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Digitalization of Business Process of Selected Smes in Guangdong, China: A Proposed Framework for Operation Management Efficiency

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Abstract: This study aimed to explore the current application status of digital transformation in SMEs in Guangdong Province and its impact on operational management efficiency. Through mean analysis, it was found that the study also pointed out that SMEs have extensive digital applications in major business processes such as warehouse management and customer relationship management, but there is still room for improvement in the application of customer support systems. Through variance and multiple regression analysis, it was found that only digital investment among SMEs in Guangdong has significant differences in the industry. Further regression analysis showed that there was a significant positive correlation between digitalization level (digital investment and digital incremental income) and main activities, supporting activities, and operational management efficiency. Among them, the impact of digital investment is greater. This study provided theoretical support and practical suggestions for the digital transformation of SMEs, and provides reference directions for future researchers.

Keywords: Digitalization level, Business Process, Operation Management Efficiency, Digital investment, Digital incremental income.

1. Background of the Study

The advancement of digital technology has fueled the robust growth of the digital economy, while also affecting the country's industrial structure adjustment and economic growth layout. The domestic and international landscapes now witness the digital economy emerging as a fresh driver of economic expansion. In this context, the Chinese government has outlined a clear plan for constructing a "digital China" and fostering a "smart society". Digitalization is a technological platform created for systems such as product consumption, infrastructure construction, and industrial assets (Leviakangas et al., 2019).

As a crucial element of the national economy, enterprises are the main targets for promoting and developing digital construction. Whether enterprises can achieve digitalization and continuously improve their level of digital development is not only related to the survival and development of the enterprise itself, but also to whether China can seize the development opportunities in the digital economy era. Rialti (2019) pointed out that the use of digitalization by enterprises can enhance organizational agility and adaptability, improve the organization's level of adaptation to external environmental changes, enable enterprises to quickly integrate internal and external resources, innovate products, and thus occupy a favorable position in the market. The extensive connectivity of digital technology can also promote collaboration and integration between enterprises and partners, quickly capturing and realizing users' personalized needs, thereby enhancing differentiated competitive advantages and improving enterprise performance. IT technology improves the performance of enterprises by assisting them in rational production planning, promptly addressing consumer needs, and increasing organizational agility and flexibility (Kaurad, 2019).

Based on the above research gaps, this study will fill them. Previous research on digital business processes mainly focused on large enterprises, lacking research on SMEs. Although numerous studies have revealed the positive impact of digitalization, the specific paths and effects of digital transformation in SMEs in specific industries and regions still need further exploration. There may be significant differences in the degree and application methods of digital transformation among enterprises of different scales and industries. The current development status and transformation needs of SMEs in Guangdong provide rich cases and data sources for studying the digitalization and business processes of SMEs. Enterprises in different regions face different challenges and opportunities in the process of digital transformation. Research on SMEs in Guangdong Province can fill the gap in regional research. This can provide more targeted insights for SMEs in Guangdong.

2. Statement of the Problem

The aim of this research was to investigate the digitalization level of SMEs in Guangdong, and to link it with business processes and operational management efficiency as a guiding principle for the survey. To attain the aforementioned objectives, this research combined relevant research results on digital level and company operational management efficiency, and sought answers to the subsequent thematic research inquiries.

(1) What is the profile of selected SME's in Guangdong Province with regards to:

1.1 Type of industry;
1.2 Capitalization; and
1.3 Number of employees?

(2) What is the status of the selected SME's in term of the following:

2.1 Digitalization level;
2.1.1 Digital investment
2.1.2 Digital incremental income

2.2 Business process; and

2.3 Operation management efficiency?

(3) How the digitalization level may affect the various types of industry?

(4) How the digitalization level affects the main activities, support activities and operation management efficiency?

(5) From the results of the study what framework on operation management efficiency can be proposed?

3. Hypothesis

Based on the review of relevant research literature and the objectives of this study, the following null hypotheses were tested:

Ho1: The digitalization level has no effect on the various types of industry.

Ho2: The digitalization level has no effect on the main activities, support activities and operation management efficiency.

