

## Data quality analytics, business ethics, and cyber risk management on operational performance and fintech sustainability

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### ABSTRACT

This study conducted a test to see the influence of data quality analytics, business ethics, and cyber risk management on operational performance and its implication on corporate sustainability of Fintech P2P Lending companies registered and licensed in Indonesian Financial Services Authority (OJK). This study used descriptive analysis and statistical method Structural Equation Modeling (SEM)-Lisrel. The data was collected by using questionnaires given to 104 managers from 91 Fintech P2P Lending companies registered and licensed at OJK until the end of December 2021. The results show that data quality analytics and cyber risk management had a positive and significant influence on operational performance. The results also show that analytical data quality, business ethics and cyber risk management had a positive and significant influence on operational performance. The findings of this study added to the limitations of the research literature on the elaboration of variables that determine performance and business sustainability in Fintech P2P lending.

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## 1. Introduction

In digital platforms, including P2P lending, there is an Artificial Intelligent (AI)-based analysis system that generates information by performing the task to identify data and projecting the right decisions to the user (Malgonde et al., 2020). With data analytics capabilities, information is presented more quickly, more complete, more reliable, and more comprehensive so the interested parties can make quality decisions (Soedarsono et al., 2019). Data quality analytics refers to the company's ability to utilize analytical data-based resources as a factor in achieving operational success. Competence in using data analysis tools can help organizations improve operational performance through quality decision-making (Ghasemaghaei et al., 2018). Gao et al. (2020) stated that the cause of P2P lending failure in China was not purely because of an information system failure, but it involved a more complex process. P2P platforms in China generally act as intermediaries for credit products. A flaw in the credit system and information asymmetry creates a credit risk. Credit risk plus the low ethics of P2P lending operators are the main obstacles in determining the operational success and sustainability of the fintech lending business. The application of ethics is increasingly important because P2P business is a business of trust. The platform as an intermediary uses the structure of the internet to facilitate transactions between borrowers and lenders in the online market by collecting, processing, and recommending alternative decisions. Lenders must place their trust not only in borrowers but also in intermediaries. Therefore, trust in intermediaries is a subjective belief in which the lender believes that the intermediary will institute, enforce rules and procedures, fair distribution of results, competent, reliable, possess integrity, and provide alternative settlements if they have to deal with the borrower's opportunistic behavior (Chen et al., 2014).

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In the digital industry, according to Galligan et al. (2015) companies that use online platforms should implement cyber risk management i.e. Enterprise Risk Management (ERM). ERM will inform management on how to mitigate information system risks to consistently help achieve company goals. Based on the reality of business development, capabilities, ethics and risks faced by P2P business, KPMG (2018) made the premise that Indonesia's P2P sector is still in its infancy, but there is a risk of P2P becoming a magnet for criminality and unscrupulous practices so that it remains a real threat to P2P businesses in Indonesia. In line with this premise, this research is one form of effort to explain the main factors that determine the operational performance and sustainability of P2P lending companies in Indonesia.

## 2. Literature Review and Hypothesis Development

### 2.1. Data Quality Analytics, Operational Performance and Corporate Sustainability

Bag et al. (2020) found that BDA affects the performance of a sustainable supply chain in a significantly positive way through improving operational performance. A study by Di Vaio & Varriale (2020) also found that the application of analytical technology using Airport Collaborative Decision Making (A-CDM) as an application of blockchain technology, is proven to improve the efficiency, decision effectiveness and sustainability of air transportation companies. Mulyani et al. (2016) also stated that business intelligence which consists of a collection of information systems and technology helps managers to make decisions and control operations by providing information that implicates organizational competitiveness. Raut et al. (2019) stated data analytics can influence operational sustainability practices in sustainable business management. Suzan et al. (2019) found that the successful implementation of a data-based management accounting information system will have a positive implication on a company's performance with balanced scorecard-based. Mangina et al. (2020) surveyed the cargo companies in Europe and found that data analytics using algorithms improve corporate sustainability by reducing emissions and increasing logistics efficiency.

