

The Role of Big Data Analytics, Digital Capability, and Agility on Firm Competitiveness in Indonesia

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Abstract

In this study, the impact of Big Data Analytics, Digital Capability, and Organizational Agility on Firm Competitiveness in Indonesia was analyzed. Being a part of the rapidly developing digital era, it becomes necessary for organizations to apply data-driven approaches, improve their digital competencies and develop agility to ensure competitiveness. A quantitative research design was used in the study. A cross-sectional survey involving 220 responses from managers and professionals was used in this case. The data obtained in the process of the survey were analyzed using the Structural Equation Modeling (SEM). It can be stated that each of Big Data Analytics, Digital Capability, and Organizational Agility impacts Firm Competitiveness positively and significantly. However, Digital Capability is the most influential variable. Organizational Agility has more impact on Firm Competitiveness than Big Data Analytics. Thus, the studied variables explain 68.3% of variance of Firm Competitiveness. Therefore, it can be stated that Firm Competitiveness in the digital era is determined by the application of technologies and organizational agility.

Keywords: Big Data Analytics, Digital Capability, Organizational Agility, Firm Competitiveness, Digital Transformation

1. Introduction

The fast-paced development of digital technology has radically changed the business world globally, influencing the ways in which firms create value, compete, and maintain their competitive positions (Zhu et al., 2018). The arrival of digital transformation and the development of technologies like artificial intelligence, cloud computing, IoT, and big data analytics has presented businesses with new possibilities and challenges in their operation. Being in an ever more competitive and interconnected market, organizations are expected to adapt constantly to changes in consumer needs, technology, and market dynamics (Painoli et al., 2021). Successful implementation of digital technologies will allow businesses to increase their efficiency and make better decisions while maintaining sustainable competitive advantage. Thus, the study of factors influencing firm competitiveness has gained importance (Kumar, 2023).

The variety of digital technologies includes the Big Data Analytics (BDA), which is considered to be one of the most significant tools for making decisions within companies and improving their performance. Big data is defined as an abundance of structured and



unstructured data collected through different channels, such as social media, transactions, sensors, and other digital systems (Constante Nicolalde et al., 2018). Through data analysis, companies can discover certain insights that will help them learn about market trends, forecast customers' behaviors, optimize business processes, and develop strategies. Data analytics and usage allow companies to make more informed decisions as compared to their competitors. Nowadays, companies capable of implementing big data technology in their business practices have an opportunity to increase innovation and customer satisfaction levels and become more competitive. Nevertheless, in order to be able to implement BDA successfully, companies need to possess certain capabilities (Mbuh et al., 2019; Sharma et al., 2021).

Apart from big data analytics, digital capability is another important aspect of business performance in the digital age. Digital capability can be defined as the ability of an organization to harness, utilize, integrate, and adopt digital technologies. Digital capability involves technological assets, digital expertise, organizational knowledge, and managerial capability (Vats & Biswas, 2023). It helps businesses cope with changes in technology and leverage digital opportunities. Organizations with digital capabilities have the capacity to innovate, collaborate, and enhance customer engagement. In other words, digital capabilities help organizations change business models (Vassakis et al., 2018; Arif & Windarsari, 2026). With digital technologies shaping different industries, organizations with higher digital capabilities are better placed to deal with changes in their environment. On the other hand, organizations with low digital capabilities are unlikely to cope with the ever-changing technological landscape.

Organizational agility is yet another critical element that shapes competitive capabilities in organizations. Organizational agility is defined as the capability of an organization to detect changes in the environment, respond swiftly to new opportunities and threats, and react through adaptation of its activities. In turbulent and uncertain business settings, agility helps organizations to stay flexible and resilient while being effective at what they do (Zhang et al., 2023; Windarsari & Arif, 2026). Agile organizations can change their strategies, resources and innovations depending on the changes happening in the market. The growing complexity of the business setting, especially after the pandemic, has revealed the significance of organizational agility as a strategic asset. Organizations that demonstrate high levels of agility are more capable of managing uncertainty, sustaining their performance, and gaining competitive advantages (Arshad et al., 2024; Mahmoud et al., 2025).

