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A STUDY ON INFLUENCING FACTORS AND DEMONSTRATION OF LEADING THE TRANSFORMATION AND UPGRADING OF TRADITIONAL MANUFACTURING INDUSTRY WITH ARTIFICIAL INTELLIGENCE

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ABSTRACT

China's traditional or conventional manufacturing business has been facing a lot of trouble because of things like growing labour prices, more competition from across the world, and changing consumer expectations. Artificial intelligence (AI) is increasingly becoming a prominent topic as businesses try to upgrade their operations and manufacturing methods. Businesses are doing this to make sure that the industrial sector keeps growing and that they have growth of the best quality. This article looked at the main reasons why AI is being used to enhance and change conventional manufacturing, as well as the evident effects. This study want to help to fully understand these aspects and how they affect things. Some of the things that assist create the ideal circumstances for the successful integration AI include government policy support, digital infrastructure, organisational leadership, and worker skills. Demonstration projects are set up to show off the technology's advantages and get more people in the sector to use it. Setting up smart industrial pilot projects and AI innovation zones are two things that need to be done. This study seeks to enhance operational efficiency, product quality, flexibility, and competitiveness by examining the interplay of these attributes, therefore contributing to China's overarching industrial modernisation initiative. This study provides practical advice for practitioners, corporate executives, and politicians, with theoretical additions to the current literature on intelligent manufacturing with use of advanced technologies such as AI. The results has indicated that a complete strategy is needed to support long-term industrial growth driven by technology via the combined impacts of enabling factors and unambiguous results.

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Keywords: Influencing factors of transformation, artificial intelligence (AI), manufacturing industry, China

1. INTRODUCTION

The manufacturing industry has been a big part of China's industrialisation, exports, and general economic development throughout the years. On the other hand, the old ways of making things aren't enough anymore because of increased global competition, changing local demand, and more expensive sources of labour. In China, the usage of AI in business is on the rise. This is to make things better and more up-to-date. The purpose of this effort is to achieve high-quality growth while keeping a competitive edge over other companies in the same field. AI might help firms save expenses, boost efficiency, and make better products. It may also improve operations including managing smart supply chains, making choices based on data, predicting maintenance, and automating factories (Adesoga et al., 2024).

The quality of AI, on the other hand, depends on a number of distinct things. This canopy of consideration includes a lot of things, such the skills of workers, the views of leaders, the money for digital infrastructure, and the support of lawmakers. Two examples of demonstration projects that might provide firms useful information are AI innovation zones and pilot smart factories. These projects lower the risks of adoption and inspire others to do the same by serving as examples of how to accomplish things. It is very important to have a solid theoretical and practical understanding of how these factors affect each other, how they affect the actual world, and how to use AI (Ismatullaev & Kim, 2024). In this context, this study has focused on to develop comprehensive understanding on China's conventional manufacturing industry become smarter, stronger, and more competitive on a global scale.

2. BACKGROUND OF THE STUDY

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The traditional manufacturing sector in China has been a major driver of the country's economic growth for a long time. It employs a lot of people and makes a big difference to the country's GDP and ability to export. In the past, the textile, steel, mechanical, and automobile sectors have been seen as symbols of the country's industrial strength. The traditional manufacturing industry is under more and more pressure to change with the times because of globalisation, rising worker prices, and tough competition from other countries. Besides, traditional production methods are being pushed to their limits by the growing demand for sustainability, customisation, and higher quality. To keep growing, China needs to change its manufacturing sector from one that depends on people and resources to one that is based on information and new ideas (Li, 2024).

Many people think that AI has been a key factor in moving this evolution in a new direction. The Chinese government has been focussing on AI since the introduction of the "New Generation Artificial Intelligence Development Plan" in 2017. AI is a key technology that can speed up the upgrading of industries. AI is used in the manufacturing sector to make decisions based on data, check the quality of products, build smart robots, and forecast when maintenance will be needed. These are just a few examples of how AI can help companies become more competitive, save costs, and boost productivity. AI can help with business planning, supply chain management, and industrial operations in addition to automating technology (Onukwulu et al., 2024).

