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# IMPACT OF TECHNOLOGICAL CAPITAL ON FINANCIAL DISTRESS

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**Abstract**

The growth of the transportation and logistics sector in Indonesia since 2017 has not been significant until now coupled with the ongoing Covid-19 pandemic which forced companies to adapt to health emergencies through adaptation to technology. This study examines adaptation to technology through the variable of technological capital disclosure to financial distress. Using 92 valid observations in transportation and logistics sector companies, it was concluded that technological capital disclosure has a significant negative effect on financial distress, meaning that the higher the technology adaptation, the more the company has the potential to experience financial distress because the adaptation requires costs plus the research period involving the Covid-19 pandemic.
***Keywords: technology, distress, disclosure***

**Abstrak**

Pertumbuhan sektor transportasi dan logistik di Indonesia sejak 2017 belum signifikan hingga saat ini ditambah berlangsungnya pandemi Covid-19 yang memaksa perusahaan untuk beradaptasi dengan kondisi kedaruratan kesehatan melalui adaptasi terhadap teknologi. Penelitian ini mengkaji adaptasi terhadap teknologi melalui variabel *technological capital disclosure* terhadap kesulitan keuangan. Menggunakan 92 observasi valid di perusahan sektor transportasi dan logistik diperoleh kesimpulan *technological capital disclosure* berpengaruh negatif signifikan terhadap kesulitan keuangan, artinya semakin tinggi adaptasi teknologi maka perusahaan berpotensi mengalami kesulitan keuangan karena adaptasi tersebut membutuhkan biaya ditambah periode penelitian melibatkan pandemi Covid-19.
**Kata Kunci: teknologi, kesulitan, pengungkapan**

## INTRODUCTION

Many companies have adapted to technological developments, for example the launch of the EMOS (Enseval Mobile Order System) application by PT Enseval Mega Trading, Tbk as an alternative for customers when placing orders (Yuliana, Soegiarto, & Nurqamarani, 2019) or Kimia Farma Apps launched by PT Kimia Farma, Tbk so that consumers get better service (Royyana, 2021) including in the transportation and logistics sector.

One study explains that technology has a positive impact. The presence of technology gives birth to electronic proof of delivery (ePOD), namely approval of shipments and stamped is carried out electronically, live tracking and others, but the negative impact is the reduced need for warehouses because all transactions between buyers and sellers are carried out online

(Sumbal, Ahmed, Shahzeb, & Chan, 2023). Other studies also show that adaptation to technology will have a positive impact on supply chain agility when facing turbulence in market conditions (Shahadat, Hena, Yeaseen, Nathan, & Fekete-farkas, 2023), including increasing operational capabilities through blockchain technology (AlKubaisy & Al-Somali, 2023) and even increasing companies value (Pane, 2023).

In Indonesia, macro growth in the transportation and logistics sector in 2021 is still below Indonesia's economic growth which reached 3.69%, where in the previous year it reached 6.38% in 2019 and 8.49% in 2017 (Widiastuti & Ikhsan, 2022). During that period, three studies showed that transportation companies experienced potential financial distress. In 2019, 10 companies were in the dangerous zone while in 2020 there were 12 companies in the dangerous zone (Surachman, 2020). The second study also showed that in the period 2016 – 2020, 4 companies experienced potential bankruptcy (Safra, Fuad, & Dewi, 2022). Finally, in 2020, 2 companies experienced unhealthy conditions (Salsabilla, Hamidah, Nabila, & Fadlan, 2023).

From the discussion above, it shows that adaptation to technology provides many positive benefits, but in that period the company actually faced financial distress, so the question arises whether the application of technology can disrupt the company's financial condition. The answer to this question makes a practical contribution: companies can evaluate the technology that has been applied. In addition to practical contributions, this study provides theoretical contributions because it proposes the latest variable measurement of technological adaptation, namely technological capital, associated with financial distress so that the assessment of company conditions is more comprehensive.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT Technological capital

Technological capital in this study is the company's ability to manage technology. Historically, in the 1980s there was a significant difference in wages between workers because of the level of education, knowledge and mastery of technology possessed. This gap is widening with the presence of electrical energy so that manual work such as hauling, conveying and assembly is increasingly unneeded. For this reason, literacy is needed so that technological transformation becomes easier to produce changes, for example since the 1800s, The Times newspaper which used to rely on human power (muscular energy) for the printing process was replaced with steam power so that the print results in 1 hour increased 2 times (Ljungberg & Smits, 2004). From this history, it shows that to be able to manage technology, at least two important elements are needed, namely literacy skills and adaptation from the old way to a more modern way.

