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A STUDY ON FACTORS INFLUENCING AND DEMONSTRATING THE LEADERSHIP IN THE TRANSFORMATION AND ENHANCEMENT OF THE TRADITIONAL MANUFACTURING INDUSTRY THROUGH ARTIFICIAL INTELLIGENCE

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ABSTRACT

The traditional manufacturing sector in China has had a lot of issues in the previous several years. Some of these problems include increasing salaries, greater competition from throughout the globe, and changes in what consumers want. As businesses work to improve their production and operations, artificial intelligence (AI) is becoming more and more vital. Businesses undertake these things to make sure that the industrial sector continues developing and that the growth is as good as it can be. For the purposes of this article, the researcher looked at how AI has revolutionised traditional manufacturing and what has caused this transition. The aim of this article is to get a deeper comprehension of these components and their effects on the system. A business needs a number of factors to be able to employ AI well. These are some of the things that help: government policy backing, a solid digital infrastructure, great firm leadership, and talented workers. Building demonstration projects highlight how the technology can help the industry adopt it more quickly. This is accomplished by demonstrating the advantages that the technology offers. The businesses need to accomplish two things: set up innovation zones for AI and test out smart industrial technologies in pilot projects. This article has also focused on analysing ways to improve operational efficiency, product quality, adaptability, and competitiveness by use of advanced technology such as AI contributing to China's overarching industrial modernisation program. The findings indicate that sustaining technologically driven industrial development over the long term requires a comprehensive strategy that include both facilitating factors of upgrade for industrial development of manufacturing businesses in China.

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Keywords: Influencing factors of upgrade, artificial intelligence (AI), manufacturing businesses, China

1. INTRODUCTION

China's manufacturing sector has been a primary engine of the country's overall economic growth, as well as its industrialisation and exports, for many years. On the other hand, traditional production processes are no longer useful since competition is growing throughout the world, demand is changing in the local market, and the prices of different forms of labour are going up. Manufacturing businesses in China are using AI more and more. If one do things this way, things will become better and more up-to-date. The objective of this technological advancement is to make sure that the development is of the highest quality while also staying ahead of other organisations in the same field. Companies may utilise AI to save costs, manufacture more things, and develop things that are better. This technology might be helpful in a lot of different areas, including running smart supply chains, making decisions based on data, figuring out when maintenance is required, and automating industrial processes (Javaid et al., 2022).

There are a number of other things that may impact the quality of AI. This canopy of worries includes a number of different elements, such the skills of workers, the attitudes of leaders, the money for digital infrastructure, and the backing of politicians, each in their own manner. Two examples of demonstration projects that might help firms are AI innovation zones and pilot smart factories. These are both examples of demonstration projects. These steps not only make adoption less risky, but they also demonstrate others how to attain their goals, which makes them more likely to use the same method. One need to know both theory and practice extremely well to comprehend how these elements function together, how they impact the real world, and how AI is applied (Bjola, 2022). This is also vital for learning how to utilise AI. The fundamental purpose of the study has been to learn more about how China's conventional

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manufacturing industry has become more sophisticated, robust, and competitive on a worldwide scale.

2. BACKGROUND OF THE STUDY

For a time, the conventional manufacturing sector in China was a large portion of the country's total economic growth. A lot of people work in this industry, and it has a large influence on the country's GDP and its capacity to sell goods and services to other countries. Textiles, steel, mechanical manufacturing, and automotive manufacturing have all been viewed as the most essential portions of the country's industrial strength throughout the years. Globalisation, increasing wage prices, and intense rivalry from other nations are putting more and more pressure on the conventional industrial sector to change with the times. All of these things are making the pressure worse. Another intriguing point is that the manufacturing methods that are already in place are being placed under stress since more consumers are desiring eco-friendly goods, greater customisation, and higher quality (Atkinson & Atkinson, 2024).

