in terms of supporting economic development. The study employs the concepts of law's role, particularly those pertaining to legal requirements conducive to economic development. We selected this concept because the primary objective of law in the economic domain is to establish and maintain regulatory frameworks that safeguard rights and interests, especially those of vulnerable stakeholders, and promote economic growth.¹⁷

2. LITERATURE REVIEW

There is a robust correlation between law and economics. The conduct of economic activities is contingent upon adhering to a set of rules that govern the interactions between the parties involved. Legal scholars are in charge of formulating these rules, while economists are in charge of economic mechanisms and forces.¹⁸

In his research, Leonard J. Theberge highlighted Burg's insights on the relationship between law and economic development. Burg's concept is the result of Western economics' development, which adapts Max Weber's thinking. According to this approach, certain and consistent laws are an important element in economic development. Burg posited that in a country's economic development efforts, the law must fulfill five essential elements. The five

¹¹ Riani Sanusi Putri, "44 Juta Data My Pertamina Diduga Dibobol Bjorka, Pertamina Gelar Investigasi," *Tempo.Co*, 2022, <https://bisnis.tempo.co/read/1655373/44-juta-data-my-pertamina-diduga-dibobol-bjorka-pertamina-gelar-investigasi>.

¹² Anggi Muliawati, "Bawaslu Temukan 20 Ribu Data Pribadi Warga Dicatut Parpol Di SIPOL," *Detik.Com*, 2022, <https://news.detik.com/pemilu/d-6464417/bawaslu-temukan-20-ribu-data-pribadi-warga-dicatut-parpol-di-sipol>.

¹³ Yasep Azzery, "Analysis of E-Commerce Growth in the Industrial Age 4.0 in Indonesia," *International Journal of Engineering Continuity* 1, no. 1 (2022): 6–7, doi:10.58291/ijec.v1n1.33; Indriani Muin, "Perlindungan Data Pribadi Dalam Platform E-Commerce Guna Peningkatan Pembangunan Ekonomi Digital Indonesia," *MJP Journal Law and Justice* 1, no. 2 (2023): 83, <https://jurnalilmiah.co.id/index.php/MJPJLJ/article/view/30>.

¹⁴ Adisya Poeja Kehista et al., "Analisis Keamanan Data Pribadi Pada Pengguna E-Commerce: Ancaman, Risiko, Strategi Kemanan (Literature Review)," *JIMT: Jurnal Ilmu Manajemen Terapan* 4, no. 5 (2023): 628, doi:10.31933/jimt.v4i5; Kadar Nurjaman, "Pemberdayaan E-Commerce Di Kalangan Pelaku UMKMdi Indonesia," *Jurnal Abdimas Peradaban: Jurnal Pengabdian Masyarakat* 3, no. 1 (2022): 36–37, doi:10.54783/ap.v3i1.6.

¹⁵ Trias Palupi Kurnianingrum, "Urgensi Pelindungan Data Pribadi Konsumen Di Era Ekonomi Digital," *Kajian* 25, no. 3 (2020): 198–99, doi:10.22212/kajian.v25i3.3893.

¹⁶ Chintia Indah Mentari et al., "Dampak Digitalisasi Terhadap Pertumbuhan Ekonomi Makro Indonesia," *Al-Sharf: Jurnal Ekonomi Islam* 5, no. 2 (2024): 198, doi:10.56114/al-sharf.v5i2.11589; Fazli Abdillah, "Dampak Ekonomi Digital Terhadap Pertumbuhan Ekonomi Di Indonesia," *BENEFIT: Journal of Business, Economics, and Finance* 2, no. 1 (2024): 2–3, doi:10.37985/benefit.v2i1.335.

¹⁷ Rizal Umami, M. Ulfatul Akbar Jafar, and Ilham Zitri, "Fungsi Hukum Sebagai Bagian Dari Penguatan Ekonomi Di Indonesia," *Jurnal Ilmiah Mandala Education (JIME)* 8, no. 1 (2022): 1004–5, doi:10.58258/jime.v8i1.2837; Durahman Marpaung, Surya Bakti, and Rahmat Suhargon, "Urgensi Pemahaman Hukum Ekonomi Terhadap Para Generasi Muda," *Community Development Journal* 2, no. 3 (2021): 991–92, doi:10.31004/cdj.v2i3.2876.

