

Servitization of Selected Electronics Manufacturing Enterprises in Guangdong, China: An Enhanced Enterprise Competitive Advantage Model

Xi Yu

College of Business Administration, Adamson University, Manila, CO 1000, Philippines

Abstract: This paper provided an in-depth exploration of the current state of servitization in the electronics manufacturing industry in Guangdong Province, China, with a particular focus on product-oriented and customer-oriented servitization. The study aimed to assist electronic manufacturing enterprises in Guangdong Province in enhancing their enterprise performance through servitization, thereby improving their competitive advantage. In this paper, quantitative research methods were used, including analysis of variance (ANOVA), Pearson correlation analysis, and structural equation modeling (SEM). The survey data were collected from respondents in 121 enterprises, revealed significant differences in servitization, customer integration, and enterprise performance among Guangdong's electronics manufacturing enterprises, as well as the impact of servitization on enterprise performance. Based on these findings, enterprises can formulate appropriate servitization strategies to improve their performance. The conclusions drawn from this study offered valuable insights for stakeholders and provided a reference for promoting high-quality development in Guangdong's manufacturing industry.

Keywords: Servitization, Enterprise performance, Competitive advantage.

1. Introduction

Global enterprises are moving away from a profit model that is exclusively focused on production in order to better serve the varied and individualized needs of customers as globalization continues to develop. Servitization is a trend in manufacturing that is becoming more and more obvious. An increasing number of manufacturing organizations were shifting their emphasis from producing physical products to emphasizing the value contributed by post-sale services in order to gain a competitive advantage. As a result, the "service + product" paradigm is becoming more and more common.

The Chinese Central Party's "14th Five-Year Plan" (2021-2025) placed a strong emphasis on enticing manufacturing enterprises to expand into the service sector, assisting in the transformation and upgrading of manufacturing enterprises into service-oriented manufacturing, and supporting the creation of a new service value-addition development model. Enterprises can move up the value chain through servitization, giving them a competitive edge in the global market. Scholars have currently conducted a large amount of study to examine the effects of servitization on enterprise performance. The results of these studies supported the idea that servitization improves corporate success. According to Wang Yuqian's report from 2022, which gathered information from 141 Chinese sample enterprises, a servitization strategy improves enterprise performance. Based on sample data from manufacturing enterprises listed in the Shanghai and Shenzhen stock markets between 2013 and 2021, Pan Rongrong (2024) investigated the relationship between servitization and enterprise performance and discovered that it could enhance its performance [1].

This study divided servitization into product-oriented servitization and customer-oriented servitization, and measured enterprise performance from three dimensions: market performance, financial performance, and operational performance. It analyzed the current level of agreement of

servitization, customer integration, and enterprise performance in the electronics manufacturing industry in Guangdong Province. Additionally, the study analyzed whether there was a difference in the agreement of servitization, customer integration, and enterprise performance when grouped according to enterprise profile. Finally, it studied the impact of servitization on enterprise performance. This study provided guidance to Guangdong Province's electronic manufacturing enterprises on how to improve their performance through servitization and gain a competitive edge. The study intended to offer insights for promoting high-quality development in the region's manufacturing industry. It was based on survey data from publicly listed electronic manufacturing enterprises in Guangdong Province, China.

2. Statement of the Problem and Hypotheses

2.1. Statement of the Problem

This study aimed servitization among electronics manufacturing enterprises in Guangdong, China, as a basis for an enhanced enterprise competitive advantage model. Specifically, this study sought answers to the following sub-problems:

(1) What is the enterprise profile of the respondents in terms of:

- 1.1 Year Founded;
- 1.2 Number of Employees; and
- 1.3 Nature of Company?

(2) What is the current level of agreement of servitization of the electronics manufacturing enterprise in terms of:

- 2.1 Product-oriented servitization
 - a. Installation and Transportation Services;
 - b. Maintenance and Diagnostic Services; and
 - c. Update and Upgrade Services?
- 2.2 Customer-oriented servitization

- a. Leasing Services;
- b. Consulting Services;
- c. Training Services; and
- d. Integrated Solutions?

(3) Is there a significant difference on the agreement of servitization among the electronics manufacturing enterprise when grouped according to enterprise profile?

(4) What is the current level of agreement of customer integration of the electronics manufacturing enterprise?

(5) Is there a significant difference on the agreement of customer integration among the electronics manufacturing enterprise when grouped according to enterprise profile?

(6) What is the current level of agreement of enterprise performance of the electronics manufacturing enterprise in terms of:

- 6.1 Market performance;
- 6.2 Financial performance; and
- 6.3 Operational Performance?

(7) Is there a significant difference on the agreement of enterprise performance among the electronics manufacturing enterprise when grouped according to enterprise profile?

(8) Based on the research results, what recommendation may be proposed to enhance the enterprise competitive advantage model among electronics manufacturing enterprises in Guangdong, China?

2.2. Hypotheses

The following null hypotheses had been tested based on the statement of the problems:

H₀₁: There is no significant difference on the agreement of servitization of the electronics manufacturing enterprise when grouped according to the enterprise profile.

H₀₂: There is no significant difference on the agreement of customer integration of the electronics manufacturing enterprise when grouped according to the enterprise profile.

H₀₃: There is no significant difference on the agreement of enterprise performance of the electronics manufacturing enterprise when grouped according to the enterprise profile.

3. Literature Review

3.1. Servitization

Most scholars treated servitization as a holistic concept and utilized data from publicly listed enterprises for empirical research. Dai Keqing (2021) posited that the servitization of manufacturing essentially represented an extension and expansion of the manufacturing industry's value chain. The implementation of a servitization strategy could bring new value creation capabilities to firms [2]. Ma Asong (2019) believed that servitization was a process by which manufacturing firms aimed to diversify their revenue and profit streams and thereby providing and optimized services to the market [3]. Gao Xuetong (2023) defined the servitization of manufacturing firms as the shift from focusing solely on products to focusing on both products and services, thereby improving enterprise performance [4].

Some researchers divided servitization into two types: product-oriented servitization and customer-oriented servitization. Liu Xiaoyan (2019) stated that servitization strategies in manufacturing companies were essentially about how these companies defined and planned their services and their operational models. The service offerings included a market combination of services, products, and knowledge. He categorized servitization strategies into product support

services and customer support services [5]. Li Yu (2024) pointed out that product-oriented services were universal services closely related to products. At this time, manufacturing enterprises considered the common needs of customers and are product suppliers that retained their original business processes, offering conventional pre-sales, during-sales, and after-sales services combined with products [6]. Hao Z (2021) argued that customer-oriented services combined advanced technology, extensive knowledge, and abundant resources to provide highly customized and intelligent services [7].

3.2. Customer Integration

Zeng Jinglian (2019) believed that customer integration referred to the actions of close cooperation, information sharing, and joint participation between enterprises and customers, especially those who could anticipate market demands in advance [8]. Liu Meixin (2023) pointed out that the core of servitization was customer orientation, and manufacturing enterprises needed to assist customers in creating value [9]. Lu Yong (2022) stated that customer integration was a process where companies actively worked and interacted with customers to ensure products were delivered on time and to improve customer satisfaction. Raising the level of customer integration helped align business processes between manufacturers and important customers [10].