Literacy skills are generally acquired through education. One study explained, the higher the education of the board of commissioners in mining companies, the better the company's performance because it is more rational when processing information, when implementing actions and being responsible for its duties and responsibilities (Suhardjanto, Alwiyah, Utami, & Syafruddin, 2017). More specifically, CEOs who work in manufacturing companies and have an engineering education background have a positive impact on company performance and value because they are considered to have room for growth (Celikyurt & DÖNMEZ, 2017). Adaptation to technology is also important. One study shows that Germany's success in creating renewable energy technology is an advantage over China and India because of consumer demand to continue to innovate (Dögl, Holtbrügge, & Schuster, 2012).

## Financial Distress

Financial distress are a condition of companies that experience funding difficulties either in the sense of funds in the sense of cash or in the sense of working capital (Brigham, 2012 as

cited by Hantono, 2019). Financial distress have five forms, namely economic failure is a condition of company income that cannot cover total company costs such as capital costs, business failure is a condition of the company that can stop operational activities with the aim of reducing losses for creditors, technical insolvency is a condition of the company that is unable to meet mature obligations, Insolvency in bankruptcy is a condition where the book value of total liabilities exceeds companies market value and legal bankruptcy is a condition that causes the company to be legally bankrupt (Gamayuni, 2011 as cited by Hantono, 2019). The clearest signs of financial distress are negative profitability, declining market position, inability to pay cash obligations, high employee turnover, decreased sales volume and value and dependence on debt (Salatin, Darminto, & Sudjana, 2013).

To determined financial distress, various methods that can be used include Grover's GScore model, Springate, Zmijewski model, and Altman's Z-Score model (Primasari, 2017). This study uses Altman's Z-Score Model because it combines various measures necessary for liquidation, profitability, solvency and calculating activity. In addition, even though company is very rich, if the Z-Score shows a bad value, the company must be careful (Sapari, Patiasina, & Mudiha, 2023).

Financial distress are a condition which avoided by the company, so to reduce this risk, the company manages governance well so that there is a conducive relationship between shareholders and management (Putri & Siswanto, 2019). Other potential variables are technological capital because it has a positive impact so operations become more efficient (Ljungberg & Smits, 2004), gives companies growth opportunity (Celikyurt & DÖNMEZ, 2017), creates better profit margins (Arora & Rahman, 2017) and increases company value through the creation of intellectual property rights (Alazzawi, Upadhyaya, El-Shishini, & Alkubaisi, 2018). The application of blockchain technology can also increase stock market returns and price volatility (Othman, Alshami, & Abdullah, 2022).

Based on the reasons above, the hypotheses proposed are:

**H1 = Technological Capital Disclosure Lowers Risk of Financial Distress**

The research framework of the above hypothesis is as follows:


**Picture 1. Framework RESEARCH METHOD**

This study uses secondary data from the Indonesia Stock Exchange (IDX) in the form of annual reports and financial statements, purposive sampling with the criteria of successively having a complete report from 2018 – 2022. The population of sampling companies, namely the transportation and logistics industry according to the IDX Industrial Classification (IDXTRANS) category, is 32 companies. This research uses quantitative methods of panel data from 2018 – 2022 and is processed with Eviews software version 10.

The dependent variable of this study is the technological capital disclosure, namely the disclosure of the results of technology adaptation and the presence or absence of the director's technological education background. This measurement is novelty because previous research used the total information technology expenditure budget (Dehning, Pfeiffer, & Richardson, 2006), rankings published by InformationWeek 500 magazine (Arora & Rahman, 2017) and development research costs and intellectual property rights values (Alazzawi et al., 2018) while

this research was conducted through disclosure by dividing the number of disclosures by companies by a set cumulative score. Each disclosure item is assigned a score of 0, if the item is not disclosed; 1, when briefly expressed; 2, when disclosed in more detail. The cumulative score set is 3.

Two disclosure items in technological capital are the results of adaptation to technology and the technological educational background of the directors. The results of technology adaptation mean that the technology developed is specific to the internal interests of the company while the director's technology education background covers undergraduate, master and doctoral strata, for example food technology education, information technology education, electrical engineering education and others.