4. Scope and Limitations

The study targets were SMEs in Guangdong Province that have gone digital. According to the collected data, a total of 300 SMEs has undergone digitalzation, so these 300 enterprises were the survey subjects of this study. The respondents are senior managers of selected SMEs in Guangdong. Compared to other employees, senior management has a comprehensive perspective on various departments and business units of the enterprise, and can provide comprehensive insights on the impact of digitalization on the overall operational efficiency and business processes of the enterprise.

The limitations of this study were manifested in the following aspects:

Firstly, although this study strictly followed scientific procedures in sample selection and research methods, due to limitations in objective conditions such as time and resources, it was unable to cover SMEs nationwide. This study mainly focused on SMEs in Guangdong Province. The regional nature of the samples affected the universality of research conclusions. Secondly, the coverage of this study was not extensive enough, the sample size is limited, and the causal relationships between variables may not be strictly self-consistent. In addition, research data is mainly collected through questionnaire surveys, and there may be self-reporting bias (such as respondents tending to choose more positive options). Thirdly, research data collection and analysis were conducted during specific time periods and failed to track the sustained impact of digitalization and business processes on the efficiency of enterprise operations and management over the long term. Due to the limitation of the research period, it was not possible to conduct long-term longitudinal studies.

5. Research Design

This research explored the relationship and impact mechanism between a company's level of digitalization and OME from the perspective of business processes. Firstly, this study reviewed and summarized relevant literature on digitalization and business processes, laying a certain theoretical foundation for the paper; Secondly, it analyzed the relationship and impact mechanism between digitalization level and enterprise operation management; Finally, this study investigated the relationship between digitalization level, business processes, and OME of enterprises.

This study mainly focused on multiple SMEs in Guangdong Province. In this study, digitalization level was measured as an independent variable, mainly from two dimensions: digital investment and digital incremental income. The business process was based on the value chain theory and is measured from two perspectives: main activities and auxiliary activities. The efficiency of operational management was mainly based on key performance indicators, measured from two dimensions: asset utilization efficiency and customer satisfaction.

Utilizing a survey questionnaire approach to gather data on various variables, conducting empirical analysis and testing on effective questionnaire data, attempting to draw research conclusions on the relationship between a company's digital level and its business processes, OME, and so on.

6. Results

This chapter introduces the data collection and processing by researcher after obtaining the initial approval certificate. It also conducted descriptive statistical analysis and multiple regression analysis based on questionnaire data from 169 selected SMEs.

6.1. Organizational Profile of selected SMEs in Guangdong Province

The number of manufacturing enterprises is 54, accounting for 31.95% of the total sample; The number of retail enterprises is 50, accounting for 29.59%; The number of enterprises in the technology industry is 37, accounting for 21.89%; The number of enterprises in other industries (such as construction, finance, culture and entertainment) is 28, accounting for 16.57%.

According to the distribution data of total capital of SMEs, SMEs are divided into four ranges based on capital: 3-100 million yuan, 100-200 million yuan, 200-300 million yuan, and 300-400 million yuan. According to the data, the highest proportion of enterprises, accounting for 32.54% or a total of 55 companies, have capital falling within the 100 to 200 million yuan range. Next is the span of 200-300 million yuan, accounting for 24.85%, with 42 enterprises; There are 38 companies in the range of 3-100 million yuan, accounting for 22.49%; The number of enterprises in the 300-400 million yuan range is the smallest, accounting for 20.12%, with 34 enterprises. Data showed that more than half of the total capital of enterprises was concentrated between 100 and 300 million yuan, accounting for 57.39%.

According to the frequency analysis results, one can know the distribution of SMEs in Guangdong Province among different employee numbers. There are 45 SMEs with 50-100 employees, accounting for 26.63% of the total sample. The number of SMEs with 101-300 employees is 57, accounting for 33.73%. There are 43 SMEs with 301-500 employees, accounting for 25.44%. There are 24 SMEs with 501-2000 employees, accounting for 14.20%.

6.2. The Status of The Selected Smes in Terms of Digitalization Level and Business Process and Operation Management Efficiency

Table 1. The status of the selected SMEs in terms of Digital Investment

Items	Mean	Interpretation
Digital Investment Weighted mean	3.07	Agree
Digital Incremental Income Weighted mean	3.05	Agree
Main Activities Weighted mean	3.03	Agree
Support Activities Weighted mean	3.12	Agree
Asset Utilization Efficiency Weighted mean	3.04	Agree
Customer Satisfaction Indicators Weighted mean	3.04	Agree

Through comprehensive analysis of the performance of enterprises in digital investment, it was evident that they have invested a considerable amount of resources in digital technology, platform systems, hardware and software upgrades, and strategic planning. The weighted average value of overall digital investment is 3.07, reaching the "agreed" level. This indicated that although the specific level of investment by enterprises in different digital fields may vary slightly, their overall attitude towards digitalization is consistent, and most enterprises have taken positive actions in digital transformation.

