Artificial Intelligence Implementation in the Business Model Innovation for Ensuring Business Continuity: A Case Study of PT. Metrodata Electronics Tbk.

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Abstract

This paper explores potential risks to PT Metrodata Electronics Tbk. (ME), contemplating current technical developments and the effects of the Covid-19 pandemic. It highlighted how important business model innovation is to the company's survival in a changing business ecosystem. This paper proposed a new innovative business model that includes an AI-powered system, an online shipping platform, and digital payment methods. In addition, an initiative to develop ME's IT solutions business is also needed to be added to the new innovative business model. The formulated paper objectives are successfully achieved because this paper managed to explain that business model innovation may enhance operational efficiency and sustain revenue generation, making the company keep its business continuity. This new innovative business model can be empowered by opportunities like changing consumer behavior and online shopping trend, but it can be hampered too by threats like digital transformation. Therefore, it is important for future authors to further explore AI implementation in business model innovation and valuable digital solutions for IT companies.

Keywords: Business Model Innovation, Artificial Intelligence, Digital Transformation.

Introduction

1. Background

Digital transformation becomes a real phenomenon that happen in the recent era. It is currently used by many companies to support their business operation to be automated and efficient. To respond to this phenomenon, they implemented Industry 4.0. technology that may promote and support the development of the digital economy. However, the success of Industry 4.0. technology depends on the digital literacy of the country where the companies exist. Tutak, & Brodny (2022) conducted a research study on the European Union 27 countries (EU-27) and found that the success of Industry 4.0.

implementation there is influenced by the countries' digital maturity–capabilities to respond to the digital transformation such as Artificial Intelligent (AI), big data analysis, cybersecurity, etc. The result of this study reveals that not all EU-27 countries have the same levels of digital maturity. Thus, there is an adjusted digital economy plan that may be in line with the companies' digital maturity.

However, one region has a different digital transformation issue from the other ones. Rhee, Wood, & Kim (2022) conducted another research study on Southeast Asian countries and found that digital transformation may happen there because of the increasing rate of aged populations due to the decreasing fertility rates that is followed by the increasing life expectancy rate. Unfortunately, those conditions may negatively impact Total Factor Productivity (TFP). However, the researchers then display another result that may overcome those issues with public Research & Development (R&D) and Information & Communication Technology (ICT) tools. Thus, there is a need for Southeast Asian countries to develop and utilize digital technologies that may enable them to keep their productivity rate–like AI for instance (Marsan, 2021).

Since there is a positive impact that Industry 4.0. may give towards productivity, many countries begin to adopt and use it as a tool to ease their business operation, including in Indonesia. Hidayatno, Rahman, & Irminanda (2019) mentioned that the utilization of Industry 4.0 technology in that country may improve production efficiency while reducing its costs at the same time. However, it is not easy to realize that thing because there is a threat of restricted knowledge that Indonesian companies have about the digital economy (Fridayani et al., 2021). This kind of restricted knowledge is caused by the digital divide between those who may access the Internet and hardware, and those who may not (Lai, & Widmar, 2021). So, when all business activities switch to digital space, not all companies are able to do that.

2. Problem Statement

He et al. (2021) conducted a research study on the correlation between digital transformation and organizational resilience. The researchers want to identify whether digital transformation may help companies to keep their organizational resilience during COVID-19 or not–the measurements are based on being creative, flexible, and resilient. The findings of this research study showed that digital transformation is built by two initiatives i.e., strategic technology investment (keeping sustainability, understanding external turmoil, looking for resources, and developing relevant solutions), and transformation management intensity (building leadership that can encourage employees to deal with crises). This research study, however, only focuses on studying digital transformation when companies face crises, but it does not examine what happens after they pass the crises.

Niemimaa et al. (2019) proposed the concept of business continuity that covers both present times (when companies deal with crises), and future times (after the companies pass the crises). This business continuity may be realized once companies may combine rapid technology changes and new innovative business models in operating their businesses. However, companies need to ensure that their business models consist of value preservation and value creation. These two things are the ones that can support the companies' business continuity in both present and future times.

At this point, the author of this paper already gets the idea of linking business continuity with business model innovation.

However, he thinks that a specification needs to be done to make this paper become more particular. Teece (2010) mentioned that the business model is the company's philosophy in dealing with customer needs, organizational ability, and the company's profit. Based on that statement, the author of this paper needs to choose which section of the business model he wants to write down. Inputting customer needs in making a paper about business model innovation may offer a value proposition that companies/businesses offer to their customers. In the end, this may give benefits both the customers and the companies (business success) (Geissdoerfer, Vladimirova, & Evans, 2018).

In addition, Niemimaa et al. (2019) argued that companies should include rapid technological advancement in their business model innovation initiative. At this point, the author of this paper needs to specify the type of technological advancement that he wants to write about too. He chooses to set Artificial Intelligence (AI) as the selected type of technological advancement because it can be used to do marketing-related tasks like enhancing customer satisfaction and automated ordering systems (Kutyauripo, Rushambwa, & Chiwazi, 2023). Thus, the author of this paper sees that AI is suitable for the paper's objectives.

