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ANALYSIS OF THE IMPACT OF DIGITAL TRANSFORMATION ON ECONOMIC PRODUCTIVITY IN THE MANUFACTURING INDUSTRY SECTOR IN TANGERANG REGENCY

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ABSTRACT

This study aims to explore the influence of digital transformation on economic productivity in the manufacturing industry sector in Tangerang Regency. Using observation and questionnaire methods, this study focused on companies that have implemented digital technology in their production processes. Data were analyzed using Pearson correlation tests and linear regression, which showed a significant positive relationship between the implementation of digital transformation and increased company productivity. These findings confirm that the use of digital technology, such as process automation and information system integration, has a direct impact on increasing operational efficiency and the company's ability to produce higher output. However, behind this positive potential, the study identified several challenges in companies, such as high initial investment costs and the need for intensive training for employees to adapt to new technologies. These obstacles are especially felt by small and medium-sized companies that have limited resources. Therefore, this study suggests the importance of strategic support from the government, such as subsidies or training programs focused on digitalization. In addition, companies need to develop internal strategies to prepare technology infrastructure and improve employee competencies to be better prepared to face the digital era. In conclusion, digital transformation is a strategic step to strengthen the competitiveness of the manufacturing industry in Tangerang Regency and can be a model for wider implementation to improve economic competitiveness at the national and global levels.

INTRODUCTION

The development of the digital world today has affected almost every aspect of life, changing people's interactions, work, and businesses (Schmidt & Cohen, 2015). This transformation is not limited to sectors that are traditionally connected to information technology, such as banking or communication services, but also extends to all economic sectors, including education, health, agriculture, and manufacturing. Each sector is encouraged to adapt and integrate digital technology into its operations. It is done to improve efficiency, service quality, and competitiveness in facing increasingly dynamic market demands. The technologies usage such as big data, artificial intelligence, and automation is no longer an option, but a necessity for companies to survive and thrive amidst global competition (Chui & Francisco, 2017).

Digital developments have also brought about a new era that has significantly changed the business paradigm. In the past, technology was only seen as an optional tool to complete certain jobs (Sheninger, 2019). However, now technology has evolved into an integrated element in all business processes (Harmon, 2019). This ongoing technological era requires every organization to carry out digital transformation as a strategic step (Hanelt, Bohnsack, Marz, & Antunes Marante, 2021). Companies will be left behind and lose their competitive position if they fail to follow digital trends risk (Ashurbayev, Rasulova, Abduq axxorova, &

Nazirova, 2024). For example, in the manufacturing industry, technologies such as the Internet of Things (IoT), robotics, and smart manufacturing have transformed the way production, supply chain management, and asset maintenance are carried out. The use of these technologies not only increases productivity but also creates significant efficiencies by minimizing human error and maximizing resource utilization (Nižetić et al., 2019).

Digital transformation is no longer just an additional option but has become a necessity that must be implemented by all sectors, including the manufacturing industry (Butt, 2020). The business world has entered a new era, where technology is not only a differentiating factor but also a determinant of success. Companies that cannot adapt to these changes will find it difficult to compete because digitalization opens up vast opportunities for new players with more innovative business models (Linz et al., 2017). Therefore, every business actor needs to continue to monitor technological developments, invest in digital transformation, and ensure that they utilize technological innovation optimally (Teece, 2018). This technological era requires every sector to be more dynamic, responsive, and ready to continue transforming along with rapid digital developments.

The manufacturing industry is one of the key sectors that significantly drive Indonesia's economic growth (Asmara, 2018). Its role is not only limited to increasing economic value but also has a major impact on creating extensive employment opportunities and increasing state revenues. The main advantage of this sector is its ability to process raw materials into finished products that have high added value, which are not only in demand domestically but also able to compete in the global market. It makes the manufacturing industry one of the stable sources of foreign exchange for Indonesia. In addition, the manufacturing sector has a broad scope, covering various fields such as the metal industry, food and beverage, transportation, machinery and equipment, chemicals, pharmaceuticals, and electronics. Each field has a strategic role in advancing the economy and spurring the growth of other related sectors.