**Hypothesis 1:** *Data Quality Analytics has a positive and significant influence on operational performance.*

**Hypothesis 4:** *Data Quality Analytics has a positive and significant influence on corporate sustainability.*

### 2.2. Business Ethics and Operational Performance and Corporate Sustainability

Vidgen et al. (2020) stated that the alignment of ethical priorities with commercial goals is the essence of business today. Lin et al. (2020) who used a dynamic data panel system to examine 465 IT service companies in the Thomson Reuters, Canada database found that ethical leadership plays a critical role in technology innovation, and it impacts the company performance. Novianty et al. (2018) stated that organizational performance depends on the accuracy of decision-making. Decision-making is inseparable from the role of managers as individuals who may have ethical or unethical behavior. Jones et al. (2019) found that managers become role models for company members in adopting ethics in the form of moral characteristics needed to implement business sustainability as part of daily practice. ElGammal et al. (2018) who surveyed MSMEs in Lebanon and Egypt found that ethics can affect corporate sustainability which is a function of corporate social responsibility. A study by Vadastreanu et al. (2015) concluded that the company's awareness of the importance of implementing business ethics is an important foundation for the existence, success, growth and long-term development of the company.

**Hypothesis 2:** *Business ethics has a positive and significant influence on operational performance.*

**Hypothesis 5:** *Business ethics has a positive and significant influence on corporate sustainability.*

### 2.3. Cyber Risk Management, Operational Performance and Corporate Sustainability

Operational risk management is an analytical technique focusing on risk assessment and identification, evaluation, and control processes by integrating operational procedures and processes that affect and contribute to the implementation of accounting information systems (Suzan et al., 2019). Company risk management is applied as a strategy to achieve the mission, goals, and operational needs of the organization (COSO, 2017). Liu et al. (2018) stated that the risk control feature (the ability to accurately assess and screen borrowers) is determined by an AI algorithm which is the competitive differentiator of P2P lending business operations. Risk management practices support organizations to achieve positive financial performance (Singh et al., 2020). Risk management affects organizational sustainability through three dimensions: social, economic and environmental (Durst & Zieba, 2020). A study by Durst et al. (2019) found empirical facts that Knowledge Risk Management (KRM) improves organizational performance. Galligan et al. (2019) stated that an entity that can identify, assess, and mitigate cyber risks will impact the entity's ability to achieve its business strategies and goals on a sustainable basis.

**Hypothesis 3:** *Cyber risk management has a positive and significant influence on operational performance.*

**Hypothesis 6:** *Cyber risk management has a positive and significant influence on corporate sustainability.*

## 2.4. Operational Performance and Corporate Sustainability

Ojha (2015) stated that an organization can only survive if it becomes effective, i.e. it provides optimal results from operational activities. To provide the best results, excellence in the production process, speed of delivery to customers, and product quality are required. Wiengarten & Longoni (2015) found the supply chain can integrate the influence of operational performance on corporate sustainability.

**Hypothesis 7:** *Operational performance has a positive and significant influence on corporate sustainability.*

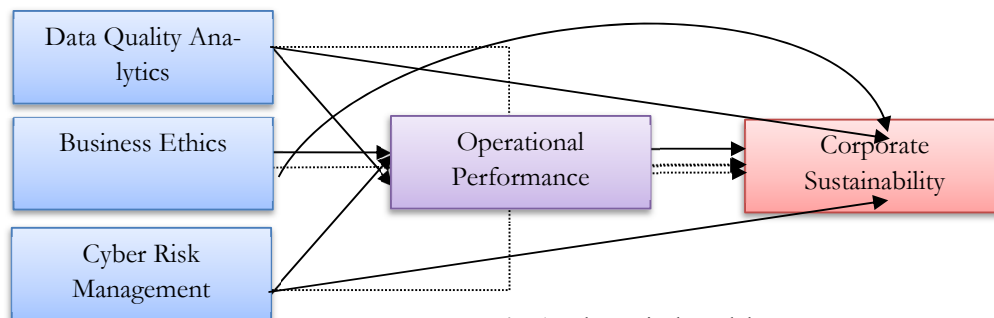
## 2.5. Mediating Effect of Operational Performance