From the literature reviews above, the author of this paper manages to formulate several research questions and research objectives that he wants to answer at the end of this paper.

a. To identify the relationship between business model innovation and business continuity;
b. To identify the key factors and enablers of business model innovation;
c. To identify the opportunities and challenges of adding AI to business model innovation.

3. Company Overview

PT. Metrodata Electronics Tbk. (ME) is considered one of the leading IT industries in Indonesia. It has already provided clients with IT products distribution such as hardware and software for 45 years since its establishment (Metrodata Electronics, 2022). Aside from that, the company also offers digital solutions through numerous technologies such as digital platforms, cloud services, big data & analytics, business applications, hybrid IT infrastructure, IT security, etc. with the intention to assist clients to adapt to digital transformation.

ME's current business model is centered on ranging IT products and solutions provisions for its clients. This is based on its vision by which it wants to be one of the leading actors in the Indonesian digital economy advancement (Metrodata Electronics, 2022). Following this vision, the company set three missions to be done:

a. Driving digital technology in Indonesia;
b. Providing innovative and excellent digital solutions and services to its clients;
c. Increasing shareholders' value and building a proper workplace.

To ensure that those missions may be done properly, the company then formulated three values that are proposed to the clients i.e.:

a. Keeping the done actions in line with moral, ethical, and legal norms;

b. Demonstrating superior knowledge, competencies, and skills in doing the jobs;

c. Being capable to keep making improvements and turning the idea into reality.

4. Significance of the study

In short, this paper tried to analyze the correlation between business model innovation and business continuity. The author chooses to focus on the customer needs section of the business model. On another side, he selects AI to be the type of digital technology that he wants to input into his paper. He believed that the existence of AI in this paper may differ from his paper the existing research studies.

Nunes, & Russo (2019) conducted a research study to analyze the business model innovation of Brazillian companies and found that those companies may present a new way to generate value through market expansion, diversification, as well as product and service differentiation. Since that research study does not discuss AI yet, then this paper would bring an explanation about AI implementation in business model innovation, and seek whether it helps the company to innovate on its business model to thrive its business continuity or not.

Niemimaa et al. (2019) mentioned that rapid technological changes may affect business continuity. From this statement, the author of this paper believed that the emergence of AI, which is one of the recent digital technology types, may affect the company's business continuity. Haleem et al. (2022) stated that AI may make the marketing campaign becomes more effective by spreading information and content based on the customer's preferences, thus it can be helpful for the company to meet the customer needs. However, this study also mentioned that the result of AI implementation depends on each industry. Hence, it drives the author of this paper to write down AI, ME's business model innovation, and ME's business continuity.

Analysis of Uncertainties

Every company aims to ensure the long-term sustainability of their business. Sustained business operations provide advantages such as increased revenue, cash flow, and capital. The more advantages a company earns, the stronger its ability to operate smoothly and meet its financial obligations, reducing the risk of encountering financial difficulties. To achieve these goals, companies need to establish a business model that enables them to adapt to the evolving business ecosystem and maintain a sustainable business cycle.

However, there is a significant challenge that hinders companies from achieving these ideals, namely uncertainty. Uncertainty refers to unpredictable future events or outcomes that may disrupt business continuity within a specific sector. According to the Corporate Finance Institute (2022), uncertainty arises when companies lack knowledge or information in particular fields or sectors.

In the context of IT solutions and distribution businesses like ME, several uncertainties pose challenges. The first uncertainty is the rapid transformation of technological trends. Technological advancements evolve rapidly and are difficult

to predict accurately. Simultaneously, the demand for technology continues to grow in recent times. For instance, Arribathi, Maimunah, and Nurfitriani (2017) emphasized the importance of information technology in empowering companies' problem-solving capabilities and decision-making processes. Drawing on Michael Porter's competitive advantage theory, these researchers highlighted information technology innovation as a crucial element for building a company's competitive advantage.

Aligned with the transformation of technological trends, external events like the COVID-19 pandemic also pose threats to ME's business. The pandemic has led to a shift in consumer behavior globally, transitioning from offline to online activities. This shift does not merely alter physical infrastructure or society but transforms how individuals, including consumers, interact with brands and products (Cruz-Cardenas et al., 2021). Consequently, consumers increasingly rely on technological applications such as social media and e-commerce platforms. To respond to this changing landscape, ME should concern with AI implementation that may be in line with the changing consumer behavior due to the events above.

Analysis of the Impact of Uncertainties

The uncertainties discussed earlier can have various impacts on ME's business continuity. Changes in technology trends may require the company to transition from a traditional supply chain management system to a digitalized one. With digital transformation and evolving technological trends such as Artificial Intelligence or cloud computing, supply chain management can be conducted within an integrated business network, enabling the systematic and organized flow of information, materials, and finances (Wiedenmann & Größler, 2019).

On the positive side, technological changes in supply chain management can enhance ME's effectiveness, efficiency, and convenience in distributing IT products. However, there are also potential negative impacts, such as increased implementation and maintenance costs. Adopting a digitalized supply chain system would require the company to invest in supporting IT features like artificial intelligence, the Internet of Things, etc. Consequently, additional funds would be needed for the digitalization of supply chain management.

