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# Enhancing Financial Inclusion in the MSME Sector: An Investigation of Fintech Adoption in Indonesia through Structural Equation Modeling

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**Abstract**

*This study aims to critically analyze the determinants of fintech adoption among micro, small, and medium-sized enterprises (MSMEs) in Indonesia, utilizing the robust Structural Equation Modelling (SEM) method. Financial Technology (fintech) represents a disruptive innovation that is transforming traditional banking and financial services by integrating digital financial products and services, including payment transactions and security systems such as e-payments, peer-to-peer lending, remittances, crowdfunding, and retail investment. The research focuses on four key variables: the Decision to Use Fintech (DUF) as the dependent variable, and three independent variables — Perceived Ease of Use of the Fintech Platform (POE), Perceived Risk (POR), and Benefits Offered/Sales Promotion (BP). Data was collected via surveys from owners and managers of MSMEs in Malang City, East Java, Indonesia. The findings reveal that the ease of use and time-saving features of fintech significantly influence adoption decisions among MSMEs, underscoring its positive impact on business operations and economic efficiency. Conversely, perceived risks and promotional benefits were found to have no significant effect on the decision to adopt fintech platforms.*

***Keywords:***
*Financial Techology; MSMEs; Structural Equation Model; Business Growth*
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***JEL:*** F63, O12, O17

## 1. Introduction

According to a survey by the Central Bank of Indonesia, 87.5% of MSMEs were impacted by the pandemic. However, these MSMEs have shown remarkable resilience, adapting their operational and marketing strategies to the new normal. This transformation includes the adoption of Financial Technology (fintech) (Laura, 2020; Avriyanti, 2021), a testament to their ability to navigate and overcome crises. Financial Technology (fintech) is a disruptive innovation that is revolutionising traditional banking and financial services (McWaters, 2020). Fintech, when integrated with financial products and services, including payment transactions and payment security systems such as e-payments, P2P lending, remittances, crowdfunding, and retail investment, can offer significant advantages. It eliminates intermediaries, making access to financial services more efficient and cost-effective (Darma et al., 2020). In the realm of digitalisation, fintech offers consumers a plethora of conveniences, effectiveness, efficiency, and transparency (Singh et al., 2020; Yoshino et al., 2020).

In Indonesia, the potential of fintech is vast, particularly in the realms of e-wallets, e-commerce, and Internet and mobile banking (Herwi Saputri et al., 2024; Madani, 2021). The widespread use of e-wallets, e-commerce, and Internet/mobile banking in Indonesia, bolstered by government support for the cashless movement, has proven highly efficient and user-friendly (BI, 2024). Notably, 43% of fintech users in Indonesia primarily utilise electronic payment systems, with an additional 17% engaging in Fintech lending (Rizal et al., 2018). While MSMEs have faced numerous shocks and uncertainties, the COVID-19 pandemic has introduced a new level of unpredictability and challenges to business sustainability (Zutshi et al., 2021). In response, many MSMEs have embarked on a digital transformation journey, with fintech playing a crucial role in their survival and growth, particularly in areas such as e-payment or lending Fintech (Avriyanti, 2021; Wiyono & Kirana, 2021; Islami et al., 2021; Rahardjo et al., 2019). Limited movement during the COVID-19 pandemic also encourages people and MSMEs to stay in business (Nagel, 2020). However, it is essential to recognise that Fintech adoption has challenges, including data security, privacy concerns, and the need for digital literacy among MSME owners and employees.

Recent studies have explored the factors influencing fintech adoption and continuance intention. Perceived benefits, particularly economic benefits and convenience, positively impact users intention to continue using fintech services (M. Nguyễn et al., 2020; Chandra & Kohardinata, 2022; Ryu, 2018). Perceived risks, including financial and security risks, generally have a negative influence on continuance intention (M. Nguyễn et al., 2020; Hyun-Sun Ryu, 2018). However, one study found that perceived risk did not significantly affect e-wallet continuance intention (Chandra & Kohardinata, 2022). The impact of these factors may differ between early and late adopters, with convenience being more important for early adopters and seamless transactions being more important for late adopters (Ryu, 2018; A. Mascarenhas et al., 2021). Interestingly, one study in Brazil found that perceived risk was not a determinant of continuance intention, contradicting other findings (A. Mascarenhas et al., 2021).

