

STRATEGIC MANAGEMENT IN INDUSTRY 4.0: DIGITAL TRANSFORMATION IN NIKE INC. USING THE DYNAMIC CAPABILITY APPROACH

Dwi Utami Puterisari*, a,1

^a Universitas Teknologi Yogyakarta, Sleman, Indonesia

¹ puterisari@staff.uty.ac.id*

Abstract

Today we are in the industrial ecosystem 4.0, which is characterized by various uses of technology such as the Cloud Computerization, the Internet of Things (IoT), Artificial Intelligence (AI) and Big Data which they are part of what is called digital transformation. At this time the company is required to adapt to industry 4.0, especially with digital transformation, in order to the company can survive and still be able to competing with other companies. The research method used in this study is a descriptive research method by using secondary data sources, where secondary data comes from literature studies conducted from the results of searching various articles on the internet. Furthermore, this paper discusses how NIKE Inc. carry out digital transformation through dynamic capabilities which consist of sensing, seizing, and transforming processes.

Keywords: Digital Transformation, Dynamic Capability, Industry 4.0.

I. INTRODUCTION

In recent years, the economy among the world has developed rapidly through a process of transformation, where the main driving force is driven by sophisticated innovations in the digital, MATERIAL, and biological fields. In the digital category of the industrial revolution 4.0, the emphasis is more on Cloud Computing, Internet of Things (IoT), Artificial Intelligence (AI) and Big Data which they are part of what is called digital transformation, which is a perspective of the use of information and communication technology where acts as the dominant element in digital transformation and reconfiguration of organizational elements, such as: strategy, process, culture and structure [1].

Digital transformation is a continuous process of using new digital technology into everyday organizational life and places agility as a core mechanism for strategic renewal of (1) the organization's business model, (2) collaborative approaches, and (3) culture [2]. Today, organizations are more pressured to "go digital" before other competitor companies move forward, in consequence organizations inevitably to develop various capabilities to successfully lead and implement digital transformation initiatives [2].

At this era organizations are more likely to depend on digital technology because they are an integral part of their products and services [3], so making it difficult to separate technology infrastructure from business processes [4]. To overcome this condition, digital transformation of the main business operations that affect products and processes, as well as organizational structure and management concepts is needed to carry out complex transformations throughout this company [1].

Manufacturing companies use technology that aims to move from mass production to customization production because customization tends to have more advantages for producers to better respond to consumer demand [5]. Therefore, the social benefits of implementing digital transformation targeted at improving people's living standards by providing high quality products and in a better work environment [6].

In addition to carrying out digital transformation on companies, organizations must also be able to adapt to overcome an increasingly competitive market, therefore the dynamic capabilities increasingly needed. Dynamic capabilities consist of specific strategic and organizational processes that produce value for organizations in dynamic markets [7]. Teece et al. [8] defines dynamic capabilities as a company's ability to build and reconfigure internal and external competencies to facing rapid environmental changes. TEECE [9] divides the concept of dynamic capabilities into (1) identification and assessment of opportunities (sensing); (2) mobilization of resources to overcome opportunities and to capture value (seizing); and (3) continue the transformation (transforming).

The main purpose of this study is to analyze how one of the world's largest companies in the field of shoes, clothing and sporting goods, NIKE Inc., performs digital transformations using a dynamic capability approach which consists of sensing, seizing, and transforming. This case study has never BEEN examined.

II. LITERATURE REVIEW

A. Industry 4.0

The term of industry 4.0 was initially introduced as a strategic initiative in Germany in 2011 to encompass and to advance many developments that occur in the manufacturing industry based on information and communication

technology that seeks to integrate emerging technologies such as: smart sensors, additive manufacturing (3D printing), artificial intelligence and big data analysis [10].

Industry 4.0 is a concept which has similarities with American initiatives regarding the Internet Industry and Smart Manufacturing, where the industry 4.0 can be understood as the full realization of smart manufacturing [11]. Smart Manufacturing itself is defined as a fully integrated and collaborative manufacturing system that responds in real time to meet changing demands and conditions in factories, supply chain networks, and customer needs [12].

