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Regional Differences and Digital Transformation of Manufacturing Companies in China: A Systematic Literature Review

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Abstract

This paper systematically evaluates the regional variations on digital transformation in the context of China's manufacturing industry. This is still a controversial issue in the existing literature. It demonstrates the significant disparity in digital progress across the Chinese regionally different environments from the eastern coast to the less developed areas in central and western China. After the literature review is done, research finds the factors that differentiate the region from others in China, including economic development levels, technological infrastructure, human capital, government policies etc. On the other hand, it identifies the challenges, trends, and possibilities from the implementation of the digital revolution in industrial manufacturing. On one hand, it also advises the corporate executives and policy makers who are planning to achieve this by digging deeper into digital transformation on a both local and national levels. The research concludes that the area-specific policies along with the investments should be considered as the key tools for achieving balanced growth in the regions. Apart from that, they suggest that overcoming regional imbalances can increase the general competitiveness and the sustainability of the Chinese manufacturing industry. It emphasizes the importance of influential strategies to bridge the digital divide and foster equitable growth across different regions.

Keywords: Regional Differences, Digital Transformation, Manufacturing, China, Literature Review.

1 Introduction

Under the background of Industry 4.0, digital transformation is the trend in various industries. As the digital economy has grown, an increasing number of businesses have been able to adapt to the trend and undergo digital transformation with the help of emerging technologies to obtain better development (Peng & Tao, 2022). China, one of the most powerful nations in the world, is well-known for its manufacturing. It is obvious how important China's manufacturing sector is to the world economy.

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As for the definition of digital transformation, to put it simply, Bekkhus, (2016) provided an explanation as "use of digital technologies to radically improve the company's performance". As a significant global manufacturing nation, China's manufacturing industry is now experiencing digital changes. Nevertheless, the development level of digital transformation of manufacturing enterprises varies by region in China. Lyu et al., (2023) found that although China's manufacturing sector is becoming more digitally transformed, there is still a disparity among regions and industries. Regionally speaking, the northern, central, and western regions have not kept up with the eastern region's level of transformation. In addition, Lei et al., (2022) also stated that when it comes to digital transformation, Eastern SMEs are more developed than Western SMEs in the context of China. Additionally, Liu et al., (2023) indicated that there are notable geographical differences in economic and digital advancements in China. As a result, regional differences indeed exist in manufacturing industry development levels, especially in developing countries like China, and less developed areas would benefit more from further digitalization, but only if their governments make investments in digital infrastructure and education. However, the existing literature on digital transformation mainly focuses on its success factors (Osmundsen et al., 2018; Muehlburger et al., 2019; Mhlungu et al., 2019) and its impact on sustainable development of enterprises (Elgohary, 2022; Gomez-Trujillo & Gonzalez-Perez, 2021; Xu et al., 2023), while research on the impact of regional differences on digital transformation is still limited.

The novelty of this paper lies in systematically exploring the impact mechanism of regional differences on digital transformation in China's manufacturing industry through a comprehensive literature review, filling the gap in extant research. Its significance comes from providing a comprehensive perspective on understanding the digital transformation trends, influencing factors and competitiveness of the manufacturing industry in different regions, and providing valuable insights and guidance for practice and policy formulation within the Chinese context. Its distinctive contribution is its in-depth examination of the effects of various geographic areas on digital transformation, offering thorough insights and recommendations for business practices, thus supporting the manufacturing sector's development of digital transformation at a balanced level within the framework of China.

Research Questions

The research questions of this research are:

- "How do regional differences impact the digital transformation of manufacturing companies in China?"
- "What are the key factors contributing to the regional disparities in digital transformation within China's manufacturing industry?"
- "How can policy interventions and strategic initiatives mitigate the impact of regional disparities on digital transformation in China's manufacturing sector?"