The increase in people's digital literacy, accelerated by the COVID-19 pandemic, has led to a significant rise in digital financial transactions (Inam et al., 2020; Jnr & Petersen, 2021). When considering the adoption of fintech, individuals weigh the perceived benefits and risks (Morgan et al., 2019). However, it is important to note that a person's financial adoption decision can also be influenced by their behaviour (Van Rooij et al., 2011; Xiao & O'Neil, 2018), including imitation patterns from their surroundings. In the context of Fintech adoption by MSMEs, a notable challenge is technology resistance, where barriers, often related to the age of the business owners, affect the adoption pattern. With fintech's

promising business development potential, this is an opportunity for MSMEs in Indonesia. This study, conducted in Malang City, one of the regions in East Java that has developed a creative economy and a relatively high number of digitally transformed (MSMEs (amasari et al., 2021), aims to critically analyse the behaviour of SMEs in determining decisions when using Finceth to support their business development. This research becomes essential as a complement to the studies (Panda et al., 2022; Solarz & Swacha-Lech, 2021; Yoshino et al., 2020) because it delves into the complex factors of Fintech adoption, including the perceived ease of use, perceived risks, and benefits of Fintech platforms, that influence SMEs' decision of using fintech.

Industrial revolution 4.0 is the starting point for a major change from the traditional system to digitalization. From this very rapid development, it has brought a diffusion of innovation theory about digitalization both in terms of organization, industry, and MSMEs. Key factors influencing adoption include technological aspects such as relative advantage, complexity, and compatibility (Shahadat et al., 2023; Ghobakhloo & Ching, 2019). Nguyen (2019) conceptualises preparedness for technology adoption at three levels: assets, capabilities, and commitment (the backing of companies for innovation projects). Further, digital technologies offer the potential to help firms or SMEs significantly outperform competitors by reducing their costs (e.g., reduced paperwork and error rates), optimising their business models (Chen et al., 2019), improving their marketing efforts, human resource management, and increasing their collaboration with geographically distributed manufacturing entities (Caputo et al., 2016).

Numerous theories aim to elucidate the phenomena of technology adoption, including the attempting theory, social cognitive theory, theory of reasoned action, technology acceptance model (TAM), and the theory of acceptance and use of technology (Davis, 1989). TAM provides two key factors: perceived usefulness and ease of use (Davis, 1989). Perceived usefulness and perceived ease of use consistently emerge as significant factors influencing adoption intentions (Diouani et al., 2023; Utama et al., 2022; Astiti et al., 2023). The studies by Diouani et al. (2023) and Utama et al. (2022) employed quantitative approaches using structural equation modelling to test their hypotheses. The findings support the applicability of TAM in explaining SMEs' digital adoption (Diouani et al., 2023; Ghamatrasa, 2006); however, some studies have revealed variations in the relative importance of the factors. For instance, a study by Utama et al. (2022) found that compatibility and cost-effectiveness were the most crucial considerations for SMEs. It can be concluded that they are sure that adopting digital technologies has the potential to trigger both incremental and disruptive innovation. The adoption of digital technologies is also primarily driven by internal operational problems. In particular, there is a greater need for firms to gain new business insights, uncover strategic information, communicate with internal and external stakeholders, and reduce operational costs

The literature emphasizes the transformative potential of financial technology in enhancing efficiency (Rahardjo et al., 2019; Abbasi et al., 2021) and supporting sustainable business models (Pizzi et al., 2021). Fintech offers significant benefits across stakeholders: producers gain reduced operational costs and streamlined transactions, consumers enjoy faster services and lower prices, and governments can promote financial inclusion and boost economic activity (Rahardjo et al., 2019). In the context of the "new average era," fintech is also seen as a catalyst for innovation in business operations (Wiyono & Kirana, 2019). However, the full benefits of fintech remain underutilized, largely due to limited financial

literacy and public trust. Prior studies identify platform quality, perceived benefits, and social influence as key drivers of fintech adoption (Seong-ha Jeong et al., 2023; Al Aways & Mohammad, 2020), although other research argues that financial literacy does not significantly affect fintech-based investment decisions (Junianto et al., 2020). In response to these mixed findings and knowledge gaps, this research aims to examine the key factors influencing the adoption of fintech among micro, small, and medium-sized enterprises (MSMEs) in Indonesia, focusing on perceived ease of use, perceived risk, and promotional benefits.