3.3. Enterprise Performance

Early scholars believed that enterprise performance refers to the benefits achieved by a company within a specified period, resulting from its production and operational activities. This includes the outcomes of production operations and the achievements of managerial personnel. Currently, most scholars measured enterprise performance using financial indicators. Huang Yangping (2020) viewed enterprise performance as the operational benefits and managerial achievements within a certain operating period, using the total asset return rate as the core indicator to measure both operational benefits and managerial performance [11]. Huang Wei (2022) used the Return on Equity (ROE) as a measure to show how well a company is performing [12]. Lin Liting (2023) used financial indicators and the Economic Value Added (EVA) method to study the financial performance of Goldwind Technology [13].

Some scholars argued that relying solely on financial indicators to measure enterprise performance is one-sided and should be complemented with non-financial indicators. Lian Ruiqing (2021) selected a combination of financial and non-financial indicators to objectively and comprehensively assessed company performance, thereby more accurately and reasonably reflecting changes in enterprise performance [14]. Hu Qing (2020) used market share, revenue growth rate, and profit margin as measures of enterprise performance through a questionnaire survey [15]. Wang Yuqian (2022) measured the performance of companies from three different points of view. These included financial performance, market performance, and operational performance. Financial performance represented the operating income earned during the operational period, market performance represented the external achievements of the enterprise in the market, operational performance reflected the quality, delivery, and cost aspects of the products produced by the enterprise [16].

3.4. Servitization and Enterprise Performance

Most research concluded that servitization has a positive impact on enterprise performance. Tan et al. (2019) noted that offering bundles that included both products and services could better satisfy customer needs than offering only products, thereby enhancing enterprise performance [17]. Park Kyung-soo (2020) conducted an exploratory case study with the Shenyang Machine Tool Group as an example, finding that the company's transformation towards servitization positively affected its innovative resources and capabilities [18]. Moreno et al. (2019) believed that there was a strong positive link between the level of servitization in manufacturing companies and their performance. The level of economic development in a country could influence how servitization affected the performance of manufacturing companies [19].

Some researchers have also studied how servitization affected company performance. They looked at it from the viewpoints of products and customers. Lee et al. (2020) utilized data from a 2014 survey on the current state of integration between the service and manufacturing enterprises in South Korea, and their empirical research found that product-oriented servitization strategies contributed more to operational performance than customer-oriented servitization strategies [20]. Shah et al. (2020) empirically discovered that manufacturing enterprises undergoing servitization transformations needed to improve specific dimensions of supply chain integration to implement certain types of servitization strategies [21].

3.5. Synthesis

Most scholars like Dai Keqing (2021), Ma Asong (2019), Zhang Ang (2019), Gao Xuetong (2023), considered servitization as a holistic concept. Some scholars divided servitization into product-oriented and customer-oriented dimensions (Xiaoyan, 2019; Li Yu, 2024; Hao Z, 2021). Additionally, most scholars measured enterprise performance using financial performance indicators (Huang Yangping, 2020; Huang Wei, 2022; Lin Liting, 2023). However, some scholars argued that relying solely on financial metrics to measure firm performance is inadequate and that non-financial indicators should also be incorporated (Lian Ruiqing, 2021; Hu Qing, 2020; Wang Yuqian, 2022). Customer integration referred to the actions of close cooperation, information sharing, and joint participation between enterprises and customers, especially those who could anticipate market demands in advance, manufacturing enterprises needed to assist customers in creating value and improve customer satisfaction (Zeng Lian, 2019; Liu Meixin, 2023; Lu Yong, 2022). Additionally, most scholars measured enterprise performance using financial performance indicators (Huang Yangping, 2020; Huang Wei, 2022; Lin Liting, 2023). However, some scholars argued that relying solely on financial metrics to measure firm performance is inadequate and that non-financial indicators should also be incorporated (Lian Ruiqing, 2021; Hu Qing, 2020; Wang Yuxi, 2022). Finally, most of the scholars believed that there was a relationship between servitising and firm performance (Tan et al., 2019; Park Kyung-soo, 2020; Moreno et al., 2019) and that servitising has a positive impact on firm performance (Lee et al., 2020; Shah et al., 2020).

Although the relationship between servitization and enterprise performance was prominent, the research gap still exists. Firstly, no studies have yet explored servitization in the

electronics manufacturing industry in Guangdong Province. Furthermore, a smaller number of studies have taken into account several performance metrics, with the majority concentrating on business profitability indicators. Finally, no scholars have conducted research on grouping based on enterprise profiles to analyze whether there are significant differences on the agreement of product-oriented servitization, customer-oriented servitization, customer integration, and enterprise performance in the electronics manufacturing industry of Guangdong Province.

Therefore, this study aimed to address these gaps by exploring the differences on the servitization, customer integration, and enterprise performance when grouped according to enterprise profile in Guangdong electronics manufacturing enterprises, and measured servitization through two types: product-oriented servitization and customer-oriented servitization, enterprise performance measured from three different points of view: financial performance, market performance, and operational performance. This study explored the effect of servitization on enterprise performance, the purpose of this study was to learn more about the servitization that occurs in Guangdong Province's electronics manufacturing enterprise. Following this study, a model would be developed to enhance competitive advantages for entrepreneurs.

4. Methods

4.1. Research Designs

The quantitative data for this study has been collected through a questionnaire survey, using a four-point Likert scale. SPSS software has been utilized to conduct mean analysis, variance analysis on the relevant variables, correlation analysis and SEM analysis. This research methodology was well-suitable for examining whether there was significant difference on the agreement of servitization, customer integration, and enterprise performance within Guangdong's electronics manufacturing industry, as well as for exploring the impact of servitization on enterprise performance.

This study aimed to assess the level of servitization in electronic manufacturing enterprises in Guangdong Province, examined the differences in servitization, customer integration, and enterprise performance according to enterprise profile. The questionnaires were collected using a four-point Likert scale.

4.2. Data according to Source

The data used in this study came from primary sources, gathered through distributing questionnaires. At the same time, enterprises were screened as follows: manufacturing enterprises that did not carry out service business were excluded. Enterprises that have gone bankrupt or closed down within the statistical time frame were excluded, and enterprises that were not listed were excluded.

4.3. Sampling Design

According to the 2021 Shenwan Industry Classification Standard in China, there were 28 primary industries and 142 secondary industries, with the electronics industry being one of the primary industries. Specifically, the electronics industry included semiconductors, components, optoelectronics, other electronics, consumer electronics, and electronic chemicals. This study focused on publicly listed electronic manufacturing companies. According to the

Guotai'an database in China, there were 485 publicly listed electronic manufacturing companies, with 175 of these companies located in Guangdong Province. Using the RAOSOFT sample size calculator with a 5% margin of error and a 95% confidence level, the required effective sample size was determined to be 121 companies.

5. Results

5.1. Profile of the Respondents

The distribution of the 121 respondent enterprises as shown in table 1, table 2, and table 3. They were grouped according to year founded, number of Employees and the nature of company, respectively.

Table 1. Distribution of Respondents' Enterprises by Year Founded

Year founded	Frequency	Percent
≤ 10 years	10	8.3
11-20 years	48	39.7
21-30 years	50	41.3
> 30 years	13	10.7
Total	121	100.0

Table 1 showed the distribution of the 121 respondent enterprises based on their year founded, along with their respective frequencies and percentages. The interpretation was as follows: 10 enterprises have been established for less than 10 years, accounting for 8.3% of the total. 48 enterprises have been established for 11 to 20 years, representing 39.7% of the total. 50 enterprises have been established for 21 to 30 years, constituting 41.3% of the total. Lastly, 13 enterprises have been established for more than 30 years, making up 10.7% of the total. Overall, companies established between 21 to 30 years ago were the most numerous, while those established for less than 10 years were the least numerous.