The business environment in Indonesia represents a valuable setting to consider the interrelations between big data analytics, digital capability, agility, and firm competitiveness. Indonesia is regarded as one of the most prominent and rapidly developing digital economies in Southeast Asia with growing internet connectivity, digital technology usage, and formation of digital business ecosystems. In its turn, state initiatives aimed at encouraging digital transformation and implementing the principles of Industry 4.0 have fostered companies from different industries to embrace digital technologies and develop their technological capabilities (Dipoatmodjo et al., 2026). Nonetheless, many Indonesian organizations are still facing problems connected with technology implementation, data management, lack of digital competence, and adaptability of the organization. Despite the fact that some businesses have managed to leverage the digital technologies to improve their performance, others fail to do so and reap all the benefits of digital transformation. Thus, studying the interrelationships between

big data analytics, digital capability, and agility in fostering firm competitiveness in the case of Indonesia is highly important.

Although digital transformation has become increasingly significant in improving organizational efficiency, there are still numerous companies in Indonesia that struggle to transform their digital assets into competitive advantages. Previous research studies have usually focused on the impacts of big data analytics, digital capabilities, or organizational agility individually without paying much attention to how these variables jointly impact firm competitiveness. Moreover, there is a lack of empirical evidence about the interaction between big data analytics, digital capability, agility, and competitiveness among firms operating in Indonesia. With the rising competition and fast-changing market conditions and customer demands, it has become necessary for firms to know which capabilities are needed in order to be competitive. Thus, it is essential to conduct research on the role of big data analytics, digital capability, and agility in improving firm competitiveness in Indonesia.

The objectives of this study include investigating the effect of big data analytics, digital capability, and organizational agility in determining firm competitiveness in Indonesia. In particular, this research study intends to analyze the degree to which big data analytics contributes to firm competitiveness, assess the contribution of digital capability in competitive performance, and investigate the effect of organizational agility in determining competitive advantage. This study also intends to contribute empirical findings about the relationships between these variables in the context of Indonesia, thus helping managers, policymakers, and researchers in developing strategies for organizational competitiveness in the digital age.

2. Method

For this study, a quantitative research method will be used to explore the impact of Big Data Analytics, Digital Capability, and Organizational Agility on Firm Competitiveness in Indonesia. This research will make use of cross-sectional survey methodology to gather information from businesses that are based in various industries in Indonesia. Business owners/managers/executives/professionals having sufficient knowledge about their firm's digital transformation strategy and competitive strategies will be chosen as the respondents for this study. A structured questionnaire is used as the main source for data gathering where measurement questions have been developed from validated scales of past studies.

This research will use a purposive sampling method where the sampled subjects are selected based on certain criteria, which are companies that have employed digital technology and data in their business processes. The data collection method involves survey distribution via online and offline means to increase participation. Before conducting the actual survey, the researchers will conduct a pilot study to evaluate the validity and reliability of the questionnaires used. Additionally, information about firm size, industry, years of experience, and respondents' positions will be obtained.

For data analysis purposes, SEM approach is used with the help of software as SmartPLS. The analysis starts with the use of descriptive statistics to characterize the respondents and the firms under study, and then moves on to the assessment of the reliability and validity of the measurement model. Such aspects as convergent validity, discriminant validity, composite reliability, and Cronbach's alpha are analyzed for the measurement instrument assessment. After that, the structural model is assessed in order to find out the existence of the hypothesized

relationships between Big Data Analytics, Digital Capability, Organizational Agility, and Firm Competitiveness.

3. Results and Discussion

The total number of questionnaires that were handed out to managers and business people in Indonesia across different sectors was 250. However, after filtering the data for consistency and completeness, 220 responses were found to be valid for analysis. The results were analyzed using Structural Equation Modeling (SEM) and the software SmartPLS. Analysis was done in two steps: measurement model analysis and structural model analysis. The measurement model was analyzed based on the reliability and validity tests, while the structural model was analyzed using the path coefficient, t-statistics, and p-values.

