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Dynamic capabilities, digital transformation and innovation performance: Basis for sustainable manufacturing enterprise development model

Zhu, Xiumei ✉
Graduate School, Lyceum of the Philippines University - Batangas, Philippines

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Abstract

This study takes the relationship among dynamic capability, digital transformation, and innovation performance of enterprises as the main research object, and manufacturing enterprises as the research sample. This study deeply analyzes the effective way of "Digital transformation - dynamic capabilities - innovation performance", sorts out relevant literature, and summarizes the research results related to Digital transformation, enterprise dynamic capabilities and enterprise innovation performance. Analyze the relationship between dynamic capabilities of enterprises and innovation performance of enterprises, and the relationship between Digital transformation and innovation performance of enterprises and build a theoretical model containing the influence mechanism between these variables. Measure the dynamic capability, Digital transformation, and innovation performance of enterprises, and study the relationship between them. This research mainly uses SPSS software version 29 to analyze the survey data, make descriptive statistics on the survey data, analyze the reliability and validity of the questionnaire, and make correlation analysis and regression analysis on the dynamic capabilities of enterprises, Digital transformation and enterprise innovation performance; Finally, the empirical results are discussed, and based on the explanation of the mechanism of action, corresponding suggestions are proposed based on the research conclusions.

Keywords: dynamic capabilities, digital transformation, innovation performance, sustainable development

Dynamic capabilities, digital transformation and innovation performance: Basis for sustainable manufacturing enterprise development model

1. Introduction

Since the reform and opening up, China's economic development has also entered a new normal under the socialist market economy system. Such changes in the environment have brought new opportunities and challenges to the sustainable development of enterprises, and adhering to independent innovation is an important support for the sustainable development of enterprises. Digital technologies are advancing iteratively, the digital economy is booming, and enterprises' digital transformation is like sailing against the current. If they do not advance, they will fall back. In recent years, many enterprises have gained competitive advantages by virtue of digital transformation. Digital transformation is becoming an important factor affecting the market competition of enterprises and the success or failure of industry development (Hong et al., 2022). Under the background of digital transformation, how can manufacturing enterprises adhere to continuous innovation in the dynamic market changes to provide impetus and vitality for enterprises.

Dynamic capability of an enterprise is the ability of an enterprise to maintain sustainable competitive advantage in the constantly changing environment, the ability of an enterprise to flexibly apply knowledge and skills to production and operation, and the ability of an enterprise to manage and change the organization (Fu, 2016). Such ability is closely related to the sustainable development of an enterprise. Then, does this dynamic capability have an impact on the innovation performance of manufacturing enterprises?

Under the background of digital economy, digital transformation is an important strategic choice to be followed in the development process of the main body of manufacturing enterprises. Digital transformation refers to the process of reconstructing business models using a combination of emerging digital technologies such as artificial intelligence, cloud computing, blockchain and big data. Digital transformation is an innovative behavior with destructive properties, which can fundamentally change consumer behavior and expectations, the basic form of products, business models and even overturn the competition pattern of incumbents. Similarly, digital transformation will also trigger the transformation of enterprise innovation activities, provide new driving forces for enterprise innovation, and guide the innovation level of enterprises to achieve leapfrog development (Roper & Tapinos, 2016). In this context, whether enterprises can seize the opportunities of new digital technologies, promote digital transformation, give full play to the innovation enabling effect of digital technologies, and improve innovation performance has become an important topic of common concern in theoretical exploration and management practice. In the context of digital economy, enterprises in digital transformation need to accumulate and reserve resources with the help of dynamic capabilities, thus affecting the improvement of innovation performance.

How to promote enterprises to form good innovation performance through digital transformation has become a hot topic of common concern in academia and industry. The COVID-19 pandemic in early 2020 further forced traditional enterprises to make digital transformation. In the post-pandemic period, market conditions such as volatility, uncertainty, complexity and ambiguity (VUCA) have become the norm. In this "new normal", traditional enterprises should change their mindset and break through the "cold start" dilemma of digital transformation.

The market environment and external environment that enterprises are facing are increasingly complex, and the rapid development of digital technology undoubtedly increases this complexity. Today's turbulent market environment puts forward higher requirements for the dynamic capability and adaptability of enterprises. Based on this, how to cultivate the dynamic capability of enterprises to promote the digital transformation has become the focus of attention.