Table 2. Distribution of Respondents' Enterprises by Number of Employees

Number of Employees	Frequency	Percent
1-1000	45	37.2
1001-3000	34	28.1
3001-10000	27	22.3
> 10000	15	12.4
Total	121	100.0

Table 2 showed the distribution of the 121 respondent enterprises based on their number of employees, along with their respective frequencies and percentages. The interpretation was as follows: 45 enterprises have fewer than 1,000 employees, accounting for 37.2% of the total. 34 enterprises have between 1,001 and 3,000 employees, representing 28.1% of the total. 27 enterprises have between 3,001 and 10,000 employees, constituting 22.3% of the total. Lastly, 15 enterprises have more than 10,000 employees, making up 12.4% of the total. Overall, companies with fewer than 1,000 employees were the most prevalent, while those with more than 10,000 employees were the least common. most businesses had between 1,000 and 10,000 people.

Table 3. Distribution of Respondents' Enterprises by Nature of Company

Nature of Company	Frequency	Percent
State-owned enterprise	17	14.0
Private enterprise	72	59.5
Foreign-funded enterprise	32	26.4
Total	121	100.0

Table 3 showed the distribution of the 121 respondent enterprises based on nature of company, along with their respective frequencies and percentages. The interpretation was as follows: 17 state-owned enterprises, accounting for 14% of the total. 72 private enterprises, accounting for 59.5% of the total, and 32 foreign-funded enterprises, accounting for 26.4% of the total. Overall, private enterprises were the most common, while state-owned enterprises were the least common.

5.2. Current Level of Agreement of Servitization of the Electronics Manufacturing Enterprise

Table 4. Current level of Agreement of Servitization

Servitization	Mean	Std Dev	Interpretation
Product-oriented servitization			
Installation and Transportation Services	3.07	.76	Agree
Maintenance and Diagnostic Services	3.09	.71	Agree
Update and Upgrade Services	3.15	.72	Agree
Customer-oriented servitization			
Leasing Services	3.11	.71	Agree
Consulting Services	3.10	.76	Agree
Training Services	3.12	.77	Agree
Integrated Solutions	3.12	.69	Agree

Table 4 showed that electronic manufacturing enterprises in Guangdong Province held a positive attitude towards the agreement of installation and transportation services, maintenance and diagnostic services, update and upgrade services, leasing services, consulting services, training services, and integrated solutions.

Installation and transportation services were key parts of value-added services for businesses. These services helped improve how well a company operated and increased customer satisfaction [22]. Maintenance and diagnostic services, as a value-added service, could reduce the time and cost of product or process maintenance, thereby enhancing customers' perceived value [23]. Customers expected companies to provide software updates and upgrades, and by offering continuous update and upgrade services, enterprises could keep their products technologically advanced while reducing future maintenance and repair costs [24]. Leasing, as an alternative to durable goods sales in the market, enabled enterprises to flexibly adjust the usage cycle of equipment and technology, allowing them to quickly respond to market changes based on business needs and avoid the burden of long-term asset occupancy [25]. Consulting services were a key way to show the level of servitization by offering external expertise and industry experience to businesses. These services helped companies fill gaps in internal resources and knowledge, especially in important areas like technology, management, and strategic decision-making [26]. Training not only improved customer usage abilities but also allowed

the company to demonstrate its professionalism and customer service awareness in the market, thereby enhancing its competitiveness [27]. Integrated solutions customize products with embedded services that could be tailored to specific customer needs, fostering synergy between servitization and productization [28].

5.3. Significant Differences on the Agreement of Servitization when Grouped According to Enterprise Profile

This study conducted an Analysis of Variance (ANOVA)

using SPSS statistical software based on data collected from respondents representing 121 enterprises. The analysis looked at whether there was a significant difference in the level of agreement on servitization among electronics manufacturing enterprises. These enterprises were grouped based on their year of founding, number of employees, and the nature of the company.

Table 5. ANOVA Results on the Agreement of Servitization When Grouped According to Enterprise Profile

Dimensions	Servitization	df	Mean Square	F	Sig.	Interpretation	Null Hypothesis Decision
Year Founded	Installation and Transportation Services	3	3.192	6.260	.001	Significant	Reject the Null Hypothesis
	Maintenance and Diagnostic Services	3	2.545	5.678	.001		
	Update and Upgrade Services	3	1.413	2.844	.041		
	Leasing Services	3	2.059	4.411	.006		
	Consulting Services	3	2.804	5.428	.002		
	Training Services	3	4.452	8.977	.000		
	Integrated Solutions	3	2.310	5.336	.002		
Number of Employees	Installation and Transportation Services	3	1.963	3.625	.015		
	Maintenance and Diagnostic Services	3	1.292	2.690	.050		
	Update and Upgrade Services	3	1.772	3.636	.015		
	Leasing Services	3	1.484	3.082	.030		
	Consulting Services	3	1.528	2.782	.044		
	Training Services	3	3.145	5.941	.001		
	Integrated Solutions	3	1.816	4.074	.009		
Nature of Company	Installation and Transportation Services	2	1.067	1.875	.158	Not Significant	Accept the Null Hypothesis
	Maintenance and Diagnostic Services	2	1.992	4.190	.017	Significant	Reject the Null Hypothesis
	Update and Upgrade Services	2	1.918	3.868	.024		
	Leasing Services	2	2.954	6.351	.002		
	Consulting Services	2	3.291	6.238	.003	Not Significant	Accept the Null Hypothesis
	Training Services	2	.653	1.100	.336		
	Integrated Solutions	2	2.949	6.732	.002		

Table 5 presented the results of the ANOVA for the agreement of servitization among electronics manufacturing enterprises grouped by year founded, number of employees and the nature of company. The ANOVA results indicated that there was a significant difference on servitization grouped by year founded and number of employees. With the exception of installation and transportation services, as well as training services, there were significant differences in other services grouped by nature of company. However, the significance levels for installation and transportation services ($F(2) = 1.875, P > .05$) and training services ($F(2) = 1.100, P > .05$) were above 0.05, indicating no significant differences in these services across different types of enterprises.

Li Jianfei, Shui Huili, and Song Wen (2023) found that younger companies with shorter founding histories were more likely to produce technological innovations, leading to a higher degree of servitization [29]. Zhang Ang (2019) posited that the age of a company partially reflected its risk tolerance level, and differences in risk tolerance influenced a company's willingness to pursue servitization [30]. Li Wenkuan (2020) pointed out that different company sizes result in varying degrees of servitization. For larger companies, it was appropriate to increase the level of servitization, while for

smaller companies, expanding the company size before pursuing servitization could be a viable option [31].

5.4. Current Level of Agreement of Customer Integration of the Electronics Manufacturing Enterprise

This study collects questionnaire data from respondents representing 121 surveyed enterprises, the agreement levels of customer integration among the electronics manufacturing enterprises in Guangdong Province were as follows.