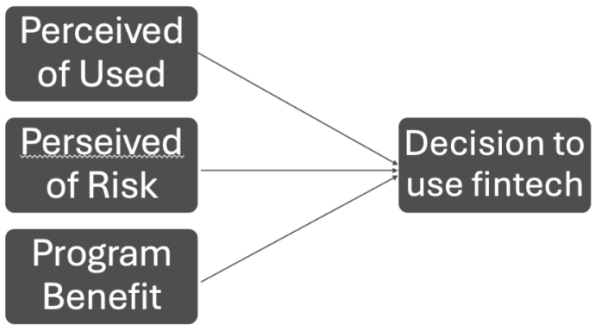
## 2. Method

### 2.1. Research Design

Data were collected through surveys distributed to owners or managers of 155 MSMEs in Malang City, East Java, Indonesia, encompassing the food and beverages sector, agribusiness, health sector, fashion, services, education, creative and arts, and tourism and travel sectors. The research instrument is a questionnaire to measure respondents' perceptions of each variable. This study employs both purposive sampling and snowball sampling methods in its sampling approach. This method was chosen to collect data from respondents who possess special characteristics, specifically, MSME actors in Malang City who have or are considering using fintech. In distributing the questionnaire, the researcher also employed the snowball sampling method to expand the reach of respondents by asking the initial respondents to recommend other MSMEs that met the study's criteria. These two approaches aim to optimise the number of samples and obtain more diverse data on the factors that affect fintech adoption among MSMEs in Malang City.

To achieve the research objectives, this study adopts a framework that investigates the influence of perceived usefulness, perceived risk, and program benefits on MSMEs' decisions to adopt fintech (see Figure 1). Perceived usefulness reflects users' beliefs that fintech provides functional advantages and improves efficiency (Saeed et al., 2024; Irani, 2009), while perceived risk involves potential uncertainties or losses associated with fintech usage (Darmawan, 2022). Program benefits refer to the incentives or advantages offered by fintech platforms to attract users (Mascarenhas et al., 2021; Haqqi et al., 2020). These three constructs interact to shape decision-making, where users weigh benefits against potential risks in considering fintech adoption. Based on this framework, the study proposes three hypotheses: (1) Perceived Ease of Use of the Fintech Platform (POE) positively influences Fintech Use Decisions (DUF) among MSMEs in Indonesia; (2) Perceived Risk (POR) negatively influences Fintech Use Decisions (DUF); and (3) Benefits Offered/Sales Promotion (BP) positively influences Fintech Use Decisions (DUF) in the MSME context.

Figure 1. Research Framework




Source: Authors

### 2.2. Data Analysis

This study, with direct implications for the industry, aims to understand the determinants of fintech adoption in micro, small, and medium-sized enterprises (MSMEs) in Indonesia using the Structural

Equation Modelling (SEM) method. The SEM model was chosen because its advantages cover the weaknesses contained in the regression method. In this stage of SEM analysis, several tests will be carried out to ensure the validity and reliability of the primary data obtained, including the confirmatory factor analysis (CFA) test, which aims to determine the goodness of fit, as referred to by Hair et al. (2017). Then, a variance extracted (AVE) and composite reliability test were carried out to assess the consistency of the latent variable constructs (Hair et al., 2017).

The variables used in this study include the Decision to Use Fintech (DUF) as the dependent variable, Perceived Ease of Use of the Fintech Platform (POE), Perceived Risk (POR), and Benefits Offered/Sales Promotion (BP) as independent variables. By testing the relationship between the independent and dependent variables and identifying the significant effects of each variable, this study's findings will directly inform industry practices (Hair et al., 2021). SEM, a versatile tool, allows this study to model the complex relationship between perceived ease of use, perceived risk, benefits offered, and fintech usage decisions in a more comprehensive and detailed manner (Hair et al., 2021).