The core idea of industry 4.0 is to use information technology to implement the Internet of Things (IoT), so that business processes and industrial processes can be deeply integrate and the production process will operate in a flexible way, efficient and environmentally friendly with high quality and in a lower cost [6]. Oberg and Graham also expressed a similar opinion [13] that Industry 4.0 involves connecting and integrating the digital/virtual and real/physical world through CPS and IoT where the intelligent objects continue to communicate and interact with each other.

Industry 4.0 aims to encourage digital manufacturing to be advanced by expanding digitization and interconnection of products, value chains and business models [14]. More specifically, it aims to transform established factories into intelligent, connected, autonomous ones [15]. Industry 4.0 has produced a fundamental revolution in manufacturing, characterized by computerization in various fields, smart networks (cloud computing) and autonomous microcomputers (embedded systems) [16]. Industrial process automation is an important part of the industry 4.0 concept, where the manufacturing equipment under the industry paradigm 4.0 is characterized by the use of highly automated machine tools and robots [17].

B. Digital Transformation

Digital transformation is defined as the process where the company combining several new digital technologies and then enhanced by network connectivity which aims to achieve superior performance and sustainable competitive advantage, by changing various business dimensions, business models, and customer experiences.

According to Schallmo dan Williams [18] digital transformation illustrates the fundamental transformation of the entire business world through the formation of new internet-based technologies with a fundamental impact on society as whole. To achieve digital transformation, the important things to do is not only to apply advanced technology into business processes, but also to reshape customer value propositions and change business processes by using digital technology for superior customer communication and cooperation [19]. Liu et al. [20] argue that digital transformation can be defined as an organizational transformation that integrates digital technology and business processes in a digital economy.

C. Elements of Digital Transformation: Internet of Things, Artificial Intelligence and Big Data

Internet of Things (IoT) described as a world of broad connectivity, where number of physical devices that support the internet continually provide valuable information feedback to enable improvements in production and shipping processes [21]. IoT was expected to make a change the manufacturing industry in the coming years by enabling increased connectivity and integration between production processes [22]. In IoT, the engine-activated environment will have its own monitoring capabilities and will be able to communicate their real time performance on the production line [21].

The impact of the industrial and digital revolution or information substantially affects society, but there is a new revolution formed by Artificial Intelligence (AI) and will make a strong impact on companies and jobs where AI is currently present in everyday life for individuals and business [23]. According to Strandhagen [24] cs will make a turnaround in the organization regard to administrative functions, especially in 2025 it was predicted that there will be changes where AI robots will carry out 30% of company audits, and this will happen because AI felt to be easier for automatically matching standards and processes that make adoption of this technology more recommended.

Big Data is a holistic approach to manage, process and analyze data in five dimensions that aims to provide sustainable value, measure performance, create skills and improve decision making processes [25]. Big Data makes it possible to improve organizational efficiency and effectiveness, and enables decision-making processes based on data, not intuition [26].

D. Dynamic Capability

Dynamic capabilities as a company's ability to build and reconfigure internal and external competencies to facing rapid environmental changes [27]. Dynamic capabilities are the process of integrating, reconfiguring, obtaining, and releasing resources to achieve new resource configurations [7]. Other opinion defined that dynamic capability is the main asset of the company in order to understand and integrate deeply into the new digital era which has a mechanism to identify and exploit innovation, research and development and analyze the surrounding environment where it plays an important role to feel the benefits offered by new technology to company [28].

The concept of dynamic capabilities divides into three groups of activities: (1) identification and assessment of opportunities (sensing); (2) mobilization of resources to overcome opportunities and to capture value (seizing); and (3) continue the transformation [29].

