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THE EFFECT OF TECHNOLOGICAL CAPITAL DISCLOSURE ON MANUFACTURING COMPANIES EMPLOYEES

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ABSTRACT

Technological transformation is mandatory for companies sustainability, but unfortunately it has potential negative impact on employees. This research examines the impact of technological capital disclosure on the number of employees and salary expenditure by expansive test. Using secondary data of 366 observations and 371 observations of expansive test with manufacturing industrial companies in 2015 - 2020, it was found that technological capital had a significant negative impact on the number of employees and salaries expenditure2. These results show highly technology used and the presence of directors with technical/technology education backgrounds can reduce number of employees and salary costs. For this reason, research contribution is additional consideration for companies director when investing in technology so the benefits are equally received by companies and employees, for example through technology training and similar development of human resources.
***Keyword**: salary, employee, disclosure, technology*

A. INTRODUCTION

Technological transformation is a fundamental phase that every organisation, industry and society must go through in order to achieve sustainable development although negative impacts will always exist alongside the positive benefits. This positive impact such as reduce transaction processing time (Ali et al., 2023), support decision-making and make it easier to actively follow trends and customer needs (Muchlis et al., 2021) even received a positive stock market response (Lee et al., 2017).

Technology utilisation are diverse. In banking industry, digitalisation improve security and convience of transactions. (Oktaviani & Sarkawi, 2017) and also increase electronic money transactions from 2015 - 2021, made PT Bank Bank Central Asia, Tbk (BCA) acquisition the Royal Bank. (Marcellina et al., 2022). In tourism industry, technology was help MSME for create, innovate, and connect with stakeholders. (Poerwanto & Shambodo, 2020). In manufacturing industry, there are five categories of technology utilisation. Firstly, the Internet of Things (IoT), which is a dynamic WIFI-based infrastructure equipped with sensors (RFID, barcodes) that allow them to capture, process and communicate data between technology and humans. (Margherita & Braccini, 2023) for example RFID unitilisation in supply chain management. Companies which announce RFID utilisation have a positive market reaction because investors and shareholders recognise cost saving and improve future performance. (Jeong & Lu, 2008). Second, integrated logistics, which is a set of tools used to make the warehouse run automatically through conveyors automation, integration of production and time recording of inventory (Margherita & Braccini, 2023). Third, robotics, which is collaborative and autonomous equipment that capable of performing specific tasks (Margherita & Braccini, 2023) for example 3D printing utilisation received a positive market reaction because it can shorten imaging and processing time (Goldberg et al., 2021). Fourth, tracking system, which is an integrated system of hardware, barcode scanners, QR codes and photos to map flow of raw material (Margherita & Braccini, 2023). Last, data analytics, which is an integrated system to

provide visual and real-time feedback on each job relating cost, lead time, main product and by-products (Margherita & Braccini, 2023) for example EMOS (Enseval Mobile Order System) application is able to provide maximize product price and inventory accuracy so errors with customers can be minimised (Yuliana et al., 2019).

Beside benefits side, technology can also have a negative impact. First, data securities threats. One study showed that companies with less security breaches disclosure have more positive market reaction (Chen et al., 2023). Second, threat of employee reduction. Presence of latest technology have impact to employee direct or directly employee involvement. It mean companies will establish their own standards, procedures and regulations then open recruitment for new employees (Azmy, 2024). In addition, technological advances make employees feel threatened and potentially leave their jobs. It could an impact on stability employees number in companies (Nurmiyati & Astuti, 2021). Also, decrease in employee number occur by termination. In 2015, BPS recorded that 320.000 people were laid off due to downsizing strategies for overcome financial problems and the majority was carried out by mining and manufacturing companies (Hidayati, 2016) until 383.600 people as of August 2020 (Krisnandika et al., 2021).

Above phenomenon shows technology implementation impact to companies, both positively and negatively. This study specifically examines negative impact of implementation technology, spesifically whether a companies technology adaptation causes a decrease in the number of employees. This research do as a consideration for board of directors when investing in technology so they can received in a balanced benefit between companies and employee for sustainability goals. Second, providing theoretical input for accounting literature to observe technological developments through narrative presentation in the annual report by new variable for technology disclosure called technological capital disclosure, contains elements of disclosure companies technology adaptation and director technological education background.

This research also urgent for two reason. First, add novelty in accounting literature through technological capital disclosure in line with technology era. Second, as predictor future companies condition relating their performance, value and sustainability.