3.1. Measurement Model Assessment

The reliability and convergent validity of the constructs were examined using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). The results are presented in Table 1.

Table 1. Reliability and Convergent Validity Results

Construct	Cronbach's Alpha	Composite Reliability	AVE
Big Data Analytics	0.892	0.919	0.692
Digital Capability	0.901	0.926	0.714
Organizational Agility	0.884	0.913	0.677
Firm Competitiveness	0.912	0.934	0.739

Source: Data Analysis

The results indicate that all constructs achieved Cronbach's Alpha and Composite Reliability values above the recommended threshold of 0.70. Similarly, the AVE values exceeded 0.50, demonstrating satisfactory convergent validity. Therefore, the measurement model can be considered reliable and valid for subsequent structural analysis.

3.2. Structural Model Assessment

After confirming the adequacy of the measurement model, the structural model was evaluated to test the research hypotheses. Table 2 presents the path coefficients, t-statistics, and significance levels.

Table 2. Structural Model Results

Hypothesis	Relationship	Path Coefficient (β)	t-value	p-value	Result
H1	Big Data Analytics → Firm Competitiveness	0.287	4.123	0.000	Supported
H2	Digital Capability → Firm Competitiveness	0.352	5.276	0.000	Supported
H3	Organizational Agility → Firm Competitiveness	0.301	4.587	0.000	Supported

Source: Data Analysis

The explanatory power of the model was further assessed using the coefficient of determination (R^2). The result is shown in Table 3.

Table 3. Coefficient of Determination

Endogenous Variable	R^2	R^2 Adjusted
Firm Competitiveness	0.683	0.678

Source: Data Analysis

The R^2 value of 0.683 indicates that Big Data Analytics, Digital Capability, and Organizational Agility collectively explain 68.3% of the variance in Firm Competitiveness, while the remaining 31.7% is explained by other factors not included in the model.

Based on the findings, all hypotheses are validated. Big Data Analytics has a very strong influence on Firm Competitiveness ($\beta = 0.287$, $p < 0.001$). This means that companies that have the ability to collect, analyze, and process large amounts of data are well-equipped for improving the quality of their decisions and creating competitive advantage. The finding is consistent with the resource-based view where big data analytics capability becomes one of the strategic resources of the firm.

Moreover, Digital Capability has the most significant impact on Firm Competitiveness ($\beta = 0.352$, $p < 0.001$), emphasizing the significance of technological skills and digital resources integration to ensure better performance of companies. Additionally, Organizational Agility has a significant impact on Firm Competitiveness ($\beta = 0.301$, $p < 0.001$). In other words, companies which can react to changes in the environment rapidly will be able to maintain their competitive advantage. Therefore, the above findings show that Indonesian companies may enhance their competitiveness through the development of advanced data analytics skills, digital competencies, and organizational agility.

3.3. Discussion

The main objective of this research was to determine the impact of Big Data Analytics, Digital Capability, and Organizational Agility on Firm Competitiveness in Indonesia. The results show that all three variables positively and significantly impact firm competitiveness, indicating that organizations that efficiently use data, build their digital capability, and sustain agility are in a good position to create sustainable competitive advantage. These results provide evidence that firm competitiveness in the digital age largely depends on integrating technology resources with organizational capabilities.

The first research finding shows that Big Data Analytics considerably improves Firm Competitiveness. It implies that firms that can collect, process and analyze large amounts of data can develop useful insights for effective decision-making. By making decisions based on the data, companies can better understand the needs of their customers, market trends, manage resources, and react to changes in the environment. These abilities help companies cope better with competitive challenges and market opportunities. This finding aligns with earlier research findings that stress the importance of big data analytics as a strategic asset for organizations. From the perspective of RBV, big data analytics is a valuable, rare, and difficult-to-imitate ability.