In order to solve this problem, researchers are analyzing the impact of dynamic capability and digital transformation on the innovation performance of manufacturing enterprises, so as to obtain specific data and information, and ensure that dynamic capability and digital transformation of enterprises have good use for the development of manufacturing enterprises. This process is very important in order to improve enterprise innovation and optimize development. The purpose of this study is to give full play to the dynamic capabilities of enterprises and the effectiveness of digital transformation, so as to further improve the innovation performance of enterprises. Therefore, this paper studies the effects of enterprise dynamic capability and digital transformation on the innovation performance of manufacturing enterprises, tries to find out the problems, and puts forward reasonable suggestions on this basis to make the dynamic capability and digital transformation of enterprises really play an effective role, promote the further improvement of innovation strength of manufacturing enterprises, and realize the optimal development of manufacturing enterprises.

Existing researches have made some achievements in the aspect of enterprise innovation performance, but there are still some deficiencies in the relevant researches on enterprise dynamic capability and digital transformation. Will enterprise dynamic capability have an impact on enterprise innovation performance? How does digital transformation improve the innovation performance of enterprises? What is the impact of digital transformation on the dynamic capability of enterprises? The relationship between these variables remains to be verified. Therefore, to a certain extent, this study also hopes to enrich the research on the dynamic capabilities of enterprises and the effective mechanism of digital transformation.

Research on the mechanism of digital transformation remains to be enriched. At present, research on the mechanism mainly focuses on the discussion on the role of internal factors of enterprises, focusing on the supplement of internal resources or the improvement of capabilities brought by digital transformation, which limits the analysis of the promoting role of digital transformation for the development of enterprises from the overall level. Much emphasis is placed on the influence of the input of digital equipment and the application of digital technology on the economic consequences of digital transformation, but the initiative of enterprises is ignored, and it has not been maturely introduced into the analysis process of enterprise digital transformation mechanism.

Based on the above reasons, this paper will theoretically analyze and empirically test the mechanism of dynamic capability and digital transformation on enterprise innovation performance. Exploring the relationship between dynamic capability, digital transformation and innovation performance will help manufacturing enterprises deepen their understanding of the relationship between dynamic capability and innovation performance, and help manufacturing enterprises explore how to promote the improvement of dynamic capability through digital transformation, so as to improve their innovation performance. For manufacturing enterprises, they should constantly carry out self-transformation and innovation, cultivate their dynamic capabilities, improve their dynamic capabilities and innovation efficiency, and help them maintain competitive advantages in the ever-changing market environment. Enterprises can take digital transformation as the breakthrough of innovation development, explore the direction and path to improve innovation performance, promote the coordinated development of internal technological innovation and organizational change, and then promote the high-quality economic development of manufacturing enterprises and build innovative enterprises. This research will also contribute to the sustainable development of manufacturing enterprises.

1.1 Objectives of the Study

This study aims to evaluate the dynamic capabilities, digital transformation and enterprise Innovation performance in manufacturing enterprises in China as basis for sustainable development of enterprises in China. More specifically to determine the dynamic capabilities of manufacturing enterprises in terms of absorptive capacity, integration capacity and organizational transformation capacity; describe the impact of digital transformation of manufacturing enterprises in terms of digital technologies, digital products and digital platforms; identify the innovation performance of manufacturing enterprises in terms of innovation intention,

innovation process and innovation results; test the significant relationship between dynamic capabilities, digital transformation and innovation performance of manufacturing enterprises; and come up with a model that can be used by manufacturing enterprises for sustainable development of enterprises in China.

2. Methods

Research Design - Descriptive research methods are adopted in this study to determine the impact of enterprise dynamic capabilities and digital transformation on improving the innovation performance of manufacturing enterprises. Data obtained from special investigations are used to analyze the research results fully and accurately.

Participants of the Study - The participants of this study are the top managers, middle managers and some grassroots managers of Chinese manufacturing enterprises. They are familiar with the strategic planning of the enterprise, and have a comprehensive understanding of the dynamic capabilities, digital transformation and enterprise performance of the enterprise, so they can provide a more realistic development situation of the enterprise. The criteria for selecting respondents were some knowledge of the dynamic capabilities of the firm, digital transformation and firm innovation performance. The destination of this study is manufacturing enterprises in 17 prefecture-level cities in Shandong Province, China, and surveyed enterprises are randomly selected. The selected enterprises are from different regions of 17 cities in Shandong Province, which are representative and random in general. Contact relevant leaders of the enterprise through phone and WeChat to complete the research content.