The relationship between variables in SEM forms a structural model that describes the prediction of latent independent variables on latent dependent variables (Haryono, 2017). The following equation presents the research model that will be tested:

$$DUF = \beta_1 POE + \beta_2 POR + \beta_3 BP + \epsilon$$

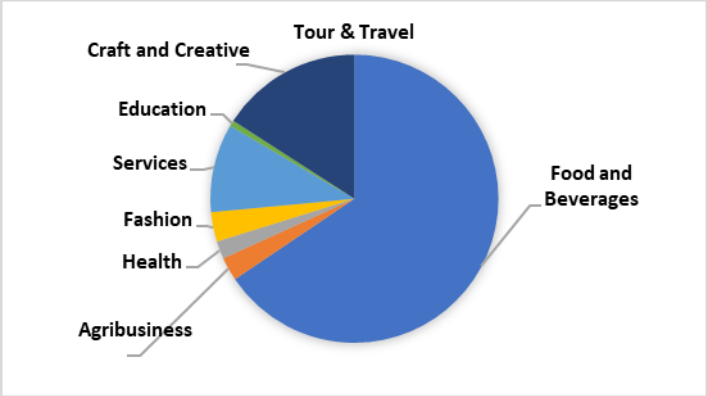
which
DUF: Decision to Use Fintech
POE: Perceived Ease of Use
POR: Perceived Risk
BP: Benefit
$\beta_1, \beta_2, \beta_3$ : Coefficient
$\epsilon$: error term

## 3. Result

### *3.1. Descriptive Statistics*

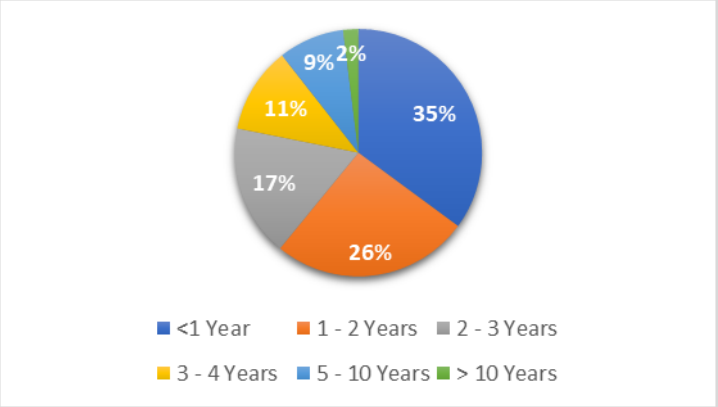
Based on the results of the analysis of the respondents that have been obtained, the following are the results of the descriptive analysis of the respondents in this study. Figure 2 presents the array of business fields operated by the respondents. The culinary business, a powerhouse with 99 MSMEs, takes the lead, followed by creative products and crafts (24 MSMEs), services (15 MSMEs), fashion (5 MSMEs), agribusiness (4 MSMEs), health (3 MSMEs), and education (1 MSME). The robust demand in the culinary business, driven by the basic human need for food and beverages, is a promising sign. Equally encouraging are the crafts and creative fields, the second largest percentage, which are buoyed by the city's tourism background. These fields hold immense potential for complementary production of unique souvenirs such as mask crafts and pottery. Then 3, Figure 3 illustrates the duration of Fintech usage among our respondents. The results are enlightening, with 61% of respondents using fintech for less than a year to two years, 28% for two to four years, and 11% for over five to ten years. These usage patterns are influenced by key factors, including age, technology adoption, and security concerns, all of which play a significant role in the decision to explore Fintech features for business development.

Figure 2. MSMEs Business Field




Source: Authors (2023)

Figure 3. Duration of Fintech Usage




Source: Authors (2023)

### *3.2. Normality, Validity and Reliability Test Result*

Based on data testing using the Structural Equation Modeling (SEM) method with the Lisrel 8.80 application, each indicator's Standardised Loading Factor (SLF) value is obtained as stated in the table above. According to Adam (2018), indicator variables are valid against latent variables if the SLF value is ≥ 0.50, so all indicator variables in this study are valid.

