Research on the Impact of Digitization and Intelligentization on the Creation of Shared Value by Small, Medium-sized and Micro Enterprises

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Abstract: With the development of a new round of industrial upgrading and technological revolution, China's manufacturing enterprises are also gradually moving towards the direction of digital and intelligent transformation and upgrading. Can such enterprises benefit the society and create shared value while carrying out transformation and upgrading? Based on the sample data of the top three representative enterprises of China's intelligent manufacturing enterprises in 2019, this paper uses the content analysis method to measure the shared value measures of the sample enterprises, calculates the intelligence degree of the enterprises according to the intelligence degree im formula, and empirically analyzes the impact of the intelligence degree of manufacturing enterprises on the shared value created by enterprises. It is found that the degree of digitization and intelligence of enterprises plays a positive role in creating shared value. Therefore, we put forward ten possible ways to promote enterprises to realize shared value by implementing digitization and intelligence.

1 INTRODUCTION

In today's era, the world is rapidly entering the era of digital economy, and the opportunities and challenges of enterprise digital intelligent transformation and upgrading are also coming one after another. Based on the "Internet plus" era, the popularity of new technologies and the impact of innovation driven, the matching efficiency of idle resources has also been improved, thus promoting the creation of shared value. In the context of modern economy, shared value plays a complementary role. It can not only assist the government in social management, reform the operating environment of traditional industries and improve social welfare, but also ease labor relations, optimize transaction relations, develop green economy and broaden the boundary of public goods.

Reviewing the current research status of shared value in China, domestic scholars have provided analysis ideas and model construction of various industries, and provided a large number of theoretical ideas on how to create and realize and how to measure shared value. But for possible new ways (combined with digitization and intelligentization) is still rarely involved. Therefore, this paper aims to analyze the impact of the digitization and intelligentization of a specific enterprise on the creation of shared value, hoping to contribute to this research, provide some suggestions on how to realize a more intelligent shared value strategy, and help enterprises integrate their own economic goals with social goals work together.

2 LITERATURE REVIEW

Domestic and foreign scholars' research on shared value is common in many disciplines, such as corporate strategic management, corporate economy, corporate social responsibility and so on. At present, the relevant research on the concept of shared value has not been clearly defined. The debate on relevant research is mainly divided into two factions: one is to

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accept Porter's point of view, that is, shared value is that enterprises can not only achieve their own economic goals, but also contribute to the improvement of community economic and social conditions (Porter, 2011, Kramer, 2011); Others believe that shared value is only a way to create their own value for all stakeholders. Some scholars choose to vaguely define shared value as a new path to help enterprises or organizations achieve economic achievements. So far, foreign academic circles have still failed to give a unanimously recognized definition of shared value. The core reason is that three questions have not been well answered, that is, what is the specific way to create shared value? What results can shared value bring to us? Who are the beneficiaries of this result?

After reviewing many foreign studies on shared value, it can be found that although many disciplines use the concept of shared value to enrich the relevant theories of this discipline, they are often misunderstood and over understood due to the lack of unified recognition and definition. Looking at the relevant domestic research on shared value, we can also find that no matter what perspective the shared value research is based on, the quantitative research is very limited, and there are few qualitative and quantitative studies. Therefore, this paper attempts to adopt the generally recognized definitions and theories of Porter and others on shared value, analyze the specific path that enterprises can create shared value while transforming and upgrading digital and intelligent, and integrate the evaluation index system of digital, intelligent and shared value to measure the concept of shared value, Verify the impact of the digital and intelligent development of manufacturing enterprises on the creation of shared value.

3 RESEARCH DESIGN

Porter and others believe that shared value is a conceptual model for enterprises to realize their own economic interests by creating shared value to meet social interests, which can not only help enterprises achieve economic success, but also improve enterprise efficiency and expand the scale of product market. Porter believes that if enterprises want to create shared value, they can mainly start from the following three ways: first, rethink products and markets; Second, redefine the productivity of the value chain; Third, improve the local industrial cluster environment and promote the development of industrial clusters.

To sum up, can enterprises improve their business efficiency, reduce their costs, expand their market scale, increase their performance and create shared value by taking more measures related to improving their digital and intelligent degree, starting from the above three ways? Therefore, this paper hopes to conduct factor influence research from the two directions of digitization and intelligence, obtain certain theoretical results, and put forward assumptions:

H1: the degree of digitization and intelligence has a positive impact on enterprises to create shared value. That is, the higher the degree of digitization and intelligence of the enterprise, the more shared value the enterprise creates.

This paper selects the top three Chinese intelligent manufacturing enterprises from the "top 100 Chinese intelligent manufacturing enterprises in 2019" released by Lyon business school in France as the research object, They are Foxconn Technology Group (Industrial Fulian), Haier Group Corporation and Huawei Technology Co., Ltd. obtain the text content such as shared value measures related to digitization and intelligence adopted by the enterprise from the official website of the sample enterprise, the 2019 annual report released by the enterprise, the 2019 corporate social responsibility report or the sustainable development report, and then use the content analysis method to extract and analyze the content analysis.