The significance of the aforementioned questions is that they may explore the mystery of unequal development of the digital transformation in various regions of China. Through elucidating the primary factors that generate these disparities, the study calls attention to the imperative nature of evidence-based policies and initiatives that aim for equitable and sustainable digital change. Moreover, this investigation not only fills the gap in the literature but could also be used to develop targeted strategies by the business executives and policymakers that would ultimately make the digital divide tightened and strengthen China's manufacturing industry.

2 Literature Review

Manufacturing businesses are now facing fierce competition from all over the world as a result of globalization, and the implementation of digital transformation in these businesses has become a major and wild-ranging topic in recent years (Garzoni et al., 2020; Albukhitan, 2020; Jones et al., 2021; Ghobakhloo & Iranmanesh, 2021). The adoption of technologies like the Internet of Things (IoT), cloud computing, artificial intelligence, blockchain, etc., for example, increase production efficiency and product quality while also assisting businesses in being more competitive and better able to adjust to changing market environments (Zhang et al., 2021).

Recently, the "Ministry of Industry and Information Technology (MIIT)" released statistical data on the manufacturing industry in 2022, whose added value accounts for nearly 30% of the world and the scale of the manufacturing industry has been the first in the world for 13 consecutive years, this reveals how important China's manufacturing sector is to the world economy. As a consequence, in the current market environment, digital transformation should be required in a large manufacturing nation like China in order to maintain competitiveness and pursue greater development of its manufacturing industry (Guo & Xu, 2021; Zhai et al., 2022).

Although digitalization provides a platform for globalization, due to the influence of some factors such as economic development level, policies and regulations, organizational culture, etc., uneven development of digitalization level is a global problem, especially in the manufacturing industry, these reasons can all be attributed to regional differences. Meanwhile, the degree of digitalization varies from different countries, (Kravchenko et al., 2019) found that highly developed nations have the highest levels of economic digitization because they have widespread access to information, excellent Internet connectivity, and a high degree of capacity development in science and technology. Nevertheless, many developing countries still have low levels of digitalization in the economy although they hold great expectations for digital technologies to spearhead the shift in their economies towards prosperity (Matthess & Kunkel, 2020). As a consequence, it is still worthwhile exploring the impact factors of digital transformation, especially in those developing nations. Based on the data analysis shown above, which indicates that China leads the globe in the manufacturing industry, this article will concentrate its research on Chinese manufacturing enterprises as it is a more representative sample.

Chen & Zheng, (2008) proposed that the regional disparities have been mostly exacerbated by China's regional development strategies. That is to say, different regions have distinct development strategies, which leads to variations in the application and outcomes of digital transformation. This view highlights the Chinese government’s regional differentiation strategy in promoting digital transformation, which may include differences in policy orientation, resource allocation, and support from different local governments. The development trends of digital transformation in China's eastern coastal areas and western inland areas are similar to the development differences in digital transformation between the east and west of the world. On the one hand, the lack of skilled digital workers is the biggest problem facing the West. On the other hand, the biggest issue in the East is a lack of digital transformation related training and communication channels (Lei et al., 2022). Moreover, technological innovation is mostly determined by innovation investment, with Eastern China receiving a disproportionate share of innovation resources compared to Central and Western China. Western China's development was severely hampered by the unfavourable market conditions that prevailed in Eastern and Central China (Zhang, 2021). Overall, China’s digital transformation development level varies from region, as technological innovation is a crucial part of digital transformation.