In addition to technological trend changes, external events like the COVID-19 pandemic can significantly impact the company's business continuity. Governments worldwide implemented social distancing measures to mitigate the virus's spread (Hartt, 2020). Consequently, consumer behavior shifted from offline to online channels. In response, ME must provide a business model that facilitates clients and vendors in conducting their business activities with minimal physical contact. Failure to adapt to this change may result in losing out to competition from e-commerce companies, leading to a loss of customer trust and a damaged reputation.

Design of Changes

In this part, the author proposes a design of changes that can help ME navigate the potential impacts of the uncertainties discussed earlier. The reason why the author chose ME as the case in this paper is to explore the correlation between

business model innovation and business continuity according to what happens in ME's business. Since ME is an IT company, the author sees that it may fit with the paper's objectives by which one of them wants to explain AI implementation in business model innovation.

Here are the details of the new innovative business model design that ME may implement to deal with the identified uncertainties, as well as to sustain its business continuity:

Table 1. Metrodata Business Model Innovation Framework (Wang et al., 2021; Zavarella, 2021; Investor Academy Indonesia, 2022a, 2022b; Metrodata Electronics, 2022; Raj et al., 2022; Synnex Metrodata Indonesia, n.d).

	ME's Existing Business Model	Uncertainties' Impact on ME's Existing Business Model	ME's New Innovative Business Model
Customers	Microbusinesses; enterprises		
Value Proposition	Offering the best, most secure, and most reliable IT products and solutions	Difficulty in selling products and solutions in the traditional way because of the evolution of market and consumer behavior due to COVID-19 and social distancing policy	ME may create mobile apps by which there are features like a chatbot and recommendation system. So, it may keep selling products and solutions based on the customer's needs.
Resources	Infrastructures; IT facilities; IT products; IT services; Technology partners; Employees	ME probably needs digital infrastructures to sell its products and services online	ME should concern with the development of digital infrastructure such as AI, cybersecurity, digital payment, etc.
Channels	Direct sales; Sales through distributors and system integrators	Scarcity of materials may happen because of increasing product demand from customers to adapt to the physical restriction phenomenon during Covid-19. So, product sales may be disrupted	ME should develop mobile apps so that customers may buy the products in a contactless way. This includes the products delivery process after the purchase is done
Technical Design	Providing IT hardware and software to the customers; Assisting the customer to adapt to digital transformation by providing digital solutions	IT hardware and software stocks may be disrupted because of Covid-19 and the physical restriction phenomenon	ME should put more focus on providing digital solutions for the customers
Payment Methods	Payment via debit/credit card	Online payment may emerge as the new requirement for ME due to Covid-19	ME should provide digital payment methods
Cost	Operational costs; wages and salaries; maintenance costs; distribution costs, and research and development (R&D)	Operational costs would perhaps increase due to the required changes for innovating the existing supply chain system.	ME can implement AI to optimize the operational costs by identifying inefficiencies in its existing operational system, and evaluating the possible threats due to Covid-19
Revenue	IT hardware & software; Digital solution & consultation	Digital solutions & consultation, as well as software, may become the promising revenue sources that ME should focus on	ME should put more focus on providing digital solutions for the customers

Execution Plan for Changes Project

To meet the customer's needs during the Covid-19 pandemic, ME should conduct several changes to modify its existing business model. The first change is the implementation of an AI-based system. As we know, the pandemic turns consumer behavior from offline to online shopping because they want to avoid physical contact (Wang et al., 2021). In addition, the increasing demand for IT products and solutions also occurs because many people want to adapt themselves to the e-commerce trends due to the pandemic. It can be seen from **Figure 1** below that showed ME's

revenue rate.
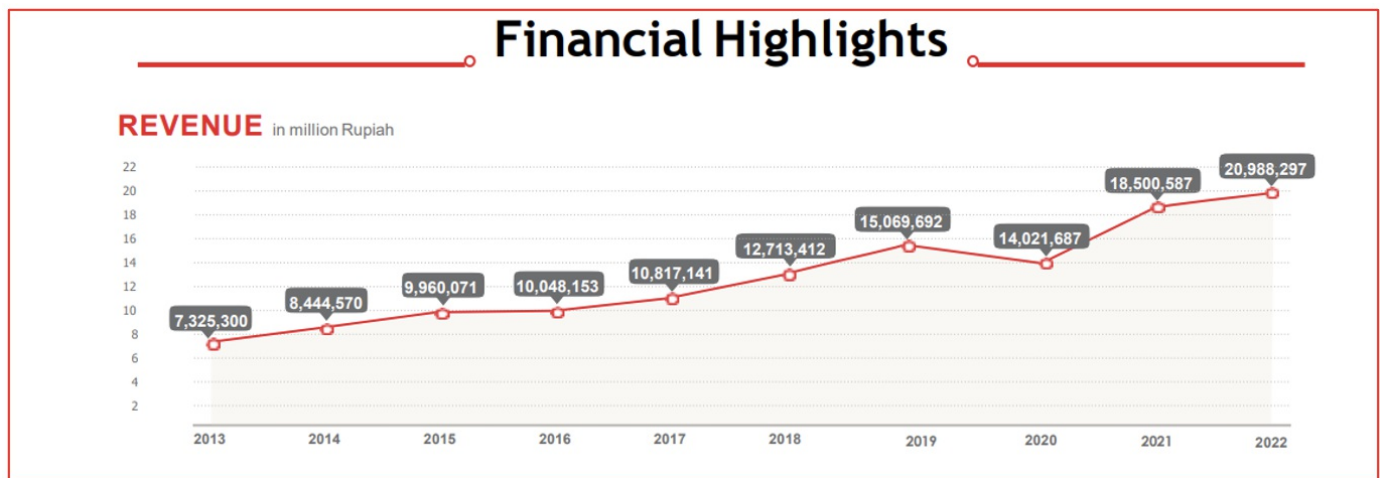
Fig. 1. ME's revenue rate indicates the increase in IT products and solutions (*focus on 2019-2021 since it is when Covid-19 occurs*) (Metrodata, 2022).