A lot of people believe that AI has played a key part in this change. A lot of people assume this. The "New Generation Artificial Intelligence Development Plan" that the Chinese government put out in 2017 made AI a hot topic. AI is a very significant technology for speeding up the process of modernising industries. Companies use AI for a lot of things, such making judgements based on data, making sure products are of high quality, constructing clever robots, and figuring out when maintenance will be required. AI can help businesses do a variety of things, including work faster, save money, and be more competitive. These are only a few things that can be done. AI may assist with company planning, operating manufacturing, and managing supply chains, in addition to automating technologies that are currently in use (Helo & Hao, 2022).

Some industrial procedures incorporate artificial intelligence, although these processes are frequently not clear or consistent. These are the things that make them different from normal

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industrial procedures. There are a number of elements that impact how substantial the shift is, and the following several paragraphs will go into more detail about each of them. There are a few different kinds of enterprises in the field of AI that may serve as models for other kinds of businesses. "National innovation zones," "model enterprises," and "pilot factories" are all examples of the types of groupings that fit into this category. The goal of these demos is to accomplish a number of different objectives. Working towards these objectives may help clear up any confusion, inspire others to do the same, and persuade people to support using the product more. Because of this, China could be able to employ AI to make its operations more efficient and resilient (Sundaramurthy et al., 2022).

AI is having an effect on many parts of the industrial industry. This topic covers how companies deal with the environment, the quality of the products and services they provide, how well they can adapt to changing conditions, and how well they can use new technologies. There are a lot of things happening today, and the folks mentioned below are only a few of the people that are taking part. On the other side, the pace with which AI is being employed is causing concerns. This is quite different from the excellent things that new technology accomplishes for the economy and society as a whole. One may compare this to how technology growth has helped society. Based on what researchers' know so far, it's really vital to look into all the ways that new technology such as AI may be utilised to replace the traditional method of creating things in China with a more contemporary one (Xu et al., 2021). The primary objective of this research is to enhance the intelligence, strength, and global competitiveness of China's manufacturing industry. This has implied that effective utilisation of AI technology would be beneficial for manufacturing businesses in China to improve their capabilities in operational efficiency improvements as well as gain competitive advantage on global level.

3. THE PURPOSE OF THE RESEARCH

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This research examined the many ways in which AI might assist China's conventional industrial sector in its development and transformation. The objective was achieved by the synergistic impacts of key components in conjunction with demonstrative effects. The manufacturing sector is very important to the Chinese economy, but a lot of people are anxious about how quickly, competitively, and for how long the business is developing. This seems to be the case, even though the industrial sector is a large element of China's economic growth. Two of the most important goals of this study are to (1) find the most important factors to upgrade AI and (2) look at how demonstration projects could help the industry adopt new technologies such as AI faster. To make sure that AI functions successfully, the first thing to do is find out which elements are the most crucial. The purpose of this project is to look at how AI may help businesses do better and become stronger. To achieve this objective, the researcher examined both the upgrading and transformation processes. For China to be a leader in global manufacturing in the digital and intelligent industries age, the research has to be able to provide both theoretical advances in intelligent manufacturing and practical suggestions for company owners, entrepreneurs, and practitioners. This ability hinges on the research's ability to make both of these possible contributions. This will help China get closer to its goal of becoming the world's manufacturing powerhouse with use of advanced technologies such as AI in future.

4. LITERATURE REVIEW

China aspires to transform and modernise its old industrial and service sectors. This is part of China's ambition to modernise its factories. Because of this, the nation could be able to build industries that are much superior to usual. This should be one of the most significant things the nation does, and it should be one of the most important things the country does. The team is working on all of these objectives at the same time, even though they are all making progress towards each one. The poll findings suggest that the manufacturing sector is having a lot of issues right now. The need to safeguard the environment, increased production costs,

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competitiveness throughout the globe, and a greater need for innovative technology are all elements that are driving this trend. One should also think about ways to better protect the environment. Keeping the environment healthy is another important item that has to be done. Another issue that has to be addressed is the environment's capacity to stay healthy throughout time. The entire industry is experiencing problems like these, and on top of that, the sector is having issues with the old business drivers, which were benefits in terms of manpower and resources. These advantages were good things. Many professionals who work in the industry argue that AI might transform how manufacture things and operate organisations by leveraging data-driven decision-making, smart supply chain systems, predictive analytics, and automated jobs (Selvarajan, 2021).