According to Teece [30] sensing is a process which involves a process of identification, development, joint development and assessment of technological opportunities in relation to customer needs. The sensing capabilities contain a set of resources and routines such as the process of making strategies related to variations, resources to competitive intelligence, tracking technological changes, and forums for discussion of new opportunities [31]. Overall, sensing is an ability that mainly includes gathering and interpreting information which aimed to identifying threats or opportunities [32]. Organizations must use the sensing ability in their strategies to be able to maintain or gain a competitive advantage, therefore companies need to monitor the market to respond quickly and seize opportunities [33], Teece [34] suggests that seizing is where the organization mobilize resources to meet the needs and opportunities identified in the sensing process. Teece [35] details how this structure includes organizational boundaries, product architecture, business models and internal processes that support this design. Seizing requires the ability of managers to be able to imagine and develop strategic decisions, establish appropriate organizational adjustments (exploitation or exploration), allocate complementary assets and decide on the allocation of resources and time, in order to the company will avoid failure in responding directly to seize opportunities and reduce threats [31].

Teece [35] described that transforming is a sequence of ongoing renewal involving asset alignment, joint alignment, realignment, and reassignment. Teece [35] broadly discusses how transforming can involve revamping routines, restructuring departments, managing specific assets, and placing governance and knowledge development structures, in other words, involving reconfiguring organizational resources. In addition, transforming includes increasing and changing tangible and intangible assets when the market and technology are in the process of sustainable development [36]. Reconfiguration is very important for the company's development phase, where it is not only to function to adapt to the rapidly changing environment but also to change the company's ecosystem [9]. Therefore, it is very important for companies to have the ability to recombine and reorganize the resource base and organizational structure in the form of technology, processes, skills and knowledge in order to have sustainable profitable development [33].

E. Digital Transformation in NIKE Inc.

Several years investing in a digital transformation strategy, finally paid off at NIKE Inc. The Wall Street analysts estimate NIKE's earnings per share of 63 cents, while NIKE Inc. posted 68 cents per share in the third quarter of 2019 which ended on February 28, 2019, resulting in NIKE Inc.'s earnings increased from 7% to 11% (\$ 9.6 billion) compared to the previous period [37].

NIKE Inc.'s CEO, Mark Parker, links most of the company's growth with its emphasis on digital transformation. NIKE Inc. executives promise to continue investing in digital transformation from digital "demand" to inventory connected to digital-based product design and development. NIKE Inc.'s CFO, Andy Campion, stated that NIKE Inc. will continue to invest as a key capability to drive digital transformation and drive strong profit growth until the next fiscal year and beyond [37].

Meanwhile, CEO of NIKE Inc., Mark Parker noted that digital transformation helped the company to better engage customers. Parker revealed that NIKE Inc. enhances digital capabilities to serve consumers more personally. Furthermore, Parker revealed that NIKE Inc. views innovation as companies' number one competitive advantage. One of the biggest drivers of the plan was, of course, NIKE Inc.'s shift in strategy to digital transformation. By that way the company can get to know and reward members for what they want, including investing in personalization that enhances machine learning to collect various kinds to suit each member's preferences [37].

Parker added that at NIKE Inc., innovation in various forms and developing digital ecosystems is a good example that can make consumers more connected and take advantage of premium personal digital services. Overall, sophisticated digital tools at NIKE Inc. can reduce waiting times, encourage sustainability, and lead to faster design cycles [37]. Parker stated that NIKE Inc. see early wins piled up in digital transformation and what makes it very interesting is the more companies invest in stronger digital capabilities, the more growth opportunities are found [37].

III. RESEARCH METHODS

The research method used in this study is a descriptive research method using secondary data sources, where secondary data comes from literature studies conducted from browsing various articles on the internet. Descriptive research is research intended to investigate the conditions, conditions or other things that have been mentioned, the results of which are presented in the form of research reports. Descriptive method in this study used to describe or illustrate the application of digital transformation strategies using dynamic capabilities at NIKE Inc.

IV. DISCUSSION

A. *NIKE Inc. Digital Transformation Strategy Through Dynamic Capabilities*

The researcher will describe how NIKE Inc. carries out digital transformation through dynamic capabilities in this analysis. [27] defines dynamic capabilities as a company's ability to build and reconfigure internal and external competencies to facing rapid environmental changes. Teece [9] divides the concept of dynamic capabilities into (1) identification and assessment of opportunities (sensing); (2) mobilization of resources to overcome opportunities and to capture value (seizing); and (3) continue the transformation (transforming).