Table 1. SLF Valuer, Error and P-Value

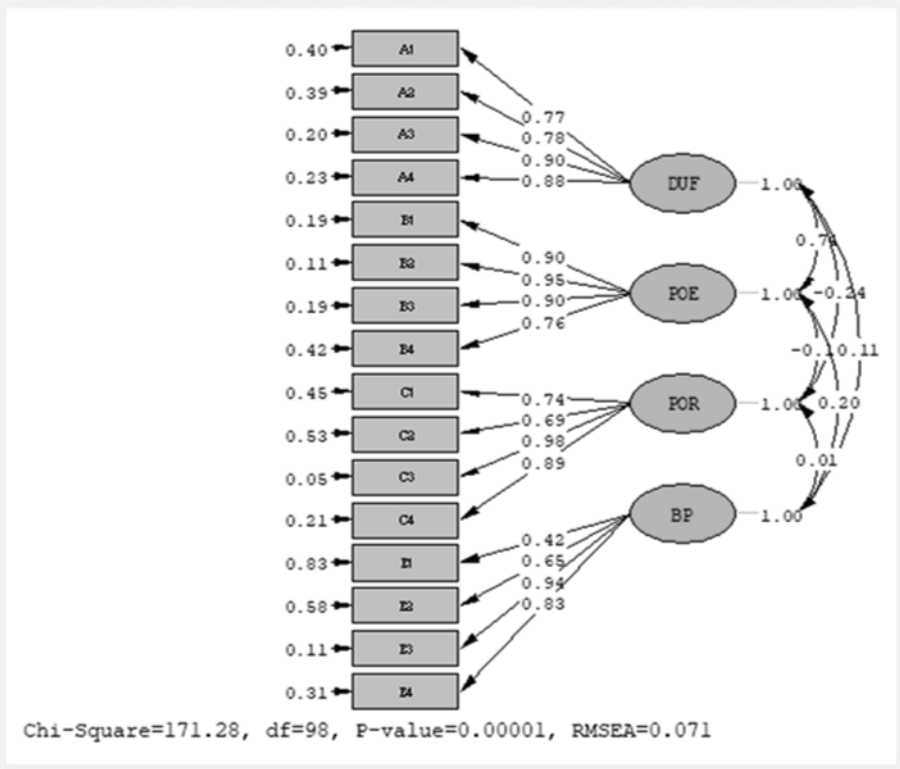
| Indicators | Latent Variables | SLF | Errors |
|---|---|---|---|
| B1 | POE | 0.9 | 0.19 |
| B2 | | 0.95 | 0.11 |
| B3 | | 0.9 | 0.19 |
| B4 | | 0.76 | 0.42 |
| **CR: 0.93** | | | |
| **VE: 0.77** | | | |
| C1 | POR | 0,74 | 0.45 |
| C2 | | 0,69 | 0.53 |
| C3 | | 0,98 | 0.05 |
| C4 | | 0,89 | 0.21 |
| **CR: 0.90** | | | |
| **VE: 0.7** | | | |
| E1 | BP | 0,42 | 0.83 |
| E2 | | 0,65 | 0.58 |
| E3 | | 0,94 | 0.11 |
| E4 | | 0,83 | 0.31 |
| CR: 0.82 | | | |
| VE: 0.50 | | | |
| A1 | DUF | 0.77 | 0.4 |
| A2 | | 0.78 | 0.39 |
| A3 | | 0.9 | 0.2 |
| A4 | | 0.88 | 0.23 |
| **CR: 0.90** | | | |
| **VE: 0.62** | | | |

Source: Autors (2023)

### *3.3. Path analysis*

The results of the path analysis show that the model has a reasonably good match where the results of the chi-square and SLF tests indicate that latent variables, such as DUF (Decision to Use Fintech), POE (Perceived Ease of Use), and POR (Perceived Risk), can be explained by the indicators. However, there are several indicators, especially in the BP (Benefits Offered/Sales Promotion) construct, which has an SLF below 0.7, indicating a lower contribution to its latent variable. The Construct Reliability (CR) and Variance Extracted (VE) values indicate the reliability of each indicator variable. Indicator variables are said to be reliable if the CR value is≥ 0.70 and VE ≥ 0.50 (Adam, 2018). Based on this information, all indicator variables in this study are reliable.