¹⁸ Gunawan Nahravi, *Hukum Ekonomi Dalam Pembangunan* (Bandung: CV Cendekia Press, 2020).

elements are stability, predictability, fairness, education, and the special development ability of lawyers.¹⁹

According to Burg, the concept of stability encompasses the law's ability to reconcile and accommodate competing interests. We can understand the concept of stability requirements by acknowledging that every country strives to achieve a multitude of distinct goals. As these goals may conflict, the legal system must balance competing interests.²⁰ The predictability function is concerned with the operation of substantive law in ensuring the predictability of the consequences of measures taken. Both Burg and J.D. Nyhart emphasize the crucial role of this function in countries where a significant portion of the population is entering into economic relationships that are markedly distinct from traditional legal frameworks.²¹

The next function to be considered is that of fairness. We prioritize this function based on the law's ability to treat parties equally and the existence of standard patterns of government behavior to maintain market mechanisms and prevent excessive bureaucracy.²²

The law must be able to perform the function of education. This function pertains to the law's ability to act as a force that creates responses to new conditions or even reinforces old habits.²³ Burg's viewpoint supports Roscoe Pound's claim that law serves as a tool for social engineering, regulating societal conduct. "Law" can manifest as principles, norms, ideas, rules, practices, and legislative interests.²⁴

The role of the lawyer is of significant importance when cases arise in court. In litigation, lawyers serve as the litigants' representatives. Lawyers' arguments in court proceedings offer a concrete framework for evaluating economic considerations.²⁵ The role of lawyers extends beyond representing clients in court when there is a dispute. They can also play a role in plan evolution, legislative implementation, executive decision-making and administration, structuring private arrangements, litigation, or dispute settlement. Similarly, attorneys also assume a role in non-legal matters, offering solutions based on their respective disciplines.²⁶

3. RESEARCH METHOD

The objective of this research is to ascertain whether the legal framework of the Personal Data Protection Law can effectively safeguard consumers' personal data in e-commerce transactions. Given the aforementioned objective, we can characterize the research's nature as normative. Legislation, specifically Law No. 27 of 2022 on Personal Data Protection, serves as the primary legal material and is considered binding²⁷. In order to gain a deeper comprehension of the primary legal materials, secondary legal materials are employed²⁸ in the form of books and legal journals. Consequently, this research employs a statute approach and a conceptual approach. Data analysis was conducted qualitatively. Using the law as the main legal material, the researchers conducted a content analysis of the articles in this study

¹⁹ Leonard J. Theberge, "Law and Economic Development," *Denver Journal International Law & Policy* 9, no. 2 (1980): 232, <https://digitalcommons.du.edu/djilp/vol9/iss2/5/>; Elliot M. Burg, "Law and Development: A Review of the Literature & Critique of Scholars in Self-Estrangement," *The American Journal of Comparative Law* 25, no. 3 (1977): 492, doi:10.2307/839691.

²⁰ Theberge, "Law and Economic Development."

²¹ Ibid.; J.D. Nyhart, "The Role of Law in Economic Development," HD28M414 (Massachusetts, 1964), <https://dspace.mit.edu/bitstream/handle/1721.1/48911/roleoflaweconomi00nyha.pdf?sequence=1>.

²² Theberge, "Law and Economic Development."

²³ Ibid.; Burg, "Law and Development: A Review of the Literature & Critique of Scholars in Self-Estrangement."

²⁴ Sally Falk Moore, *Law as Process: An Anthropological Approach* (Hamburg: Lit Verlag & James Curry Publisher, 2000).

²⁵ Nyhart, "The Role of Law in Economic Development," 14.

²⁶ Ibid., 22.

²⁷ Muhammad Wahdini, *Pengantar Metodologi Penelitian Hukum*, ed. Tri Ramdhani, 1st ed. (Yogyakarta: K-Media, 2022).

²⁸ Ibid.

relating to the protection of personal data.²⁹ The next step is to link the primary legal material as a major premise with the legal conditions conducive to economic development as a minor premise.³⁰ This deductive method of thinking critically and comprehensively concludes that the studied legislation's content supports economic development.