Today's world still has widespread regional disparities within countries, despite the efforts made by the international community to reduce poverty in developing areas (Eva et al., 2022). When it comes to the development of the manufacturing industry in China, Zhao et al., (2007) looked into differences in the manufacturing sector between provinces in eastern, central, and western China, as well as between northern and southern China. The findings show that the trend of disparities within provinces has been gradually increasing; the disparities within the eastern, central, and western regions have fluctuated over the past few years, with the disparities between the three regions serving as the main source. The discrepancies within each region are minor and steadily decreasing, while the disparities between the North and the South are the main source of the increasing disparities. In addition, Han et al., (2022) highlighted the significance of regional disparities, their study is based on data from 2014 to 2018 and aims to address the issues of regional imbalance by evaluating the manufacturing industry's development across innovation, green, and efficiency dimensions. It emphasizes the need for targeted development strategies to enhance the sector's overall quality and competitiveness. Moreover, according to the data released by the China Academy of Information and Communications Technology (CAICT, 2022) and China Internet Network Information Center (CNNIC, 2022), in 2021, China boasted 1.032 billion internet users, a 73.0% internet penetration rate, 950 million smartphone users, and a 40% digitally driven GDP. Meanwhile, China is a large country with widely disparate regional development and resource endowments. The Chinese manufacturing sector varies greatly across different areas and subsectors at the same time (Chen et al., 2020). However, there are still significant regional disparities in China's digital infrastructure, IT education, online lifestyle services, and government digitization (Loo & Wang, 2017). According to the data from the "Ministry of Industry and Information Technology" in 2022, although the high-quality development of China's manufacturing regions has achieved positive results in the past ten years, there are still certain differences in development between regions. According to the "Notice on Development Plan for Digital Economy during the 14th Five-Year Plan Period" promulgated by the State Council in 2021, the digital divide among different industries, different regions, and different groups in the manufacturing industry has not been effectively bridged, and there is even a trend of further expansion. This shows that the development level of the manufacturing industry in different regions of China is uneven, and the imbalance between regions has a tendency to expand (China's State Council, 2022).

Moreover, the specific manifestations are as follows: the leading role of the eastern region in the high-grade enlargement of manufacturing industry continues to increase; the role of advanced manufacturing bases in the central region becomes more prominent; the industry in the western region maintains a rapid growth trend; and the northeastern region makes new progress in industrial upgrading (Shen, 2022). As a consequence, it is true that different locations have varying degrees of digital growth, especially for a manufacturing powerhouse like China. There may be regional variations in the state of development of digital life services, government digitization, information technology education, and digital infrastructure construction. The ability of a region to innovate and compete economically may be impacted by such disparities. Therefore, in order to reduce the digital divide between different regions and promote balanced development throughout the nation, specific policies and development strategies are required.

Digital transformation is a key issue in modern business and organizational management. There are certain factors that enable a firm to achieve a successful digital transformation including organizational culture, personnel skill, technology, organizational structure, and market adaptability. Many scholars have also studied the factors that enable digital transformation and its challenges (Morakanyane et al., 2020; Stentoft et al., 2020; Jones et al., 2021; Ghobakhloo& Iranmanesh, 2021; Ko et al., 2022).

Moreover, Morakanyane et al., (2020) reviewed the literature and examined 16 cases from 10 organizations focusing on the best practices of digital transformations. These success factors are: Cultivate Digital Culture, Determine Digital Triggers, Determine Digital Drivers, Develop Digital Vision, Determine Transformed Areas, Establish Digital Organization and Determine Impacts, each of these main factors is further broken down into several sub-factors. Ghobakhloo & Iranmanesh, (2021) found that the digital transformation initiatives of SMEs depend on eleven success determinants. Results showed, for instance, that operations' technology readiness is the most difficult success factor to attain and external funding for digitalization is the initial step in guaranteeing digital transformation attainment among SMEs. Meanwhile, Ko et al., (2022) proposed that management commitment and business play a major role in determining digital breakthroughs, with strategy playing a much smaller one. IT departments' roles and services become less significant in the context of digital transformation. However, digital transformation is also facing a variety of challenges. For example, Stentoft et al., (2020) identified several key barriers that small and medium-sized enterprises (SMEs) face in implementing Industry 4.0 technologies. These barriers are Insufficient Awareness and Knowledge About the New Digital Technologies, Absence of Standards, Emphasis on Operations Instead of Company Growth, Data Protection (Cybersecurity), Deficiency of Specialists, Employee Resistance to Change, More Training Needed, Inadequate Knowledge of the Strategic Significance of the New Digital Technologies, Low Awareness of the Relationship Between Technology and People, Insufficient Financial and Human Capital (Manpower), while (Jones et al., 2021) emphasized the importance of understanding digital transformation obstacles in order to develop effective strategies for successful digital transformation. The paper provides a comprehensive review of the literature on this topic, offering insights into how manufacturing companies can navigate the complexities of digital adoption and integration.