If the supply chain is not well managed, then ME may experience a scarcity of materials by which the products are unavailable while the demand for those products increases (Raj et al., 2022). Hence, AI implementation is important to be added to the company's business model because it may help the company to optimize its supply chain management. AI (which is one of the Industry 4.0. technology) may reduce errors and costs while the company wants to do demand forecasting due to its capability to analyze data, market trends, and customer preferences in a more accurate and efficient way compared to human methods. This can allow the company to prevent overstocking, and to adjust their supply chain management policy. Thus, unnecessary operational costs may be cut, and more revenue may be earned. AI implementation in this area may take several shapes such as machine learning algorithms to analyze historical data and conduct forecasting based on it, AI-powered forecasting tools to predict demand automatically, etc. (Aamer, Yani, & Priyatna, 2021).

Aside from that, ME should also digitalize its products and solutions sales by establishing online shopping platforms i.e., mobile apps, and websites. In Indonesia, the amounts of smartphone users keep increasing starting from 2017 to 2022, and it is predicted to keep increasing until 2028–you can see the statistics in **Figure 2** below. The trend also happens to Indonesian internet users whose amounts keep increasing from year to year–you can see the statistics in **Figure 3** below. Those statistical data are evidence that online shopping may become a certain opportunity for ME to keep its business continuity. In this case, AI may be utilized by ME to optimize its online shopping through several features like chatbots and virtual assistants, recommendation systems, image tagging and visual search, etc.
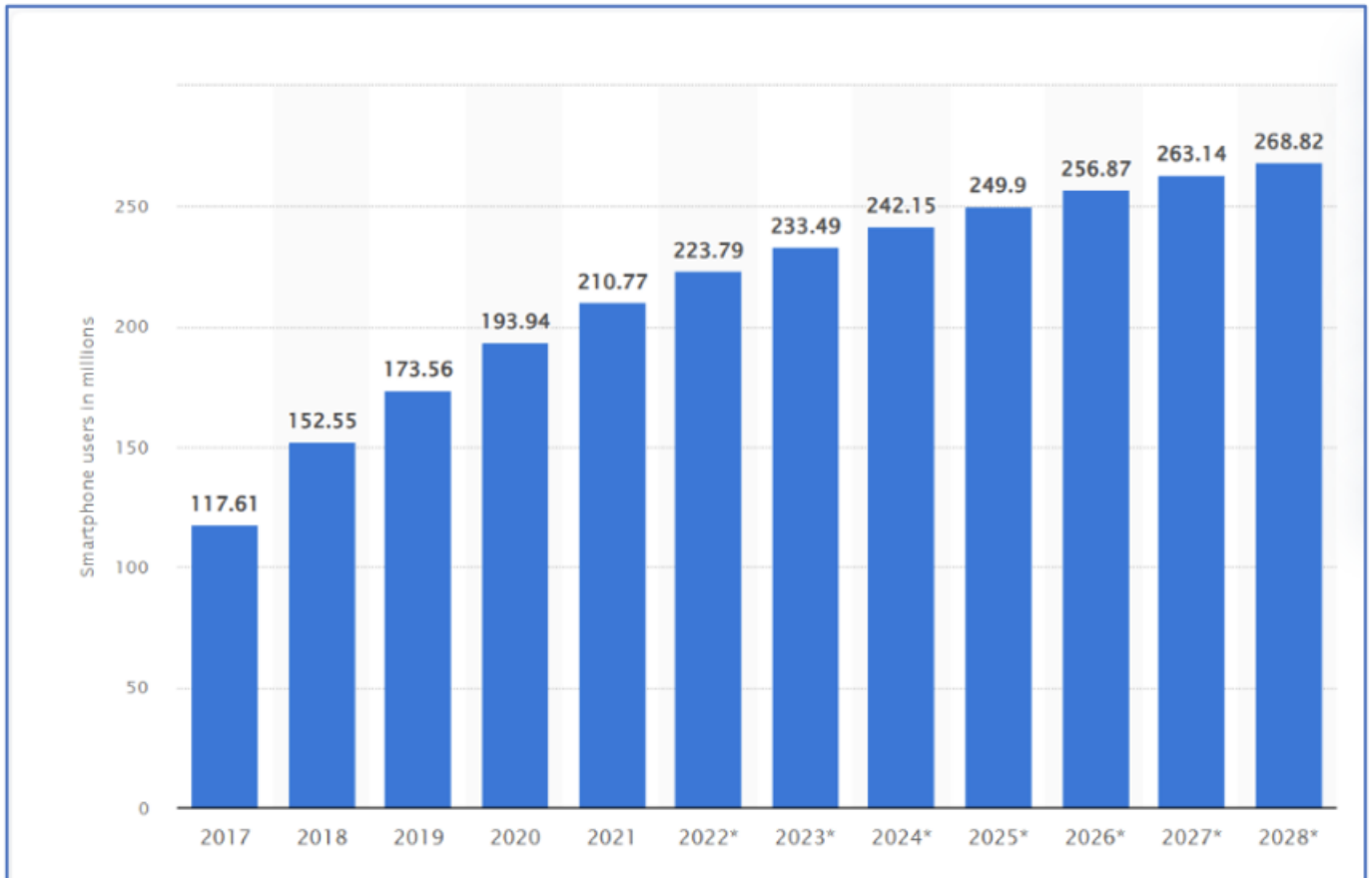
Fig. 2. The amounts of smartphone users in Indonesia from 2019 to 2021 with forecasts until 2028 (Statista, 2022a)
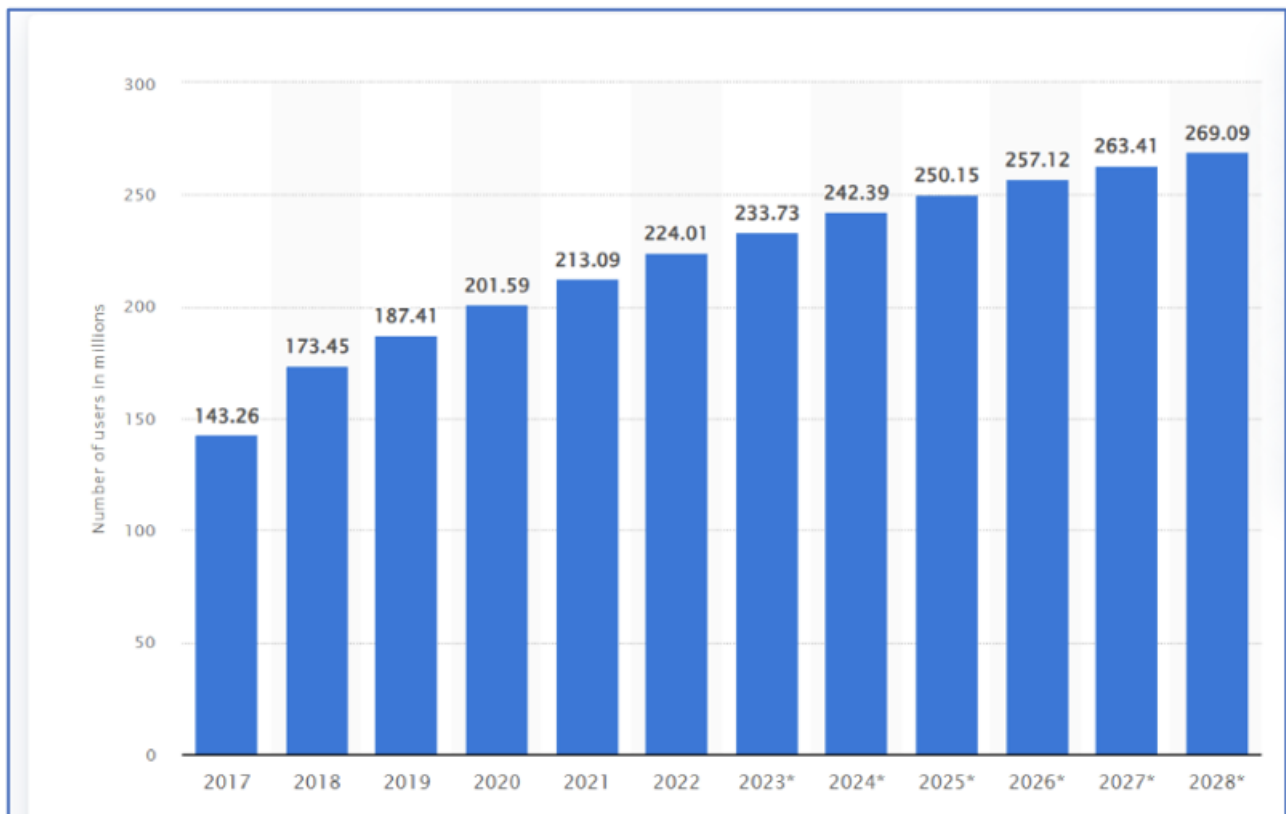

Fig. 3. The amounts of internet users in Indonesia from 2019 to 2021 with forecasts until 2028 (Statista, 2022b)

For the payment methods, ME should incorporate a cashless system into its new business model (BM). While it is true that many Indonesian people still use conventional payment methods such as debit/credit cards or bank transfers, we cannot reject the fact that the Covid-19 pandemic and government physical restriction drive companies and customers to do buying-and-selling activities online (Jilkova, & Kralova, 2021). Therefore, it is important for the company to provide digital payment methods such as in-app payment, m-banking, e-money, etc. However, conventional payment methods should be maintained to facilitate payments from those who are unable to use cashless methods.