The study needs to understand the dynamic capabilities, digital transformation, and innovation performance of Chinese manufacturing enterprises. This study used questionnaire survey questionnaire star distribution and recycling, we decided to adopt the method of random sampling to sampling of the manufacturing enterprises in Shandong province, draw the basic information of the research enterprise, dynamic capabilities, digital transformation and enterprise innovation performance, the form of questionnaire using Likert scale, respondents according to its real situation and problem please a consistent degree of scores, Get the sample data. the sample size was 398, with an effect size of 0.25, a power probability of 0.95 or 95% and an alpha level of 0.05 or 5% using G*Power 3.1.9.2. The data was retrieved and 398 out of 500 was included in the study because of the current situation.

Data Gathering Instrument - This instrument is to combination of domestic and foreign research literature, refer to the mature classical scale in existing studies for translation processing, design the questionnaire including the demographic characteristics of the respondents, enterprise dynamic capability scale, digital transformation, and enterprise innovation performance scale items, and according to the language habits of the respondents combined with the Chinese context, the questionnaire expression is refined. The researchers modified the instrument to suit this study. This study uses three sets of questionnaires as the main mechanism to collect necessary data. The measurement items of each tool are reflected in the form of descriptive statements. The interviewees should be informed of the application frequency of each measurement item on the four-point Likert scale and the use of questionnaires should be clarified. The details are as follows: Oral interpretation indicates that scale 3.50 -- 4.00 indicates strong agreement, scale 2.50 -- 3.49 indicates agreement, scale 1.50 -- 2.49 indicates disagreement, scale 1.00 -- 1.49 indicates strong disagreement.

This instrument includes the evaluation of enterprise dynamic capability, digital transformation and enterprise innovation performance. Enterprise dynamic capability refers to the research of Jiao et al. (2021), Warner and Wager (2019), which is a three-factor model. There are 15 items in total, including absorptive capacity (5 items), integration capacity (5 items) and organizational transformation capacity (5 items). Based on the studies of Nambisan (2017), Vial (2019), Wang and Du (2021), the measurement of digital transformation isa three-factor model, which is measured from three aspects: digital technologies (5 items), digital products (5 items) and digital platforms (5 items). There are 15 items in the questionnaire. The measurement of enterprise

innovation performance is based on the studies of Zheng et al. (2014), CAI (2020), Li (2019), Yang & Liu (2018). This paper measures innovation intention (5 items), innovation process (5 items) and innovation results (5 items). There are 15 items in the questionnaire.

Data Gathering Procedure - In order to carry out the study smoothly, before data collection, the researchers prepared a request letter, asking relevant enterprises in Shandong Province, China to allow the questionnaire survey on the impact of dynamic capability and digital transformation on the improvement of enterprise innovation performance, and to guarantee the confidentiality of the survey enterprises. The questionnaires were distributed by the researchers themselves and conducted through the questionnaire survey platform Wenjuanxing, which gave the survey enterprises enough time to answer. After the survey is completed, researchers immediately retrieve the data, count the results, analyze and interpret the survey content.

Ethical Considerations - Ethical considerations, such as informed consent and disclosure, were fully considered in the conduct of the research. To ensure that the collected questionnaire information is only used for academic research purposes, the researchers will also seek the consent of the respondents through letters and communication to ensure that the respondents of manufacturing enterprises are ready to answer the questionnaire questions designed in the study. To ensure the quality and comprehensiveness of the study, the researchers provided a letter to the companies before answering the questionnaire and sought permission if they could participate in the study. Participating companies have the right to decline to participate or answer questions that make them uncomfortable. Your answers will only be used for the research of the paper. Please do not have any concerns. We will keep your information confidential and adopt anonymous method for the questionnaire to keep the confidentiality of the surveyed enterprises and interviewees.

Data Analysis - To perform data analysis, the following statistical tools were used. Frequency and percentage distribution were used to describe the profile of the respondents. Weighted means and ranking were used to dynamic capabilities of manufacturing enterprises in terms of absorptive capacity, integration capacity and organizational transformation capacity; describe the impact of digital transformation of manufacturing enterprises in terms of digital technologies, digital products and digital platforms; identify the innovation performance of manufacturing enterprises in terms of innovation intention, innovation process and innovation results; test the significant relationship between dynamic capabilities, digital transformation and innovation performance of manufacturing enterprises. The result of Shapiro-Wilk Test revealed that p-values of the main variable was less than 0.05 which means that the data set is not normally distributed. Therefore, Spearman rho was used to test the significant relationship of the treated variables. In addition, post hoc test was also conducted. The following Likert Scale was used in assessing the variables: 3.50- 4.00 = Strongly Agree; 2.50-3.49 – Agree; 1.50 – 2.49 –Disagree; and 1.00 – 1.49 –Strongly Disagree. In addition, all data were treated using a statistical software known as PASW version 26 to further interpret the result of the study using an alpha level of 0.05 and 0.01.