The success of the switch to AI-driven production will rely a lot on the findings of a number of research initiatives. The "New Generation Artificial Intelligence Development Plan" and the "Made in China 2025" strategy are both aimed to help China manufacture more artificial intelligence. The point of all of these plans is to make life easier. Businesses do this by giving them more money and helping them make good choices. Some of the things that are required include a complex digital infrastructure, money for research and development, employing talented staff, and good leadership inside the company. There are also a few other things that are required. These criteria, which are very significant, make the work easier or harder to complete. The ability of a company to adopt and use AI technology is closely associated with its internal capabilities and its attitude towards organisational transformation. This is because the two parts are so closely related (Chen, 2024).

Demonstrative effects are a kind of approach that may have a lot of good impacts, including making things clearer and promoting new ideas. These findings are really excellent. This term came about because of the investigation's conclusions. Many businesses think that China's national pilot smart factories and AI innovation zones are fantastic models of how smart

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factories may work in real life. The examples of how these ideas could be used in the real world to make things run better and boost the economy show that they might be helpful. They also show people how to do things, which will speed up the changes that are already occurring in the firm. There is a bigger possibility that stakeholders will invest in AI technology if they see a demonstration. This helps them feel surer (Hoffman et al., 2023).

AI might transform the way things are manufactured in a number of ways. Some of these techniques are to improve goods, have less of an impact on the environment, speed up production schedules, and provide consumers more choices for how to personalise their stuff. If organisations want to be successful, most experts in the industry say they need to incorporate AI in every part of their operations. This includes everything from how they create products to what they do for their consumers. They preach about the social and economic advantages of AI, tell people how to do things the right way, and urge others to copy them. These tactics are much more valuable if people see that they work since they encourage others to employ them. The study's results reveal that there are still difficulties that haven't been totally fixed, even with these changes. A lot of organisations, particularly small and medium-sized enterprises (SMEs), have a lot of trouble when they attempt to use AI technology. Some of these challenges include the high costs of implementation, the absence of a reliable mechanism to measure return on investment (ROI), and the fact that there aren't enough individuals who have been trained to do the job. These are just a handful of the numerous problems they have to cope with. There are a number of reasons why people are less inclined to accept something. Some of these factors include cultural resistance to change, concerns about data security, and issues with interoperability (Ivchyk, 2024).

5. RESEARCH QUESTION

- What are the influencing factors of upgrade on traditional manufacturing industry using artificial intelligence?

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6. METHODOLOGY

6.1 Research Design

The quantitative data analysis was performed with SPSS version 25. The researcher used the odds ratio and the 95% confidence interval to ascertain the strength and direction of the statistical association. The researchers established a statistically significant criteria at $p < 0.05$. Key aspects from the data were derived by descriptive analysis. Quantitative methods are often used to assess data gathered via polls, surveys, and questionnaires, together with data enhanced by computational tools for statistical analysis.

6.2 Sampling

The research included individuals completing questionnaires. Following the identification of 470 individuals as the research population by the Rao-soft methodology, 600 questionnaires were distributed. Following the collection of 568 replies, the researchers excluded 68 due to incompleteness, resulting in a final sample size of 500.

6.3 Data and Measurement:

This study used a questionnaire survey as the principal approach for data collecting. The first piece of the survey solicited fundamental personal information, whilst the subsequent section used a 5-point Likert scale to enquire about elements associated with online and offline channels. The secondary data was obtained from several sources, mostly internet databases.