4. RESULT AND DISCUSSION

4.1. The Legal Substance of The Personal Data Protection Law is Capable of Providing Predictability

In his work, Leonard J. Theberge, by lifting the study from Burg, posits that the capacity of law to fulfill the function of predictability is contingent upon the ability of substantive law to provide predictions regarding human actions, determining whether the action in question is legally wrong or otherwise legally right.³¹ This function is of particular importance in countries where a significant proportion of the population is entering into economic relationships that are markedly different from traditional legal frameworks.³²

According to J.D. Nyhart, one form of predictability is that the law can provide clarity regarding both property and people's status.³³ In light of this perspective, the fulfillment of the predictability requirement is evaluated in accordance with the substance of the Indonesian Personal Data Protection Law (hereafter written as Indonesian "PDPL") which delineates the definition and scope, the parties, the subject of personal data, along with their rights and obligations, and exceptions to these rights.

First: the predictability of personal data definition, personal data protection, and personal data types are all areas of concern.

The term "personal data protection" is defined as all efforts to safeguard personal data throughout the process of personal data processing (Article 1, point 2 of the Indonesian "PDPL"). In the meantime, personal data can be defined as any information about an identifiable individual, whether directly or indirectly obtained from electronic or non-electronic systems (Article 1, point 1 of the Indonesian "PDPL"). The data encompasses both general and specific personal data, as defined in Article 4 of the Indonesian "PDPL". General Personal Data includes:

- a. Full name;
- b. Gender;
- c. Citizenship;
- d. Religion;
- e. Marital status; and/or
- f. Personal data combined to identify an individual

While specific Personal Data includes:

- a. Health data and information;
- b. Biometric data;
- c. Genetic data; Crime records;
- d. Child data;

²⁹ Bethel Uzoma Ihugba, *Introduction to Legal Research Method and Legal Writing* (Lagos: Malthouse Press Limited, 2020).

³⁰ Sharon Hanson, *Legal Method & Reasoning* (United States of America: Cavendish Publishing Limited, 2013).

³¹ Nyhart, "The Role of Law in Economic Development," 12.

³² Theberge, "Law and Economic Development."

³³ Nyhart, "The Role of Law in Economic Development," 15.

- e. Personal information data; and/or
 - f. Other data in accordance with the provisions of laws and regulations.
- Second: the parties involved in the processing of personal data should be predictable.

The Indonesian “PDPL” is the first law to identify the parties involved in the processing of Personal Data. These includes Personal Data Controllers and Personal Data Processors. The term "personal data controller" refers to any individual, public body, or international organization that determines the purposes for and exercises control over the processing of personal data, whether acting alone or collectively (Article 1, point 4 of the Indonesian “PDPL”). A personal data processor is any individual, public body, or international organization that processes personal data on behalf of a personal data controller. The processing of personal data is defined in Article 16 of the Indonesian “PDPL” as follows:

- a. Acquisition and collection of personal data;
- b. Processing and analysis of personal data;
- c. Storage of personal data;
- d. Correction and updating of personal data;
- e. Appearance, announcement, transfer, dissemination, or disclosure of personal data; and/or
- f. Deletion or destruction of personal data.

Third: predictability about personal data subjects and their rights and obligations. Article 1, point 6 and 7 of the Indonesian “PDPL”, stipulate that the subject of personal data is an individual to whom personal data is attached. In addition, the term "person" is defined to include both natural persons and corporations. The rights of Personal Data Subjects are regulated in Article 5 through Article 13 of the Indonesian “PDPL”, namely:

- a. The right to obtain clarity on the use of personal data
- b. The right to change their personal data to be accurate
- c. Right of access and copy of personal data
- d. The right to delete their data
- e. The right to withdraw consent to the processing of personal data
- f. Right to object to automated processing of personal data
- g. The right to suspend or restrict the processing of personal data
- h. The right to sue and receive compensation
- i. The right to obtain and/or use and transmit personal data about him/her

Fourth: predictability regarding exceptions to the rights of Personal Data Subjects. Article 15 Indonesian “PDPL” states that the rights of Personal Data Subjects stipulated in Article 8 through Article 11, and Article 13:1 and 2 of the Indonesian “PDPL” are exempted for: the interests of national defense and security; the interests of the law enforcement process; the public interest in the context of state administration; the interests of supervision of the financial services sector, monetary, payment systems, and financial system stability carried out in the context of state administration; or the interests of statistics and scientific research.