3. Results and discussion

Table 1

Assessment on leadership in enterprise dynamic capability

Indicators	Weighted Mean	Verbal Interpretation	Rank
Absorptive Capacity	2.74	Agree	3
Integration Capacity	2.79	Agree	2
Organizational Transformation Capability	2.85	Agree	1
Composite Mean	2.79	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table presents the summary table on leadership in enterprise dynamic capability. The over-all composite mean of 2.79 which indicates that they positively agreed in general. Among the domains, organizational transformation capability ranked first with mean score of 2.85. This reflects that an organization's capacity to

effectively plan, execute, and sustain significant changes. It encompasses various dimensions, including change readiness, strategic alignment, change management, flexibility, learning, and continuous improvement. Developing and nurturing this capability enables organizations to successfully navigate complex and rapidly changing environments while achieving their desired transformation goals. Teece (2016) article, published in the California Management Review, discusses the link between dynamic capabilities and organizational agility. It emphasizes the role of dynamic capabilities in enabling organizations to respond effectively to uncertainty and risk in the innovation economy. The paper provides insights into the relationship between organizational transformation capability and strategic agility. Whereas Schoemaker and Day, (2017), explores the concept of organizational capability and its relevance during times of economic crisis and recovery. It discusses how organizations can build capabilities to effectively manage and navigate through turbulent periods, including the need for transformation and adaptation. In addition, explores the concept of dynamic capabilities, including their role in facilitating organizational transformation. It discusses how dynamic capabilities enable organizations to adapt and respond to changes in the external environment, drive innovation, and achieve sustainable growth.

Moreover, integration capacity ranked second and absorptive capacity ranked the least. This means that it encompasses the organization's ability to continuously learn, adapt, and update its knowledge base in response to new information and changing external environments. It involves creating a learning culture that encourages knowledge sharing, experimentation, and openness to new ideas. Thus, absorptive capacity reflects an organization's ability to effectively acquire, assimilate, transform, and apply external knowledge to enhance its performance and competitiveness. By developing this capacity, organizations can stay at the forefront of industry developments, drive innovation, and adapt to a rapidly changing business environment.

Table 2

Assessment on enterprise digital transformation

Indicators	Weighted Mean	Verbal Interpretation	Rank
Digital Technologies	2.77	Agree	2
Digital Products	2.85	Agree	1
Digital Platform	2.72	Agree	3
Composite Mean	2.78	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table presents the summary table on enterprise digital transformation. The over-all composite mean of 2.78 indicates that they agreed in general. Among the domains cited, digital products ranked first followed by digital technologies. It shows that digital products can integrate and interconnect with other digital systems, platforms, or devices, enabling seamless data exchange and interoperability. This integration facilitates enhanced functionality, improved user experiences, and the ability to leverage the capabilities of other digital products or services. Also, digital products have the ability to evolve and adapt over time. Developers can release updates, patches, or new versions to enhance functionality, fix bugs, or introduce new features. This dynamic nature allows digital products to stay relevant and aligned with changing user needs and technological advancements. Likewise, Parjer et al. (2016) explores the rise of digital platforms and their role in transforming industries and creating new digital products. It provides insights into the strategies and business models behind successful digital platforms and discusses how they enable the creation and distribution of digital products.

On the other hand, digital platform ranked the least with mean value 2.72. This means that this provides a common platform for users to connect with each other, share information, and collaborate on projects. Digital platforms can be used for a variety of purposes, including social networking, e-commerce, and collaboration. Further, digital platform is a virtual infrastructure that connects multiple user groups, facilitates interactions and transactions, and creates value through network effects and data-driven capabilities. It enables scalability, fosters ecosystems, and promotes continuous innovation. Digital platforms have transformed various industries, ranging from e-commerce and ride-sharing to social media and cloud computing, by reshaping how goods, services, and information are exchanged and accessed in the digital economy.