Moreover, it can be stated that Digital Capability has the highest impact on the Firm Competitiveness among all the variables being considered in the current analysis. Indeed, one

should not neglect the importance of such factors as the ability to use technological competences, digital technologies, and organizational competence as means of forming competitive advantages. With higher digital capabilities, an organization becomes able to effectively implement digital technologies, improve customer experience, facilitate communication, and create innovations. Within the context of digital economy development in Indonesia, it becomes obvious that companies implementing their own digital transformation programs are much better positioned to benefit from new market opportunities. In addition, the high impact of digital capability on the dependent variable means that mere adoption of digital technologies is not enough for companies – they need to develop required skills and knowledge to make effective use of these technologies.

In addition to the above findings, the study has also verified the positive impact of Organizational Agility on Firm Competitiveness. This implies that firms that have the capability of detecting environmental changes and acting promptly to meet the demands of the market are more likely to achieve superior performance. Due to the highly dynamic business environment of today's world, agility helps firms make quick strategy adaptations, process adjustments, and resource reconfiguration. The fast pace of technology development and market disruptions has increased the need for agility as a firm's attribute. Agile firms will be able to take advantage of available opportunities and mitigate negative consequences associated with uncertainty and competitive threats. Thus, organizational agility is one of the key mechanisms through which firms convert their resources and capabilities into competitive results.

When the three aspects of Big Data Analytics, Digital Capability, and Organizational Agility are put together, they provide further insights into how companies become competitive in the digital age. The quite high R^2 values mean that the factors together help to explain a significant share of the variance in the competitiveness of the companies. This means that, for example, competitiveness is not created through only one type of capability, but through the interactions of several technological and organizational capabilities. Big Data Analytics creates useful information, Digital Capability helps to use the digital technologies effectively, and Organizational Agility supports quick adaptations.

From the management point of view, this research suggests that the investments in data analysis capabilities, technologies, and digital literacy of the staff must be made a priority. Businesses need to create data-driven corporate cultures that will promote making decisions on the basis of evidence as well as constant learning. Moreover, managers need to pay attention to flexible organization structures and processes that can help to react promptly to any changes in the market situation. For organizations to become agile, they need not only technology but also committed leadership, empowered employees, and good communication within the organization.

The results also have significant implications for Indonesian policymakers. In addition to policies focused on hastening digital transformation, there must be efforts made to foster digital skills, innovations, and capabilities of firms. This is especially true for SMEs, who will need more assistance in overcoming any obstacles in the adoption of technology and data analysis. By fostering a positive digital environment, policymakers will be able to make firms more competitive and assist in economic growth for the country.

Although this study is quite helpful, it has some limitations that need to be addressed. For instance, the use of the cross-sectional approach does not allow for causality. The future research may consider using a longitudinal approach to investigate the effects of Big Data Analytics, Digital Capability, and Organizational Agility on competitiveness over time. Another limitation of this study is that it considers companies working in the Indonesian market. The future research can consider comparing different regions or industries. Additionally, some other variables like innovation capability, organizational culture, leadership, and environmental uncertainty can be considered by future researchers.

4. Conclusion

Based on the results of the research, the following conclusions have been drawn: Big Data Analytics, Digital Capability and Organizational Agility have a significant effect on the development of the Firm Competitiveness in Indonesia. The results prove that those companies which use data analytics properly are more capable of creating insights, and digital capability provides organizations with an opportunity to capitalize on the advantages provided by technology and innovations. At the same time, organizational agility helps firms to react promptly to changes in market environment and to strengthen their competitive position. In particular, among all investigated variables the biggest impact on firm competitiveness belongs to Digital Capability, which shows that modern business environment requires from companies certain technological competence. All three capabilities combined make a considerable contribution to firm competitiveness, which means that in order to gain sustainable competitive advantage in the digital era, organizations need to combine their efforts in terms of data analytics, digital resources and agility.

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