From an overall analysis, the weighted average of digital incremental revenue is 3.05, indicating that enterprises generally have a strong recognition of the revenue growth brought by digital means, and digital means have a positive impact on the increase of incremental revenue. Especially in the application of digital marketing channels and platforms, the average score reached 3.11, with the highest rating, indicating that the enterprise has shown high satisfaction and identification, indicating that these digital tools have played a key role in promoting sales revenue growth.

Overall, the average value for digital applications in main activities of enterprises was 3.03, which is interpreted as "agree". Reflecting the widespread recognition of the application of these digital measures in major business activities, most enterprises have already adopted digital technology at different stages to improve operational efficiency. This is consistent with recent research indicating that companies are gradually accelerating their digital transformation to enhance competitiveness and adapt to market changes (Verhoef et al., 2021).

The overall average of support activities for enterprise business processes is 3.12, which is interpreted as "agree". which means that the enterprises were actively using many kinds of management systems to enhance the efficiency of support activities. It can be analyzed from the data that a high implementation rate in supporting activities is seen, for example: ERP, HRMS, and electronic procurement systems. These have played a positive role in integrating resources, managing personnel, and team collaboration and thus enhanced the operation efficiency and management level of enterprises.

The weighted average of all projects results in an asset utilization efficiency score of 3.04, meaning these SMEs consider that digitalization has a positive effect on their asset utilization efficiency. In summary, the asset utilization efficiency of SMEs has been boosted on the positive side through the application of digital initiatives. Such enterprises could, through digital projects and utilization of digital tools, effectively manage their assets and resources for the betterment of asset turnover, increasing return equity, reducing inventory backlog, and decreasing resource waste.

On the basis of the preceding four indicators, we should be able to calculate an average for the customer satisfaction indicator as 3.04, which is "agreed". It can be seen that the Customer Satisfaction Indicators of surveyed SMEs have shown upward movements after adopting digital technologies.

6.3. Grouping Multiple Regression Analysis Based on Various Types of Industry

Table 2. Multiple regression results of the impact of digitalization levels in different industries on main activities

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1-Manufacturing	(Constant)	1.105	.527		2.096	.041
	Digital Investment	.200	.153	.170	1.312	.195
	Digital Incremental Income	.412	.133	.402	3.096	.003
2-Retail	(Constant)	.458	.344		1.334	.189
	Digital Investment	.533	.123	.533	4.322	.000
	Digital Incremental Income	.317	.129	.302	2.449	.018
3-Technology	(Constant)	1.223	.556		2.199	.035
	Digital Investment	.437	.193	.391	2.263	.030
	Digital Incremental Income	.157	.156	.175	1.010	.319
4-Others	(Constant)	1.332E-15	.362		.000	1.000
	Digital Investment	.500	.117	.530	4.264	.000
	Digital Incremental Income	.501	.141	.439	3.536	.002
a. Dependent Variable: Main Activities						
b. *p<0.05, **p<0.01						

Based on the information presented in Table 2, there are differences in the impact of digitalization levels (digital investment and digital incremental income) on main activities across different industries.

A. Manufacturing industry

Table 2 presents a multiple linear regression analysis of the main activities of business processes based on digital inputs and digital incremental income from the perspective of manufacturing industry. The results indicate the existence of a statistically significant regression equation (F (2, 51) =7.842, p=. 001) with a correlation R2 of 0.235. It is worth noting that digital incremental income has shown a significant impact, while digital investment has not reached statistical significance.

The results indicated that the digital incremental revenue of the manufacturing industry is positively correlated with the main activities, suggesting that as the company's digital incremental revenue increased, it promoted the digitalization of the main activities of the company's business processes. However, in this model, the relationship between digital investment and the main activities of business processes didn't reach statistical significance, which may be because the capital-intensive nature of the manufacturing industry leads to an investment effect that is insignificant in the short term. From a manufacturing industry perspective, what these results point out is how the main activities are impacted by digital incremental revenue.