Digital platforms are not necessarily the least important aspect of digital transformation. In fact, digital platforms often play a crucial role in driving and enabling digital transformation initiatives within organizations. However, the perception of digital platforms being the least important aspect may stem from various factors. In some cases, organizations may prioritize transforming their internal processes, systems, and infrastructure before considering external-facing digital platforms. They might focus on streamlining operations, implementing new technologies, or optimizing their existing digital capabilities before expanding to digital platforms that involve external stakeholders. Parker et al. (2016) explores the rise of digital platforms and their influence on different sectors of the economy. It provides insights into the strategies, business models, and dynamics of successful platforms. He discusses how platforms create value, leverage network effects, and foster innovation. Though, delves into the concept of platform scale and how it enables startups to achieve significant growth and impact with minimal investment. It explores the fundamental principles behind successful digital platforms, including network effects, two-sided markets, and ecosystem dynamics. And provides insights and frameworks to help entrepreneurs and businesses design and launch platform-based ventures.

Table 3

Assessment on enterprise innovation performance

Indicators	Weighted Mean	Verbal Interpretation	Rank
Innovate Intention	2.78	Agree	3
Innovation Process	3.22	Agree	1
Innovation Result	2.92	Agree	2
Composite Mean	2.97	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table presents the summary table on enterprise innovation performance. The over-all composite mean of 2.97 indicates that they positively assessed as they agreed. Innovation process ranked first with mean value of 3.22. The innovation process provides a structured framework for organizations to manage and drive their innovation initiatives effectively. By following this process, organizations can increase their chances of success, minimize risks, and maximize the value and impact of their innovations. Organizations follow to generate, develop, and implement new ideas, technologies, products, or processes. It involves a series of stages and activities that aim to transform innovative concepts into tangible outcomes. Through analysis, it is found that the academic community focuses on enterprise innovation in the context of digitization from the following perspectives: (1) Causing inferences about how digital transformation impacts enterprise innovation and determining if that impact is significant (Liu et al., 2021). Investigating the mechanism that drives digital transformation in enterprise innovation and analyzing how digital transformation impacts innovation in enterprises, Kleis et al. (2012); (3) Studying the boundary conditions of digital transformation affecting enterprise innovation. In other words, enterprises regard digitalization as a kind of resource that needs other complementary resources to be matched and combined, in order to play a better role; they can then study the effect of the interaction between digital transformation and complementary resources on the innovation capacity of enterprises.

Zhan et al. (2017), put forward the idea that enterprise digitization can accelerate the innovation process, strengthen customer contact, and build an innovation ecosystem, which can help enterprises develop products at a faster speed and lower cost. (3) Organizational innovation. Svahn et al. (2017) discussed how established enterprises embrace digital innovation in competition, and the organizational changes brought about by digital technology through case studies. AlNuaimi et al. (2022) studied the impact of digital transformation on organizational agility through a questionnaire survey and concluded that digital-transformation leadership improved the organizational agility of enterprises; Li et al. (2020) believed that e-commerce was crucial to organizational agility. (4) Business model innovation. Haaker et al. (2021) analyzed how to use the Internet of Things for business-model innovation in digital transformation through case studies. Based on the perspective of digital capability, Gao et al. (2015) studied how entrepreneurship in the era of digital economy affects enterprises' sustainable-business-model innovation.

Innovation intention ranked the least with mean score of 2.78. Result suggests that the act of innovating is purposeful and deliberate. It implies that the process of introducing new ideas, methods, or products is done with a specific goal or intention in mind. It emphasizes the importance of thoughtful and strategic innovation, rather than simply making changes for the sake of novelty. It implies that innovation is not accidental or haphazard but rather a conscious decision to pursue creative and groundbreaking ideas. It emphasizes the proactive approach of actively seeking out new solutions, improvements, or breakthroughs. In this scenario, innovation emerges as a driver for the economic development of societies. This effect is particularly true for the least developed countries. Given that developed nations have a high intensity of knowledge, Industry 4.0 is used in these territories as a tool for further development of the knowledge economy. In contrast, in developing countries, Industry 4.0 is seen as a self-goal, Bogoviz et al. (2019). Besides, the development prospects of Industry 4.0 in the global economy indicate that in some future scenarios, this phenomenon may become a competitive advantage for developing countries compared to developed nations or at least a source of competitive parity. However, in other future scenarios, emerging economies will not be winners (Sozinova, 2019).

Consequently, this study aims to analyze the impact of perceived barriers to innovation to predict the innovative intention of companies in an emerging economy. We drew on a contingency theoretical lens that argues that mechanisms and barriers change according to internal and external contingencies, Flynn, et al, (2016). Thus, we compared how perceptions change towards the barriers for innovation between large organizations that possess more resources, and small and medium organizations that possess fewer resources.