4.2. The Legal Substance of The Personal Data Protection Law is Capable of Providing Stability

The ability to provide stability is the second prerequisite for the law to be conducive to economic development. Leonard J. Theberge, citing Burg's study, asserts that a law capable of performing the function of stability is one that can balance and accommodate "competing interests."³⁴

The concept of "competing interests" is closely related to the views of A.F.K. Organski, who delineates the three stages of political development experienced by countries in achieving modernization and development (Three Stages of Political Development).

Wallace Mandelson, citing A.F.K. Organski, defines the initial phase as one in which a country attempts to integrate in order to achieve national unity (the Stages of Unification). Although a nation may have achieved political unification through the adoption of a constitution (the politics of primitive unification), the question remained as to whether a nation on paper would become a nation in fact.³⁵ In the second stage of industrialization, the state's primary objective is to facilitate economic growth and political modernization. At this stage, the state's objective is to mobilize capital in order to establish a robust economic foundation. As a result, the most important feature of legislation during the industrialization phase is one that is favorable to entrepreneurs and capital owners.³⁶

The state's primary objective in the third stage, which is the welfare state stage, is to protect the population from the negative consequences of industrialization and to rectify the errors made in the previous stage. This stage is primarily focused on the distribution of wealth.³⁷ In this stage, the law's characteristics not only protect capital owners and entrepreneurs, but also safeguard the vulnerable, such as workers and consumers.³⁸

A country undergoing three distinct stages of development simultaneously must possess the capacity to harmonize its legal framework. J. D. Nyhart asserts that fulfilling the stability prerequisite is crucial, given that almost no state dedicates itself to a single goal. Consequently, at any given time, there is a possibility that different goals within the state will experience conflict. Therefore, we must consider the concept of balance as one of the foundational concepts in the process of economic development.³⁹

Burg and J.D. Nyhart's perspectives allow us to gauge the stability of the Indonesian Personal Data Protection Law by examining the four fundamental elements that safeguard consumers as subjects of personal data. These elements include the basis for processing personal data, the controller of personal data, the prohibition of the use of personal data, and the imposition of criminal law sanctions.

Firstly, the substance of the Indonesian Personal Data Protection Law provides stability by regulating the basis for processing personal data. Article 20:1 of the Indonesian "PDPL" explicitly states that the personal data controller must have a valid basis for processing personal data. In this instance, the Indonesian Personal Data Protection Law has provided stability by establishing that the primary basis for this processing is the explicit, valid consent

³⁴ Theberge, "Law and Economic Development."

³⁵ Wallace Mendelson, "Law and The Development of Nations," *The Journal of Politics* 32, no. 2 (1970): 223, <http://www.jstor.org/stable/2128652> .

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Nyhart, "The Role of Law in Economic Development," 14.

of the personal data subject. This consent may be provided in written or recorded form, and it may be delivered electronically or non-electronically (Article 20:2 letter a, Article 22:1 and 2 of the Indonesian “PDPL”).

In connection with this consent requirement, the Personal Data Controller is obliged to show proof of the consent that has been given by the Personal Data Subject. Agreement clauses that do not contain explicit, valid consent from the Personal Data Subject are declared null and void (Articles 23 and 24 of the Indonesian “PDPL”). Meanwhile, the processing of Personal Data of children is organized in a special manner, which is required to obtain consent from the child's parents and/or guardians in accordance with the provisions of laws and regulations (Article 25 of the Indonesian “PDPL”).

Secondly, the Indonesian Personal Data Protection Law regulates the obligations that the Controller of Personal Data must fulfill, thereby providing stability. The obligations imposed upon personal data controllers include the following (Article 27-35 of the Indonesian “PDPL”):