6.4 Statistical Software:

Utilising SPSS 25 and MS-Excel, statistical analysis was conducted in this research.

6.5 Statistical Tools:

Using descriptive analysis, the researcher has gained a basic understanding of the data. Analysing the data using ANOVA is a researcher's responsibility.

7. CONCEPTUAL FRAMEWORK

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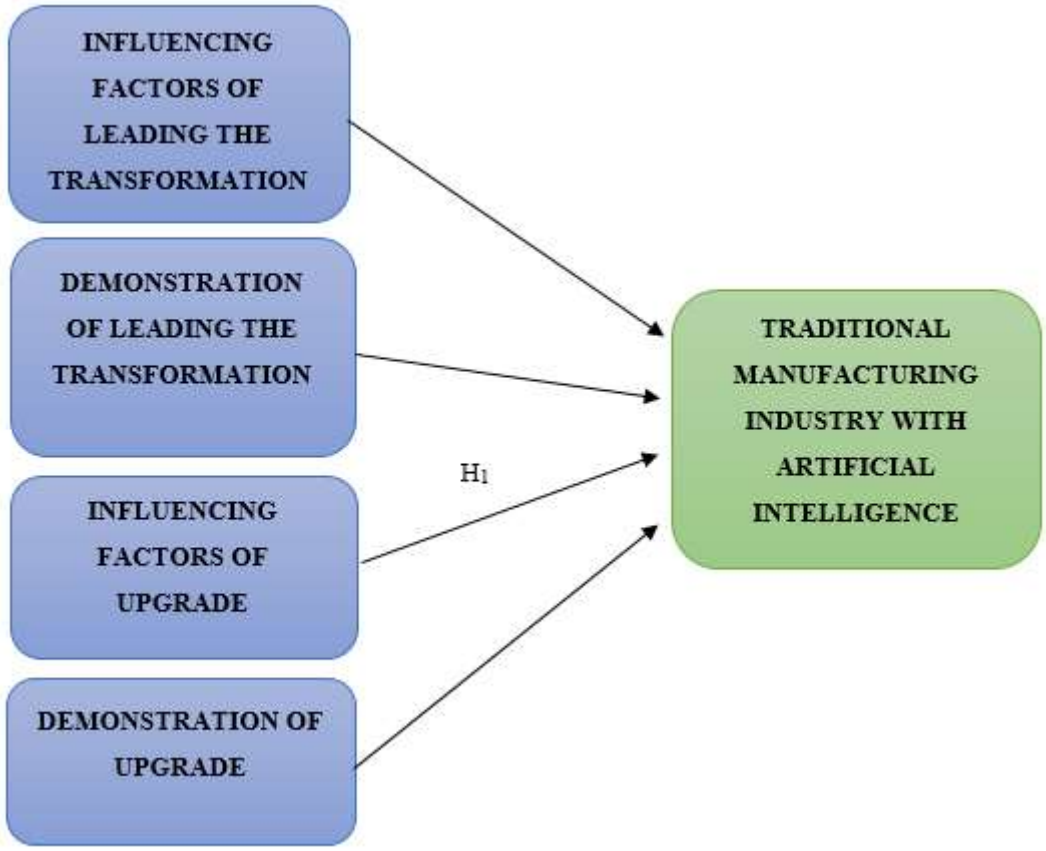

8. RESULT

- **Factor Analysis**

Assessing whether a collection of measurement items has a coherent component structure is a standard use of Factor Analysis (FA). It is theoretically feasible for non-obvious causes to affect the scores of observable variables. One model-driven methodology is the FA approach. The primary objective of this research is to identify the links among observed events, their origins, and measurement errors.

A method to assess the appropriateness of data for factor analysis is the Kaiser-Meyer-Olkin (KMO) Method. The researcher verifies whether the sample size is sufficient to represent the whole model and all its variables. Statistical metrics quantify the amount of variance shared across various variables. In general, using lower-level data is advantageous for factor analysis.