Table 4

Relationship between leadership in enterprise dynamic capability and enterprise digital transformation

Absorptive Capacity	r-value	p-value	Interpretation
Digital Technologies	.422**	0.000	Highly Significant
Digital Products	.354**	0.000	Highly Significant
Digital Platform	.365**	0.000	Highly Significant
Integration Capacity			
Digital Technologies	.304**	0.000	Highly Significant
Digital Products	.313**	0.000	Highly Significant
Digital Platform	.289**	0.000	Highly Significant
Organizational Transformation Capability			
Digital Technologies	.258**	0.000	Highly Significant
Digital Products	.194**	0.000	Highly Significant
Digital Platform	.226**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table illustrates the relationship between enterprise dynamic capability and digital transformation. It was seen in the table that the computed r-values indicates a moderate direct correlation and the resulted p-values were less than the alpha level. This means that there was significant relationship between the treated variables and reveals that the better the digital transformation, the better is the dynamic capability. The relationship between enterprise dynamic capability and enterprise digital transformation emphasizes the importance of adaptive capacity, agility, innovation, resource integration, and learning in driving successful digital transformation. Dynamic capabilities provide the necessary foundation and capabilities for organizations to embrace and leverage digital technologies effectively, enabling them to adapt to changing market conditions, improve performance, and gain a competitive edge in the digital age. As well, dynamic capabilities are closely linked to learning and knowledge management processes within the organization. As digital transformation involves acquiring new skills, knowledge, and expertise, dynamic capabilities play a crucial role in facilitating organizational learning and knowledge transfer. Organizations with strong dynamic capabilities can effectively learn, absorb, and assimilate new knowledge related to digital technologies, enabling successful digital transformation.

Dynamic capabilities enable organizations to successfully navigate the challenges of digital transformation, adapt to digital disruptions, and leverage digital technologies for strategic advantage. The study proposes an integrated framework and identifies future research directions in this domain, Spruit et al. (2020). While, Shih, et

al., (2021) investigates the relationship between dynamic capabilities, digital transformation capability, and organizational performance. The research findings support the positive influence of dynamic capabilities on digital transformation capability, which, in turn, enhances organizational performance. The study emphasizes the importance of developing dynamic capabilities to facilitate successful digital transformation initiatives. The result of the study also supports the claim of Zhang et al. (2021) which explores the role of dynamic capabilities in digital transformation. It analyzes the key themes and concepts related to dynamic capabilities for digital transformation, such as agility, adaptability, and absorptive capacity. The study provides a research agenda for further investigating the relationship between dynamic capabilities and digital transformation. Correspondingly, Safadi, et al. (2019), This systematic review observes the relationship between dynamic capabilities and digital business transformation. It synthesizes existing research to identify the key dimensions of dynamic capabilities relevant to digital transformation, such as sensing, seizing, and reconfiguring capabilities. The study provides insights into how dynamic capabilities contribute to successful digital business transformation.

Table 5

Relationship between leadership in enterprise dynamic capability and enterprise innovation performance

Absorptive Capacity	r-value	p-value	Interpretation
Innovate Intention	.411**	0.000	Highly Significant
Innovation Process	.393**	0.000	Highly Significant
Innovation Result	.366**	0.000	Highly Significant
Integration Capacity			
Innovate Intention	.440**	0.000	Highly Significant
Innovation Process	.350**	0.000	Highly Significant
Innovation Result	.399**	0.000	Highly Significant
Organizational Transformation Capability			
Innovate Intention	.281**	0.000	Highly Significant
Innovation Process	.322**	0.000	Highly Significant
Innovation Result	.247**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table displays the relationship between enterprise dynamic capability and innovation performance. It was noticed that the computed r-values indicates a moderate direct correlation and the resulted p-values were less than the alpha level. This means that there was significant relationship between the treated variables and showsthat the better the dynamic capability, the more innovative the performance. The relationship between leadership in enterprise dynamic capability and enterprise innovation performance highlights the critical role of leadership in shaping organizational culture, providing resources, fostering collaboration, and promoting change and adaptability. Effective leadership practices contribute to the development of dynamic capabilities that drive innovation, ultimately impacting the organization's innovation performance positively. In addition, effective leadership establishes performance measurement systems that track innovation performance and provide feedback to employees and teams. Leaders set clear goals and metrics, regularly review progress, and provide constructive feedback. This enables continuous improvement, identifies areas for innovation enhancement, and aligns the organization's efforts towards achieving better innovation performance. Results supports the study of De Jong et al. (2020) examines the relationship between leadership and innovation performance. It explores various leadership behaviors and practices that impact innovation outcomes. The study highlights the significant role of leadership in fostering enterprise dynamic capability and influencing innovation performance. Likewise, Ortega-Argiles et al. (2020) examines the relationship between dynamic capabilities, innovation, and competitive advantage in the software industry. The research findings demonstrate that dynamic capabilities significantly influence innovation performance, leading to improved competitive advantage. The study emphasizes the critical role of dynamic capabilities in driving innovation outcomes.