Sensing

Sensing refers to gathering and filtering information from the environment to make guesses or hypotheses about possible technological evolution, customer needs, and market responses and involves scanning and monitoring developments in internal and external technology and assessing customer needs [38].

In sensing process of digital transformation, NIKE Inc. acquired start-up companies in the fields of data science and demand sensing. NIKE Inc. announced on August 6,2019 that it had acquired Celect, a Boston-based predictive analytic and demand sensing company [39] Celect is the latest acquisition of NIKE that triggered the Consumer Direct Offense strategy, which serves consumers on a personal scale on a global scale [39].

The purpose of the acquisition of Celect is expected to accelerate the ability of NIKE Inc. to predict and anticipate consumer needs. By integrating Celect technology into mobile applications and the NIKE website, athletic apparel makers can predict how and when consumers will buy a certain style [40]. Eric Sprunk, COO of NIKE Inc. stated "With the acquisition of Celect, NIKE greatly accelerates our digital advantage by adding a platform developed by world-class data scientists. As demand for our products grows, we must be insight-driven, data-optimized and hyper-focused on consumer behavior. This is how we serve consumers more personally at scale." [40]

B. Seizing

Seizing refers to the development and selection of business opportunities that are appropriate to the organization's environment and its strengths and weaknesses, and details how this structure includes organizational boundaries, product architecture, business models and internal processes that support this design [38].

In seizing process on digital transformation, on October 14, 2015, NIKE, Inc. announced cooperation with Flex, a world-class global manufacturer, to accelerate NIKE's vision to bring sophisticated innovation to its manufacturing supply chain. In this collaboration, NIKE and Flex will provide footwear innovations that allow products to reach consumers faster, with specialized solutions and improved performance innovations [41]. The partnership with Flex brings new capabilities and expertise outside the existing footwear industry to create future systems for making products and to catalyze innovation throughout the NIKE global supply chain [42].

Eric Sprunk, Chief Operating Officer, NIKE, Inc. said "Flex's proven expertise in design, engineering and manufacturing in industries like automotive, medical and consumer electronics make them a perfect partner to help us revolutionize footwear manufacturing". He continued, "Together, the future of personalized, rapidly-delivered product that is made more efficiently and with less waste is well underway." [42].

C. Transforming

Transforming is a sequence of ongoing reforms involving asset alignment, joint alignment, realignment, and reassignment [38]. In addition, transforming includes increasing and changing tangible and intangible assets when markets and technology are in the process of sustainable development [36].

In transforming process on digital transformation, NIKE Inc. on April 9,2018 acquired Invertex Ltd., a leading computer vision company based in Tel Aviv, Israel because it wanted to continue to strengthen its digital technology platform. The talented team will focus on developing innovative innovations to help Nike serve millions of members worldwide [41].

Nike's Chief Digital Officer, Adam Sussman, said "The acquisition of Invertex will deepen our bench of digital talent and further our capabilities in computer vision and artificial intelligence as we create the most compelling Nike consumer experience at every touch point" [41] David Bleicher, CEO of Invertex, adds "NIKE's connection to and understanding of their consumer is unsurpassed and we look forward to joining their team to help drive the Consumer Direct Offense." [41]. In 2014, Invertex released the FeetID system, which can scan 3D on foot size and send it directly to consumer phones in seconds [41].

On May 9,2019 NIKE Inc. launched Nike Fit, the latest scanning solution that uses a combination of computer vision, data science, machine learning, artificial intelligence, and algorithms. This process is carried out by measuring the full shape of both feet, offering the ability to find the perfect fit on both feet for each style of Nike shoes [41]. According to Nike, the FIT application can find the foot's size, volume, and shape with an accuracy of almost 2 millimeters.