According to the current research status at home and abroad, few studies can directly quantify the degree of digitization and intelligence, and digitization and intelligence are not separated. Digitization is the basis of intelligence, and digitization and intelligence are different stages of enterprise development. These two stages are not completely progressive, but also overlap to a certain extent, Therefore, intelligence is the development trend of digitization. In order to facilitate quantitative research, this paper combines the digitization degree and intelligence degree of the enterprise into the variable of intelligence degree, constructs the research model as shown in Fig.1, and reduces the digitization and intelligence factors to an intermediary factor, intelligence degree IM, so as to analyze its impact on the creation of shared value SV.

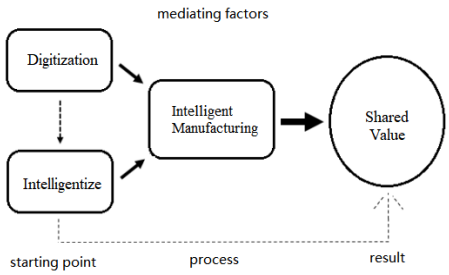

Figure 1: Research model.

4 VARIABLE MEASUREMENT

This paper selects the shared value of the sample enterprises as the explained variable. Because this variable is difficult to measure directly, this paper mainly measures the effect of the shared value measures implemented by the sample enterprises.

On the basis of reviewing and learning the research results in this research field, this paper refers to the three shared value approaches proposed by Porter and the refinement results of these three approaches (Fu, 2013) with reference to the research results of Fu Hongzhen, endows the factors related to the degree of digital intelligence, and considers the measures taken by enterprises related to digital intelligence, Ten shared value measures are summarized, as shown in Tab.1. Finally, the evaluation team will evaluate and discuss the shared value measures implemented by the three sample enterprises, rate them according to the implementation and effect of a certain measure (divided into high, medium and low levels), and count the rating of each sample.

The explanatory variable is intelligence IM, Referring to the research results of Deng Xiang et al. (Deng, et al, 2019), which used the number of patent applications related to artificial intelligence to measure the level of artificial intelligence (Deng, 2019, Huang, 2019), Zhao Gang verified the action mechanism of R&D investment, human capital and intelligent equipment on the intelligent transformation of high-end equipment manufacturing enterprises (Zhao, 2020). Therefore, based on the research of these scholars, this paper adds dimensions such as R&D investment and R&D personnel, hoping to reflect the intelligence level of intelligent manufacturing enterprises from a more comprehensive dimension. Finally, five indicators are selected to construct the comprehensive intelligence index IM of the sample enterprises: the cumulative number of patents, the number of R&D personnel, the ratio of the number of R&D personnel to the total number of employees, R&D investment, and the ratio of R&D investment to operating revenue. According to the results of principal component analysis conducted by Lou Yong, etc., the component score coefficient matrix (Lou, 2021, Wang, 2021, Hao, 2021) obtained is adopted, as shown in Table 2. In order to make the model easy to test, this paper takes the natural logarithm as the comprehensive index of intelligence, and the calculation formula of the comprehensive index of intelligence is as follows:

IM=ln(0.325*patent+0.414*rdstaff+0.395*rdstaden+0.024*rd+0.013rddensity)

Referring to the relevant research of Li Qinghua et al. (Li, 2021, Guo, 2021, Liu, 2021) and Fu Hongzhen, this paper takes the enterprise scale, enterprise age and enterprise nature as the control variables of the research model, and its measurement method is shown in Tab. 2.

According to the measurement method of control variables provided in Table 2, the measurement results of the three sample enterprises as of 2019 are obtained. The enterprise scale difference rate of the three intelligent manufacturing enterprises is less than 0.1, the enterprise age difference rate is also within 0.1, and the nature of the enterprises is also non-state-owned. Therefore, it can be considered that the three enterprises have similar enterprise scale, similar enterprise age and consistent enterprise nature. It can be considered that these three variables are at the same level, and there is no significant difference in the effect on the explained variables.

Table 1: Measurement methods of control variables.

Control variable	Measurement method
Enterprise scale	Natural logarithm of total assets of the enterprise at the end of 2019
Enterprise age	Number of years from establishment to 2019
Nature of enterprise	If the enterprise is state-owned or state-controlled, the value is 1, while the value of non-state-owned or non-state-controlled is 0

Table 2: Measures of shared value.