The last change that the author would like to propose in this paper is being focused on digital solutions and software. As it is mentioned before, scarcity of materials may happen due to the Covid-19 pandemic, and the government's physical restriction policy, making the supply chain activities negatively influenced by it (Raj et al., 2022). To deal with this issue, it is important for ME to put its attention on developing its IT solutions and consultation. Since those things are immaterial, it seems that their sales rate may be maintained, allowing the company to keep earning revenue despite the supply chain problem occurring. It does not mean that ME should close its IT products business, but the company should look at its other business (IT solutions) and develop it.
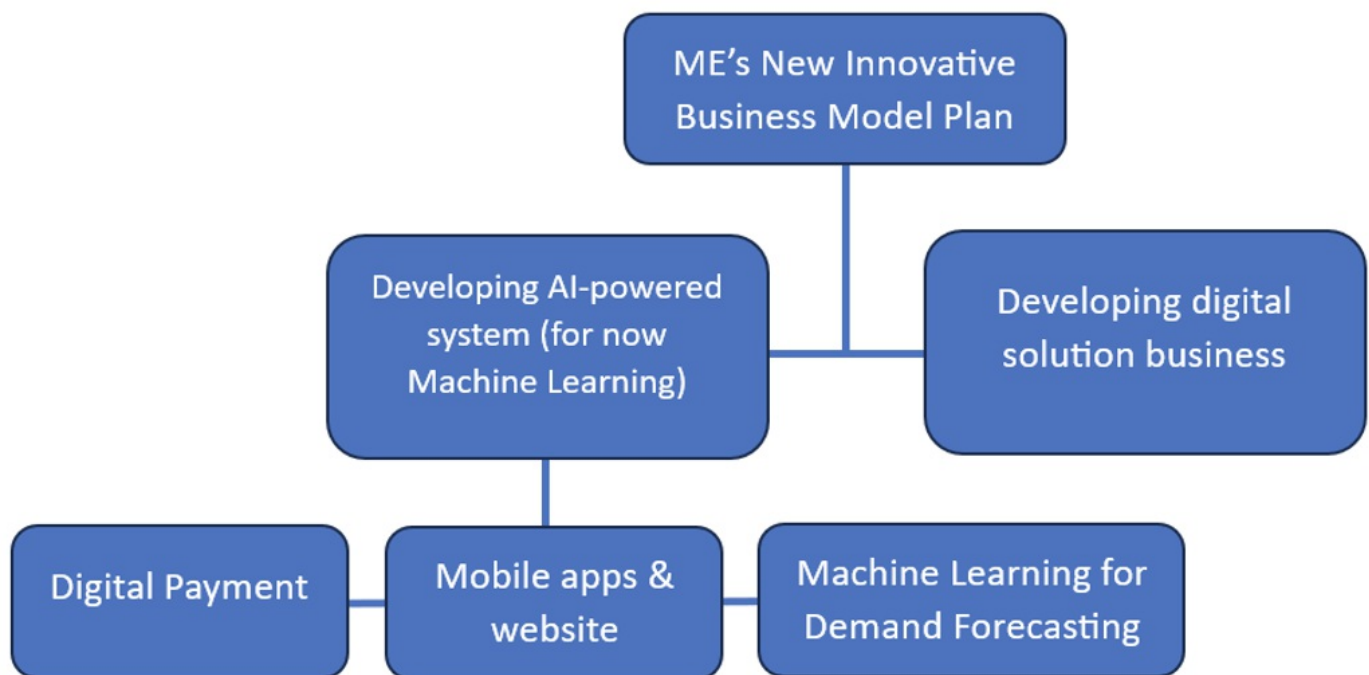
Fig. 4. The step-by-step flowchart of the business model innovation for ME. First, an AI-powered system should be developed. At the same time, the company should also develop its IT solution business. Then, it may proceed to the next stage i.e., developing several AI tools and methods such as digital payment methods, mobile apps & websites, as well as machine learning for demand forecasting (Aamer, Yani, & Priyatna, 2022; Statista, 2022a; Statista, 2022b).

Conclusion

In this paper, the author highlights the potential threats posed by technological trends and the Covid-19 pandemic to PT. Metrodata Electronics Tbk. By reflecting on ME's existing business model, the author emphasizes the need for business model innovation to ensure business continuity. The company's new innovative business model should feature with AI-powered system, an online shopping platform, digital payment methods, and the initiative to develop its IT solutions business.