Table 6. Current level of Agreement of Customer Integration

Customer Integration	Mean	Std Dev	Interpretation
Customer Integration Weighted Mean	3.08	0.66	Agree

Table 6 showed that electronic manufacturing enterprises in Guangdong Province held a positive attitude toward the level of agreement of customer integration. Lu Yong (2022) believed that customer integration involved proactive collaboration and interaction with customers to ensure timely product delivery, this helped to improve customer satisfaction

and enabled firms to form long-term connections with key clients. As a result, they could reduce the cost of looking for new potential customers [32].

5.5. Significant Differences on the Agreement of Customer Integration when Grouped According to Enterprise Profile

Table 7 presented the results of the ANOVA on the agreement of customer integration among the electronics manufacturing enterprise when grouped according to enterprise profile.

Table 7. Significant Differences on the Agreement of Customer Integration when Grouped According to Enterprise Profile

Dimensions	df	Mean Square	F	Sig.	Interpretation	Null Hypothesis Decision
Year Founded	3	1.188	2.850	.040	Significant	Reject the Null Hypothesis
Number of Employees	3	.720	1.679	.175	Not Significant	Accept the Null Hypothesis
Nature of Company	2	2.530	6.314	.002	Significant	Reject the Null Hypothesis

5.6. Current Level of Agreement of Enterprise Performance

Table 8. Current Level of Agreement of Enterprise Performance

Enterprise Performance	Mean	Std Dev	Interpretation
Market Performance	3.17	.66	Agree
Financial Performance	3.38	.52	Strongly Agree
Operational Performance	3.10	.66	Agree

Table 8 showed that electronic manufacturing enterprises in Guangdong Province held a positive attitude toward the level of agreement of market performance, operational performance, and held a strongly positive attitude toward the

According to table 7, the ANOVA results indicated that there was a significant difference on customer integration across founded year and the nature of company, but no significant difference across the number of employees. The electronics manufacturing industry typically relied on standardized supply chains and production processes, regardless of the company size, many firms adopted similar customer integration strategies. Ma Ashuang (2019) posits that the founding years of manufacturing enterprises may result in substantial differences in resources and partnerships, leading to varying degrees of customer integration [33].

level of agreement of operational performance. Zhou, D., & Yan (2021) considered there was a positive interactive effect between basic services and advanced services on a company's market performance. This finding suggested that basic services held value for servitizing manufacturers in enhancing the value creation potential of advanced services [34].

5.7. Significant Differences on the Agreement of Enterprise Performance When Grouped According to Enterprise Profile

Table 9 presents the results of the ANOVA on the agreement of enterprise performance among the electronics manufacturing enterprise when grouped according to enterprise profile.

Table 9. ANOVA Results on the Agreement of Enterprise Performance When Grouped According to Enterprise Profile

Dimensions	Enterprise Performance	df	Mean Square	F	Sig.	Interpretation	Null Hypothesis Decision
Year Founded	Market Performance	3	4.615	14.199	.000	Significant	Reject the Null Hypothesis
	Financial performance	3	1.894	8.182	.000		
	Operational Performance	3	3.406	9.618	.000		
Number of Employees	Market Performance	3	3.630	10.360	.000		
	Financial performance	3	2.394	10.948	.000		
	Operational Performance	3	3.110	8.596	.000		
Nature of Company	Market Performance	2	2.788	7.104	.001		
	Financial performance	2	1.851	7.516	.001		
	Operational Performance	2	2.613	6.641	.002		

According to table 9, the significance levels for the analysis of differences on market performance ($F(3) = 14.199, P < .05$), financial performance ($F(3) = 8.182, P < .05$), and operational performance ($F(3) = 9.618, P < .05$) across founded year were all below 0.05, indicating significant differences among enterprise performance across different founding years. The significance levels for the analysis of differences on market performance ($F(3) = 10.360, P < .05$), financial performance ($F(3) = 10.948, P < .05$), and operational performance ($F(3) = 8.596, P < .05$) across the number of employees were all below 0.05, indicating significant differences among corporate performance based on employee size. The significance levels for the analysis of differences in market performance ($F(2) = 7.104, P < .05$), financial performance ($F(2) = 7.516, P < .05$), and operational performance ($F(2) = 6.641, P < .05$) across the nature of company were all below

0.05, indicating significant differences in corporate performance across the nature of company. Gao Xuetong (2023) suggested that the length of time a company has been operating is closely related to the accumulation of capital, and company age reflected business sustainability and production conditions, the longer a company has been established, the better its performance tends to be [4]. Jian Zhaoqian (2021) measured company size based on the number of employees and found that company size affects corporate performance [35]. Hu Pengfei (2022) argued that state-owned enterprises have an advantage in terms of national resources and policies compared to other ownership types, as national strategies and policies tend to favor state-owned enterprises [36].

5.8. An Enhanced Enterprise Competitive Advantage Model

To better develop a model for enhancing enterprise competitive advantage, this study employed Structural Equation Modeling (SEM) to further analyze the impact of servitization on enterprise performance. This section aimed to test how the different types of servitization affect enterprise performance using SEM. The goal was to provide a theoretical foundation to help companies create a competitive advantage.

Before conducting Structural Equation Modeling (SEM), this study first performs a correlation analysis. Correlation analysis helps to understand whether there is a significant linear relationship between independent and dependent variables, providing initial insights for the subsequent SEM analysis. If there is no significant correlation between

variables, it may affect the model fit and explanatory power of the SEM. In the correlation analysis of different numerical variables, a common statistical method used is the Pearson correlation coefficient.

In the correlation analysis of different numerical variables, a common statistical method used is the Pearson correlation coefficient. This method helps to examine the strength and direction of the linear relationship between pairs of variables. When using Pearson correlation analysis, we usually use the correlation coefficient r , to show the degree of linear correlation between the variables. If the correlation coefficient r is less than 0, it means there is a negative correlation between the two variables. On the other hand, if r is greater than 0, it means there is a positive correlation. If r equals 0, it suggests that there is no correlation between the two variables.

Table 10. Pearson Correlation Analysis

Items	Enterprise Performance	df	Mean Square	F	Sig.	Interpretation	Null Hypothesis Decision
POS	Market Performance	3	4.615	14.199	.000	Significant	Reject the Null Hypothesis
COS	Financial performance	3	1.894	8.182	.000		
MP	Operational Performance	3	3.406	9.618	.000		
FP	Market Performance	3	3.630	10.360	.000		
OP	Financial performance	3	2.394	10.948	.000		
Notes: POS is Product-oriented Servitization, COS is Customer-oriented Servitization. MP is Market Performance, FP is Financial Performance, OP is Operational Performance.							

As shown in Table 10, the five items including product orientation, customer orientation, market performance, financial performance, and operational performance exhibited significant positive correlations with each other, with correlation coefficients ranging from 0.260 to 0.652, all correlation coefficients were greater than zero and $P < 0.05$, the correlation was significant.

Structural Equation Modeling (SEM) is a method used for analyzing data that involves multiple variables. It helps to study the relationships and influences between different hidden or unobserved variables. SEM has two main parts: measurement relationships and influence relationships. The results of this study were shown in two parts:

Part, one shows the results for how reliable and valid the measurement model is, while Part two includes the model's fit and quality measures for the sub-models, followed by the results of the structural model, which shows the relationships between the different constructs.

Part One: Measurement Model

Reliability analysis checks how consistent the scale is internally. This study used Cronbach's alpha coefficient to test the scale's internal consistency. A Cronbach's alpha coefficient higher than 0.70 was viewed as suitable, and a

scale with this value or more was seen as reliable.