B. Retail Industry

Table 2 presents a multiple linear regression analysis of the main activities based on digital investment and digital incremental revenue from the perspective of the retail industry. The results indicate the existence of a statistically significant regression equation (F (2,47) =33.053, p=. 000) with a correlation R2 of 0.584. It is worth noting that both digital investment and digital incremental income have shown significant impacts. The results indicated that both digital investment and digital incremental revenue in the retail industry have a significant positive impact on main activities, suggesting that as the company's digital investment and digital incremental revenue increase, it can promote the digitalization of main activities in the company's business processes. From the perspective of the retail industry, these results highlight the impact of digital investment and digital incremental revenue on the main activities of business processes.

C. Technology Industry

The results showed that digital investment in the technology industry is positively correlated with main activities, indicating that investment in digital technology is more important in the technology industry and directly promotes the digitalization of main activities in the BP of enterprises. However, in this model, there was no statistically significant relationship between digital incremental revenue and the main activities of business processes, possibly due to the lag in the return on investment of the technology industry. From the perspective of the technology industry, these results highlighted the impact of digital investment on the main activities of business processes. This provided a reference for the research in the field of digital application analysis of the main activities promoting business processes in the technology industry.

D. Other industries

Shown in table 2 is a multiple linear regression analysis of the main activities of BPs based on digital investment and digital incremental revenue from the perspective of other industries. The results indicate the existence of a statistically significant regression equation (F (2,47) =33.053, p=. 000) with a correlation R2 of 0.584. It is worth noting that both digital investment and digital incremental income have shown significant impacts. The results indicated that in other industries, digital assets and incremental digital revenue are crucial for digitizing the main activities that enhance a company's business processes. From the perspective of other industries, these results highlighted the impact of digital investment and digital incremental revenue on the main activities of BPs.

Table 3. Multiple regression results of the impact of digitalization levels in different industries on support activities

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1-Manufacturing	(Constant)	1.032	.404		2.555	.014
	Digital Investment	.551	.117	.551	4.720	.000
	Digital Incremental Income	.129	.102	.148	1.265	.212
2-Retail	(Constant)	1.234	.451		2.738	.009
	Digital Investment	.225	.162	.225	1.390	.171
	Digital Incremental Income	.377	.170	.360	2.223	.031
3-Technology	(Constant)	.991	.465		2.128	.041
	Digital Investment	.335	.162	.315	2.070	.046
	Digital Incremental Income	.368	.130	.429	2.822	.008
4-Others	(Constant)	3.331E-16	.270		.000	1.000
	Digital Investment	.167	.087	.190	1.907	.068
	Digital Incremental Income	.833	.105	.790	7.906	.000
a. Dependent Variable: Support Activities						
b. *p<0.05, **p<0.01						

A. Manufacturing industry

Table 3 presents a multiple regression analysis of the support activities of business processes based on digital inputs and digital incremental income from the perspective of manufacturing industry. It is worth noting that digital investment significantly affects support activities, but the impact of digital incremental income is not significant. These findings indicated that, in the manufacturing industry, digital investment is significant in enhancing the digitalization of support activities for company business processes. These results emphasized that in the manufacturing industry, support activities were primarily driven by digital investment, thus providing meaningful insight into the advancement of research in the field of digital application analysis of business process support activities in the manufacturing industry.

B. Retail industry

The results indicate the existence of a statistically significant regression equation with a correlation R2 of 0.285.

It is worth noting that digital incremental income significantly affects support activities, while the impact of digital investment is not significant. The results indicated that retail enterprises drive the improvement of support activities by increasing digital incremental revenue. These results highlighted the influences of digital incremental revenue on support activities in the retail industry, providing meaningful insights for advancing research in the field of digital application analysis of business process support activities in the retail industry.

C. Technology industry

The results indicate the existence of a statistically significant regression equation. It is worth noting that both digital investment and digital incremental income have a significant impact on supporting activities. The findings suggested that in the technology industry, the digitalization of business process support activities relied on two aspects: both digital investment and incremental growth. These results highlighted the impact of digital investment and incremental digital revenue on the support activities of business processes. This provided meaningful insights into the field of digital application analysis for supporting activities in the retail industry's business processes.