- a. Data controllers must have a basis for processing personal data;
- b. In carrying out the processing of personal data, the personal data controller shall be obliged to show proof of the consent given by the personal data subject.
- c. Personal data controllers shall conduct limited and specific, lawful and transparent processing of personal data;
- d. Personal data controllers shall carry out processing of personal data in accordance with the purposes for which the personal data are processed;
- e. Personal data controllers shall ensure the accuracy, completeness, and consistency of personal data in accordance with the provisions of laws and regulations;
- f. The personal data controller shall record all personal data processing activities;
- g. The controller of personal data shall provide the personal data subject with access to the personal data processed and a track record of the processing of the personal data in accordance with the period of retention of the personal data;
- h. In carrying out personal data processing, the personal data controller shall maintain the confidentiality of personal data;
- i. The personal data controller shall supervise any party involved in the processing of personal data under the control of the personal data controller;
- j. Personal data controllers are obliged to protect personal data from unauthorized processing;
- k. Personal data controllers shall prevent personal data from being accessed unlawfully;
- l. The controller of personal data shall be responsible for the processing of personal data and demonstrate accountability in fulfilling the obligation to implement the principles of personal data protection;
- m. Personal data controllers shall protect and ensure the security of the personal data they process, by conducting.

Third, the substance of the Indonesian Personal Data Protection Law has provided stability through the regulation of the prohibition on the use of personal data. The principle of stability, as elucidated by Bayles and Bayles, encompasses two distinct aspects. The first aspect pertains to the legal stability of ownership, which is a general principle applicable to all laws and is free from claims by others to such ownership. In this regard, the substance of

Articles 65 and 66 of the Indonesian “PDPL” has provided stability through the regulation of prohibitions on the use of pribadi data. Such prohibitions include the prohibition of obtaining or collecting, disclosing, or using personal data that does not belong to them, creating false personal data, or falsifying personal data.

Fourth, the substance of the Indonesian Personal Data Protection Law provides stability through criminal sanctions regulation. Stability is a fundamental requirement for the establishment and maintenance of business relationships. The law's role is to facilitate such stability⁴⁰. Legal sanctions must accompany the provisions of these norms for them to be legally binding and enforced.⁴¹ The misuse of consumers' personal data in the digital economy era is also considered to have a negative impact on the country, which may result in a loss of investor confidence and a subsequent reduction in investment in Indonesia.⁴² A country that is able to maintain the rule of law will be more attractive to foreign investors because its laws provide stability.⁴³

In fulfilling the function of stability, Articles 67, 68, and 69 of the Indonesian “PDPL” provide for criminal law sanctions in the event of violations of the prohibition on the use of personal data.

4.3. The Legal Substance of The Indonesian Personal Data Protection Law is Capable of Providing Fairness

As previously stated by Leonard J. Theberge, the concept of fairness encompasses legal processes, equality of treatment, and standards of behavior for the government.⁴⁴ According to Lawrence M. Friedman, the assurance of justice necessitates that the law guarantee the appropriate distribution of rights, at least without prejudice to others' rights.⁴⁵

The concept of justice in the legal process is closely related to the resolution of disputes. The function of law in dispute resolution is to provide mechanisms and venues through which individuals can resolve conflicts and restoring equilibrium between the conflicting parties.⁴⁶

The process encompasses a number of different methods for the resolution of disputes, including adjudication in courts or administrative tribunals, arbitration, and conciliation. These methods' efficiency is critical for the economy's optimal functioning.⁴⁷ J. D. Nyhart posits that the means of dispute resolution and its procedural law are necessary for accommodation and the procedural capability of the law.⁴⁸

According to Burg and J.D. Nyhart's perspectives, the substance of the Indonesian Personal Data protection Law satisfies the fairness stipulation inherent in its substance by regulating the principle of legal certainty and incorporating provisions for dispute resolution. The principle of legal certainty, as elucidated in the Indonesian Personal Data Protection Law, pertains to fairness. The Indonesian Personal Data Protection Law 's Article 3 defines the

⁴⁰ Muthucumaraswamy Sornarajah, “The Case Against a Regime on International Investment Law,” in *Regionalism in International Investment Law*, ed. Leon Trakman and Nick W. Ranieri (New York: Oxford University Press, 2013), 492, doi:10.1093/acprof:oso/9780195389005.003.0016.

⁴¹ A'an Efendi and Dyah Ochterina Susanti, *Teori Ilmu Hukum* (Jakarta: Kencana, 2023).

⁴² Kurnianingrum, “Urgensi Pelindungan Data Pribadi Konsumen Di Era Ekonomi Digital,” 208.

⁴³ Sornarajah, “The Case Against a Regime on International Investment Law.”

⁴⁴ Theberge, “Law and Economic Development.”

⁴⁵ Lawrence M. Friedman, *Legal System, The: A Social Science Perspective* (New York: Russell Sage Foundation, 1975).