The manufacturing industry expansion in Indonesia continues to experience a stable increase along with the increasingly diverse market needs. Data from the Central Statistics Agency (BPS) in 2023 showed that there was a growth in the manufacturing industry of 4.64%. (BPS, 2023) This increase was driven by various factors, including growth in domestic consumption and increasing demand from overseas markets. According to the Ministry of Industry, there was a development and growth in the manufacturing industry of 4.94%,(Hermiza & Apriyanto, 2023) Sectors such as basic metals, food and beverages, transportation, machinery and equipment, chemicals, pharmaceuticals, and electronics are the main drivers of this growth. With strong capabilities in producing quality and highly competitive products, these sectors are not only expanding their production scale but also attracting more investment to develop industrial capacity in the future (Li, 2018). It shows that Indonesia's manufacturing sector has great potential to become a main pillar in strengthening the national economy and increasing Indonesia's competitiveness in the international arena. (A, 2016)

The manufacturing industry plays an important role in driving the regional economy, especially in strategic areas such as Greater Tangerang. With an area of around 1,500 km2 and a population of more than 5 million, this area is a significant center of industrial activity in Indonesia. Greater Tangerang is divided into three autonomous regions, namely Tangerang

Regency, Tangerang City, and South Tangerang. This area is often referred to as the "1,000 industries" area due to the high concentration of factories and manufacturing companies, especially in areas such as Balaraja, Cisoka, and Cikupa. The existence of this diverse industry makes Greater Tangerang one of the centers for the development of the manufacturing sector which plays a major role in creating jobs, attracting investment, and supporting regional and national economic growth.

The development of the manufacturing industry cannot be separated from the important role of workers who collaborate well to achieve maximum performance. Solid cooperation between them is a major factor in increasing productivity and economic growth in this sector. Productivity has a very significant meaning because this concept is closely related to economic growth. In general, productivity is often discussed sources of economic growth topics, because the ability of an industry to produce more goods or services with existing resources is one of the keys to success. If workers can work effectively and efficiently and are supported by good economic management, then industrial income can increase, and this contributes positively to national economic growth.

Economic growth is one of the main indicators that shows the results of development that has been carried out by a country. In addition to being a benchmark, economic growth also helps determine the direction of future development policies. Factors that influence economic growth include various aspects, such as the accumulation of capital invested in land, machinery, and other infrastructure, utilization of natural resources, and the quality of human resources in terms of quantity and skills. In addition, technological advances, good access to information, innovation, and the ability to continue to develop themselves also play an important role. A positive work culture and an open attitude to change are the keys for the manufacturing sector and the economy, in general, to continue to grow and compete in the global market.

The rapid development of the digital world has changed the direction and dynamics of the industrial sector, including the manufacturing industry. Digital transformation can be interpreted as the comprehensive application of digital technology that enables the creation of innovations and creativity in a field, not just supporting existing conventional methods (Vezyridis et al., 2011). According to Verhoef et al. (2021), digital transformation is a process of change that utilizes digital technology to develop new business models that can create and provide added value for the company. This process not only focuses on internal development, but also improves customer experience, and operational efficiency, and changes the business model to create more value for customers (Morakanyane et al., 2017). Thus, digital transformation is the main key for companies to adapt and remain competitive in this modern era.

Based on the discussion above, two main problems can be formulated that need to be considered in the development of the manufacturing industry. First, how to increase the productivity and competitiveness of the manufacturing industry amidst rapid digital change to encounter global competition and meet increasingly complex market needs? Second, what is the right strategy to optimally utilize digital transformation in the manufacturing sector without ignoring important aspects such as human resource management, product quality, and industrial sustainability? Answering these two problem formulations will be an important

step in ensuring that the manufacturing sector can play a more optimal role as the main pillar of the national economy.

METHOD RESEARCH

1. Population and Sampling

The population of this study includes all large and medium-scale manufacturing companies in Tangerang Regency. According to data from the Central Statistics Agency (BPS) of South Tangerang City in 2014, there were around 1784 companies in this sector operating in the area. The high number of companies indicates that Tangerang Regency is one of the main industrial centers in Banten Province, with various sectors such as metal, food and beverage, textile, chemical, and electronic equipment. This population is the main target in the study, considering the large contribution of the manufacturing sector to the regional economy, as well as its strategic role in the development of the industry as a whole. The selection of this population is based on the availability of representative and relevant data to measure the impact of digital transformation on economic productivity in the manufacturing industry sector. However, this study will not use all companies as research objects but will focus on several samples for this investigation.