V. CONCLUSION

The conclusions from the analysis above are, FIRST, In sensing process, where is the main objective is to identify and assess opportunities that originate from outside the company, NIKE Inc. made acquisition of Celest, a predictive analytic and demand sensing company. The purpose of the acquisition was to make NIKE Inc. can do analysis through Big Data related to what consumers need and what consumers want so that NIKE Inc. can respond to consumers quickly. Second, in seizing process, where the main objective is to capture opportunities that come from sensing, NIKE Inc. made acquisition of Flex, a company experienced in manufacturing and the supply chain field. The purpose of the acquisition is to make NIKE Inc. can continue to improve the quality of its products and can make efficiency in the supply chain so that products delivered to consumers will be faster to the consumer and at the same time can reduce waste. Last, In transforming process, where is the main goal is to redesign the company's business model, NIKE Inc. made acquisition of Invertex, a company engaged in computer vision and artificial intelligence. The purpose of the acquisition is to make NIKE Inc. have a 3D scanning technology on consumers' feet which can be done via a smartphone, called NIKE Fit. The 3D scanning technology will change the business model of NIKE Inc. previously the mass product was a customized product because the size of each customer's feet was different in size.

REFERENCES

- [1] C. Matt, T. Hess, A. Benlian, and F. Wiesbock, 'Options for formulating a digital transformation strategy', *MIS Quarterly Executive*, vol. 15, no. 2, p. 6, 2016.
- [2] K. S. R. Warner and M. Wäger, 'Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal', *Long Range Plann.*, vol. 52, no. 3, pp. 326–349, 2019.
- [3] Y. Yoo, R. J. Boland Jr, K. Lyytinen, and A. Majchrzak, 'Organizing for innovation in the digitized world', *Organization science*, vol. 23, no. 5, pp. 1398–1408, 2012.
- [4] A. Bharadwaj, O. A. el Sawy, P. A. Pavlou, and N. v Venkatraman, 'Digital business strategy: toward a next generation of insights', *MIS quarterly*, pp. 471–482, 2013.
- [5] D. Newman, 'Top 5 Digital Transformation Trends in Manufacturing Forbes'. August 2017.
- [6] S. Wang, J. Wan, D. Li, and C. Zhang, 'Implementing smart factory of industrie 4.0: an outlook', *Int J Distrib Sens Netw*, vol. 12, no. 1, p. 3159805, 2016.
- [7] K. M. Eisenhardt and J. A. Martin, 'Dynamic capabilities: what are they?', *Strategic management journal*, vol. 21, no. 10-11, pp. 1105–1121, 2000.
- [8] D. J., Teece, G., Pisano, and A. Shuen, 'Dynamic Capabilities and Strategic Management.', *Strategic Management Journal*,
- [9] D. J. Teece, 'Dynamic Capabilities: Routines versus Entrepreneurial Action.', *Journal of Management Studies*.
- [10] A. Ustundag and E. Cevikcan, *Industry 4.0: managing the digital transformation*. Springer, 2017.
- [11] 'Kang, H. S., Lee, J. Y., Choi, S., Kim, H., Park, J. H., Son, J. Y., Noh, S. D. 2016. Smart manufacturing: Past research, present findings, and future directions. International Journal of Precision Engineering and Manufacturing-Green Technology, 3(1), Hal. 111-128.'
- [12] H. S. Kang *et al.*, 'Smart manufacturing: Past research, present findings, and future directions', *international journal of precision engineering and manufacturing-green technology*, vol. 3, no. 1, pp. 111–128, 2016.
- [13] C. Öberg and G. Graham, 'How smart cities will change supply chain management: a technical viewpoint', *Production Planning & Control*, vol. 27, no. 6, pp. 529–538, 2016.
- [14] 'Germany: Industrie 4.0'.
- [15] D. Kiel, C. Arnold, and K.-I. Voigt, 'The influence of the Industrial Internet of Things on business models of established manufacturing companies—A business level perspective', *Technovation*, vol. 68, pp. 4–19, 2017.
- [16] 'Kagermann, H.J.; Helbig, A. Hellinger; dan W. Wahlster. 2013. Recommendations for Implementing the Strategic Initiative Industry 4.0: Securing the Future of German Manufacturing Industry. Final Report of the Industry 4.0 Working Group.'
- [17] 'Strandhagen, J. W., Alfnes, E., Strandhagen, J. O., dan Swahn, N. 2016. Importance of production environments when applying Industry 4.0 to production logistics—a multiple 13 case study. Advances in Economics Business and Management Research: Atlantis Press. Hal. 241-247'.
- [18] 'Schallmo, D. dan Williams, C. 2018. Digital Transformation Now! Guiding the Successful Digitalization of Your Business Model. 1st ed. Cham: Springer.'
- [19] S. J. Berman, 'Digital transformation: opportunities to create new business models', *Strategy & Leadership*, 2012.
- [20] D. Liu, S. Chen, and T. Chou, 'Resource fit in digital transformation: Lessons learned from the CBC Bank global e-banking project', *Management Decision*, 2011.