⁴⁶ *Ibid.*, 18.

⁴⁷ Nyhart, “The Role of Law in Economic Development,” 12,15.

⁴⁸ Nyhart, “The Role of Law in Economic Development.”

principle of legal certainty as the need for all personal data processing to adhere to the law, protecting personal data and guaranteeing its legal recognition both within and outside the court system.

The principle of legal certainty, as set forth in the Indonesian Personal Data Protection Law, serves as the foundation for the principle of fairness. Article 3 of the Indonesian “PDPL” defines the principle of legal certainty as the need for all personal data processing to adhere to the law, with the aim of safeguarding personal data and facilitating its implementation. This guarantees the legal recognition of personal data processing both inside and outside the court.

The provisions of Article 64 of the Indonesian “PDPL” on dispute resolution support this principle. This provision allows arbitration, courts, or other alternative dispute resolution institutions to settle disputes involving personal data, following the applicable procedural law as stipulated by the legislation. The same article also provides for the possibility of conducting the proceedings in private.

4.4. Indonesia's Personal Data Protection Law's legal substance necessitates education support

Friedman and Hayden argue that legal culture is the primary and most essential element for the legal system's functioning. If legal culture does not support the law, it will perish and become mere words, regardless of its quality. In Friedman's terms, “without the legal culture, the legal system is inert, like a dead fish lying in the basket, not a living fish swimming in the sea.”⁴⁹

According to Friedman and Heyden's perspectives, the effectiveness of the Indonesian Personal Data Protection Law's legal framework is contingent upon the existence of a legal culture within the community that is conducive to its implementation. Individuals within a given society hold attitudes, habits, views, and ways of thinking about the law, which we refer to as “legal culture”. This ultimately determines whether individuals will comply with the law, seek recourse through it, or even flout it.⁵⁰

In her research, Rohmah posited that the vulnerability of cyber security is not solely a consequence of the technology employed, but also a result of the inadequacies in human resources. This deficiency in human resources represents a target for criminal exploitation.⁵¹ A number of studies have indicated that a significant proportion of data owners (consumers) perceive personal data as a relatively unimportant issue.⁵² Furthermore, many of these individuals are unaware of the legal framework that governs their rights and obligations when conducting e-commerce transactions.⁵³ Additionally, consumers tend to pay little attention to

⁴⁹ Lawrence M. Friedman and Grant M. Hayden, *American Law: An Introduction* (New York: Oxford Academic, 2017).

⁵⁰ Lawrence M. Friedman and Grant M. Heyden, *American Law: An Introduction*, 3th ed. (United States of America: Oxford University Press, 2017), 5, 18.

⁵¹ Ratri Nur Rohmah, “Upaya Membangun Kesadaran Keamanan Siber Pada Konsumen E-Commercedi Indonesia,” *Cendekia Niaga: Journal of Trade Development and Studies* 6, no. 1 (2022): 6, doi:10.52391/jcn.v6i1.629.

⁵² Kurnianingrum, “Urgensi Pelindungan Data Pribadi Konsumen Di Era Ekonomi Digital,” 206.

⁵³ Alexandra Exelsia Saragih, “Muhammad Fadhil Bagaskara, Mulyadi, Perlindungan Hukum Terhadap Konsumen Dalam Transaksi E-Commerce,” *Civilia: Jurnal Kajian Hukum Dan Pendidikan Kewarganegaraan* 2, no. 2 (2023): 2, doi:10.572349/civilia.v2i2.414.

the security of their personal computers⁵⁴, often due to a lack of technical knowledge and confusion about appropriate security practices.⁵⁵

One of the strategies to alter individuals' perceptions and behaviors regarding the significance of personal data protection is to enhance their literacy. This literacy encompasses an understanding of personal data, the necessity of safeguarding personal data, and the implementation of preventative measures against the risk of personal data hacking.⁵⁶

Article 63 on Public Participation of the Indonesian "PDPL" regulates the conduct of education. This article permits the public to play a direct or indirect role in supporting the implementation of personal data protection through a variety of educational and training activities, as well as advocacy, socialization, and/or supervision, all in accordance with the provisions of relevant laws and regulations.