Validity analysis is the process used to assess the validity of a measurement instrument or questionnaire. Specifically, it refers to the analysis of whether a measurement instrument or questionnaire is able to accurately and reliably measure the concept or attribute that it is intended to measure. Product-oriented servitization, customer-oriented servitization, and enterprise performance all exhibited high validity.

Part Two: Structural Equation Model

This section examines the model fit and structural relationships between variables using AMOS software.

Table 11 presented the model fit indices, and Table 12 showed the path coefficients between the variables.

As shown in Table 11, CMIN/DF was 1.438, which was less than 3, indicating that the model fit was excellent. The TLI was 0.923, which was greater than 0.9, indicating that the model fit was excellent. The CFI was 0.936, which was greater than 0.9, indicating that the model fit was excellent.

The RMSEA was 0.06, which was less than 0.08, indicating that the model fit was acceptable. Overall, all model parameters meet acceptable standards, indicating that the model's goodness of fit was satisfactory and the model was deemed acceptable.

Table 11. Model fitting index

Parameter	Acceptable Standard	Excellent Standard	Model Value	Parameter Assessment	Meets Standard
CMIN			184.050		
CMIN/DF	< 5	< 3	1.438	Excellent	Yes
TLI	> 0.8	> 0.9	0.923	Excellent	Yes
CFI	> 0.8	> 0.9	0.936	Excellent	Yes
RMSEA	< 0.08	< 0.05	0.060	Acceptable	Yes

Table 12. Path Parameter

Path	Unstandardized Parameter	Standard Error	Critical Ratio	Sig.	Standard Parameter (β)	Interpretation
POS \rightarrow MP	0.45	0.149	3.004	0.003	0.35	Significant
POS \rightarrow FP	0.41	0.103	3.912	0.000	0.45	Significant
POS \rightarrow OP	0.53	0.163	3.241	0.001	0.43	Significant
COS \rightarrow MP	0.67	0.166	4.056	0.000	0.49	Significant
COS \rightarrow FP	0.62	0.125	4.972	0.000	0.64	Significant

Notes: POS is Product-oriented Servitization, COS is Customer-oriented Servitization.
MP is Market Performance, FP is Financial Performance, OP is Operational Performance.
***the correlation was significant at 0.01 level.

From Table 12, it could be observed that: product-oriented servitization had a positive impact on market performance ($p < 0.01$), with a standard parameter of 0.35. This suggested that, all else being equal, a higher product-oriented servitization results in a greater impact on market performance.

Product-oriented servitization has a positive impact on financial performance ($p < 0.01$), with a standard parameter of 0.45, indicating a positive influence. This implies that, all else being equal, a higher product-oriented servitization led to a greater impact on financial performance.

Product-oriented servitization had a positive impact on operational performance ($p < 0.01$), with a standard parameter of 0.43, indicating a positive influence. This implied that, all else being equal, a higher product-oriented servitization led to a greater impact on operational performance.

Customer-oriented servitization had positive impact on market performance ($p < 0.01$), with a standard parameter of 0.49, indicating a positive influence. This suggested that, all else being equal, a higher customer-oriented servitization resulted in a greater impact on market performance.

Customer-oriented servitization had a positive impact on financial performance ($p < 0.01$), with a standard parameter of 0.64, indicating a positive influence. This indicated that, all else being equal, a higher customer-oriented servitization resulted in a greater impact on financial performance.

Customer-oriented servitization had a positive impact on operational performance ($p < 0.01$), with a standard parameter of 0.38, indicating a positive influence. This indicated that, all else being equal, a higher customer-oriented servitization resulted in a greater impact on operational performance.

Table 12 presented the path standard parameters for each variable in the SEM model. All the standard parameters were greater than zero, indicating a positive effect. The results showed that product-oriented servitization positively influences market performance, financial performance, and operational performance. Likewise, customer-oriented servitization also positively affected market performance, financial performance, and operational performance.

In comparison with previous studies, most researchers agreed that servitization improved firm performance. Li Huashan (2019) conducted a study using a sample of 931 manufacturing companies from 22 countries and regions. The study examined how two types of service strategies affect enterprise performance. The findings showed that the impact of servitization on company performance depends on the type of servitization used. Market and operational success were enhanced by product-oriented services, but financial performance was not significantly impacted. Services focused on the customer greatly enhanced business performance [37]. Lian Ruiqing (2021) scientifically and reasonably categorized servitization strategies in manufacturing firms into two types: product-centered and customer-centered servitization strategies. According to the empirical examination of the

survey data, the two strategies had a considerable positive impact on firm performance [38].

The positive impact was observed in the SEM model align closely with actual situations in China. On the one hand, regarding product-oriented servitization, traditionally, Chinese manufacturing companies prioritized production volume and cost-efficiency. However, in recent years, driven by policies such as "Made in China 2025," many companies had shifted toward product-oriented servitization. By incorporating after-sales services, product customization, and predictive maintenance, companies like Huawei and Haier had not only enhanced their market performance but also strengthened their financial outcomes. These companies demonstrate that providing value-added services can increase customer loyalty and expand revenue streams beyond one-time product sales.

On the other hand, customer-oriented servitization aligns well with China's shift toward a consumer-driven economy. In practice, many companies had adopted digital tools, for example, Alibaba and Xiaomi leveraged customer data to optimize customer service, offering research, development, and design services to clients. This adjustment not only improved operational efficiency but also enhanced customer satisfaction, which had more bearing in the highly competitive electronics market in Guangdong.

From the results of the study, the electronic manufacturing enterprises in Guangdong Province hold a positive attitude towards the agreement of servitization. When grouped by enterprise profile, there are significant differences between servitization, customer integration and enterprise performance among electronic manufacturing enterprises in Guangdong Province. Except when grouped by nature of company, there is no significant difference in installation and transportation services, as well as training services, and when grouped by the number of employees, there are no significant differences in customer integration. Furthermore, there is a significant positive effect of servitization dimensions on enterprise performance dimension.

An enhanced competitive advantage model has been developed, as shown in Figure 1. To improve competitive advantage, electronic manufacturing enterprises in Guangdong Province must strengthen product-oriented services, customer-oriented services, and customer integration. By adopting a "product + service" approach, these companies can enhance communication with customers and better meet customer needs, thereby improve firm performance, and ultimately enhance the competitive advantage of enterprises.

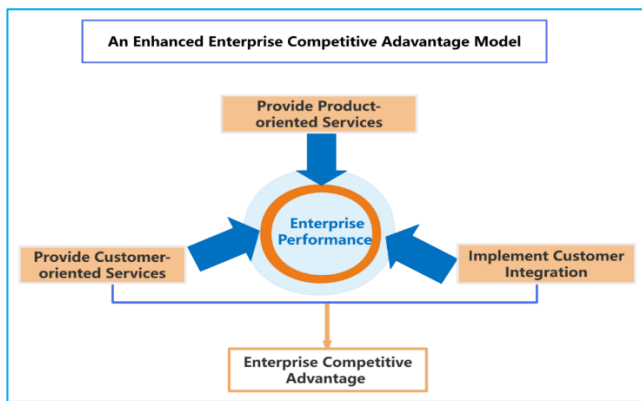


Figure 1. An Enhanced Enterprise Competitive Advantage Model

6. Discussions

6.1. Conclusions

In order to assist electronics manufacturing enterprises in Guangdong Province in improving their enterprise performance through servitization and gaining competitive advantages, this study systematically reviewed the value chain theory, resource dependence theory, and competitive advantage. It employed ANOVA analysis, Pearson correlation analysis, and structural equation modeling. Based on the results presented in Chapter three, the following conclusions were drawn:

The enterprise profile from the 121 surveyed companies in terms of year founded, the majority of companies had been established for 11 to 20 years or 21 to 30 years, with fewer companies having been established for less than 10 years or over 30 years. In terms of number of employees, companies with fewer than 1,000 employees were the most common, while those with over 10,000 employees were the least common. In terms of nature of company, private enterprises were the most prevalent, whereas state-owned enterprises were the least represented.