D. Other industries

Table 3 presents a multiple linear regression analysis of support activities for business processes based on digital investment and digital incremental revenue from the perspective of other industries. The results indicate the existence of a statistically significant regression equation with a correlation. It is worth noting that the impact of digital incremental income on supporting activities is significant, while the impact of digital investment is not significant. The results indicated that support activities in other industries mainly relied on revenue growth brought about by digitalization, and although the role of digital investment exists, it is relatively weak. These results highlighted the impact of incremental digital revenue on support activities in other industries, providing meaningful insights for advancing research in the field of digital application analysis of business process support activities in other industries.

Table 4. Multiple regression results of the impact of digitalization levels in different industries on operational management efficiency

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1-Manufacturing	(Constant)	1.413	.402		3.513	.001
	Digital Investment	.351	.116	.384	3.020	.004
	Digital Incremental Income	.188	.101	.236	1.856	.069
2-Retail	(Constant)	.651	.285		2.284	.027
	Digital Investment	.392	.102	.452	3.826	.000
	Digital Incremental Income	.377	.107	.415	3.515	.001
3-Technology	(Constant)	.347	.311		1.115	.273
	Digital Investment	.720	.108	.736	6.661	.000
	Digital Incremental Income	.130	.087	.165	1.494	.144
4-Others	(Constant)	.141	.287		.490	.628
	Digital Investment	.073	.093	.088	.784	.440
	Digital Incremental Income	.833	.112	.837	7.433	.000
a. Dependent Variable: Operational Management Efficiency						
b. *p<0.05, **p<0.01						

A. Manufacturing industry

The results indicate the existence of a statistically significant regression equation with a correlation. It is worth noting that digital investment significantly affects operational management efficiency, but the impact of digital incremental revenue does not hold statistical significance. The findings suggested that increasing digital investment played a pivotal role in enhancing the efficiency of operational management within the manufacturing sector. These results highlighted that the operational management efficiency of the manufacturing industry is driven by digital investment, providing meaningful insights for advancing research in the field of digital application analysis of operational management efficiency in the manufacturing industry.

B. Retail industry

The results indicate that both digital investment (β=0.392, p=0.000) and digital incremental income (β=0.377, p=0.001) significantly affect OME. The findings indicated that in the retail industry, digital investment and digital incremental income significantly improved the OME of enterprises. These findings highlighted the impact of digital investment and digital incremental revenue on operational management efficiency, providing meaningful insights for advancing research in the field of operational management efficiency analysis in the retail industry.

C. Technology industry

The results indicate the existence of a statistically significant regression equation (F (2, 34) d=38.756, p=.000), R^2 =0.695. It is worth noting that digital investment showed a significant impact (β=0.720, p=0.000), while digital incremental income did not reach statistical significance (p=0.144). The results indicated that in the technology industry, digital investment and digital incremental income significantly improved the operational management efficiency of enterprises. These findings highlighted the impact of digital investment and digital incremental revenue on operational management efficiency, providing meaningful insights for advancing research in the field of operational management efficiency analysis in the technology industry.

D. Other industries

The results indicate that digital incremental income showed a significant impact (β=0.833, p=0.000), while digital investment did not reach statistical significance (p=0.440). The results indicated that in other industries, digital incremental revenue promoted a significant positive impact on the OME of enterprises. These results highlighted the impact of digital incremental revenue on OME, providing meaningful insights for advancing research in the field of OME analysis in other industries.

6.4. Multiple Regression Analysis of The Digitalization Level on The Efficiency of Main Activities, Supporting Activities, And Operational Management

Table 5. Multiple linear regression analysis of the impact of digitalization Level on the main activities.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.699	.225		3.108	.002
	Digital investment	.410	.071	.395	5.780	.000
	Digital incremental income	.350	.070	.344	5.030	.000
a. Dependent Variable: Main Activities						
b. *p<0.05, **p<0.01						

The result obtained a statistically significant regression equation (F (2,166) =56.418, $p<0.01$), with an R2 of 0.405, indicating that approximately 40.5% of the variation in main activities can be explained at the digital level. It is worth noting that both digital investment and digital incremental income have had statistically significant impacts. Specifically, the β value of digital investment is 0.410 ($p<0.01$), and the β value of digital incremental income is 0.350 ($p<0.01$). A notable positive relationship existed between various aspects of digital level (digital investment and digital incremental income) and main activities, but digital investment has a slightly higher impact on main activities. The significant impact identified has enhanced understanding of the complexity of the main activities that affect business processes. This is of great significance for further research.