Some community participation activities, like literacy activities that emphasize the importance of personal data protection, are implemented through community service activities. For instance, community service activities include the socialization of the Indonesian Personal Data Protection Act,⁵⁷ data security in the context of the digital realm (cyber space),⁵⁸ data security and data privacy in the digital era,⁵⁹ criminal threats to the misuse of personal data, and tips on protecting personal data.⁶⁰ Additionally, community service activities include socializing and training computer-secure users.⁶¹

4.5. Indonesia's Personal Data Protection Law's legal substance necessitates special development ability of the lawyer

Burg emphasizes in Leonard J. Theberge that the unique development abilities of lawyers must support the creation and application of the law.⁶²

Hager asserts that the law serves as a silent partner in the development process, manifesting itself in economic policies like laws, regulations, agreements, and contracts. Legal professionals, including legal counsel, are responsible for resolving legal issues. They are responsible for applying the law in a manner that is both effective and compliant with relevant legislation.⁶³ For this purpose, Article 64 on dispute resolution of the Indonesian

⁵⁴ Edy Santoso, "Opportunities And Challenges: E-Commerce In Indonesia From A Legal Perspective," *Jurnal Penelitian Hukum De Jure* 22, no. 3 (2022): 396–97, doi:10.30641/dejure.2022.V22.395-410.

⁵⁵ Jonson Manurung, Agus Putra Emas Sihombing, and Boyner Pandiangan, "Sosialisasi Dan Edukasi Tentang Keamanan Data Dan Privasi Di Era Digital Untuk Meningkatkan Kesadaran Dan Perlindungan Masyarakat," *Jurnal Pengabdian Masyarakat Nauli* 2, no. 1 (2023): 2, <https://ejournal.marqchainstitute.or.id/index.php/Nauli/article/view/103>.

⁵⁶ Naylawati Bahtiar, "Darurat Kebocoran Data: Kebuntuan Regulasi Pemerintah," *Development Policy and Management Review (DPMR)* 2, no. 1 (2022): 87, 97, <https://journal.unhas.ac.id/index.php/DPMR/>.

⁵⁷ Syahrul Salam et al., "Sosialisasi UU Nomor 27 Tahun 2022 Tentang Perlindungan Data Pribadi Di Kelurahan Serua, Bojongsari, Depok," *Jurnal Pengabdian Masyarakat Mandira Cendikia* 3, no. 5 (2024): 6, <http://journal-mandiracendikia.com/index.php/pkm/article/view/1117>.

⁵⁸ Syaddam, "Sosialisasi Keamanan Data Di Dunia Siber Untuk Meningkatkan Kewaspadaan SMK 1 Negeri Tarakan Terhadap Ancaman Cybercrime," *Archive: Jurnal Pengabdian Kepada Masyarakat* 3, no. 2 (2024): 294,295, doi:10.55506/arch.v3i2.103.

⁵⁹ Manurung, Sihombing, and Pandiangan, "Sosialisasi Dan Edukasi Tentang Keamanan Data Dan Privasi Di Era Digital Untuk Meningkatkan Kesadaran Dan Perlindungan Masyarakat," 4, 5.

⁶⁰ Siti Alvi Sholikhatin et al., "Sosialisasi Security Awareness Dan Perlindungan Data Pribadi Di Media Sosial Pada SMK MAARIF NU 1 Cilogok, Selaparang," *Jurnal Pengabdian Masyarakat Berkemajuan* 7, no. 3 (2023): 1520, doi:10.31764/jpmb.v7i3.16024.

⁶¹ Sopi Sapriadi et al., "Sosialisasi Dan Pelatihan Secure Computerdalam Meningkatkan Kesadaran Siswa Terhadap Keamanan Data," *Majalah Ilmiah UPI YPTK* 30, no. 2 (2023): 40, doi:10.35134/jmi.v30i2.149.

⁶² Theberge, "Law and Economic Development."

⁶³ L. Michael Hager, "Training Lawyers for Development: The IDLI Experience," *Third World Legal Studies* 5, no. Article 6 (1986): 57, http://scholar.valpo.edu/twls/vol5/iss1/6/?utm_source=scholar.valpo.edu%2Ftwls%2Fvol5%2Fiss1%2F6&utm_medium=PDF&utm_campaign=PDFCoverPages.

“PDPL” authorizes arbitration institutions, courts, and other alternative dispute resolution institutions to resolve disputes related to the protection of personal data.