Ultimately, the digital transformation process is complicated and has multiple levels of adaptation and optimization involved. Companies must decide on all these issues carefully and overcome those to be successful during the transformation process and long-term sustainable development. In addition to that, regional diversification of the digital transformation of manufacturing enterprises remains a solemn problem for developing countries like China. Economic development disparities, technology infrastructure, culture and policies of government and regulations among different regions may have a remarkable effect on digital transformation. Hence, based on the analysis of China's regions on digital manufacturing transformation, this article suggests the development status of digital transformation of China's manufacturing enterprises, offering relevant development strategies for enterprises to achieve balanced and sustainable development.

3 Methodology

Research Design

This research aimed to analyze and evaluate regional disparities in the digitizing process of manufacturing enterprises in a systematic way. Through an in-depth understanding of the similarities and differences in the digitization process of various manufacturing enterprises in different regions of China, the objective of this research we can achieve. The main problems are, however, not limited to variations in digital transformation strategies, implementation, and outcomes among manufacturing companies in different regions. Other factors that may cause differences are also of consideration. The qualitative method is the approach we are going to follow in this study because (Vogelsang et al., 2018) believe that this method is more suitable to the field of digital transformation. Moreover, this research enables us to have a holistic and in-depth take on the features of the digital transformation trends among

manufacturing firms across countries by observing concepts, perspectives, and trends from the literature. The technique of literature classification, content analysis, and comparative analysis will let us extract such views as theoretical perspectives, ideas, and trends which will add a deeper understanding of the contemporary research field, and as a result, offer some valuable inspiration for future study. Consequently, adopting a qualitative research methodology will enable us to achieve the research goal by providing a more detailed and holistic understanding of the regional differences in digital transformation. Scholars have proven that digital transformation is a multifaceted process that incorporates many factors (Osmundsen et al., 2018; Vogelsang et al., 2018). Consequently, the major purpose of our study is to fill these gaps and provide guidelines for future studies through a comprehensive identification, analysis, and synthesis of important results and patterns from previous research in this field.

A qualitative approach is preferred in order to gain insight into the complexity, context-specific nature and interconnectedness of digital transformation, for which the quantitative methods may not be suitable enough. The type of qualitative research that is best suited for uncovering the working, the stakeholder perspectives, and the contextual factors that shape the digital transformation processes are finding out the working of digital transformation processes. Systematic coding of the textual data to identify the recurring themes and patterns interpret the theme analysis, and comparative analysis to find differences and similarities across the regions is the approach that will be used for data analysis. This holistic approach is crucial for a balanced evaluation of the literature, thus the formation of sophisticated conclusions and actionable suggestions.

Data Source and Literature Search

Our primary literature databases of choice for conducting an extensive literature review were Web of Science (WoS), Scopus, Google Scholar and the official websites of some government departments, which the first two are the world-leading databases (Zhu & Liu, 2020) and these above-mentioned databases are all well-known, they contain a large number of articles, the journals are of high quality, and they have great reference significance. The terms "Digital Transformation", "Manufacturing", "China", and "Regional Differences" in this study are among the combinations that are employed. Additionally, we expanded the search to encompass a wide range of potential keyword combinations and variations by utilizing the Boolean operators "AND" and "OR". In addition, the time frame is set to the last five years to ensure access to the latest research results (see Table 1 for details).