To measure financial distress, Altman's Z-Score method is used with a combination of five ratios, namely the ratio of working capital to assets, retained earnings to assets, earnings before interest and taxes, the market value of equity to the value of debt and sales to total assets. The categories of companies that experience or do not experience financial distress are (Salsabilla et al., 2023):

a. If the Z value > 2.99 then it includes a healthy company
b. If the value of 1.8 < Z < 2.99 then including companies whose health cannot be determined

If the Z value < 1.8 then it is an unhealthy company.

Details of measurements to the four variables are described in the following table:

**Table 1. Summary of measurement variables**

| No | | Definition | Measurement |
|---|---|---|---|
| **Variable** | | | |
| **1** | ***Technological capital disclosure* (TECH)** | | |
| | a. The result of adaptation to technology | Specific technology developed and used internally by the company | **TECH=$\frac{\Sigma X_{ij}}{n_j}$** If, Xij = number of scores obtained nj = number of scores set |
| | b. Director's technology background education | The existence of directors with technology / engineering education at the bachelor's, master's, and doctoral levels | Score value: 0, If not expressed 1, If expressed generally 2, If expressed more descriptively 3, If expressed with nominal |
| **2** | **Financial distress (FINDES)** | Financial ratios to predict business failure | Z-Score = 0,717 $X_1$ + 0,847$X_2$ + 3,107$X_3$ + 0,420 $X_4$ + 0,998$X_5$ |

source: Pane, Wangsih (2024)

Hypothesis testing is carried out using model feasibility tests and data quality tests with regression models as follows:

$$\mathbf{FINDES_{it} = \alpha + TECH_{it} + \varepsilon}$$

When,

FINDES = financial distress of company i period t
TECH = technological capital disclosure of company i period t

## RESULT AND ANALYSIS

The first test result is to select the feasibility of the model and is presented in the following table:

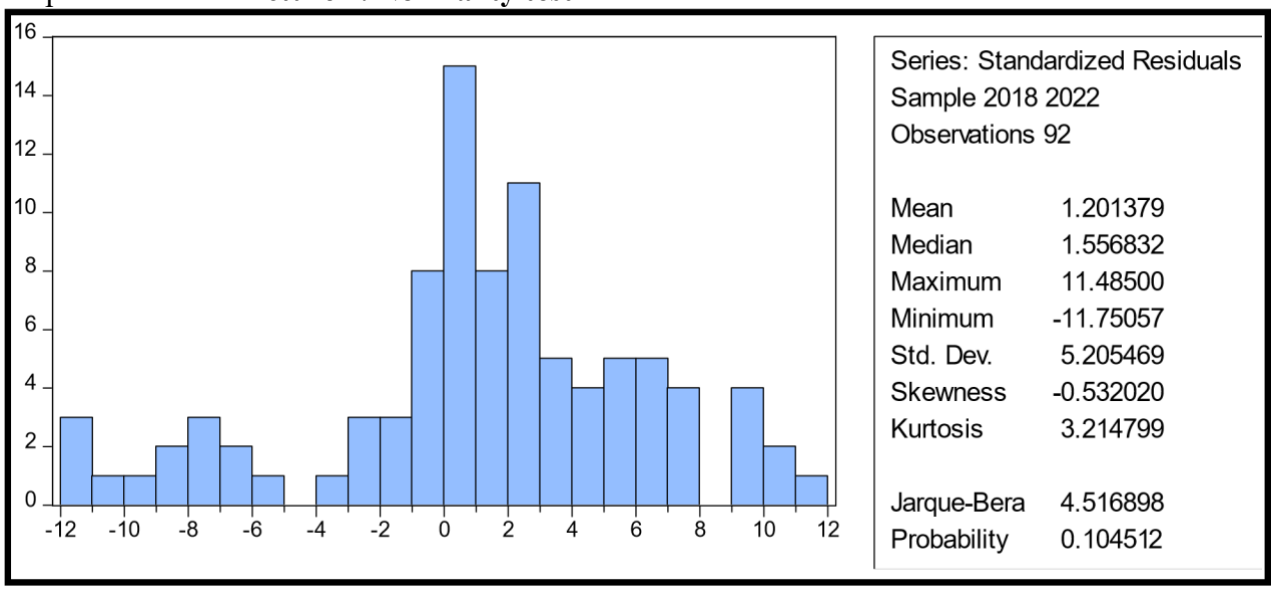
**Table 2. Panel data regression model test**

| Method | Testing | Value | Result |
|---|---|---|---|
| **Chow test** | *Common effect vs Fixed effect* | Prob : 0,029 | *Fixed effect* |
| **Haustmann test** | *Fixed effect vs Random effect* | Prob : 0,6027 | *Random Effect* |
| **Lagrange test** | *Common effect vs Random effect* | Breusch-Pagan 0,021 | *Random effect* |

source: Pane, Wangsih (2024)