All three paper objectives are managed to be fulfilled. First, business model innovation may enhance the company's business operation, making it able to keep earning revenue and sustain its business life. Second, the uncertainties are the driving factors why the company does business model innovation, and the things that the company has (infrastructures, facilities, etc.) may assist it to do that. Third, the changing consumer behavior (from offline to online) and the business ecosystem due to external conditions (such as Covid-19) may become opportunities for the company to add an AI-based system to its current business model, however, digital transformation may perhaps become a threat in the future. So, it is important for the company to always be aware of the technological advancement that happens right now or later in the future.

Despite the conclusion that managed to be formulated, the author realized that this paper has some limitations and weaknesses. It mentioned AI implementation to enhance the company's existing business model, but it still does not give more elaboration on how AI may do that. So, it is the job of future authors to explain more about this issue. In addition, it is also important to specify which types of AI that can help business model innovation. For instance, the author of this paper mentioned that machine learning algorithms may help the company's demand forecasting to be more accurate and more efficient. Probably, future authors may explain more and observe deeper regarding this topic.

Another weakness of this paper is the lack of specification about digital solutions that IT companies should develop. Future authors may identify what types of digital solutions are valuable for customers in the digital era so that companies are better to develop that. From there, they may then explain why those types of digital solutions matter and how the companies may develop that.

Used Comments to Do Paper Revision

1. Comment Number 1. This comment inspires the author to make research objectives and background part. However, the author does not use the research methods suggestion because he realized that it is incompatible with the given task i.e., writing a paper, not a research study.

   "A. Abstract should be explained:

   1. Research objectives;

   2. The method used; whether qualitative or quantitative. If qualitative, who was interviewed, if quantitative how many samples were used;

   3. What analysis method is used;

   4. What are the findings of the study and what are the recommendations.

   B.Introduction:

1. The first paragraph should explain how IT solutions and products are delivered to consumers in developed countries (Europe);

2. The second paragraph should explain how IT solutions and products are offered to consumers in Asian countries;

3. The third paragraph should explain how IT solutions and products are offered to consumers in Indonesia;

4. The last paragraph explains the purpose of the research and the novelty of your research.

C. Method, preferably explaining:

1. Research Design;

2. Study Areas;

3. Data Collection Methods;

4. Research Respondents;

5. Data Validity and Reliability;

6. Methods of Data Analysis."

2. Comment Number 2. The author is inspired by this comment to provide a more specific explanation of the need for a new innovative business model, how he formulates it, and what components exist inside it.

   "Author

   Hope you are trying to propose a business model in this paper. But it is not mentioned in the paper. Mention the need for the model, how you develop it, and the components of the model. More references must be included. The data used for the study is not clear and the inferences also."

3. Comment Number 3. The author is inspired by this comment to fix some grammatical issues, make a step-by-step flowchart to display the stages of the proposed new innovative business model plan, and give suggestions for future research studies. However, the author rejects the finding suggestions since it is incompatible with the given task i.e., writing a paper, not a research study.

   "The grammar in some paragraphs can be better punctuated to improve the flow of reading to enhance understanding. The authors can present a graphical or a step-by-step flowchart to the presented "Execution Plan for Changes Project" in chapter 4.

   The authors should discuss their findings in comparison with similar studies in the field to pinpoint the novel scientific contributions of the article.

   The authors can focus on possible suggestions for further research."

Acknowledgments

References

- Aamer, A.M., Yani, L.P.E., & Priyatna, I.M.A. (2021). Data Analytics in the Supply Chain Management: Review of

Machine Learning Applications in Demand Forecasting. *Operations and Supply Chain Management*, 14(1), 1-13.

- Arribathi, A. H., Maimunah, & Nurfitriani, D. (2017). Implementation System of Business Intelligence System in the Company. *Aptisi Transactions on Management (ATM), 1*(2), 136-142.

- Corporate Finance Institute. (2022). *Uncertainty*. Available at https://corporatefinanceinstitute.com/resources/risk-management/uncertainty, retrieved on May 04, 2023.

- Cruz-Cardenas, J., Zabelina, E., Guadalupe-Lanas, J., Palacio-Fierro, A., Ramos-Galazara, C. (2021). COVID-19, Consumer Behavior, Technology, and Society: A Literature Review and Bibliometric Analysis. *Technological Forecasting & Social Change, 173*, 1-13.

- Fridayani, H.D., Iqbal, M., Chiang, L.C., Pratama, M.A., & Atmojo, M.E. (2021). Opportunities and Challenges of Digital Economy for Micro, Small, and Medium Enterprises Facing Pandemic Covid-19 in Indonesia: A Case Study. *Proceedings of the International Conference on Public Organization (ICONPO 2021)*, 209, 83-89.

- Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018). Sustainable Business Model Innovation: A Review. *Journal of Cleaner Production*, 198, 401-416.

- Hartt, M. (2021). COVID-19: A Lonely Pandemic. *Cities & Health, 5*(1), 80-82.