Table 6. Multiple linear regression analysis of the impact of digitalization level on supporting activities.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.973	.207		4.697	.000
	Digital investment	.376	.065	.393	5.764	.000
	Digital incremental income	.325	.064	.346	5.072	.000
a. Dependent Variable: Support Activities						
b. *p<0.05, **p<0.01						

Specifically, the β value of digital investment is 0.376 ($p<0.01$), and the β value of digital incremental income is 0.325 ($p<0.01$). There is a significant positive correlation between various aspects of digital level (digital investment and digital incremental income) and supporting activities, but the impact of digital investment on supporting activities is slightly higher. The significant impact identified has enhanced our understanding of the complexity of support activities that impact business processes. This is of great significance for further research.

Table 7. Linear regression analysis of the impact of digitalization level on operational management efficiency.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.857	.172		4.983	.000
	Digital investment	.401	.054	.461	7.403	.000
	Digital incremental income	.311	.053	.364	5.840	.000
a. Dependent Variable: Operational Management Efficiency						
b. *p<0.05, **p<0.01						

Specifically, the beta value of digital investment was 0.401 ($p<0.01$), and the beta value of digital incremental income was 0.311 ($p<0.01$). There was a strong positive correlation between various aspects of digital level (digital investment and digital incremental income) and operational management efficiency, but digital investment has a greater impact on operational management efficiency. The significant impact identified has enhanced understanding of the complexity of the impact on operational management efficiency. This is of great significance for further research.

6.5. Proposed Framework on Operational Management Efficiency

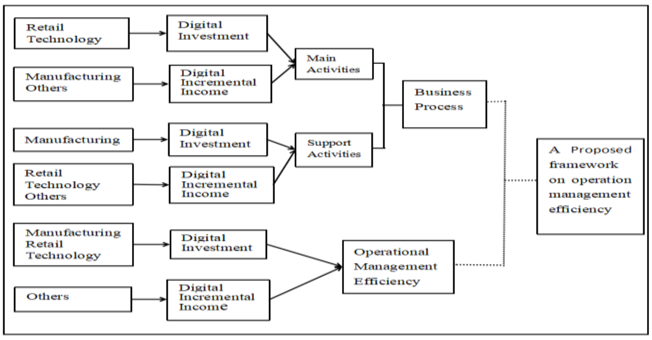

Figure 1. Proposed framework for operational management efficiency

Based on the analysis results of this study, the above framework for operational management efficiency is proposed. In this framework, the level of digitalization is considered as the independent variable and measured from two perspectives: digital investment and digital incremental income. Business processes (main and supporting activities) and enterprise operational management efficiency are dependent variables. According to this framework, the level of digitalization (digital investment and digital incremental revenue) has a significant positive impact on business processes and operational management efficiency.

The retail and technology industries mainly rely on digital investments (such as ERP systems, procurement and upgrading of digital hardware) to improve the digital application level of key activities in business processes, while the manufacturing and other industries rely more on digital incremental revenue (such as revenue growth from digital products or services, e-commerce websites, and mobile applications), which is consistent with existing literature.

The manufacturing industry has mainly improved the level of digitalization in supporting activities by increasing digital investments, such as enterprise resource planning (ERP) systems, human resource management systems (HRMS), and electronic procurement systems and other digital tools. These digital investments can help enterprises integrate resources and simplify processes, thereby improving the level of digitalization in business process support activities, enabling manufacturing enterprises to better manage assets, improve operational efficiency, and customer satisfaction (Li et al., 2018).

The manufacturing, retail, and technology industries have effectively improved operational management efficiency, optimized asset utilization, and customer response capabilities by increasing digital investment, such as introducing ERP systems, electronic procurement platforms, and digital marketing tools. In contrast, other industries drive operational management efficiency by increasing revenue through digitalization, such as using digital tools to boost sales and optimize supply chains, with a focus on improving asset returns through revenue growth. Research has shown that digital investment plays a key role in improving operational efficiency in the manufacturing, retail, and technology industries.