Figure 4. Path Analysis




Source: Authors (2023)

### *3.4. Goodness of Fit Test*

The data passed ten goodness-of-fit tests. The Chi-Square: df ratio of 1.86 and the P-value of Chi-Square at 0.03 indicate a good fit. Indices such as NFI (0.93) , RFI (0.92) , CFI (0.97) , IFI (0.97) , and NNFI (0.96) all exceed the 0.90 threshold for good fit. The GFI at 0.88, while marginally below the ideal 0.95, still suggests a good fit. However, AGFI (0.83) and indices like PGFI (0.63) and PNFI (0.76) indicate areas needing improvement. SRMR and EVCI also support the model's acceptability, with values within acceptable ranges. AIC (247.28) and CAIC (399.93) show mixed results, with AIC closer to the saturated value, indicating a good fit. Overall, the model demonstrates strong goodness of fit with some areas for potential refinement.

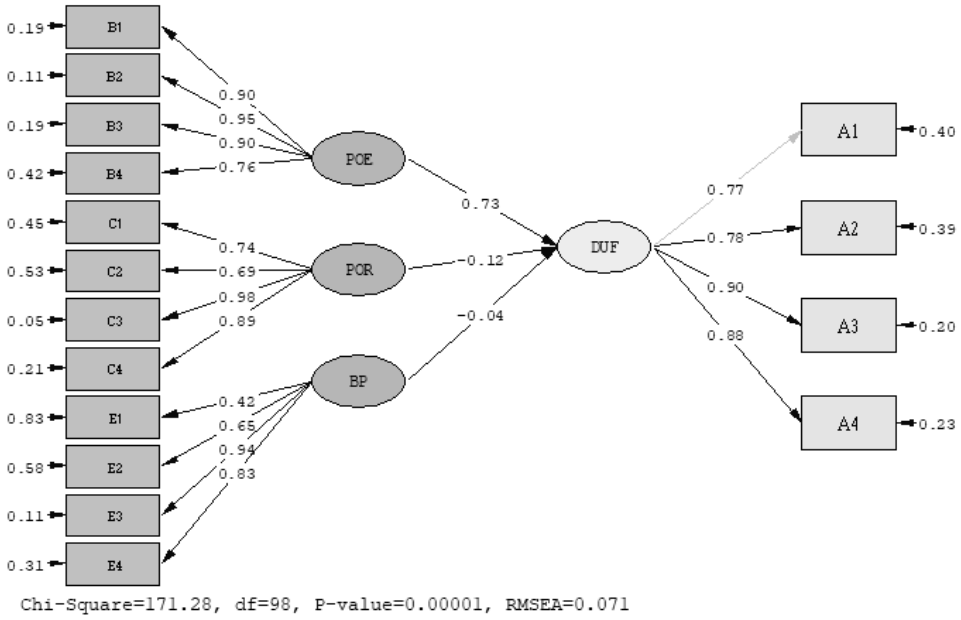
Table 2. *Goodness of Fit Value*

| Indicators | Standard | Value | Descriptive |
|---|---|---|---|
| Chi-Square: df | 0<CS:df<2 | 1,86 | *Good Fit* |

| Indicators | Standard | Value | Descriptive |
|---|---|---|---|
| P-Value of Chi-Square | 0,01≤P-Value of CS≤0,05 | 0,03 | *Good Fit* |
| GFI | GFI >= 0.95 Good Fit | 0,88 | *Good Fit* |
| SRMR | SRMR<0.10 Acceptable Fit | 0,60 | *Good Fit* |
| EVCI | 0: perfect fit | 1,65 | *Good Fit* |
| NFI | >=0.90 Good Fit | 0,93 | *Good Fit* |
| RFI | >=0.90 Good Fit | 0,92 | *Good Fit* |
| CFI | >=0.90 Good Fit | 0,97 | *Good Fit* |
| IFI | >=0.90 Good Fit | 0,97 | *Good Fit* |
| NNFI | 0.85<=Value<0.90 Marginal Fit | 0,96 | *Good Fit* |
| AGFI | 0.80<=Value<0.90 Marginal Fit | 0,83 | *Not fit* |
| PGFI | 0: Not fit | 0,63 | *Not fit* |
| PNFI | 0: Not fit | 0,76 | *Not fit* |
| AIC | good fit if it is closer to saturated value | 247,28 | *Good Fit* |
| CAIC | good fit if it is closer to saturated value | 399,93 | *Not fit* |