- [21] D. R. Brousell, J. R. Moad, and P. Tate, 'The next industrial revolution: how the internet of things and embedded, connected, intelligent devices will transform manufacturing', *Frost & Sullivan, A Manufacturing Leadership White Paper*, 2014.
- [22] R. F. Babiceanu and R. Seker, 'Big Data and virtualization for manufacturing cyber-physical systems: A survey of the current status and future outlook', *Comput Ind*, vol. 81, pp. 128–137, 2016.
- [23] S. Makridakis, 'The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms', *Futures*, vol. 90, pp. 46–60, 2017.
- [24] J. W. Strandhagen, E. Alfnes, J. O. Strandhagen, and N. Swahn, 'Importance of production environments when applying Industry 4.0 to production Logistics-A multiple case study', in *6th International Workshop of Advanced Manufacturing and Automation*, 2016, pp. 241–247.
- [25] C. M. C. de Mendonça and A. M. V. de Andrade, 'Dynamic capabilities and their relations with elements of digital transformation in Portugal', *Journal of Information Systems Engineering & Management*, vol. 3, no. 3, 2018.
- [26] E. Brynjolfsson and A. McAfee, *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company, 2014.
- [27] D. J. Teece, G. Pisano, and A. Shuen, 'Dynamic capabilities and strategic management', *Strategic management journal*, vol. 18, no. 7, pp. 509–533, 1997.
- [28] 'Kaplanidou, Areti. 2018. Digitalization in the apparel manufacturing process.'
- [29] D. J. Teece, 'Dynamic capabilities: Routines versus entrepreneurial action', *Journal of management studies*, vol. 49, no. 8, pp. 1395–1401, 2012.
- [30] D. J. Teece, 'The foundations of enterprise performance: Dynamic and ordinary capabilities in an (economic) theory of firms', *Academy of management perspectives*, vol. 28, no. 4, pp. 328–352, 2014.
- [31] 'Reilly, C.O. dan Tushman, M.L., 2007. Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma. *Journal of Management*, 1904(1963), Hal. 185–206'.
- [32] H. Endres, *Adaptability Through Dynamic Capabilities How Management Can Recognize Opportunities and Threats*. Springer, 2018.
- [33] M. Ahmad, M. Papert, and A. Pflaum, 'Dynamic capabilities related implementation skills for internet of things solutions in the digital economy', 2018.
- [34] D. J. Teece, 'The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms.', *Acad. Manage. Perspect*.
- [35] D. J. Teece, 'Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance.', *Strategic Management Journal*,
- [36] C. Åberg, N. Kazemargi, and M. Bankewitz, 'Strategists on the board in a digital era', *Business and Management Research*, vol. 6, no. 2, pp. 40–51, 2017.
- [37] 'Hulme, George V. 2019. Digital Transformation Helps Drive Nike's Earning Run.'
- [38] D. J. Teece, 'Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance', *Strategic management journal*, vol. 28, no. 13, pp. 1319–1350, 2007.
- [39] I. Nica, N. Chiriță, and Ștefan Ionescu, 'Using of KPIs and Dashboard in the analysis of Nike company's performance management.', *Theoretical & Applied Economics*, vol. 28, no. 1, 2021.
- [40] R. W. Palmatier and L. Steinhoff, *Relationship marketing in the digital age*. Routledge, 2019.
- [41] Nike, 'Nike Acquires Invertex', <https://news.nike.com/news/nike-invertex-digital-technology>.
<https://news.nike.com/news/nike-invertex-digital-technology> (accessed Sep. 14, 2019).
- [42] Nike, 'Nike Acquires Invertex'. <https://news.nike.com/news/nike-celect-acquisition> (accessed Sep. 14, 2019).