When AI is used in the manufacturing process that is already in place, the process is defined by inconsistency and a lack of coherence. The amount of change that happens is affected by several distinct things, which are described below. In the realm of AI, there are a few types of enterprises that can serve as examples for other types of businesses. Some of these groups are national innovation zones, pilot factories, and model businesses. These demonstrations are meant to help reach a number of different aims. These goals include getting rid of any lingering

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misunderstandings, encouraging imitation, and gathering support for using the product in additional areas. This indicated effective use of AI might be beneficial for improvement of operational efficiency and resilience in China (Rane et al., 2024).

AI is changing a number of things in the industrial sector, like making firms more eco-friendly, improving their quality, making them more adaptable, and helping them learn new technologies. These are only a few of the things that are going on. The rate at which people start using AI is the reverse of the good things that new technologies do for the economy and society. This is similar to how new technologies can help society. Given all of this, it is very important to look into how integration of this advanced technology can change from traditional Chinese manufacturing to a more modern model (Agustian et al., 2023). This research aims to provide Chinese policymakers and manufacturing enterprises with pragmatic insights to facilitate the development of a more intelligent, resilient, and globally competitive industry. The examination of these mechanisms will yield significant insights. Another goal that needs to be met is to improve theoretical knowledge of how AI is changing industry.

3. THE PURPOSE OF THE RESEARCH

The goal of this study is to look at how AI could help China's traditional industrial sector transform and get better. To reach this purpose, the combined effects of important elements and demonstration effects was used. The manufacturing sector is important for China's economy to thrive, but people are worried about how efficient, competitive, and long-lasting it is becoming. This is true even though the manufacturing sector is very important for China's economy to grow. The two main goals of this research are to look at how demonstration projects could help the industry embrace new technologies more quickly and to find out which qualities are most important for successfully integrating AI. The first step is to figure out which parts are most critical for AI to work well. The goal of this study is to find out how AI could help firms do better and be more resilient by looking into both upgrading and transformation

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processes. This was achieved through the examination of both procedures. To achieve the objective of bolstering China's status as a global manufacturing leader in the digital and intelligent industry era, the findings must offer theoretical advancements to intelligent manufacturing and practical guidance for business leaders, entrepreneurs, and practitioners. This will help China reach its objective of becoming a world leader in manufacturing.

4. LITERATURE REVIEW

One of China's main goals is to alter and improve traditional industries through the process of industrial modernisation. This will help the country create high-quality industries. This is one of the most important things for the country to do. Both of these goals are being worked on at the same time, and both of them are being aimed at the same time. The research says that the manufacturing business is presently facing some issues, such as rising production costs, competition from around the world, rising demands for new technology, and the need to protect the environment. Another problem is that one need to keep the environment healthy. Another problem that can't be disregarded is environmental sustainability. The traditional business drivers, which were benefits in terms of labour and resources, are not the only problems the sector has; these problems are also problems the industry faces. Several experts believe that AI could improve management and production processes by making decisions based on data, creating smart supply chains, using predictive analytics, and automating tasks with technology (Mohsen, 2023).

The results of several research initiatives will be the most important aspect in deciding whether or not the shift to AI-driven manufacturing will be effective. The "Made in China 2025" program and the "New Generation Artificial Intelligence Development Plan" both make it easier to create AI in China. This is done by giving them more money and strategic advice. There are a lot of critical aspects, such as investing in research and development, having qualified people, good leadership inside the company, and a well-developed digital

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infrastructure. All of these things help make the process easy in a big way. The capacity of a corporation to adopt and adapt to AI technology is often correlated with its internal capabilities and its disposition towards organisational change (Schwaeke et al., 2025).

Because demonstration effects are described as procedures that accomplish both of these goals, it can be deduced that diminishing uncertainty and fostering creativity are both substantial advantages. This definition was made possible by the study that has been done. Many other businesses have said that China's AI innovation zones and national pilot smart factories are good examples of how to use AI in real life. These examples show how the actual world can profit from these ideas, and they are given for the sake of the economy and operations. They also provide models that others can follow, which will help speed up the process of change that is happening in the sector. Because demos build trust, stakeholders are more likely to put money into AI technology (Elliott et al., 2021).