Big data analytics has a significant influence on collaborative performance between the company and its consumers (Dubey et al., 2020). The big data-based analytical model significantly affects performance and corporate sustainability and it becomes a competitive advantage (Upadhyay & Kumar, 2020). Companies can integrate big data from multiple sources to predict future events and trends (Ghasemaghahi, 2019). Predictive insights from big data analytics allow companies to forecast sales trends, innovate developments for a new product or refine the existing ones to impact overall performance (Ghasemaghahi & Calic, 2019). Further, Božič & Dimovski (2019) found that business intelligence and analytics is positively correlated with innovative competitiveness, which in turn improves the company performance sustainably. Weber (2020) stated that automated decision-making may have socio-ethical and legal implications. Ethics becomes a value dimension in automated platforms to help make informed and safe decisions. Operational decisions based on AI need to consider ethical aspects to be more accurate and reliable in various situations (Luxton, 2014). AI models and algorithms have been widely adopted in various decision-making scenarios. A solid and appropriate AI governance framework following ethics and human values can increase public trust in AI technology and system output (Wu et al., 2020). The risk control feature in the P2P lending platform is a competitive differentiator for fintech companies (Munir et al., 2020). Risk management is highly effective in reducing operational risk and determining the viability of China's P2P platform (Liu et al., 2019). In the banking industry, Djebali & Zaghoudi (2020) found that unmanaged risk is a major factor in disrupting bank stability and sustainability. Tasmin et al. (2020) stated that risk management is a prerequisite for achieving sustainable competitive advantage through increasing business operational capabilities according to global standards. Shad et al. (2018) found that Enterprises Risk Management (ERM) plays an important role in sustainable organizational development through the identification, measurement, and management of risks including operational-related risks. ERM ensures organizational sustainability and improves business efficiency and economic growth and increases investors' trust.

**Hypothesis 8:** *Data Quality Analytics has a positive and significant influence on corporate sustainability through operational performance.*

**Hypothesis 9:** *Business Ethics has a positive and significant influence on corporate sustainability through operational performance.*

**Hypothesis 10:** *Cyber risk management has a positive and significant influence on corporate sustainability through operational performance.*



**Fig. 1.** Theoretical Model

## 3. Research Method

The population used was the managers from 104 fintech companies registered and licensed in OJK until 31 December 2021. From this population, the sample was 104 managers from 91 fintech P2P lending companies. Furthermore, the operationalization of research variables can be described in Table 1.

## 2. Results and Discussion

### 2.1. Descriptive Analysis

Based on respondent data collected, categorization was done based on the answers score. The score categorization was done based on the maximum and minimum scores divided by the expected numbers of categories. Table 2 shows the calculation result, deviation standard, and relative frequency from each variable.