According to Burg and Hager, it is clear that those engaged in the practice of judging, arbitration, conciliation, and negotiation must possess and cultivate a set of specialized skills in the domain of data privacy, including personal data protection. Furthermore, they must demonstrate an understanding of electronic transactions and consumer protection in a multidisciplinary and cross-border context. Furthermore, the capacity to utilize technology as a legal institution of justice in the digital era must also alter the manner in which it operates. For instance, the utilization of technology, such as video conferencing, email, and online documents, permits lawyers and judges to function remotely, thereby expediting the decision-making process.⁶⁴ This, of course, necessitates not only the provision of supporting infrastructure, but also the technical capabilities of law enforcement personnel. According to Hager, law enforcers must have "portable skills" that are relevant and useful in a variety of contexts, as well as substantive knowledge in several areas, particularly those of high economic value.⁶⁵

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5. CONCLUSION AND RECOMMENDATIONS

A review of normative research into the legal substance of the personal data protection law reveals that it meets the criteria for predictability, stability, and fairness. Therefore, we can argue that this regulation promotes economic growth, especially when it comes to safeguarding personal data in electronic transactions. However, implementing this legal substance requires a shift in the public's perception of personal data. An educational campaign must accompany this transformation, educating the public about their rights and responsibilities as consumers. Similarly, in order to facilitate the dispute resolution process, both within and outside of the courts, legal professionals (lawyers, legal advisers, judges, arbitrators, negotiators, and conciliators) must possess a comprehensive understanding of not only personal data provisions but also electronic transactions and consumer protection. This research has limitations because it only examines the law from a substance perspective, in the sense of "law in books." In fact, understanding the operation of the law necessitates the application of its substance, enabling us to understand the law's actual implementation. As a result, this study lays the groundwork for further research on the actual application of Indonesia's Personal Data Protection Law.

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⁶⁴ Savina Anggun Lestari et al., “Analisis Tantangan Negara Hukum Dalam Menegakkan Hukum Tata Negara Di Era Digital,” *JRP: Jurnal Relasi Publik* 1, no. 2 (2023): 38, doi:10.59581/jrp-widyakarya.v1i2.286.

⁶⁵ L.M. Hager, “Development Law Capacity Building: Training Legal Professionals for Development,” 2013, 19, 9, <https://orgs.law.harvard.edu/lids/files/2013/12/HAGER.pdf>.

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Mr. Lawrence Walambuka



Lawrence Walambuka holds BA international Relations and BA Honours in International politics and currently doing Masters in international politics at University of South Africa. Lawrence is an award winner, second runner up in the College of humanities for the 11th Annual University of South Africa Student and Innovation Showcasing in November/December 2023. The author is an analytically-minded international relations specialist who has a strong focus on strategic analysis of foreign markets to help realize organizational goals, ability to accurately assess foreign laws, regulations, sociopolitical and socioeconomic factors and their potential impact on organizational goals. Experience in designing public relations strategies in foreign markets for true global

involvement. He has a thorough understanding of South Africa's constitution and other statutory instruments. And experienced in lecturing, has Passion for Research, business management, accounting and financial management and worked in diverse sectors including construction, retail, agriculture, government parastatals, workforce solutions and education. Lawrence has been in South African education sector since 2011 as a lecturer and Head of Department of Commerce and academic manager/campus manager since 2020 to date. His focus has been on the meaning, construction and practice of leadership in Higher Education in South Africa. He has been an active practitioner in the Higher Education Sector for over 12 years. He has risen from the ranks of being a Lecturer to that of Senior Lecturer, Head of Commerce Depart and Campus Manager in a multi-campus context of Private College set up. Lawrence has a record of accomplishments in managing complex departments, which include student affairs, academic operations, marketing, finance and health and safety in a large Multi- Campus Private Colleges. During his tenure in higher education, he had a privilege of being exposed to the higher education regulatory environment as a campus manager. A major focus of the Campus Manager during his tenure was on transformation and ensuring improvements in the quality of the student experience in all campuses. In the DHET management of Private colleges, as campus manager: he was responsible for Monitoring Quality Assurance of all examination procedures and implementing DHET, CHE, QCTO and SETA policies.

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**T.C.
KÜLTÜR VE TURİZM BAKANLIĞI**



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