The seminal work by Winter (2013) explores the concept of dynamic capabilities and their impact on firm performance. The paper highlights the role of dynamic capabilities in facilitating organizational adaptation, innovation, and responsiveness to changing environments. Winter argues that dynamic capabilities contribute to sustained competitive advantage and improved innovation performance. Whereas Ala and Varblane (2017),

explores the relationship between dynamic capabilities and innovation performance, with a focus on the mediating role of organizational learning. The study provides empirical evidence of the positive impact of dynamic capabilities on innovation performance and highlights the importance of organizational learning in facilitating this relationship. However, Eisenhardt and Martin (2015) provide a definition of dynamic capabilities and discuss how they can be used to achieve competitive advantage. They argue that dynamic capabilities are the ability of an organization to sense and seize opportunities, reconfigure its resources, and adapt to change. They also argue that leadership plays a critical role in developing and sustaining dynamic capabilities. Consequently, supporting Teece (2017) concept of dynamic capabilities and how they can be used to achieve innovation and growth. He argues that dynamic capabilities are the ability of an organization to sense and seize opportunities, reconfigure its resources, and adapt to change. He also argues that leadership plays a critical role in developing and sustaining dynamic capabilities.

Table 6

Relationship between enterprise digital transformation and enterprise innovation performance

Digital Technologies	r-value	p-value	Interpretation
Innovate Intention	.349**	0.000	Highly Significant
Innovation Process	.320**	0.000	Highly Significant
Innovation Result	.307**	0.000	Highly Significant
Digital Products			
Innovate Intention	.318**	0.000	Highly Significant
Innovation Process	.330**	0.000	Highly Significant
Innovation Result	.322**	0.000	Highly Significant
Digital Platforms			
Innovate Intention	.349**	0.000	Highly Significant
Innovation Process	.351**	0.000	Highly Significant
Innovation Result	.297**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table presents the relationship between enterprise digital transformation and innovation performance. It was observed that the computed r-values inidcates a moderate direct correlation and the resulted p-values were less than the alpha level. This means that there was significant relationship between the two variables and implies that the better the digital transformation, the more innovative the performance. The relationship between enterprise digital transformation and enterprise innovation performance is characterized by how digital technologies enable organizations to innovate and improve their performance outcomes. By embracing digital transformation initiatives, organizations can leverage data, foster an innovation-friendly culture, enhance customer-centricity, and engage in collaborative ecosystems, all of which contribute to their ability to innovate and achieve better innovation performance. Also, digital transformation can help enterprises to improve their innovation performance in a number of ways. By improving access to data and insights, accelerating innovation cycles, enhancing collaboration, and improving the customer experience, digital transformation can help enterprises to develop new products and services, enter new markets, and grow their businesses. Research conducted by Hu et al. (2021) investigates the relationship between digital transformation, dynamic capabilities, and firm innovation performance. The findings provide empirical support for the positive relationship between digital transformation and innovation performance.

While, Li et al. (2020) focus on the banking industry and examines the relationship between digital transformation, innovation capability, and innovation performance. The study provides empirical evidence of the positive impact of digital transformation on innovation performance in the banking sector. It emphasizes the importance of leveraging digital technologies to enhance innovation capabilities and improve performance outcomes. Similarly, Cai et al. (2020) investigate the impact of digital transformation on innovation capability and business performance. The research examines the relationship between digital transformation initiatives, innovation capability development, and business performance outcomes. The findings support the positive relationship between digital transformation and innovation performance.

Thus, digital transformation encourages organizations to collaborate with external partners, customers, and

even competitors. Through digital platforms and ecosystems, organizations can access a wider range of resources, expertise, and ideas, fostering a collaborative and open innovation environment. Engaging with external stakeholders can stimulate innovation, accelerate product development cycles, and enhance enterprise innovation performance.