**Table 1**  
Operationalization of variables

| Variables   | Reference   | Dimension  | Indicators  |
|---|---|--|---|
| Data Quality Analytics (X1)                       | Ghasemaghaei & Calic (2019); Ghasemaghaei et al. (2018)       | Big Data Utilization                                   | Volume  |
|   |   |  | Velocity  |
|   |   |  | Variety   |
|   |   | Data Quality   | Reliable data   |
|   |   |  | Secure data   |
|   |   |  | On-time data  |
|   |   |  | Relevant data   |
|   |   | Intelligent credit rating                              | Accurate data   |
|   |   |  | Able to perform modelling and simulation                                      |
|   |   |  | Able to perform text language analysis  |
|   |   | Domain Knowledge                                       | Fintech Center and data integration   |
|   |   |  | HR knows the role of the external environment                                 |
|   |   |  | HR knows the goals and objectives of the organization                         |
| Business ethics (X2)                              | AFPBI (2019)  | Transparency of products and products offering methods | HR knows the key to organizational success                                    |
|   |   |  | Information disclosure related to rights and obligations                      |
|   |   |  | Information disclosure on fees and interest rates                             |
|   |   | Prevention on over-loaning                             | Disclosure of risk information  |
|   |   |  | Disclosure of transparency presentation methods                               |
|   |   |  | Prohibition on providing misleading information                               |
|   |   |  | Complaint service information   |
|   |   | Application of good faith principle                    | Prohibition of predatory lending  |
|   |   |  | Prohibition on granting and adding loans without the agreement of the parties |
|   |   |  | Verification and assessment obligation on loan recipients                     |
|   |   |  | Responsibility for platform errors/omissions                                  |
|   |   |  | Personal data handling  |
|   |   | Cyber Risk Management (X3)                             | Ruan (2019); Liu et al. (2019.)   |
| Support financial literacy and inclusion programs |   |  |   |
| There is a risk management due diligence          |   |  |   |
| Vigilance factors                                 | Right leaders and organizational talent                       |  |   |
|   | Appropriate cyber risk framework                              |  |   |
|   | Correct investment in cyber risk mitigation                   |  |   |
|   | Cyber risk management program appropriate for the industry    |  |   |
| Resilience factors                                | Organizational mindset and culture on cyber risk              |  |   |
|   | There is a protection against external risks                  |  |   |
|   | Ability to overcome damages from a cyber incident             |  |   |
| Operational Performance (Y)                       | Bai & Sarkis (2017); Babaei & Bamdad (2020); Ma et al. (2020) | Fee  | The effectiveness of cyber risk management program evaluation.                |
|   |   |  | Strength in the company operational ecosystem.                                |
|   |   | Quality  | The interest rate was taken by the platform                                   |
|   |   |  | Total cost (provision/fee/commission) charged                                 |
|   |   | Delivery   | Loan quality/financial quality (TKB 90)                                       |
| Flexibility                                       | Return conformity with rating list                            |  |   |
|   | Speed of loan process (bidding process)                       |  |   |
| Corporate sustainability (Z)                      | Aras et al., (2018); Raut et al., (2017)                      | Profit   | Reliability of loan process   |
|   |   |  | The flexibility of the loaned amount  |
|   |   |  | The flexibility of interest rate negotiation                                  |
|   |   | People   | Market share growth   |
|   |   |  | Consumer retention rate   |
|   |   |  | Consumer complaint rate   |
|   |   | Planet (environment)                                   | Consumer complaint-resolution rate  |
|   |   |  | Credits to consumers related to nature conservation                           |
|   |   |  | CSR level/percentage for the environment                                      |
|   |   |  |   |

Source: Research Data (2022)

**Table 2**  
Research Variable Score Analysis

| No | Variables                     | Real Score | Max  | Mean | % Realization | %GAP  | Criteria  |
|----|-------------------------------|------------|------|------|---------------|-------|-----------|
| 1  | Data Quality Analytics (DQA)  | 5788       | 7280 | 3.98 | 79.51         | 20.49 | Good      |
| 2  | Business Ethics (BE)          | 6470       | 6760 | 4.79 | 95.71         | 4.29  | Very Good |
| 3  | Cyber Risk Management (CRM)   | 4476       | 5200 | 4.30 | 86.08         | 13.92 | Very Good |
| 4  | Operational Performance (OP)  | 2765       | 4160 | 3.32 | 66.47         | 33.53 | Moderate  |
| 5  | Corporate Sustainability (CS) | 2934       | 4680 | 3.13 | 62.69         | 37.31 | Moderate  |

Source: Results of data processing (2022)

2.2. Full Model Testing and Structural Model Fit

The next test was the analysis of full structural model estimation aimed to provide an overview of the relationship between latent variables and each indicator that describe the latent variables. All indicators had been declared valid and reliable to measure the research variables. The estimation results of the full structural model are described in Fig. 2.