Table 1: Data Source and Literature Search

Search Term	Boolean Combinations
Digital Transformation	"Digital Transformation AND Manufacturing"
Manufacturing	"Manufacturing AND China"
China	"China AND Regional Differences"
Regional Differences	"Regional Differences OR Economic Development"
Economic Development	"Economic Development AND Technological Infrastructure"
Technological Infrastructure	"Technological Infrastructure OR Human Capital"
Human Capital	"Human Capital AND Government Policies"
Government Policies	"Government Policies NOT Digital Economy"
Digital Economy	"Digital Economy OR Emerging Technologies"
Emerging Technologies	"Emerging Technologies AND Industry 4.0"

Inclusion and Exclusion Criteria

Inclusion criteria include (1) papers published between 2020 and 2023; (2) research focusing on the digital transformation of China's manufacturing industry; (3) articles published in English. Exclusion criteria included: (1) studies not related to the manufacturing industry or digital transformation; (2) review articles and non-peer-reviewed publications; (3) studies with poor data quality or unclear methodology. The exclusion and inclusion criteria for this research are presented in Table 2.

Table 2: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1. Papers published between 2019 and 2023.	1. Studies not related to the manufacturing industry or digital transformation.
2. Research focusing on the digital transformation of China's manufacturing industry.	2. Review articles and non-peer-reviewed publications.
3. Articles published in English.	3. Studies with poor data quality or unclear methodology.
4. Studies addressing regional differences and their impact on digital transformation.	4. Articles that do not explicitly discuss regional differences in digital transformation.
5. Peer-reviewed journal articles, conference papers, and official government reports.	5. Studies focused on sectors other than manufacturing, such as services or banking.

Literature Screening Process

The two phases of the literature screening process were full text review and preliminary screening. Titles and abstracts were used for the initial screening process, and any material that was blatantly in violation of the inclusion requirements was disregarded. A full-text review was conducted next to assess the literature's quality and applicability. A flowchart will be used to present the screening procedure and findings.

Data Extraction and Analysis

Important details were taken from the chosen literature, such as the authors, the year of publication, the research methods, the primary findings, and the consideration of regional differences. In order to find and highlight the major themes and trends in the study, we adopted a qualitative method for content analysis of the data.

Quality Assessment

Predetermined criteria were used to evaluate the literature for both quality and relevance. This includes evaluating the reliability of the findings, the validity of the data, and the rigour of the research design. We will also go over potential study limitations and biases and how our review's findings might have been impacted by them.

Ethical Consideration

Research ethics and academic integrity were strictly complied with in this study. In order to safeguard the intellectual property rights of the original authors as well as their contribution, this study will ensure all cited references are written down and that the names of the authors and the source are correct in the paper. Besides doing that, we are going to preserve our academe and will follow citation and academic rules.

4 Discussion

This section provides an overview of the findings of the literature review. This study concentrated on the impact of a few factors that had a significant impact on the digital transformation of the manufacturing industry in China. This covers governmental support, regional economic instabilities, technological infrastructure accessibility, and human capital development. Furthermore, areas endowed with high-performing policies, like East China with its strong manufacturing hubs, have demonstrated faster digital take-up compared with their peers in the West and Central. The inequality highlighted the significance of the policy frameworks in creating a conducive atmosphere for the adoption of digital.

Additionally, the economic intensity of a region is directly proportional to the manufacturers' capacity to upgrade and acquire new digital technologies. Richer zones could finance the buying of the latest digital technologies and also attract the required human capital. Conversely, the poorer parts of the community experience numerous barriers to success in life, putting emphasis on the need for specific remedies to alleviate these inequalities.

The study implies also that human capital is one of the key factors that can shift a digital transformation. Cen et al., (2022) imply that a higher rate of economic growth results more by focusing simultaneously on production activities as well as commerce by foreign capital in coastal localities where employees with high human capital are concentrated. Companies having great human resources find it much easier to get through digital transformation Hence, the role of human talent in the process of tech adoption is invaluable, and the development of digital competencies among the workforce is crucial for the realization of new technologies.

Consequently, this implies that politicians should formulate policies that narrow down this gap, uplifting a similar level of digitization within the manufacturing industry of China. This could take the form of upgrading digital infrastructure, enabling technology uptake, and investing in education and training programs to develop a digitally skilled workforce.