Three ways to create shared value (number and content)	Measurement of specific measures of shared value (number and content)	Measurement example
Path 1: Reimagine products and markets	***SV1：*** Provide intelligent products or services that meet social needs.	Provide smart electrical appliances and smart terminal products.
	SV2： Provide corresponding intelligent products or services for the edge market.	Invest in the field of intelligence and participate in the construction of new concept equipment for the Internet of Everything.
Path 2: Redefine the productivity of the value chain	***SV3：*** Incentivize outstanding employees who have contributed to the process of enterprise intelligence.	By formulating a series of measures to effectively reward and stimulate employees' potential, mobilize employees' enthusiasm for work, improve their innovation ability, and retain innovative talents.
	SV4： Develop the application of artificial intelligence and the industrial Internet.	Establish intelligent laboratories, robotics research institutes, etc.
	SV5： Through the intelligent management and innovation of the product production process, the utilization rate of resources is improved and the cost is reduced.	Improve the utilization rate of raw materials through the intelligent plan transformation of the production process.
	SV6： Research and develop smart devices to save or provide energy.	Construct solar power stations and other facilities.
Path 3: Improve the environment of local industrial clusters and promote the development of industrial clusters	***SV7：*** Provide intelligent solutions for upstream and downstream enterprises, improve their management efficiency, and indirectly help the enterprises themselves.	Provide suppliers with intelligent professional talents and promote common development and progress with partners.
	SV8： Cooperate with scientific research institutions in the field of intelligence and intelligence research institutes in universities.	Jointly establish smart project research and development funds with universities, organize or sponsor smart robot competitions, etc.
	SV9： Cooperate with universities and vocational schools to train intelligent professional and technical personnel.	Establish cooperative relations with universities or vocational schools, provide internship bases, and oriented training of intelligent-related professionals required by enterprises.
	SV10： Promote the transformation and upgrading of industrial intelligence.	Participate in the formulation of certain technical standards for intelligent equipment.

This paper uses the content analysis method to collect the variable data of shared value measures of three intelligent manufacturing sample enterprises in 2019, draws lessons from the relevant methods of domestic scholar Zhang Yin (Zhang, 2012, Huang, 2012), and establishes a two person review group to analyze and comment on the collected text content. In the end, the two reviewers reached an agreement on the evaluation results, accounting for about 97% (29 items in total). For the text content of which the remaining 3% (1 item in total) could not reach a consensus, a senior expert in enterprise management was invited to assist in the analysis, and the final evaluation results were subject to the expert opinions. The items with different opinions of the two reviewers were (sample 1, sv9). According to the judgment of enterprise management experts, the effect of this measure taken by sample 1 enterprises is poor, and the final evaluation result is "low".

According to the calculation formula of the explanatory variable intelligence degree IM, after collecting five data of the three intelligent manufacturing enterprises in 2019, including the cumulative number of patents, the number of R&D

personnel, the ratio of the number of R&D personnel to the total number of employees, R&D investment, and the ratio of R&D investment to operating revenue, the intelligence degree rating of each sample, the index data and the intelligence degree im rating results are obtained, As shown in Tab. Ⅲ, the final statistical results are drawn into a composite diagram, as shown in Fig. 2.

Table 3: Analysis results of intelligence degree of each sample.

Name	Sample 1	Sample 2	Sample 3
patent	4276	53000	85000
rdstaff	40000	16679	96000
rdstaden	21.71%	16.72%	49.00%
rd	9,427	6,711	131,659
rddensity	2.31%	3.34%	15.30%
IM	9.8	10.1	11.16

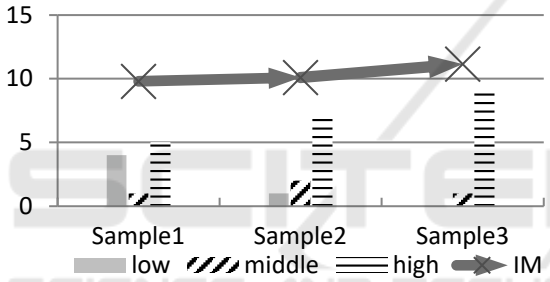

Figure 2: SV rating times and IM rating.

It can be seen from the above figure that the shared value SV rating of sample 3 is generally high, ranking first; The shared value SV rating of sample 2 is slightly lower than that of sample 3, ranking second; Sample 1 had the lowest shared value SV rating. According to the intelligence im rating results of the three samples, enterprises with higher intelligence will perform better in creating shared value.

5 CONCLUSIONS

It is found that the higher the development degree of digitization and intelligence of manufacturing enterprises, the more it can promote enterprises to create shared value. In addition, this paper also summarizes 10 possible ways for manufacturing enterprises to improve shared value by implementing shared value measures related to digitization and intelligence. Enterprises taking shared value measures is conducive to improve corporate social responsibility and ease the conflict between corporate social responsibility and corporate performance. Enterprises can create more shared value while improving the degree of digitization and intelligence, so as to improve the social evaluation of enterprises and bring performance growth to enterprises.

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