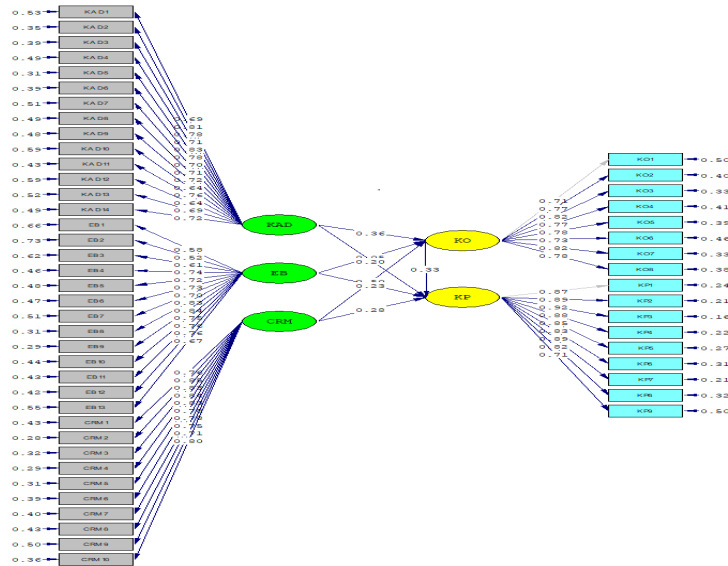


Fig. 2. Model Diagram of Structural Comprehensive Solution

Evaluation on the model fit was done by comparing the model estimation result with the fit index value recommended as shown in Table 3.

Table 3 Model Fit Test

| No | Match Criteria | Cut-off value | Result | Verification |
|----|----------------|---------------|--------|--------------|
| 1  | RMSEA          | ≤ 0.08        | 0.072  | Fit          |
| 2  | NFI            | ≥ 0.90        | 0.94   | Fit          |
| 3  | NNFI           | ≥ 0.90        | 0.96   | Fit          |
| 4  | PNFI           | ≥ 0.90        | 0.90   | Fit          |
| 5  | CFI            | ≥ 0.90        | 0.97   | Fit          |
| 6  | IFI            | ≥ 0.90        | 0.97   | Fit          |
| 7  | RFI            | ≥ 0.90        | 0.94   | Fit          |

Source: Processed Data (2022)

Table 3 shows that the overall result of model fit testing was enough to fulfil the required fit index rules. Following the research paradigm, there are two structural models tested in this study. The results of the statistical tests on the measurement of the structural model in this study are made in mathematical equation:

$$\eta_1 = 0.36 * \xi_1 + 0.054 * \xi_2 + 0.50 * \xi_3 + 0.24$$

$$\eta_2 = 0.33 * \eta_1 + 0.20 * \xi_1 + 0.23 * \xi_2 + 0.28 * \xi_3 + 0.071$$

Description:  $\xi_1$ = data quality analytics variable;  $\xi_2$ = business ethics variable;  $\xi_3$ = cyber risk management variable;  $\eta_1$ = operational performance implementation variable;  $\eta_2$  = corporate sustainability variable;  $\gamma$ = path coefficient between exogenous latent variable;  $\beta$  = path coefficient between endogenous latent variable;  $\zeta$ = measurement error of endogenous latent variable

Lastly, hypothesis testing is performed. Statistical analysis as shown in Table 4 found that quality of data analytics has a positive and significant influence on the operational performance of fintech P2P lending. Thus, the first hypothesis is accepted. The result is in line with the research results from Dubey et al. (2019) who found that big data analytics and artificial intelligence can increase the decision-making skill and they influence all dimensions in operational performance of the company. Data Analytics is a core competency for P2P lending fintech companies in operating financial inclusion programs for the underbanked community quickly and on a large scale. Testing the second hypothesis found that the quality of data analytics has a positive and significant influence on corporate sustainability. Fintech P2P lending is an early adopter of data quality analytics. With the support of algorithms and machine learning, companies can take advantage of data quality analytics as much as possible for business interests in the long term. Thus, the fourth hypothesis is accepted. This finding supports the

study by Božič & Dimovski (2019) who found that business intelligence and the skill of data analytics are related in a positive and significant way to innovation and competitive capability, which in turn improves company performance continuously