Bühler et al., (2021) stated developed countries such as Germany and USA seem to be taking the lead in implementing Industry 4.0. The influence of 4.0 and digitalizationon industrial manufacturing is one of the most examined topics. Science and statistics have demonstrated that areas with strong economy, for example, Bavaria in Germany and California in the United States, have also excelled in digital advancements through their government backing and making productive investments in technological infrastructure. Contrarily, Behera, (2021) affirmed that research from developing nations of India and Brazil revealed widespread regional disparities similar to what was seen in China. To explain, in India, the southern states of Karnataka and Tamil Nadu have been ahead in the digital transformation as they have got better technological infrastructure and human capital than other northern and eastern states. However, Bolfe et al., (2020), argue that the northern parts are lagging behind the developed states such as São Paulo in adopting digital technology due to economic disparities and the differences in the government's policies.

These comparisons point that digital transformation gaps are statues in both developed and developing country regions. However, the size and effect of these inequalities depend on the socioeconomic, technological, and political contexts of the country (Brunetti et al., 2020). In addition, this international dimension illustrates the requirement for innovative regional approaches that are sensitive to local socio-economic and technological backdrops. For China looking at the success of the developed and the developing countries will teach how to create a suitable policy and intervention that will help bridge the digital divide and even the development gap in the industry (Nambisan et al., 2019).

Robertson et al., (2019) indicate that knowledge exchange and partnership between regions have been seen as the major factors in this. Ventures, which allow knowledge and technological innovation transfers between less and more advanced regions of a country, shape a more equitable digital transformation. Thus, this approach not only improves regional competencies, but also builds the habit and culture of improvement and adoption of new technologies in the region.

5 Conclusion

The in-depth research of this paper is based on a process that is systematic and thorough with the clear aim of offering insights on the issue of digital transformation from a regional angle. It highlights the aim being to provide corporate executives and crime officials with valuable information that could also be used as the basis of future research. The methodology of this study is recognized for its role in providing comprehensive and orderly analysis, which has significant implications for understanding the regional differences due to digital transformation and providing recommendations for sustainable and equally distributed development in the digital manufacturing industry of China.

Along with balanced development, the Chinese government has set up one of the important goals of its development plan for a long time. Gong et al., (2020) showed that policymakers, government executives, researchers, and any other person involved in setting, implementing, or evaluating digital government decisions are supposed to foresee and comprehend how the process of digital transformation may occur. Such attempts can be used as a tool to even out the difference between urban and rural areas, and regions and as a result to raise the overall level of development of the country. Nowadays, the goal of sustainable development is shared by all nations, that seek sustainable economic growth while preserving the natural environment (Zhao et al., 2021). In the context of digital transformation in the manufacturing industry of China, the Chinese government should consider its own situation and take action to help achieve sustainable development of the economy. The following are some suggestions:

Differentiated support policies: Formulate flexible and differentiated policies and measures to provide corresponding support based on the industrial foundation, development stage and characteristics of different regions of China. This can include differentiated policies in finance, taxation, financial subsidies, etc., to meet the actual needs of digital transformation in different regions.

Industrial collaborative development: According to the report submitted by the State Council to the Third Session of the Standing Committee of the 14th National People's Congress on regional coordinated development for review, experts believe that at present, the problem of unstable and poor regional development still exists. The absolute gap in development between the east and west regions is still large, some areas in the north have insufficient economic development vitality, there are still difficulties in revitalizing and developing special types of areas, and the task of adjusting the regional productivity distribution is arduous (Liu, 2023). Thus, it is necessary to encourage enterprises in different regions to establish industrial collaborative relationships, making the digital transformation of the manufacturing industry a direction for all regions across the country to work together. This can promote cooperation and resource sharing between enterprises through government guidance and platform construction.

Strengthen infrastructure construction: According to some research, the rise of the digital economy and the revolution in economic and technological paradigms are both fueled by the penetration of Information and communication technology (ICT) (Zhou et al., 2022). As a consequence, improving the infrastructure level of various regions, especially digital infrastructure, ensures that the networks, data centers and other infrastructure required for digital transformation cover every region. This will help narrow the digital divide and promote the widespread application of digital technology.