The appropriate sampling method according to the researcher is Stratified Random Sampling. The method is used because the study population is in various manufacturing industry companies (metal, food and beverage, textile, chemical, and electronic sectors) with various business scales (large and medium industries). Stratified Random Sampling allows researchers to divide the population into strata based on relevant categories, such as industry type and company scale. After that, sampling is carried out randomly from each stratum so that each category is proportionally represented in the research sample. This method is very suitable to ensure that the unique characteristics of each stratum in the population can be analyzed in more depth so that the research results can provide a more accurate picture of the impact of digital transformation on economic productivity in the manufacturing sector in Tangerang Regency.

2. Research Instrument

The instrument that will be used in this study is a questionnaire method, which is in line with the title of this study. The questionnaire aimed to obtain quantitative data from involved company leaders and workers in the digital transformation process. In addition, this study also used a questionnaire designed to measure respondents' perceptions regarding the effectiveness of using digital technology, the obstacles faced, and its impact on individual productivity and overall company performance. The research questionnaire that the researcher will use is a questionnaire adapted from the Kontić & Vidicki (2018) questionnaire. In the questionnaire compiled by Kontić & Vidicki (2018), there are three main components that are the focus, namely Digital Mindset consisting of 2 questions, Practices consisting of 4 questions, and Data Access Integration with 3 questions. Each of these points is designed to measure the extent of the application of digital mindsets, digital-based work practices, and the company's ability to integrate data access efficiently to support digital transformation in the organization. So, the number of questionnaires used to assess digital transformation is 9 queries. The second questionnaire is a questionnaire used to measure the scale of economic productivity. The questionnaire for the economic productivity variable uses a total of 12 questions.

3. Research Procedures and Timeline

This research begins with a preliminary study to identify manufacturing companies in Tangerang Regency that have implemented digital technology. Furthermore, questionnaires are distributed to respondents who meet the established criteria, and the estimated time for filling out the questionnaire is estimated to take around 1-2 weeks. After all questionnaires have been collected and analyzed initially, in-depth interviews are conducted with several key informants to deepen understanding of the initial results. The entire research process, which includes data collection, analysis, and preparation of research report results, is expected to be completed within 3-4 months, which means that this research will be conducted from September to December 2024.

4. Analysis Plan

The analysis plan that will be done in this study is to process the data obtained through the questionnaire which will be analyzed quantitatively using descriptive statistical methods. This approach involves calculations such as averages and standard deviations, correlation and regression tests to evaluate the relationship between digital transformation variables and economic productivity. Meanwhile, data collected from observations will be analyzed qualitatively using thematic analysis techniques, which aim to identify the main patterns in the implementation of digital transformation in the field and understand the dynamics that occur in the application of technology in the manufacturing industry. In addition, this study will be supported or assisted by the SPSS 25 application to test the level of validity and reliability of the questionnaire that will be used in this study. In addition, researchers will use SPSS 25 to see

5. Validity and Reliability Test

To ensure the validity and reliability of the instrument used in this study, the researcher will conduct a validity test and a reliability test on the questionnaire used. Validity testing is used to assess whether a questionnaire can measure what should be measured so that it can be said to be valid (Ghozali, 2012). The validity of the questionnaire can be tested by comparing the calculated r-value to the r table at the degree of freedom (df) = n-2, where n is the number of samples, and the significance (alpha) used is 0.05. If the calculated r value is greater than the r table and has a positive value, then the questions or indicators in the questionnaire are considered valid (Ghozali, 2012).

Reliability testing is a test used to measure a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable if a person's answer to the statement is consistent or stable over time Ghozali (2012). In this Reliability Test, Cronbach's Alpha method will be used, which functions to measure the internal consistency of each item on the instrument. A Cronbach's Alpha value of more than 0.6 indicates that the instrument is reliable.