Disruptive Innovation Theory

Technological innovation cannot be separated from the beginning of the industrial revolution in the early 19th century and is called industry 1.0. It was marked by the existence of steam engines, ships and airplanes, including large-scale manufacturing owned by private individuals. Industry 2.0 starting with electrical and electronic innovations such as computers, robots, mechanical machines and the division of labor for increased efficiency and effectiveness. Industry 3.0 is an era of development cyberspace, Internet-based information and communication technology. Industry 4.0 colored with artificial intelligence, software and algorithm-based and industrial machines with connections Internet of Things (IoT) so that it allows information sharing, cognitive technology and augmented reality (Poerwanto & Shambodo, 2020).

This revolution also coincides with the elaboration of Clayton M. Christensen in The Innovator's Dilemma 1997 on the theory of disruptive innovation. Christensen stated actors who have been operating for a long time will be defeated by the presence of new business actors because they initially serve unattractive consumers but potentially take over old actors market share by time (Raynor, 2011). Christensen also expands on his theory that disruption should provide value for low-end users or new users, lowering costs and being able to meet market expectations without competing fiercely with old business actors (Liu et al., 2020).

Technological capital Disclosure

Disclosure is an effort to provide notifications to stakeholders relating companies activities, achievements and failures. Securities Exchange Commission (SEC) categorize two disclosure purpose. First, protective disclosure to protect investors (Sulistiana, 2017) For

example, Enterprise Risk Management (ERM) disclosure, is companies commitment disclosure to transparency and maintain governance (Trisnawati et al., 2023). Second, informative disclosure to provide appropriate information for stakeholders (Sulistiana, 2017) For example Environmental, Social and Governance (ESG) disclosure (Sunarsih & Augustine, 2024).

Technological capital is part of informative disclosure. It provides information to stakeholders regarding companies technology adaptation and the presence of directors with a background in technology / engineering education. Previous studies state adaptation through use of blockchain can increase firm value (Ali et al., 2023) Likewise Radio Frequency Identification (RFID) (Jeong & Lu, 2008), 3D printing (Goldberg et al., 2021), big data (Muchlis et al., 2021) and artificial intelligence (Lui et al., 2022). Directors who have a technology background also have a positive impact because it trigger companies growth (Celikyurt & Donmez, 2017), provide expand research and development financing (Barker & Mueller dalam Garcia-Blandon et al., 2019) and map resources and seek alifification better for technology development (Yavuz & Iacoviello, 2023).

Employee

According to Indonesia Law no. 13 of 2003 concerning employment, a worker / laborer is any person who works by receiving wages or other forms of remuneration meanwhile company is a form of legal entity business owned by an individual, partnership, or other legal entity, either privately or state which paying wages or other forms of remuneration. Employee Termination (PHK) is termination of employment relationship due to a certain matter and also termination of rights and obligations between the worker/laborer and the employer.

Employee termination (PHK) happens for two reasons. First, economic crisis, for example, the Covid-19 pandemic. During the pandemic, International Labour Organization (ILO) estimated 47 million representing 54 percent of all employers in the world have been laid off (Ngadi et al., 2020). Second, a dynamic environment. In certain environment, short product cycle and technological changes force companies to continue maximize their advantages by constantly seeking ideas and knowledge from new people (Fijalkowska & Hjartåker, 2017). Technology changes also cause employees feel uncomfortable (Nurmiyati & Astuti, 2021) because it has certain operational standards that are not necessarily owned by employees (Azmy, 2024).

Hypothesis development

Three previous studies show technology is able to provide positive benefits for companies. First, big data used by companies can increase firm value through innovation, personil integration, institutions, entities and processes (Muchlis et al., 2021). Second, companies with good technology capabilities are positively responded by market when adopting technology (Lui et al., 2022). Third, companies which announce use of 3D printing also reacted positively by market because it speeds up products processing (Goldberg et al., 2021).

Three previous studies also show technology is able to improve employee performance because it helps production process on time, produces a larger amount of production, and reduces the waste of raw materials (Kumbadewi et al., 2021), minimizing working hours (Iskandar & Jayanto, 2022) as well as improving knowledge and skills to facilitate their duties and responsibilities (Sjahruddin et al., 2024).

Unfortunately, technology also has a negative impact such as regarding employee satisfaction (Mahardini et al., 2023) even feeling threatened and potentially quitting their jobs (Azmy, 2024) so employees number will decrease due to technology implementation. For this reason, the hypothesis proposed is:

H : Disclosure of Technological Capital has a significant negative effect on employees number.