Talent training and mobility: The economic development, industrial restructuring, and advances in labour productivity of developing countries are significantly influenced by changes in the employment structure (Wu & Yang, 2022). With economic development, China has gradually shifted its traditional agricultural labor force to industry and service industries. This change usually reflects the transformation and upgrading of the economic structure and also promotes the skill upgrading of the labor force and the improvement of productivity. Under the background of Industry 4.0, increasing the training and introduction of talents from various regions to promote a more even distribution of professionals in the digital field across the country. At the same time, we encourage the cross-regional flow of talents to share experience and knowledge.

Support the digital transformation of SMEs: SMEs are crucial in the growth of the local economy as they create employment opportunities, alleviate poverty and enhance economic growth (Gherghina et al., 2020). Additionally, SMEs are a major component of the manufacturing industry in various regions, so policies should focus on supporting SMEs in their digital transformation. This includes measures such as providing digital technology training and easing the burden of digital investment on small and medium-sized enterprises.

Promote green digitalization: The world has been paying more and more attention to sustainability. The "14th Five-Year Plan" National Informatization Plan proposes to "deeply promote the construction of green smart ecological civilization and promote the coordinated development of digitalization and greening" and "use digitalization to lead greenization, and use it to drive digitalization". Encourage the incorporation of digital transformation with environmentally sustainable development, encourage the adoption of green digital technologies, and reduce the negative impact of digitalization on the environment. This helps drive digital transformation and sustainable development to go hand in hand.

By carefully taking into account the aforementioned tactics, China can ensure that all regions can benefit equally from the digital transformation of the manufacturing sector, foster the coordinated and sustainable growth of the sector nationwide, and achieve more balanced development in this area.

6 Implications

The findings of this research project have major implications for researchers, the business community and policy makers.

From an academic point of view, this research offers new insights into the nature of the digital transformation differences in the manufacturing industry across the regions. In this regard, more research needs to be done on how the policies, the economic structures and the infrastructures are the ones that influence digital adoption and how the effects of them can be reduced.

The study gives a practical view of the targeted government policies that are appropriate for less developed areas as well as encouraging digital transformation that happens in all areas. The standards can be made to include such initiatives as digital skills training, tax breaks for new tech, and the funding of the construction of digital infrastructure.

This research paper brings the micro-level regional perspective to the importance of the regional approach to digital transformation for industrial actors like manufacturing companies. Apart from applying local strong points and addressing the special constraints to digital access, enterprises ought to consider the peculiar features and problems of different areas in China.

7 Limitations and Future Directions

There are certain limitations to the current study as well, which point the way for the upcoming research. The first limitation is the scope of the literature. The scope of the literature involved in this study is limited. In this study, the scope of the research literature mainly focuses on English literature, while ignoring important research in Chinese or other languages, which limits the comprehensiveness of the research. It is recommended that future studies expand the scope of the literature and consider including a wider range of languages and regions to obtain a more comprehensive perspective. The second is the limitation of the research method: this study mainly relies on a literature review as the research method and lacks first-hand data obtained from the actual enterprise operation level, which limits the possibility of an in-depth understanding of the influencing factors and results of digital transformation in the context of Chinese manufacturing companies. Thus, it is suggested to combine qualitative and quantitative research methods in future studies to obtain a deeper and more comprehensive understanding. Finally, there is an uneven geographical coverage. Although the title mentions regional differences, the actual literature review itself may be geographically biased, emphasizing some manufacturing-rich regions of China while ignoring other, less developed regions. As a result, future authors are recommended to investigate the in-depth analysis of particular regions within the framework of China. Future studies can thoroughly examine the state of digital transformation in the regions that have not received as much attention as they should in order to completely comprehend the present state of growth as well as future trends of digital transformation of Chinese manufacturing firms.

8 Conflict of Interest

There was no conflict of interest declared by the authors.

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