Sumber: Authors (2023)

Figure 5. Coefficient on Path Analysis




Source : Authors

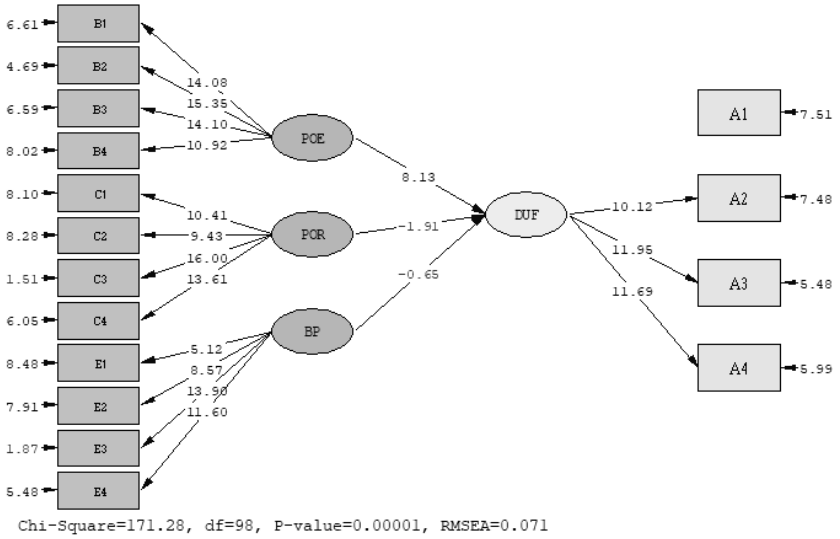
Herewith, based on figure 4 and analysis results, the coefficient of the path analysis are :

$$DUF = 0{,}73\ POE - 0{,}12\ POR - 0{,}04\ BP + \varepsilon$$

Based on Figure 4 and Figure 5, it can be concluded that the calculated t value of the POE variable (X1) on the DUF variable (Y) is -0.65 with the t table value of 8.13 and a positive coefficient direction. Hence, the POE variable has a significant effect on DUF. Increasing the ease of use of fintech will increase the likelihood of businesspeople implementing fintech in their businesses. On

the other hand, the t value of the POR (X2) variable on the DUF (Y) variable is -1.19, which is not significant. This is further supported by the t-table value of 1.66 and a negative coefficient direction, indicating that the POR variable does not have a significant effect on DUF. Similarly, the t value of the BP variable (X3) on the DUF variable (Y) is -0.65, which is not significant. This is in line with the t-table value of 1.66 and a negative coefficient direction, indicating that the BP variable does not have a significant effect on DUF.

Figure 6. T-test Analysis




Source : Authors (2023)

## 4. Discussion

Fintech, or financial technology, has revolutionised how we conduct financial transactions and manage finances. The ease and time-saving benefits of using fintech have a significant impact on business actors and the economy as a whole (Chauhan et al., 2023; Degerli, 2019). Entrepreneurs get several conveniences when using fintech. The first convenience is the ease of accessibility of financial services (Salleh et al., 2024), where MSMEs can easily access loans, payments (Chauhan et al., 2023; Salleh et al., 2024), and financial management without needing to visit the bank directly. This will undoubtedly make expanding business and streamlining business operations easier. The second convenience is an efficient transaction process through e-payments, such as e-wallets, online payments, or transfers, which will improve business operations (Chauhan et al., 2023). Apart from that, the increasingly rapid development of fintech facilitates the ease of managing finances, as several fintech applications are equipped to manage expenses, income, stocks, and even financial reports (Demirguc-Kunt et al., 2018). This will undoubtedly make it easier for businesspeople to make faster and more accurate financial decisions.