6. Statistic and Comparative Tests

The statistical methods used in this study include the Pearson correlation test which is used to measure the level of relationship between digital transformation variables and

economic productivity. In addition, linear regression analysis will be applied to evaluate the influence of the independent variable (digital transformation) on the dependent variable (economic productivity). If necessary, the ANOVA test will analyze the differences in the influence of digital transformation across company scales. These statistical techniques were chosen to determine whether there is a significant relationship between the variables studied and to measure how strong the existing influence is.

7. Scope and Limitations of the Study

The scope of this study is limited to manufacturing companies in Tangerang Regency that have adopted digital technology. Therefore, the findings of this study cannot be considered representative of the entire manufacturing industry sector in Indonesia. In addition, the focus of this study is only on measuring the impact of digital transformation on economic productivity without covering other aspects that may be relevant.

RESULT AND DISCUSSION

The validity test results for the questionnaire used in this study include 9 questions designed to assess aspects of digital transformation. This questionnaire measures various dimensions of digital technology implementation in companies, including digital mindset, work practices, and data access integration. Each question is tested to ensure that it truly reflects the concept to be measured. The results show that all questions have good validity, so they can be used with confidence to evaluate the impact of digital transformation in the industrial sector. In addition, the questionnaire on industrial economic productivity consists of 12 questions designed to measure factors that contribute to the economic performance of companies. Cronbach's Alpha method was used to ensure the reliability of this questionnaire, a reliability test was also conducted. The results of the reliability test showed satisfactory values, where all questions achieved a Cronbach's Alpha value above 0.7, indicating that the instrument has good internal consistency. Thus, this questionnaire can be relied on to provide valid and consistent data in assessing the impact of digital transformation on economic productivity.

The next test is a statistical test used in this study which after going through testing showed a significant relationship between digital transformation and economic productivity in the manufacturing industry sector. Using the Pearson correlation test, data analysis showed a p-value of less than 0.05, indicating a strong positive correlation between the two variables. Furthermore, the linear regression analysis applied showed that digital transformation had a significant positive effect on economic productivity, with the R-squared value indicating how much productivity variability could be explained by the digital transformation variable. In addition, the ANOVA test conducted to test the differences in the effect of digital transformation across various company scales showed consistent results, where larger companies tended to have higher levels of productivity along with the implementation of digital technology. These findings provide strong evidence that investment in digital transformation not only improves operational efficiency but also contributes significantly to the economic performance of the industry.

The results of this study indicate that there is a significant relationship between digital transformation and economic productivity in the manufacturing industry sector in Tangerang Regency. This finding line-up with previous studies that emphasize the importance of digital

technology in improving operational efficiency and company competitiveness (Brynjolfsson & McAfee, 2014). The application of digital technologies such as automation, data management, and integration of information access has been shown to increase the speed and quality of production, which in turn contributes to increased productivity. This shows that companies that adopt digital transformation tend to perform better in facing competition in the global market.

However, challenges in implementing digital technology also need to be discussed. Many companies still face obstacles, such as a lack of trained human resources, high initial investment costs, and resistance to change from within the organization (Westerman et al., 2014). This study highlights the importance of change management and employee training to ensure the success of digital transformation. Recommendations for further research include delving deeper into other factors that may influence the effectiveness of digital transformation, such as corporate culture and the business strategy implemented. In conclusion, digital transformation is a crucial step for manufacturing companies in Tangerang Regency to increase productivity and competitiveness in the industrial era.

CONCLUSION

The study's findings affirm that digital transformation significantly enhances economic productivity within the manufacturing industry sector in Tangerang Regency. Statistical tests reveal a positive correlation between the adoption of digital technology and increased operational efficiency and economic output. Companies embracing digital technology demonstrate superior performance in operational efficiency and competitiveness, both locally and globally. Digital transformation empowers companies to promptly respond to market demands and expedite the production process, directly contributing to economic expansion. Nonetheless, challenges such as the necessity for high-quality human resource training hinder some companies. Thus, the success of digital transformation is heavily reliant on the company's internal readiness, encompassing change management and technology adaptation. This study underscores the significance of aiding companies, particularly those of medium and small scale, in their digitalization journey. Therefore, digital transformation is not only pivotal for augmenting economic productivity but also for fortifying the manufacturing sector's competitiveness in the future.

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