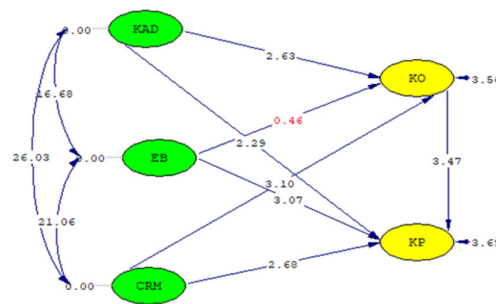
Next, testing the third hypothesis found that business ethics empirically has a positive but not significant influence on the operational performance of fintech P2P lending companies. Thus, the second hypothesis is rejected. The reason is that business ethics takes time to see the implications, and in the short term it is still limited to the compliance aspect so that operational performance does not have a significant influence. This finding supports the study by Román & Munuera (2004) who found that ethical behaviour of the sellers can reduce the conflict potential or dissatisfaction felt by the consumers and it can increase employees' job satisfaction but does not affect the company's performance directly. Furthermore, statistical examination showed a positive and significant influence of business ethics on corporate sustainability. Thus, the fourth hypothesis is accepted. This means that maintaining business ethics will more likely ensure long-term business performance. The significance of the influence of business ethics on corporate sustainability in this study confirms the findings ElGammal et al. (2018) who surveyed MSMEs in Lebanon and Egypt found that business ethics has an effect on corporate sustainability which is a function of corporate social responsibility.

Furthermore, the fifth hypothesis is empirically proven. Cyber risk management has a positive and significant influence on operational performance. P2P lending companies situated in the digital ecosystem are very vulnerable to cyber risk, so adequate cyber risk management will support the smooth operation of the fintech P2P lending platform. Empirical evidence in this study supports the conceptual framework proposed by Pandey et al. (2020) who stated that cybersecurity risk management in global supply chains has a major influence on company performance. Likewise, the results showed a positive and significant influence of cyber risk management on corporate sustainability. Fintech P2P lending companies have understood and implemented POJK Number 4 /POJK.05/2021 concerning the application of risk management in the use of information technology by non-bank financial services institutions in the context of cyber risk management. This finding also supports the statement by Galligan et al. (2019) who stated that organizations that can identify, assess and mitigate cyber risks, can affect the entity's ability to achieve its business strategies and objectives sustainably.

**Table 4**  
Hypothesis Testing

| Alternative Hypotheses (Ha) | Path (Relationship) | t-stat. value (≥1.64) | Effects |                        |       | Conclusion |
|-----------------------------|---------------------|-----------------------|---------|------------------------|-------|------------|
|                             |                     |                       | Direct  | Indirect               | Total |            |
| H1                          | DQA → OP            | 2.63                  | 0.36    | -                      | 0.36  | Accepted   |
| H2                          | BE → OP             | 0.46                  | 0.05    | -                      | 0.05  | Rejected   |
| H3                          | CRM → OP            | 3.10                  | 0.50    | -                      | 0.50  | Accepted   |
| H4                          | DQA → CS            | 2.29                  | 0.20    | -                      | 0.20  | Accepted   |
| H5                          | BE → CS             | 3.07                  | 0.23    | -                      | 0.23  | Accepted   |
| H6                          | CRM → CS            | 2.68                  | 0.28    | -                      | 0.28  | Accepted   |
| H7                          | OP → CS             | 3.74                  | 0.33    | -                      | 0.33  | Accepted   |
| H8                          | DQA → OP → CS       | 2.29                  | 0.20    | (0.20 x 0.33) = 0.1595 | 0.27  | Accepted   |
| H9                          | BE → OP → CS        | 3.07                  | 0.23    | (0.23 x 0.33) = 0.264  | 0.31  | Accepted   |
| H10                         | CRM → OP → CS       | 2.68                  | 0.28    | (0.28 x 0.33) = 0.1595 | 0.37  | Accepted   |