Based on the results of mean value analysis, the electronic manufacturing enterprises in Guangdong Province held a positive attitude towards the agreement of maintenance and diagnostic services, installation and transportation services, update and upgrade services, leasing services, consulting services, training services, integrated solutions.

The ANOVA analysis showed a significant difference in the agreement on servitization when grouped by the year the company was founded and the number of employees. There were clear differences between product-oriented servitization and customer-oriented servitization among electronics manufacturing companies in Guangdong Province. When grouped by nature of company, there were significant differences in maintenance and diagnostic services, update and upgrade services, leasing services, consulting services, and integrated solutions among electronic manufacturing enterprises in Guangdong Province. However, there was no significant difference in installation and transportation services, as well as training services. When grouped by the nature of company, there was no significant difference in installation and transportation services.

As to the current level of agreement of customer integration, the results of weighted mean value analysis show that the electronic manufacturing enterprises in Guangdong Province held a positive attitude towards the agreement of customer integration. To ensure effective collection of customer needs, customer service facilitated real-time interaction and

feedback between supply and demand information, making implicit customer needs explicit, enhancing the accuracy of service delivery, and reducing the cost of generating and delivering integrated solutions.

The significant difference on the agreement of customer integration from ANOVA analysis, when grouped by year founded, and nature of company, there were significant differences in customer integration among these enterprises. However, when grouped by the number of employees, there were no significant differences in customer integration within the electronic manufacturing enterprises in Guangdong Province.

As to the current level of agreement of enterprise performance, the results from the analysis of mean showed that electronic manufacturing enterprises in Guangdong Province had a positive attitude towards market performance and operational performance. These enterprises also had a very positive attitude towards the level of agreement with financial performance.

The significant difference on the agreement of enterprise performance from ANOVA analysis, when grouped by year founded, number of employees, and nature of company, there was a significant difference in enterprise performance among electronics manufacturing enterprises in Guangdong Province.

For the proposed enhance enterprise competitive advantage model, The SEM analysis showed that servitization dimensions had a significant effect on enterprise performance dimensions. Based on this research, a model had been suggested to improve the competitive advantage of electronics manufacturing enterprises in Guangdong, as shown in Figure 1.

6.2. Recommendations

Given that the majority of respondent enterprises have been established for 11 to 30 years, these companies likely have mature business models and established market positions. To effectively implement servitization, they should consider gradually integrating service elements into their existing products. For companies established for less than 10 years (8.3%), low-cost servitization models such as remote assistance, self-service platforms, and online knowledge bases should be considered to provide additional value with minimal resource investment.

Depending on the number of employees, since 37.2% of enterprises have fewer than 1,000 employees, smaller companies should focus on scalable and flexible service offerings that do not require substantial initial investments. Digital services, such as online customer support, remote monitoring, and subscription-based service plans, are especially beneficial because they can be scaled according to demand without significant infrastructure costs. For larger companies with over 10,000 employees (12.4%), successful servitization hinges on workforce training and development programs. These large enterprises should invest in training employees with customer-oriented skills, digital literacy, and service-related technical expertise.

Depending on the nature of company, private enterprises (accounting for 59.5% of respondents) tend to have greater flexibility in decision-making and resource allocation and should capitalize on this advantage by rapidly adopting innovative service models, such as customized solutions and personalized customer interactions. Foreign-funded enterprises (26.4%) should focus on cross-border services and consider aligning their service offerings with global standards

to attract international customers.

Since the positive attitude of electronic manufacturing enterprises in Guangdong Province towards servitization, it would be prudent for these companies to consider advanced logistics solution investments like real-time tracking and automated scheduling systems to enhance the quality and reliability of service. Companies should then focus on preventive maintenance programs and deploy IoT technologies that will support real-time product performance monitoring. Besides, they should establish a systematic upgrading program and carry out periodic software and hardware upgrades regularly, keep enough spare parts to ensure prompt substitutions. The company can promote different leasing options: short-term, long-term, and technology-upgrade lease, among others, to attract as many customers as possible. Secondly, the consulting services provided by the company have to be broadened by strategic management, technology adoption, process optimization, and others, they should also be industry-specific. The training programs, ranging from simple product usage to technical support and advanced troubleshooting, would be provided both online and offline. Building the R&D facilities would enable the companies to provide complete solutions, right from product design to site selection and construction to their clients. In this way, electronic manufacturing enterprises in Guangdong Province can utilize their advantages in various service fields to upgrade the quality of their services and realize long-term development in servitization.

Due to significant differences on stallation, maintenance, leasing, and training across year founded. The older electronics manufacturing companies should consider redeveloping their servitization models. These businesses could concentrate on consulting and training, for example, as customer-orientated services that offer a differentiation in the market. In this way, they can profit from a strong market position combined with the currently changing needs of the customer.

Considering the significant differences on servitization across companies of different employee sizes, large companies should invest in special training programs for employees. The training programs may include advanced diagnostic skills, update services, and integrated solutions, among others. Small companies, on their part can put more emphasis on enhancing versatility among employees. They do this by offering cross-functional training that avoids the use of too many resources.

Due to significant differences in maintenance, diagnostic, leasing, and consulting services across the nature of companies, state-owned, private, and foreign enterprises could each adopt different servitization strategies that suit their needs. State-owned enterprises might focus on the development of diagnostic and maintenance services by meeting industry standards. Private companies could focus on offering innovative leasing and consulting services to attract more customers. Foreign enterprises could improve their integrated solutions and consulting services based on global experience and standards to meet customer demands.

As to further enhance customer integration, Guangdong Province's electronic manufacturing enterprises should consider the application of more advanced information-sharing techniques. Companies can share information in real time by investing in integrated software platforms. This will enhance transparency with major customers. It will also aid in coordinating sales forecasts, production schedules, and

inventory. Consequently, there will be a reduction in delays while customer satisfaction will improve. In addition, Guangdong Province's electronic manufacturing enterprises should encourage customers to participate in product design, process optimization, quality improvement, and cost control to facilitate innovation. They should promote the development of skills through the provision of joint training and knowledge-sharing activities with customers. All these activities will enhance mutual understanding of each other's processes and improve efficiency, so that cooperation can go more smoothly.

Due to significant differences on customer integration in terms of year founded, electronic manufacturing enterprises in Guangdong Province that have been established for a longer time can gain from updating their customer integration practices. These companies could think about using advanced digital tools to allow real-time collaboration with customers and improve supply chain transparency. By updating their customer integration methods, these well-established companies can keep up with industry standards. This will also help them build stronger relationships with their customers.

As to the significant differences in customer integration practices across different types of companies, state-owned enterprises can focus on making their customer integration processes more standardized. This will help them follow government rules while also improving how they work with customers. Private enterprises can focus on being flexible and creative with their customer integration methods. This will allow them to quickly adjust to what customers need and to changing market trends, which is especially important in a competitive and fast-moving market. Foreign-invested enterprises can use the best practices from around the world. They can improve the exchange of data, make supply chain processes more efficient, and improve their systems for managing customer relationships. This will help them work better with both local and international customers.