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The research framework of the proposed hypothesis as follows.

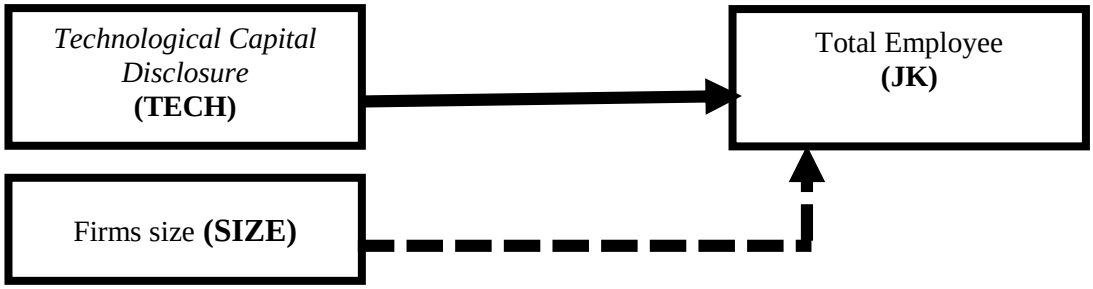

Figure 1. Conceptual Framework

B. RESEARCH METHODS

Companies population sample is manufacturing industry according JASICA (Jakarta Stock Industrial Classification), total of 66 companies during the year 2015 – 2020. Sample selection was purposive with three criteria. First, it has an annual report and stated monetary value in rupiah. Second, it did not have a negative equity value during the research period. Third, the company has been operating for at least 20 years.

This research is quantitative category with cross-data (cross section) which comes from the annual report of the Indonesia Stock Exchange (BEI). Data was obtained through content analysis and certain numbers in financial statements.

Independent variable technological capital disclosure which consists two elements, namely result of technological adaption and directors technology / engineering education background. Results of technology adaptation is relating application, software, portals and other technologies developed and used only by the companies. Directors technology education background means there is formal engineering / technology education for directors, for example bachelor of information technology, bachelor of food technology. This variable is measured through a score of 0 – 2 for both elements, summed and divided by 3 as a cumulative score.

Dependent variable is employee number held in the audit report. To strengthen this study according to Arifin et al., (2023), a separate expansion test was carried out by replacing employee number with total salary. For comprehensive test, a firm size use as controlling variable and proxy with total assets.

Table 1. Detail Variable Measurement

No	Variable	Definition	Measurement
1	***Technological capital* Disclosure (TECH)** The result of adaptation to technology.	Specific technologies developed and used internally by the company	$TECH=\frac{\Sigma Xij}{nj}$ where, Xij = number scores obtained nj = number cumulative scores.
	Directors technology educational background	Existence of directors with technology / engineering education with level bachelor's, master's and doctoral levels	Score : 0, if not disclosed 1, when short disclosed 2, if expressed more descriptively

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2	**Employee number (JK)**	Employee number stated in audit report	Ln employee number
	Total salary (TG)	Total salary in financial statements	Ln total salary
3	**Firm size (SIZE)**	Total assets in financial statements	Log Total Aset

Source : processed (2024)

Hypothesis test is carried out two times, main test and expansion test through replace employee number with total salary. All through model tests and quality daya tests with following regression model :

$$\mathbf{JK_{it} = \alpha + TECH_{it} + SIZE_{it} + é} \quad \mathbf{(1)}$$

$$\mathbf{TG_{it} = \alpha + TECH_{it} + SIZE_{it} + é} \quad \mathbf{(2)}$$

where,
JK = employee number of company i period t
TG = total salary of the company i period t
TECH = technological capital disclosure of company i period t
SIZE = firm size company i period t

C. RESEARCH AND DISCUSSION

First test is model test and results as follow:

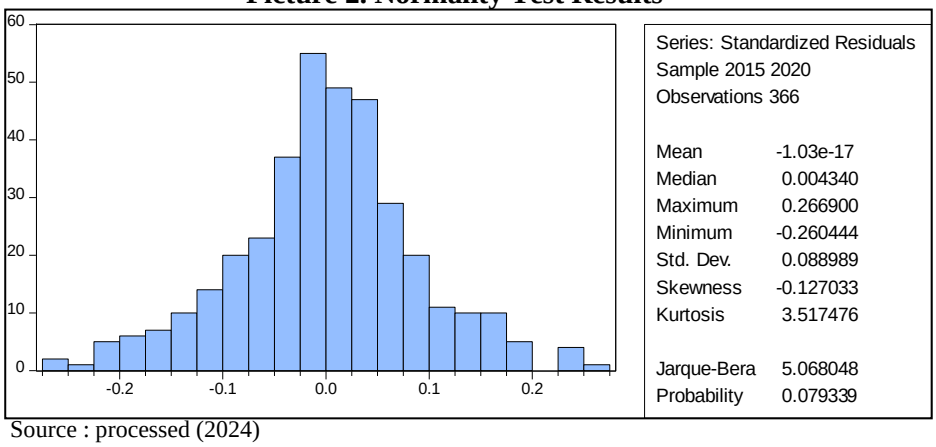
Table 2. Panel Data Regression Model Test Conclusion

Method	Testing	Value	Result
Chow Test	*Common effect vs Fixed effect*	Prob : 0,000	*Fixed effect*
Haustman Test	*Fixed effect vs Random effect*	Prob : 0,000	*Fixed Effect*

Source : processed (2024)

Table 2 above shows fixed effect is model choosed. Second test is classical assumption test and results as follow :

Picture 2. Normality Test Results



Source : processed (2024)

Picture 2 shows Jacque-Bera 5,068048 > 0,1 and probability 0,079339 > 0,05, means data residual value is normally distributed.

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Table 3. Heteroscedasticity Test

Variable	t-statistik	*Probability*	Result
TECH	0,37411	0,7086	No heteroscedasticity
SIZE	0,19047	0,8491	No heteroscedasticity

Source : processed (2024)

Table 3 show probability technological capital (TECH) and firm size (SIZE) Above 0.5 means no heteroscedasticity.

Table 4. Multicolinearity Test

	TECH	**SIZE**
TECH	1.0000	0,3744
SIZE	0,3744	1.0000

Source : processed (2024)

Table 4 shows no correlation between independent variables with a value of more than 0.8, mean no autocorrelation problem.

Table 5. Autocorrelation Test

Test	Value
Durbin Watson	1,039467

Source : processed (2024)

Table 5 shows Durbin Watson value is 1,039467 < Du 1,83264. It means autocorrelation problem occured but ignored because autocorrelation is more suitable for time series data (Basuki & Prawoto, 2017).

Table 6. Descriptive Statistic

	Employee number	**Technological capital disclosure**	**Firm Size**
Mean	7.623308	0.302368	21.89498
Median	7.320156	0.333333	21.57334
Maximum	12.32891	1.000000	26.58678
Minimum	3.367296	0.000000	18.71210
Std. Dev.	1.639464	0.289250	1.718014

Source : processed (2024)

First, average companies has total assets of Rp. 3.227.520.396, employees 2,045 personil and disclose 30% technological capital owned. This shows on average, companies only partially discloses results of technology adaptation and the technological education background of its directors.

Second, minimum value. Minimum number employees owned by PT Betonjaya Manunggal, Tbk (BTON) in 2020 with 29 employees in the office and 114 people in the production area. Company lay off 2 office employees non-undergraduate strata (SMA) compared to 2019 while the number of employees in the production area remained the same. In 2020, company did not disclose the results of adaptation to technology and did not have a board

of directors with an engineering/technology education background. Minimum firm size is owned by PT Kedaung Indah Can, Tbk (KICI) worth Rp. 133.831.888.816 in 2015. This company had 724 employees in the same year and experienced employees lay offs compared to the previous year of 740 people. Technological capital disclose minimum value is 0 means company does not disclose any technological adaptation and directors educational technology background. (Utomo & Pratama, 2024)

Third, maximum value. Maximum employee number owned by PT Astra International, Tbk (ASII) in 2018 is 226,140 personil with an asset value of Rp. 344,711,000,000,000 and provides technological capital disclosure 30% such as directors with mechanical engineering education background. Maximum firm size also owned by PT Astra International, Tbk (ASII) in 2019 is worth Rp. 351.958.000.000.000 with a total of 225,105 personil. This company also made 100% technological capital disclosure, means beside disclose directors technological educational background in mechanical engineering, company also reveals digital service innovations TARRA (Toyota Interactive Virtual Assistant) to meet customer needs for 24 hours.

Fourth, from the descriptive statistics above, it is concluded big companies tend to have a large number of employees and maximum technological capital disclosure. It shows technology as role play in larger companies because complexity and unique problem.