AI could make traditional manufacturing better by improving many things, such as the ability to customise items, the quality of products, the impact on the environment, and the speed of the production process. Most professionals in the field agree that businesses need to use AI at every step of the value chain, from production to customer service, in order to grow. These methods are better now that they have been shown to work since they encourage others to copy them, show the social and economic benefits of using AI, and point out the best ways to do things. Even though these improvements have been made, the research shows that there are still problems that need to be solved. Many businesses, especially small and medium-sized enterprises (SMEs), face a lot of problems in integration of AI technology (Govori & Sejdija, 2023). Some of these problems are a lack of experienced staff, high expenses of implementation, and not knowing how to measure return on investment (ROI). These are just a few of the problems they have to cope with. Other things that make it less likely that people

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will embrace include a cultural reluctance to change, worries about data security, and problems with systems working together (Hubbart, 2023).

5. RESEARCH QUESTION

- What are the influencing factors of leading the transformation on traditional manufacturing industry with artificial intelligence?

6. METHODOLOGY

6.1 Research Design

SPSS version 25 was utilised for the quantitative data analysis. The odds ratio and 95% confidence interval were utilised to determine the intensity and direction of the statistical association. The researchers established a statistically significant criteria at $p < 0.05$. A descriptive analysis was conducted to identify the most significant details from the data. Data obtained from questionnaires, surveys, and polls, along with data augmented by computational tools for statistical analysis, are often assessed by quantitative methods.

6.2 Sampling

Participants were requested to complete questionnaires to participate to the research. Researchers distributed 600 questionnaires after identifying a research population of 470 individuals utilising the Rao-soft method. Following the collection of 568 replies, the researchers eliminated 68 due to incompleteness, yielding a final sample size of 500.

6.3 Data and Measurement:

The principal technique for data gathering in the study was a questionnaire survey. Part A of the survey solicited fundamental demographic data, whereas Part B employed a 5-point Likert scale to gather responses concerning variables associated with online and offline channels. A multitude of sources, particularly internet databases, supplied the secondary data.

6.4 Statistical Software:

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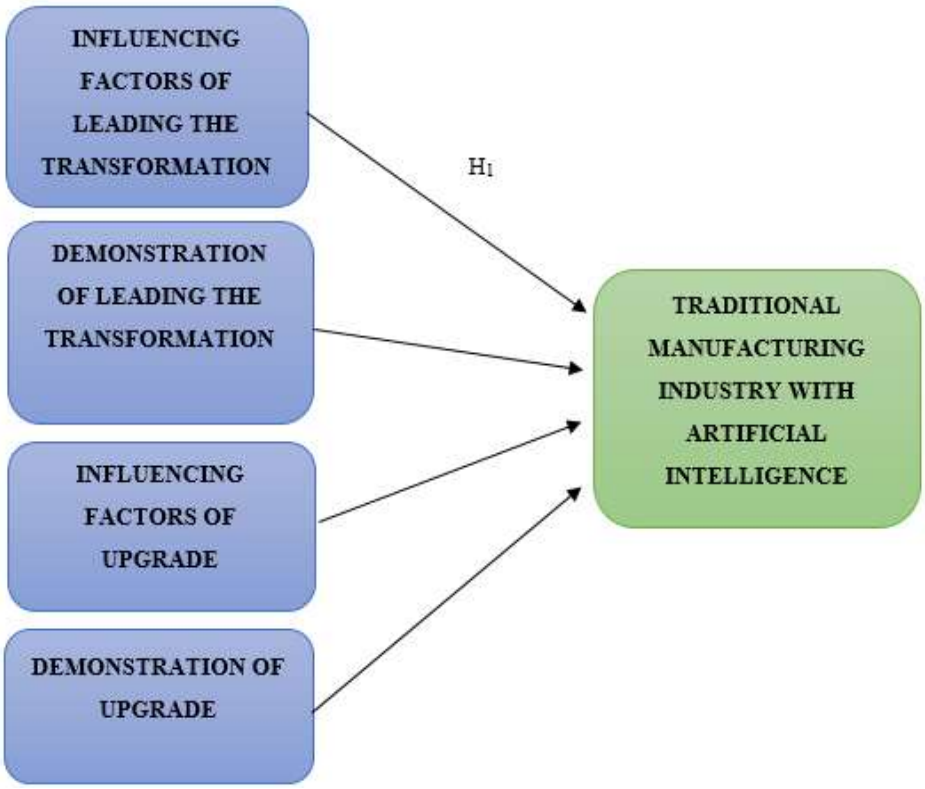
Statistical analysis was carried out using SPSS 25 and MS-Excel.