Since there are no significant differences in customer integration practices across companies of different sizes, enterprises of all sizes should continue to adopt industry-standard customer integration practices. Small and medium-sized enterprises can benefit from adopting scalable and cost-effective solutions, such as cloud-based customer relationship management systems and collaborative supply chain management tools, to maintain high standards while controlling costs.

Given the positive attitude of electronic manufacturing enterprises in Guangdong Province toward market performance, companies should put money into more focused marketing strategies, like digital marketing and forming strategic partnerships. This will help them reach more people and grow their audience. Also, by improving ways to engage with customers, like creating loyalty programs or collecting customer feedback, they can keep customers happy and make sure they stay loyal to the company.

Considering the strongly positive attitude of these enterprises toward financial performance, a business should continue reaping the benefits of their increase in sales, profit, and pre-tax profit margins. Businesses can work on their financial management strategies through cost-saving measures, high return investments, and strategic financial planning. This can be achieved by reinvestment of their profits either to expand the capacity, expand the type of products, or enhance technology.

Given the positive attitude of Guangdong's electronic

manufacturing enterprises toward operational performance, companies should, therefore, concentrate on making their production processes more efficient, enhancing quality control, and shrinking delivery times. This they can do by utilizing advanced technologies, including automation, artificial intelligence for demand forecasting, and IoT-based systems that can monitor the productions. These technologies will enhance efficiency and reduce mistakes. Besides, regular employee training programs with a focus on best practices in ensuring quality and efficiency will also be necessary.

As to significant differences on enterprise performance in terms of year founded, the enterprises established earlier should utilize their market experience and established customer base to a competitive advantage. This may be achieved by investment in modern technologies and business practices. Such companies need to innovate and upgrade services by offering product customization and adding value to the services offered. In this way, they will be able to maintain the lead in the respective markets. They should also consider the enhancement of their financial and operational performance by adopting modern financial management tools coupled with efficient operational processes. This would contribute to better efficiency and sustainability of growth.

Due to significant differences on enterprise performance in terms of number of employees, large enterprises need to continue their investment in sophisticated automation and process optimization to expand their operations. Simultaneously, they have to enhance their relations with suppliers and their customer network to generate better performance in the market. Regarding SMEs, the need for more flexible and low-cost practices will be relevant. SMEs are supposed to utilize digital tools in CRM and market intelligence. This would enable them to maximize their limited resources and to stay competitive in the market.

Due to significant differences on enterprise performance in terms of nature of company, state-owned enterprises should focus on upholding industry norms and regulations with a view of gaining stable and long-term performance in the market. They should also ponder a diversification of services in order to reduce too much reliance on a single stream of revenue, which will correspondingly enhance their all-round financial performance. On their part, private enterprises need to be more flexible and creative in their strategies in keeping up with changing market dynamics and fulfilling customer needs. They can differentiate themselves through the development and deployment of new technologies and services, which would help them by improving their both operational and financial performances. Foreign enterprises should leverage their international experience to enhance their operations and develop better relations with domestic and international customers alike.

To achieve the proposed, enhance enterprise competitive advantage model, firstly, first, electronic manufacturing enterprises in Guangdong Province should strive to develop their product-oriented services. This may be done by adding value to the products through services like customization, technical support, and after-sales services. This will help in making the products stand out, thereby not only increasing customer satisfaction and loyalty but also contributing to an improvement in market performance. Besides, investing in research and development to develop new products and stay updated with the technological trends of the time will definitely enable the companies to stay competitive. This will also enable them to meet the shifting needs of the customers.

Creating regular feedback systems with the customers for improving and adjusting the products will further enhance the overall value of the product services.

The Guangdong Province electronic manufacturing enterprises should pay much attention to customer-oriented servitization. Every company has to create a customer-centric strategy wherein the offerings must be customized to suit each individual customer's needs. In addition, companies can establish loyalty programs, offer consulting services, and enhance customer service experiences. Companies can invest in CRM tools to foster strong customer relationships and thereby derive valuable understanding of customer needs and preferences. They should also collect real-time feedback to improve services and ensure higher customer satisfaction. Training employees who interact with customers will help them develop better communication and problem-solving skills, which will improve customer relationships, increase customer retention, and ultimately boost market performance.

Lastly, electronic manufacturing enterprises in Guangdong Province should promote deeper customer integration. With enhanced customer integration, there is active involvement of customers in product development, process improvement, and service design. Companies can provide tailored solutions to increase customer satisfaction. Collaboration in delivering services brings customers closer through long-term relationships. Customer feedback should also be integrated into continuous improvement processes so that at any given time, new products and services reflect changes in the needs of customers. Besides, clear and ongoing communications with customers through various digital platforms or customer service will also help bring greater collaboration and fulfillment of customer needs. In this way, the electronic manufacturing enterprises in Guangdong Province will be able to greatly enhance their market, financial, and operational performance by reinforcing servitization strategies and allowing for deeper customer integration, thus improving the overall competitive advantage.

For future research, this study shows that both product-oriented servitization and customer-oriented servitization have a positive effect on enterprise performance. Future research should focus on the long-term effects of servitization on enterprise performance, especially how servitization influences performance during different stages of the business lifecycle, such as the startup, expansion, and maturity stages.

6.3. Implications of the Study

This study enriches the application and development of theories on servitization, customer integration, and enterprise performance by exploring the impact of product-oriented and customer-oriented servitization on corporate performance. The findings contribute to expanding the academic perspective in related fields, particularly the mechanisms through which servitization strategies enhance corporate performance.

This study provides specific strategic recommendations for electronic manufacturing enterprises in Guangdong Province, helping them improve overall performance by strengthening product-oriented and customer-oriented servitization and deepening customer integration. The conclusions offer scientific evidence for companies in an increasingly competitive market environment, aiding them in achieving product differentiation, improving customer satisfaction and loyalty, and subsequently optimizing market, financial, and operational performance.

The conclusions of this study also help governments and industry regulators better understand the current situation and challenges that electronic manufacturing enterprises face in servitization and customer integration. This understanding can help them create better policies and improve industry standards. These actions will support the high-quality development of the electronic industry.

This study not only provides new research perspectives for academia but also offers strategic guidance for the practical operations of the electronic manufacturing industry. By combining theory and practice, it fosters deeper academic research while also aiding in the optimization and implementation of enterprise servitization strategies.