Table 7. Hypothesis Test

Variable	Coefficient	Predictions	Significance	Result
Constant	3,826063			
TECH	-0,106108	-	0,00004	Significant
SIZE	0,174895	+	0,00000	Significant
Adjusted R Square			0,997054	
Variable dependent : Employee number				
Level of significance : 1% (*), 5% (**), 10% (***)				

Source : processed (2024)

Table 7 shows technological capital disclosure and firm size are able to explain employee number by 99.7%, mean only 0.3% explained by other factors. It shows technology is vital role on number of employee inside company.

Hypothesis test results technological capital disclosure negative significant negative on employee number (p value < 0,05). It means technology adaptation and directors with a technology background can reduce employee number. (H accepted). Firm size increasing could increase employee number, both in administrative / office area and production area.

Decrease employee number to technology is in line with previous research, because working hours have become more efficient (Iskandar & Jayanto, 2022), new standards is not owned by employees (Azmy, 2024), employees feel uncomfortable and threatened (Nurmiyati & Astuti, 2021), downsizing effects by company (Hidayati, 2016) and Covid-19 impact (Ngadi et al., 2020). Another factor are firm strategy to create a lean and agile organization so company achieves optimal performance as stated by PT Indocement, Tbk (INTP) in 2019 and more serious digitalization efforts stated by PT Astra International, Tbk (ASII) since 2016.

Expansive test

For comprehensive result, expansive test was carried out by replace employee number (JK) with total salary (TG). Both were tested separately and gave following results:

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Table 8. Expansive test

Variable	JK (employee number)	TG (total salary)
Constant		
TECH	0,00004*	0.0652***
Coefficient	-0,10610	-0.0029
SIZE	0,00000*	0.0000*
Coefficient	0,17489	0.0262
Adjusted R - square	0,997	0,994
Observasi	*366*	*371*
Significance level : 1% (*), 5% (**), 10% (***)		

Source : processed (2024)

Table above shows technological capital disclosure negative significant to total salary (p value 0,0652 < 0,10) in line with employee number (p value 0,0004 < 0,05). It stated technological adaptation decrease salary paid to employee and also employee number but firm size gives different results. Greater total assets impact number employee increased (p value 0,000 < 0,001) in line with total salary (p value 0,000 < 0,001). It stated companies still needs employees and pays appropriate salaries to manage assets to be efficient and effective in generating profits.

Both tests also showed adjusted r-square value are 0.997 (99.7%) and 0.994 (99.4%). It mean only 0.3% and 0.6% regression model affected by another factors. This result confirms technology adaptation and presence of directors with a background in engineering technology education is full enough to explain the impact on employees. (Pratama et al., 2022; Pratama & Sakti, 2020)

Based on above test, when companies invest in technology, it is necessary to consider employee sustainability so positive impact could be held by companies and employee, employee termination (PHK) can be minimize by two alternative way. First, provide specific training relating technology such as data analyst, give opportunity employee for continue their education to a higher strata because technological adaptation potentially reduce employee with lower education strata. This step support by director with technology / engineering education background initiative in line with previous study stated their existence provide company opportunity to growth (Celikyurt & Donmez, 2017) and also their strategy for mapping resources and seeking financing for technology development (Yavuz & Iacoviello, 2023). Second, implement technology gradually so employee have time to adapt and adjust slowly.

D. CONCLUSION

In the era of industry 4.0, technology adaptation is mandatory for companies to achieve profits and increase value. Unfortunately, it has potential negative impact on employees and also impact pandemic Covid-19. Therefore, great strategic steps is needed for minimize negative impact for companies and employee.

This study aim to explore impact technology adaptation to manufacturing employee and propose new variabel called technological capital disclosure for measure technology ability in companies. Technological capital disclosure contain two element, technology adaptation and presence director with technology / engineering education background.

This study result technology implementation reduce employee number in line with total salary. Companies will layoffs employee with lower education or employee who resistance with technology adaptation to achieve higher profit. Companies should prepare smooth strategy such as training, increase employee education supported by directors who have a background in engineering/ technology education.

This research become more valuable by test impact technology to employee with certain education. It is recommended to continue research by separating dependent variables based on education level, namely undergraduate (S1, S2, S3), diploma (D1, D2, D3) and non-undergraduate (SMA, SMP, SD) so it can be known which education level is most disadvantaged by the presence of technology. Second, technological capital disclosure measure by content analysis based on narrative in annual report and not reflect actual situation. It is recommend to include other measurement such as investment expenditure in technology, investment to increase employee capabilities in technology and others.

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