6.5 Statistical Tools:

The researcher has employed descriptive analysis to comprehend the data at a fundamental level. The researcher must analyse the data using ANOVA.

7. CONCEPTUAL FRAMEWORK



8. RESULT

- **Factor Analysis**

A common application of Factor Analysis (FA) is to validate the underlying component structure of a collection of measurement items. Factors that are not readily apparent can theoretically affect the scores of the observable variables. The FA approach is an example of a model-driven methodology. The primary objective of this research is to delineate the links between observable phenomena, their underlying causes, and measurement errors. The suitability of data for factor analysis can be evaluated using the Kaiser-Meyer-Olkin

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(KMO) Method. The researcher verify whether the sample size is sufficient to accurately reflect the entire model and each constituent variable inside it. The statistical metrics assess the degree of shared variance among multiple variables. For factor analysis, it is generally advantageous to utilise lower-level data.

KMO generates integers ranging from 0 to 1. A KMO value between 0.8 and 1 indicates adequate sampling.

If the KMO is below 0.6, corrective actions are necessary due to insufficient sampling. Exercise on the best judgement; a value of 0.5 is frequently employed by authors for this purpose, hence a range of 0.5 to 0.6 is established.

Partial correlations constitute a significant fraction of total correlations as the KMO value approaches 0. It is important to emphasise that substantial correlations significantly impede component analysis.

Kaiser has established the subsequent approval criteria:

Unsatisfactory readings ranging from 0.050 to 0.059.

Below standard of 0.60-0.69.

A mediocre grade often ranges from 0.70 to 0.79.

A rating ranging from 0.80 to 0.89 indicative of quality points.

The range is notable, spanning from 0.90 to 1.00.

Table 1: KMO and Bartlett's

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.874
Bartlett's Test of Sphericity	**Approx. Chi-Square**	3252.968
	df	190
	Sig.	.000

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This confirms the veracity of claims concerning the execution of a sample. Researchers assessed the significance of the correlation matrices utilising Bartlett's Test of Sphericity. The KMO measure of 0.874 indicates that the sample is adequate. The p-value from Bartlett's sphericity test is 0.00. The results of Bartlett's sphericity test indicate that the correlation matrix deviates from an identity matrix and is statistically significant.

❖ INDEPENDENT VARIABLE

Influencing Factors of Leading the Transformation

Factors that are causing change in the manufacturing industry means the elements that are making manufacturers that have been there for a long time attempt new things and be more open to change. There are a lot of reasons why these initiatives have worked. Some of these aspects are China's national innovation zones, significant financial prizes, and rules that help the government. A business needs creative leaders, competent employees, money to invest on digital infrastructure, and the ability to adapt to changes within the company in order to be successful. There are a lot of things that can make an organisation ready for AI. Some factors to think about are how good the organisation's employees are with computers, how it handles data, and how open its workers are to new ideas. If the right conditions for change aren't there, the experts' claims that the current actions aren't enough or don't matter could be true. For China to reach its long-term aim of upgrading its industries and growing at a high level, it needs to know these vital things. Because of this, production might go up, firms could become more competitive, and China could attain its long-term goal. This is because it's really vital to know these things. When deciding how to best use AI, these things need to be taken into account (Zou et al., 2022).

❖ DEPENDENT VARIABLE

Traditional Manufacturing Industry with Artificial Intelligence

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AI is being used in more traditional industries including textiles, manufacturing, cars, and metallurgy thanks to new digital technologies that are now available. The Chinese government sees this integration as very vital since the country is moving away from low-cost, labour-intensive industries and towards development that is led by innovation and knowledge. There are several possible effects that could happen if traditional industrial companies start using AI in their day-to-day work. Some of the things that have been accomplished are better customer-driven product adaption, real-time supply chain optimisation, automated quality control, and predictive maintenance. This change makes the world more sustainable, competitive, and resilient, and it also helps to make things run more smoothly and cut costs. AI also helps enterprises move up the value chain, which is why China wants to be the world's leader in smart manufacturing. To be competitive in today's more digital and competitive global market, traditional manufacturing is changing into a system that is more technology-focused, flexible, and dynamic. In this way, traditional manufacturing will be able to grow. The dependant variable shows what happens when the transformation is done well, which shows that this is the case (Omerovic Smajlovic, 2024).