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KMO generates integers ranging from zero to one. A KMO score between 0.8 and 1 indicates adequate sampling.

Remedial actions are essential when the KMO falls below 0.6 due to insufficient sampling. Utilise one's sound judgement; the majority of authors choose 0.5 for this parameter, hence anticipate values ranging from 0.5 to 0.6.

As the KMO statistic approaches 0, a significant proportion of the correlations are partial correlations. It is important to emphasise that component analysis is significantly impeded by strong correlations.

Kaiser has established the following approval conditions:

Values ranging from 0.050 to 0.059 are deemed inadequate.

The values fall below the standard range of 0.60 to 0.69.

A score between 0.70 and 0.79 is indicative of a low grade.

Quality points are represented by a rating ranging from 0.80 to 0.89.

A significant difference exists between 0.90 and 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

This substantiates the claims of the sample's execution. Researchers assessed the importance of the correlation matrices by Bartlett's Test of Sphericity. The sample is adequate, as shown by the KMO measure of 0.874. Bartlett's p-value for evaluating sphericity is 0.00. The

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correlation matrix markedly deviates from an identity matrix, as shown by Bartlett's sphericity test.

❖ INDEPENDENT VARIABLE

Influencing Factors of Upgrade

China's conventional manufacturing sector is now going through an upgrade, and a variety of various elements impact how much and how long changes happen. This area is becoming better all the time. China has included industrial upgrading in its plans and goals by putting into action important projects like Made in China 2025 and the New Generation Artificial Intelligence Development Plan. This has been made feasible by the deployment of these programs. This is why it is extremely vital for the government to aid and provide instructions on how the policy will work. Companies need to be able to switch from production models that are cheap and rely on a lot of workers to models that rely on new ideas. To achieve this, they need money, digital infrastructure, and talented staff. This adjustment is very vital for businesses to go forward. It is important for businesses to be able to employ AI, know about changes in the company, and have executives that support such changes. People also desire modernisation because companies require products that are high-quality, tailored to each person's needs, and beneficial for the environment. All of these things make it feasible for businesses to adopt cutting-edge technology, which makes them more competitive and helps the nation reach its objective of becoming a leader in smart manufacturing (Jwo et al., 2021).

❖ DEPENDENT VARIABLE

Traditional Manufacturing Industry using Artificial Intelligence

The conventional manufacturing sector is beginning to embrace AI at a key moment in China's efforts to modernise its industries. The purpose of this adoption is to make things better and help the industry compete with new ones. AI might help businesses to save money and cut

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down on waste. Some of these technologies include automated quality control, predictive maintenance, process optimisation, and real-time supply chain coordination. One can get these benefits by using this technology. This integration allows conventional sectors like textiles, equipment, steel, and cars to adjust to changes in the market and work better. This happened because of the integration. Companies could cease creating products in huge amounts and start adopting more flexible and tailored ways, which are very popular in both local and worldwide markets. Businesses may make this change because of AI. AI helps China perform well in a way that is good for the environment and lasts. This is because smart systems consume less energy and generate less garbage. The dependent variable that illustrates the effects of enabling conditions and influencing factors is the use of AI in traditional manufacturing. With this recognition, the sector will now be able to prove that it can change for the better by emphasising on innovative ideas and good quality (Alhosani & Alhashmi, 2024).