Likewise, the seventh hypothesis is empirically accepted, meaning that operational performance has a positive and significant influence on the sustainability of P2P lending fintech companies. Operational success indicators such as success rate of return. It makes the fintech business more attractive to prospective lenders and the company's reputation will be good and it will support business sustainability. This finding strengthens the findings from Wiengarten and Longoni (2015) who stated that the sustainability aspect is largely determined by the integral operational aspect. By implementing a supply chain in the ecosystem, the relationship between operational performance and corporate sustainability will be further improved. The calculation result of the path coefficient can be seen in Fig. 3.



**Fig. 3.** Path Coefficient

In analyzing the mediating effect, the results showed that operational performance is able to strengthen the effect of data quality analytics on a company's sustainability. This finding supports Bag et al. (2020) who found that the quality of data analytics using big data supported by the capabilities of managers can improve the operational performance of the value chain and at the same time ensure corporate sustainability. Similarly, the relationships between business ethics and cyber risk management on a company's sustainability are also mediated by operational performance. Thus, H8, H9 and H10 are accepted. This finding supports Ferdowsian (2016) who used case studies on Fortune-500 companies, both companies that were successful because of practising business ethics and vice versa, concluded that ethics must be adequately planned, integrated, checked, and enforced in all business operations as a competitive advantage. If ethics are not integrated into the company's operations, it will have serious and costly implications for corporate sustainability. The results are also in line with Tasmin et al. (2020) demonstrating that risk management is one of the prerequisites for achieving competitive operational excellence for business continuity in global business operations.

### 3. Conclusions

The findings of this study conclude that the quality of data analytics and cyber risk management has a positive and significant influence on the operational performance of fintech P2P lending. However, a positive but not significant influence was obtained from the relationship between business ethics and operational performance. Furthermore, the quality of data analytics, cyber risk management, business ethics and operational performance all have positive and significant effects on corporate sustainability. In analyzing mediating variables, the results showed that quality of data analytics has a positive and significant influence on corporate sustainability through operational performance. The data quality analytics with AI systems and machine learning are standardized so that companies can operate with best practices consistently, which will simultaneously ensure the sustainability of the P2P lending fintech business. Moreover, operational performance is also capable of mediating the effect of business ethics and cyber risk management on corporate sustainability through operational performance. The business ethics contained in the Fintech Lending Code of Conduct is the difference between legal and illegal fintech operations. If a legal fintech violates ethics, the AFPBI can provide a warning regarding operations, and in the long term, it provides a cause for OJK to revoke the operator's license. In addition, cyber risk management is carried out to minimize the potential and impact of cyber-attacks. If the potential risk of cyber-attacks is not identified from the outset, it will affect the company's operational activities and in the long term will affect the reputation and business sustainability. As practical implications, since Fintech P2P lending requires significant capital to meet regulations and thrive in the ecosystem, its business processes have faced many challenges, especially ethical issues over the past decade. Fintech P2P lending companies still have to integrate aspects of business ethics in all company operational activities. Although according to AFPBI these ethical guidelines bind all members, due to public complaints/reports of unhealthy practices, evaluation of business ethics practices from OJK and AFPBI still needs to be done regularly and more frequently.

As a limitation, in this study, operational performance and business sustainability of fintech P2P lending are also influenced by other factors not examined in this study such as market segmentation, amount of capital, business duration, management and so on. Also, the sample used is not a census of all fintech P2P lending companies registered/licensed in OJK which only represents 87,5 % of industries, other possible insights have not been explored in this study. As research results must meet the characteristics of scientific research including replicability and generability, thus it is recommended for future researchers to re-examine this research model with the same research method in different units of analysis and samples, for example in banking entities, fintech payments, and other industries. The goal is that if it shows the same results, it will add assurance to the research model that has been made so that the research results can be widely accepted.

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