From the table above, it is concluded that the selected model is *Random effect*.

The second test result is the classical assumption test. The normality test results appear in picture below: **Picture 2. Normality test**




source: Pane, Wangsih (2024)

The picture above shows the value Jacque-Bera 4,516898 > 0,1 and probability 0,104512 > 0,05 this means that the residual values are normally distributed.

Heteroscedasticity testing with Glesjer shows as follow:

**Table 3. Heteroscedasticity test**

| Variable | t-statistics | *Probability* | Result |
|---|---|---|---|
| TECH | 1,665513 | 0,0993 | No heteroscedasticity |

source: Pane, Wangsih (2024)

Table above shows *technological capital* prob 0,0993 > 0,05, means no heteroscedasticity problem.

Multicollinearity testing shows as follow:

**Table 4. Multicollinearity test**

| | TECH |
|---|---|
| TECH | 1.0000 |

source: Pane, Wangsih (2024)

The table above shows that there is no relationship between independent variables so that there is no problem of multicollinearity.

Autocorrelation testing shows the results as follow:

**Table 5. Autocorrelation test**

| Test | Result |
|---|---|
| ***Durbin Watson*** | 1,433 |

source: Pane, Wangsih (2024)

The table above shows, value *Durbin Watson* 1,433 < $D_L$ 1,496 this means there is an autocorrelation problem, but this research can still be continued because autocorrelation is more suitable for time series data (Basuki & Prawoto, 2017). Descriptive statistic of variables presented as follow:

**Table 6. Descriptive Statistic**

| | Financial distress | Technological capital |
|---|---|---|
| **Mean** | 1.474076 | 0.254348 |
| **Median** | 2.079120 | 0.200000 |
| **Maximum** | 12.86830 | 1.000000 |
| **Minimum** | -13.56008 | 0.000000 |
| **Std. Dev.** | 5.528633 | 0.308279 |

source: Pane, Wangsih (2024)

Based on table 6 above, there are two variables that get an explanation. First, financial distress. The minimum value of -13.56 is owned by PT Air Asia Indonesia, Tbk (CMPP) in 2020, meaning that in that year the company experienced financial distress. Based on the annual report in that year, the company recorded a loss of Rp. 2,754,589,873,561 due to a 76% decline in sales from 2019. The International Civil Aviation Organization (ICAO) also reported a 60% decrease in international passenger traffic due to Covid-19 conditions. The International Air Transport Association (IATA) also reported that world flight demand fell by 65.9% compared

to last year. The maximum value of 12.86 > 2.88 is owned by PT Pelayaran Nelly Dwi Putri, Tbk (NELY) in 2022, meaning that the company in that year did not experience financial distress. In that year, the company earned a profit of Rp. 114,620,997,376. The company's average (mean) of 1.474076 < 1.8 means that the average company experienced financial distress, especially in 2020 and 2021 due to Covid-19 conditions. Some companies experiencing financial distress include PT Garuda Indonesia, Tbk (GIAA), PT Batavia Prosperindo Trans, Tbk (BPTR), PT Sidomulyo Selaras, Tbk (SDMU).

The second variable is technological capital. A minimum value of 0.00 means that the company does not disclose the existence of directors who have a background in technology education and adaptation to technology. A maximum value of 1.00 means that the company discloses the existence of directors who have a technology education background, for example PT Garuda Indonesia, Tbk (GIAA) which has directors with electrical engineering and industrial engineering education backgrounds from the Bandung Institute of Technology. In addition, PT Garuda Indonesia, Tbk (GIAA) adapted technology through the use of big data for marketing and sales activities in 2018, the addition of new payment options such as LinkAja, BNI Yap, PayPal, digital wallets in 2019, the addition of new functions and features such as System of Airline Ancillary Service (SAAS), promo cards, Garuda vouchers in 2020, the addition of payment options, namely Kredivo, Shopee pay in 2021 as well as the addition of foreign currency payments and digitalize reading materials as a substitute for in-flight magazines as support for health protocols.