- **Relationship between influencing factors of upgrade and traditional manufacturing industry using artificial intelligence**

It's important to keep in mind that there is a revolutionary and synergistic relationship between the things that effect new ideas and the usage of AI in conventional manufacturing. The government has made it simpler for corporations to put money into AI technology by setting rigorous rules and giving them money to do so. These technologies require more than just people who can execute their jobs; they also need a solid digital infrastructure. Not only is it an addition to the plans for the renovation, but it is also a significant aspect of those plans. This is final because the leaders of the organisation are open to making changes. AI is a positive thing. Because the market demands items that can be changed, are better for the environment, and are of higher quality, manufacturers are more inclined to employ solutions that AI makes available. This has led to increased competitiveness, improved efficiency, and more people following the aims of the national smart industrial development program. If Chinese companies

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that have access to these high-quality components use AI in a way that is both quicker and more comprehensive, these impacts might happen. The industrial sector will alter because of AI. The most crucial variables that will affect these changes are how well these new ideas function and how many people will utilise them (Rane, 2023).

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

"H_{01}: There is no significant relationship between influencing factors of upgrade and traditional manufacturing industry using artificial intelligence."

"H_1: There is a significant relationship between influencing factors of upgrade and traditional manufacturing industry using artificial intelligence."

Table 2: H_1 ANOVA Test

ANOVA					
Sum					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	39588.620	197	5123.193	1004.153	.000
Within Groups	492.770	302	5.102		
Total	40081.390	499			

The results of this investigation are significant. A p-value of .000 (below the .05 alpha threshold) indicates that the F value of 1004.153 is statistically significant. Consequently, the researcher may assert that ***"H_1: There is a significant relationship between influencing factors of upgrade and traditional manufacturing industry using artificial intelligence"*** is valid, whereas the alternative hypothesis is not.

9. DISCUSSION

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Effective use of AI technology would be beneficial for transformation of overall operations of manufacturing processes in Chinese businesses. This is why China wants to use AI in its conventional industrial sector. A number of things might make things better. The leader's talents, the workers' readiness, the government's policies, and the money spent on digital infrastructure are all elements that may have an influence on this. These features make it possible for AI to be beneficial. The Chinese government is in charge of a variety of key programs, such the Made in China 2025 plan and the Artificial Intelligence Development Plan. The goal of these projects is to keep China competitive in the long term by emphasising on smart manufacturing and innovative technology. According to these laws, enterprises may get money and legal aid to try out AI-powered products. Businesses need to change the way they do things and pay their employees to learn about AI. This will help them adopt modern production processes that are focused on being efficient, environmentally friendly, and customisable. The digital infrastructure is operating effectively, therefore businesses are embracing AI in their daily operations. This category includes programs that automate quality control, smart logistics, and maintenance that may be planned ahead of time to help manufacturing operate more smoothly. AI applications are influenced by several aspects that depend on each other and work together to aid each other. The effectiveness of these qualities is shown by how well AI works, and the convenience of integrating technology is directly affected by how easy it is to find the right circumstances. Factories that receive a lot of aid from the government, have competent workers, and have businesses who are open to new ideas may be able to become more efficient, competitive, and in line with global industry standards. Politicians, corporate strategists, and HR experts all need to work together to drive AI forward in a coordinated manner.

10. CONCLUSION

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In conclusion, this study clarifies the importance of this shift by showing that the strength of upgrading-influencing factors is the main factor that makes it possible to use AI to change China's conventional industrial sector. This research was conducted to clarify the significance of this transition. AI works best when a lot of things happen at once. The government, the money, the leaders' vision, the digital infrastructure, and the talented workers are all pieces of this. These things not only make the atmosphere better for new ideas, but they also restrict the ways that upgrades can be done and whether or not they are even conceivable. By applying AI in its conventional manufacturing sector, China has been able to achieve its goals of being competitive and sustainable on a global scale. The nation has also been able to make its operations more flexible, its goods better, and its output greater. It's evident that the things that impact the usage of AI are connected. Organisations with supportive cultures are more likely to do well, whereas organisations without such cultures have a lot of trouble growing their operations. There is an obvious need for a complete plan that incorporates work done by the government, planning done by enterprises, and preparations made by workers when one look at the data in the appropriate manner. This sort of synergy will change traditional manufacturing into a smart, self-sufficient, and competitive enterprise on a global scale.

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