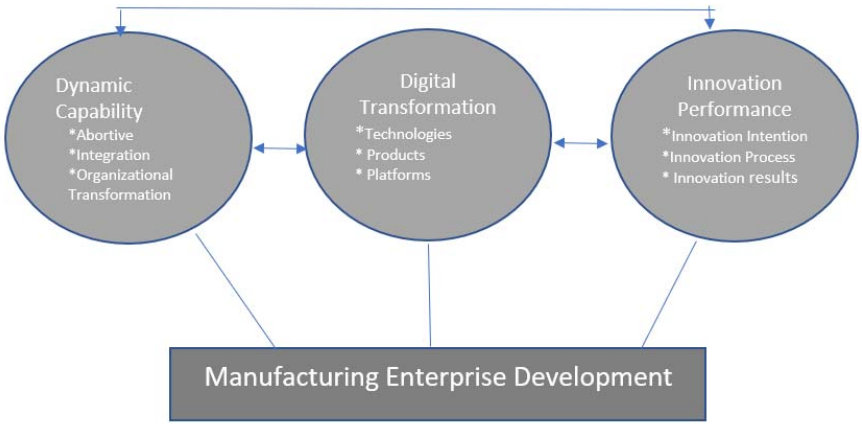

Figure 1. Manufacturing Enterprise Development Model

A test was run to predict enterprise innovation performance from enterprise dynamic capability and digital transformation. This variable statistically significantly predicted enterprise innovation performance $F_{(2, 395)} = 148.440$, $p < 0.001$, $r^2 = 0.426$. All two variables added statistically significantly to the prediction, $p < 0.001$. Thus, the Manufacturing Enterprise Development Model is a framework that outlines the key elements and considerations for developing and enhancing manufacturing enterprises. It provides a structured approach to guide organizations in optimizing their manufacturing processes, improving operational efficiency, and driving sustainable growth. The model starts by aligning the manufacturing enterprise's goals and objectives with the overall business strategy. It defines the strategic direction of the organization, identifying target markets, competitive positioning, and long-term objectives were focusing on these three variables enterprise dynamic capability, digital transformation and innovation performance. This alignment ensures that manufacturing activities contribute directly to the success of the business as a whole. The model also recognizes the importance of sustainability and environmental responsibility in manufacturing enterprises. The model was supported by the study of Mikalef and Krogstie, (2019) that investigates the relationship between digital transformation capability, innovation, and firm performance. It examines how a firm's ability to transform digitally influences its innovation activities and subsequent performance outcomes. It encourages organizations to consider the environmental impact of their operations, minimize waste generation, adopt energy-efficient practices, and promote sustainable supply chain practices. It may address topics such as green manufacturing, eco-design, and waste reduction strategies.

Overall, the Manufacturing Enterprise Development Model provides a comprehensive framework to guide organizations in developing and optimizing their manufacturing capabilities. It considers various factors, ranging from strategic alignment and market analysis to technology adoption and sustainability, to ensure the long-term success and competitiveness of manufacturing enterprises.

4. Conclusions and recommendations

Dynamic capabilities are moderately assessed as fundamental in strategic management process of the manufacturing company that enables organizations to navigate and thrive in a rapidly changing business landscape. Enterprise digital transformation is moderately practiced as a critical process that organizations undertake to leverage digital technologies and capabilities to drive innovation. Result showed that there is a high levels of innovation performance that allow organizations to stay ahead of the curve. The significant

relationships show that the better the enterprise dynamic capabilities, the better is the digital transformation; the better is the innovation performance. A proposed manufacturing enterprise development model was created in order to achieve sustainable growth, operational excellence, and competitiveness in the manufacturing sector.

The company may need to continuously improve your products, services, and processes in order to maintain competitiveness. The management may attract and retain talented individuals who possess the skills, knowledge, and mindset required for dynamic capabilities and provide opportunities for professional development, empower employees to take ownership of their work, and recognize and reward innovative thinking and contributions. The company may establish partnerships and collaborations with external ecosystem partners, including technology vendors, startups, research institutions, and industry experts. Different department may implement robust data governance practices to ensure data quality, security, and compliance, use advanced analytics and business intelligence tools to gain actionable insights and support data-driven decision making across the organization. The Human Resources Management Office may allocate resources, including time, funding, and tools, to support innovation initiatives and ensure that employees have the necessary resources and training to pursue innovative ideas and projects. The proposed manufacturing enterprise development model may be used as a roadmap for strategic alignment, process optimization, innovation, resource management, supply chain integration, and risk management. Future researchers may conduct similar study but focusing on human capital and e-commerce embeddedness.

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