**Table 7. Descriptive statistic financial distress observation**

| **Year** | Healthy company | Grey area company | Financial distress company |
|---|---|---|---|
| **2018** | 7 | 3 | 9 |
| **2019** | 7 | 1 | 12 |
| **2020** | 5 | 3 | 11 |
| **2021** | 8 | 3 | 6 |
| **2022** | 9 | 1 | 7 |
| **Sub total** | **36 (39,1%)** | **11 (11,95%)** | **45 (48,91%)** |
| **Total observation** | | **92 Observation** | |

source: Pane, Wangsih (2024)

From table 7 above shows the classification of healthy companies, unhealthy companies and companies in the gray area. As a result, 48.91% of 92 observations were companies in unhealthy condition. This result is in line with previous studies where some companies in this sector experienced financial distress (Safra et al., 2022; Salsabilla et al., 2023; Surachman, 2020) coupled with macro industrial growth that has not improved (Widiastuti & Ikhsan, 2022). The table above also shows that 39.1% of companies are in the healthy category, meaning during that period despite being affected by the Covid-19 pandemic, companies continued to innovate, for example PT Blue Bird, Tbk (BIRD) maximized opportunities by launching the BirdSend service, which is delivery of goods through a taxi fleet in 2020, PT Satria Antaran Prima, Tbk (SAPX) in collaboration with technology company PT Aiqqon Triarta Mas (AIQQON) launched a cashless on COD service in 2020. From the same table, it can be seen that 11.95% of companies are in the gray area, meaning the company's financial health cannot be determined (Salsabilla et al., 2023).

**Table 8. Hypothesis test**

| Variable | Coefficient | Predictions | Sig. | Result |
|---|---|---|---|---|
| **Constant** | 1.383292 | | 0.2409 | |
| **TECH** | -4.366439 | + | 0.0144 | rejected |
| *Adjusted R Square* | | | 0.049330 | |
| Dependent Variable: Earnings | | | | |

Significance level: 1% (*), 5% (**), 10% (***) source: Pane, Wangsih (2024)

Based on table 11 above, technological capital is significantly negative for financial distress. These results show that technological capital actually causes companies to experience financial distress, meaning that the hypothesis is not fulfilled (H rejected), in contrast to previous studies that can have a positive impact (Ljungberg & Smits, 2004; Sumbal et al., 2023), creating supply chain agility (Shahadat et al., 2023) and providing benefits for companies (Arora & Rahman, 2017). An adjusted R – square value of 0.049330 (4.9%), meaning that 95.1% of financial distress can be explained by other factors such as corporate governance or auditor opinion.

This result can occur for three reasons. First, the research period involved the Covid19 global health emergency in 2020 and 2021 where macroeconomic conditions weakened, resulting in a decrease in purchasing power. As a result, the implementation of technology is carried out so that the company can survive during the pandemic even though it burdens the company's finances. Second, in addition to the Covid-19 pandemic, post-pandemic economic uncertainty is still an obstacle for companies to improve. Third, the Russia-Ukraine war and the imposition of sanctions that followed caused limited world commodity supplies so that global economic growth slowed.

## CONCLUSION

Adaptation to current technology is mandatory to provide convenience to customers as well as being a way out when a pandemic occurs, but the implementation of technology requires costs that have the potential to disrupt the company's financial health. This study tries to examine the effect of technological capital on potential financial distress. As a result, technological capital actually makes companies face financial distress for two reasons. First, the company faced the Covid-19 pandemic period, resulting in a decrease in purchasing power and a macroeconomic slowdown. Second, post-pandemic companies still face uncertainty in economic growth plus the Russia-Ukraine war which affects conditions globally.

This study has two drawbacks. First, mapping technological capital based on the narrative in the annual report so that it cannot be an absolute reference to the real truth because some companies do not disclose it for various reasons. Second, this study uses Altman's ZScore method to calculate potential financial distress while there are other methods to calculate them and potentially produce different conclusions.

For this reason, further research is needed to make it better, for example comparing two methods of calculating financial distress or adding variable research costs as a complement to technological capital calculations.

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