Our data analysis reveals a significant finding: risk perception does not significantly influence the decisions of MSMEs to use fintech. This is because the convenience and transaction efficiency offered by fintech, such as quick and hassle-free transactions, have a profound impact that outweighs the perceived risk. This happens because MSME players have complete trust in the fintech regulations and security measures implemented by the authorities. This trust then reduces their concerns regarding the risks that might arise in implementing fintech in their MSMEs. These findings are also in line with Luo et al. (2010), who added that perceived risk is the public's perception of the vulnerability they feel from various kinds of risks that exist. The risks associated with the use of fintech can be categorised into four main types: financial risk, security risk, privacy risk, and performance risk. Additionally, Purwantini and Amalia (2021) stated that trust emerged as a crucial factor influencing fintech adoption intentions. Interestingly, implementation problems and cyber risks did not significantly deter MSMEs from using fintech (Wiyono & Kirana, 2020).

Furthermore, our findings align with the notion that the promotional offers provided by each fintech platform do not significantly influence the decision to use fintech. This means that even without discount or cashback programs, businesspeople still have a strong inclination to use fintech due to its inherent convenience and long-term benefits. This result aligns with Al Awad and K. Mohammad (2020), who identified trust as a significant mediator between perceived risks and intention to use fintech applications. Additionally, factors such as financial experience, behavioural finance, and investor awareness may influence the use of fintech applications for investment decisions (Hesti Kartika et al., 2023). Meanwhile, other research suggests that platform quality characteristics, perceived benefits, and social norms significantly affect the intention to use fintech services (Seong-ha Jeong et al., 2023).

On the whole, the utilisation of fintech in MSMEs is a catalyst for economic growth (Utami et al., 2021). Fintech acts as a bridge to greater financial inclusion, simplifying access to financial services. This, in turn, bolsters the monetary base and boosts community participation in economic activities. The resultant increase in financial inclusion spurs the development and innovation of MSMEs in Indonesia, leading to the creation of more employment opportunities. These diverse positive impacts serve as a bulwark of economic stability, ensuring that entrepreneurs, armed with robust financial resilience, can steer clear of default risks. Policymakers can foster resilient entrepreneurship by promoting innovation, supporting access to capital, and enhancing entrepreneurial education (Khuan, 2024). Collaboration among stakeholders is crucial for establishing a resilient ecosystem that fosters economic prosperity and sustainability (Khuan, 2024).

## 5. Conclusion

Malang City, recognized as a center for MSME and creative economy development in East Java, is experiencing rapid digitalization, partly driven by its identity as the "City of Education." This environment has fostered the increasing adoption of financial technology (fintech) among local MSMEs to enhance business performance. This study analyzed the determinants influencing fintech adoption among MSMEs in Malang, focusing on Perceived Ease of Use, Perceived Risk, and Benefits Offered/Sales Promotion. The findings indicate that Perceived Ease of Use and Benefits Offered significantly influence MSMEs' decisions to adopt fintech services. In contrast, Perceived Risk does not appear to be a decisive factor. This can be attributed to the high level of trust MSMEs place in existing regulatory frameworks and fintech security systems, as well as the clear transactional advantages offered by digital platforms.

These results offer several important implications. Fintech service providers are encouraged to emphasize user-friendly design and communicate tangible benefits through strategic promotions. Although perceived risk does not significantly deter adoption in this context, efforts to maintain and transparently communicate data security and regulatory compliance will sustain user trust. Importantly, these insights support broader goals of accelerating digital transformation and enhancing financial inclusion in Malang City and potentially across similar urban centers in Indonesia.

While this research provides valuable insights, it is essential to acknowledge its limitations. Future studies could further enrich the analysis by incorporating other variable factors, such as government support, digital literacy, and resistance to technology. This comprehensive approach would allow for in-depth comparisons between MSMEs that have adopted fintech and those that have not, providing a more nuanced understanding of the determinants of fintech adoption.

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