- Haleem, A., Javaid, M., Qadri, M.A., Singh, R.P., & Suman, R. (2022). Artificial Intelligence (AI) Applications for Marketing: A Literature-Based Study. *International Journal of Intelligent Networks*, 3, 119-132.

- He, Z., Huang, H., Choi, H., & Bilgihan, A. (2021). Building Organizational Resilience with Digital Transformation. *Journal of Service Management*, 34(1), 1-25.

- Hidayatno, A., Rahman, I., & Irminanda, K.R. (2019). A Conceptualization of Industry 4.0 Adoption in Textile and Clothing Sector in Indonesia. *ICIBE '19: Proceedings of the 5th International Conference on Industrial and Business Engineering*, 339-343.

- Investor Academy Indonesia. (2022a). *Meet Bpk Susanto Djaja, PresDir PT Metrodata Electronics Tbk & Donald C Lantu, Andre Lukito, Vimalasari*. Available at https://www.youtube.com/watch?v=AmaLHurENv8, retrieved on June 12, 2023.

- Investor Academy Indonesia. (2022b). *Meet Bpk Susanto Djaja, PresDir PT Metrodata Electronics Tbk & Donald C Lantu, Andre Lukito, Vimalasari 2*. Available at https://www.youtube.com/watch?v=D7rIXwY4cRM, retrieved on June 12, 2023.

- Jilkova, P., & Kralova, P. (2021). Digital Consumer Behaviour and E-commerce Trends during the COVID-19 Crisis. *International Advances in Economic Research*, 27, 83-85.

- Kutyauripo, I., Rushambwa, M., & Chiwazi, L. (2023). Artificial Intelligence Applications in the Agrifood Sectors. *Journal of Agriculture and Food Research, 11*, 1-8. DOI: 10.1016/j.jafr.2023.100502.

- Lai, J., & Widmar, N.O. (2021). Revisiting the Digital Divide in the COVID-19 Era. *Applied Economic Perspective and Policy*, 43(1), 458-464.

- Marsan, G.A. (2021). Artificial Intelligence in South East Asia: Upskilling and Reskilling to Narrow Emerging Digital Divides in the Post-Pandemic Recovery. *Georgetown Journal of Asian Affairs*, 7, 58-64.

- Metrodata Electronics. (2022). *Digital Solution Provider and Technology Innovator*. Available at https://www.metrodata.co.id/cfind/source/files/metrodata%20company%20profile.pdf, retrieved on June 9, 2023.

- Nunes, M.P., & Russo, A.P. (2019). Analysis of Business Models Innovation–A Multiple Case Study. *Innovation & Management Review*, 16(1), 17-35.

- Niemimaa, M., Järveläinen, J., Heikkilä, M., & Heikkilä, J. (2019). Business Continuity of Business Models: Evaluating the Resilience of Business Models for Contingencies. *International Journal of Information Management, 49*, 208-216. DOI: 10.1016/j.ijinfomgt.2019.04.010.

- Raj, A., Mukherjee, A.A., Jabbour, A.B.L.D.S., & Srivastava, S.K. (2022). Supply Chain Management During and Post-COVID-19 Pandemic: Mitigation Strategies and Practical Lessons Learned. *Journal of Business Research*, 142, 1125-1139.

- Rhee, T., Wood, J., & Kim, J. (2022). Digital Transformation as a Demographic and Economic Integrated Policy for Southeast Asian Developing Countries. *Sustainability*, 14(5), 1-19.

- Statista. (2022a). *Number of Smartphone Users in Indonesia from 2019 to 2021 with Forecasts until 2028.* Available at https://www.statista.com/statistics/266729/smartphone-users-in-indonesia, retrieved on June 13, 2023.

- Statista. (2022b). *Number of Internet Users in Indonesia from 2017 to 2022 with Forecasts until 2028.* Available at https://www.statista.com/statistics/266729/smartphone-users-in-indonesia, retrieved on June 13, 2023.

- Synnex Metrodata Indonesia. (n.d.). *Pernyataan Privasi.* Available at https://www.synnexmetrodata.com/id/kebijakan-privasi, retrieved on June 12, 2023.

- Teece, D.J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2-3), 172-194.

- Tutak, M., & Brodny, J. (2022). Business Digital Maturity in Europe and Its Implication for Open Innovation. *Journal of Open Innovation*, 8(27), 1-23.

- Wang, X., Wong, Y.D., Qi, G., & Yuen, K.F. (2021). Contactless Channel for Shopping and Delivery in the Context of Social Distancing in Response to COVID-19 Pandemic. *Electronic Commerce Research and Applications*, 48, 1-12.

- Wiedenmann, M., & Größler, A. (2019). The Impact of Digital Technologies on Operational Causes of the Bullwhip Effect–A Literature Review. *Procedia CIRP, 81*(8), 552-557.

- Zavarella, A. (2021). *AI Presents Opportunities for Cost Optimization in Manufacturing.* Available at https://www.journalofaccountancy.com/news/2021/may/use-ai-for-cost-optimization-in-manufacturing.html, retrieved on June 12, 2023.