References

- [1] Pan Rongrong, Luo Jianqiang, Yang Zichao. (2024).research on the influence of serving manufacturing enterprises on enterprise performance from the perspective of innovation, *Journal of Management*, 21 (01), 77-85.
- [2] Dai Keqing. (2021). Evolution trend of manufacturing industry, policy selection from curve to module, *China Science and Technology Forum*, (3), 84-92.
- [3] Ma Ashuang. (2019). Research on the impact mechanism of servitization in manufacturing enterprises on enterprise performance (Master's thesis). Chongqing University of Posts and Telecommunications.
- [4] Gao Xuetong. (2023). Research on the influence of the serving of manufacturing enterprises on enterprise performance, Beijing University of Civil Engineering and Architecture.
- [5] Liu Xiaoyan. (2019). Research on the relationship between organizational structure elements and performance of manufacturing enterprise service strategy, South China University of Technology.
- [6] Li Yu, Zhang Jinhua & Chen Yuxi. (2024). Strategies and Performance of Manufacturing Enterprises' Transformation to Servitization Based on Big Data Analysis. *Journal of Northeastern University of Finance and Economics*, (01), 79-97. doi:10.19653/j.cnki.dbcjdx.2024.01.007.
- [7] Hao Z, Liu C, Goh M. (2021).Determining the effectsof lean production and servitization of manufacturingon sustainable performance, *Sustainable Production and Consumption*, 25, 374-389.
- [8] ZengJinglian. (2019). Research on the Influence Mechanism of External Organisational Integration on Service Innovation Performance in Service Manufacturing Firms PhD (Dissertation, South China University of Technology). PhD.
- [9] Liu Meixin. (2023). The Impact of Informatization on Customer Value Creation under the Context of Manufacturing Servitization—A Chain Mediation Model. *Commercial Economy*, (06), 61-66. doi:10.19905/j.cnki.syjj1982.2023.06.017.
- [10] Lu Yong. (2022). Supply Chain Integration and Sustained Competitive Advantage. Master's Thesis, Xi'an University of Technology.Master <https://link.cnki.net/doi:10.27398/d.cnki.gxalu.2022.000738>
- [11] Huang Yangping, Zhou Yi & Li Wenkuan. (2020). Study on the Servitization Strategy and Business Performance of High-tech Manufacturing Enterprises. *Journal of Jimei University (Philosophy and Social Sciences)*, (04), 23-29.
- [12] Huang Wei. (2022). Research on the influence of servitization automobile manufacturing industry on enterprise performance , Guangxi University, 2022.
- [13] Lin Liting. (2023). Study on the Impact of Technological Innovation and Business Model Configuration on the Financial Performance of New Energy Enterprises. Master's Thesis, East China Jiaotong University. Master. <https://link.cnki.net/doi:10.27147/d.cnki.ghdju.2023.000765>.
- [14] Lian Ruiqing. (2021). Research on the influence of manufacturing enterprise service strategy and enterprise culture on enterprise performance, Xi'an University of Technology.
- [15] Hu Qing. (2020). Mechanisms and Performance of Enterprise Digital Transformation. *Zhejiang Journal*. (02),146-154.
- [16] Wang Yuqian. (2022).Research on the influence of the servitization strategy of manufacturing enterprises on enterprise performance, Henan University, 2022.
- [17] Tan K.H., Guojun J., Chung L., et al.(2019). Riding the wave of belt and road initiative in servitization: Lessons from China, *International Journal of Production Economics*, 211(5), 15-21.
- [18] Park Ching-soo, Sun Xinbo, Qian Yu, Kim Jong-ho. (2020). Research on the interactive mechanism of Technology Innovation and Business model Innovation from the perspective of servitization transformation—Take Shenyang Machine Tool Group as a case, *Science and Science and Technology Management*, (4), 1-21.
- [19] Moreno R, Marques L, Arkader R. (2019).Servitization impact on performance moderated by country development, *Benchmarking An International Journal*, 27(1), 302-318.
- [20] Lee N, Lee S, Shin H. (2020). Value creation of servitization, A focus on the mediating effect of operational performance, *Journal of the Korean Operations research and Management Science Society*, 45(1), 39-59.
- [21] Shah S A A, Jajja M S S, Chatha K A, et al. (2020). Servitization and supply chain integration: An empirical analysis, *International Journal of Production Economics*, 229, 107765.
- [22] Magazzino, C., & Mele, M. (2021). On the relationship between transportation infrastructure and economic development in China. *Research in Transportation Economics*, 88, 100947.
- [23] Vogl, G. W., Weiss, B. A., & Helu, M. (2019). A review of diagnostic and prognostic capabilities and best practices for manufacturing. *Journal of Intelligent Manufacturing*, 30, 79-95.
- [24] Wang, J., Liang, Y., Zheng, Y., Gao, R. X., & Zhang, F. (2020). An integrated fault diagnosis and prognosis approach for predictive maintenance of wind turbine bearing with limited samples. *Renewable energy*, 145, 642-650.
- [25] Kanatlı, M. A., & Karaer, Ö. (2022). Servitization as an alternative business model and its implications on product durability, profitability & environmental impact. *European Journal of Operational Research*, 301(2), 546-560.
- [26] Kohtamäki, M., Parida, V., Patel, P. C., & Gebauer, H. (2020). The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization. *Technological Forecasting and Social Change*, 151, 119804.
- [27] Rakic, S., Visnjic, I., Gaiardelli, P., Romero, D., & Marjanovic, U. (2021, August). Transformation of manufacturing firms: towards digital servitization. In *IFIP International Conference on Advances in Production Management Systems* (pp. 153-161). Cham: Springer International Publishing.
- [28] Kamal, M. M., Sivarajah, U., Bigdeli, A. Z., Missi, F., & Kolioussis, Y. (2020). Servitization implementation in the manufacturing organisations: Classification of strategies, definitions, benefits and challenges. *International Journal of Information Management*, 55, 102206.
- [29] Li Jianfei, Shui Huili, & Song Wen. (2023). Business environment, policy support, and enterprise innovation

- incentives: Empirical evidence from China's A-share listed companies. *Nankai Business Review*, 4, 1-19. <https://kns.cnki.net/kcms/detail/12.1288.F.20230421.1817.002.html>.
- [30] Zhang Ang. (2019). Research on the relationship between customer concentration, servitization and financial performance , Dalian University of Technology.
- [31] Li Wenkuan. (2020). Study on the influence of manufacturing service on enterprise performance , Jimei University.
- [32] Lu Yong. (2022). Supply Chain Integration and Sustained Competitive Advantage. Master's Thesis, Xi'an University of Technology. Master <https://link.cnki.net/doi:10.27398/d.cnki.gxalu.2022.000738>.
- [33] Ma Ashuang. (2019). Research on the impact mechanism of servitization in manufacturing enterprises on enterprise performance (Master's thesis). Chongqing University of Posts and Telecommunications.
- [34] Zhou, D., Yan, T., Dai, W., & Feng, J. (2021). Disentangling the interactions within and between servitization and digitalization strategies: A service-dominant logic. *International Journal of Production Economics*, 238, 108175.
- [35] Jian Zhaoquan, Zeng Jinglian & Liu Yan. (2021). Mechanism Analysis of the Impact of External Integration of Service Supply Chain on Business Operational Performance—A Moderated Mediation Effect. *Management Review*, (08), 290-301. doi:10.14120/j.cnki.cn11-5057/f.2021.08.025.
- [36] Hu Pengfei. (2022). Research on the impact of servitization in the manufacturing industry on innovation investment in export enterprises: Based on data from A-share listed companies in Shanghai and Shenzhen. (Master's thesis). Tianjin University of Finance and Economics.
- [37] Li, Huashan. (2019). An empirical study on the impact of servitising manufacturing companies on corporate performance and contextual factors (Doctoral dissertation, Harbin Institute of Technology). PhD. <https://link.cnki.net/doi/10.27061/d.cnki.ghgdu.2019.000128doi:10.27061/d.cnki.ghgdu.2019.000128>.
- [38] Lian Ruiqing. (2021). Research on the influence of manufacturing enterprise service strategy and enterprise culture on enterprise performance, Xi'an University of Technology.