- **Relationship between influencing factors of leading the transformation and traditional manufacturing industry with artificial intelligence**

There is a strong and direct link between the traits that affect how AI is used in traditional industrial procedures. Government laws and financial incentives provide corporations a strategic reason to use AI technologies. For this kind of adoption to work, it is important that skilled people be easy to find and that the organization's executives provide their support. For example, the national pilot smart factories in China have effectively embraced AI-driven systems because of a mix of visionary leadership and large investments in digital infrastructure. This shows that the implementation was successful. As a result, these factories can now use these technologies efficiently. At the same time, demonstration projects are making this

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relationship stronger by making successes more visible, minimising the risks involved, and encouraging other businesses to copy them. AI adoption is quite low in areas where the conditions that affect AI are not good. Some examples of these kinds of areas include those where the workforce isn't trained enough and the digital infrastructure isn't good enough. So, the amount of industrial change and improvement that is happening in China's manufacturing sector is based on these qualities and how much they are present. These variables affect how well traditional manufacturing companies can use AI. This is the case because these factors affect how much AI is deployed in China's industrial sector (Zhibiao & Yonghui, 2022).

On the basis of the above discussion, the researcher formulated the following hypothesis, which was analyse the relationship between influencing factors of leading the transformation and traditional manufacturing industry with artificial intelligence.

"$H0_1$: There is no significant relationship between influencing factors of leading the transformation and traditional manufacturing industry with artificial intelligence."

"H_1: There is a significant relationship between influencing factors of leading the transformation and traditional manufacturing industry with artificial intelligence."

Table 2: H_1 ANOVA Test

ANOVA					
Sum					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	39588.620	176	5285.137	955.548	.000
Within Groups	492.770	323	5.531		
Total	40081.390	499			

The outcome of this research is noteworthy. With a p-value of.000 (less than the.05 alpha level), the significance threshold is reached with an F-value of 955.548. Thus, the researcher accepted ***"H_1: There is a significant relationship between influencing factors of leading the***

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transformation and traditional manufacturing industry with artificial intelligence" and reject the null hypothesis.

9. DISCUSSION

There are a lot of things that affect how quickly and successfully people accept AI. This, in turn, affects how much China's conventional industrial sector is updated and modernised. When assessing whether a company is ready to deploy AI, they think about the environment that will help it work. When figuring up this equation, a variety of things are taken into account. Some of these include the expertise and commitment of management, the money that is invested into the computer network, and the legislation that helps. These projects are part of a group of demonstration projects that also includes the creation of innovation zones for AI and test beds for smart manufacturing. They demonstrate excellent adaptation and growth by offering assistance to other groups and alleviating the anxiety that typically accompanies adoption. A feedback loop is created between facilitating components and demonstrations when successful demonstrations make facilitating components more relevant and impactful, and when strong influencing elements make demonstrations more effective. This feedback loop is a loop of feedback. Because of this interaction, a feedback loop was successfully set up between the two variables that were being looked at. Traditional organisations have started using AI in their daily operations, and these companies have seen improvements in several areas, such as efficiency, quality, flexibility, and competitiveness. To achieve the aim of sustainable development, all policies, organisational plans, technical competencies, and practices must be coherent and substantiated by evidence. This can only be done by recognising that upgrading and changing are not separate processes, but rather ones that are linked. This is the only way to achieve this.

10. CONCLUSION

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China's traditional manufacturing sector would be benefitted from technological integration such as AI while analysing the interactions among its many components and their effects. The reasons for this may be linked to the fact that the factors affecting the findings and outcomes are not always clear. The AI won't work correctly until the settings are changed. To make this happen, there has to be an efficient system, skilled workers, trained lawyers, and a visionary leader. If the benefits of the deal were made clear, this would be much more important for improvement of manufacturing operations in China. Integration has helped China modernise its sectors, which has made the nation more efficient, competitive, and able to provide better products overall. To bring about change and progress, one need to put a detailed strategy into action based on the results. To clarify the issue and bring about change, all parts of this plan must work together. If powerful governments and rich companies use this information to replace inefficient practices with ones that are stronger, more efficient, and more competitive on a global scale, the industrial sector may be able to gain from it. This transformation may happen more quickly if new ideas are welcomed and the way strategic planning is done is changed in Chinese traditional manufacturing industry.

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