This study proposes a framework for improving operational management efficiency. The core strategy for improving operational management efficiency lies in the precise and flexible implementation of digital strategies, which vary across different industries. Each industry needs to choose to increase digital investment or enhance digital incremental income in a targeted manner based on its own business characteristics and development stage. Manufacturing and other industries can optimize resource integration, simplify business processes, and improve operational efficiency by introducing digital tools such as ERP systems and electronic procurement platforms. The retail and technology industries, on the other hand, rely more on the growth of digital incremental revenue, such as through digital marketing and customer management platforms, enhancing customer interaction, improving customer satisfaction, and driving sustained business growth. Regardless of the strategy adopted, digitization is a key driving force for improving operational management efficiency and achieving sustainable development of enterprises.

7. Conclusions

Based on the findings of the study, the following conclusions are drawn:

1) The industry distribution data showed that manufacturing enterprises have the largest number and proportion, and their distribution fully reflected the current situation of Guangdong Province as a major manufacturing province. Retail enterprises closely followed, and the data distribution of the industry was consistent with the current situation in Guangdong Province. This reflected the diversity of industrial structure in Guangdong Province. The capital distribution showed that scale of SMEs is mainly concentrated between 100-300 million yuan, accounting for more than half of the sample. This structure reflected the difficulty that SMEs in Guangdong Province may face in further growing into larger scale enterprises during their development process. The number of employees showed that the majority of employees in SMEs in Guangdong Province are mainly distributed between 50-300, reaching 60.36%, indicating that the number of employees in most SMEs is concentrated in this range.

2) Enterprises have invested certain resources in digital technology, platform systems, software and hardware upgrades, and strategic planning. The overall attitude of enterprises towards digitalization was consistent, and most enterprises have taken positive actions in digital investment. Most enterprises have achieved certain results in the digital application of their business processes, but there is still room for improvement, especially in customer service. These SMEs believed that digitalization has a positive impact on their operational management efficiency. This discovery emphasized the importance of digital transformation in the operation of SMEs.

3) In the regression analysis, the level of digitalization in different industries had a positive impact on the present value of main activities, support activity and operational management efficiency, thus, rejecting the null hypothesis HO1.In summary, various industries improved operational management efficiency through different digital strategies. The manufacturing industry relied on digital investments such as ERP systems, human resource management systems (HRMS), and electronic procurement systems to enhance the digitalization level of support activities, optimize resource integration and process simplification, and enhance operational efficiency and customer satisfaction. The retail and technology industries made greater use of digital tools, such as digital marketing and customer management platforms, to enhance the digitalization level of their main business activities, increase customer growth rates and response speeds.

4) The digitalization level positively affected the main and support activities of business processes and operational management efficiency, rejecting the null hypothesis Ho2. Overall, the impact of digital investment was greater than incremental digital income. In the case of limited resources, SMEs should invest their resources in digital investment and actively invest in digital construction in order to improve the digital application of their business processes more quickly, thereby enhancing operational management efficiency and market competitiveness.

5) Each industry needs to increase digital investment or increase digital incremental income in a targeted manner based on its own business characteristics and development stage. Manufacturing and other industries can optimize resource integration, simplify business processes, and improve operational efficiency by introducing digital tools such as ERP systems and electronic procurement platforms. On the other hand, the retail and technology industries rely more on the growth of digital incremental revenue, such as through digital marketing and customer management platforms, strengthening customer interaction, improving customer satisfaction, and driving sustained business growth. Regardless of the strategy adopted, digitization is a key driving force for improving operational management efficiency and achieving sustainable development of enterprises.

8. Recommendations

Based on the research findings and conclusions, the following suggestions are proposed:

1) Based on the results and conclusions of SOP1: 1. Strengthen the status of the manufacturing industry; continue to leverage Guangdong Province's advantages as a major manufacturing province, and encourage and support innovative development of manufacturing enterprises; 2. Focus on the development of SMEs: In response to the current situation where the scale of SMEs is mainly concentrated between 1 million and 3 million yuan, provide policy and financial support to help them break through development bottlenecks and achieve scale expansion.

2) Based on the results and conclusions of SOP2: 1. Increase digital investment; Encourage enterprises to continue increasing their investment in digital technology, platform systems, software and hardware upgrades, and strategic planning; 2. Optimize digital applications; Based on the achievements of enterprises in digital applications, especially the shortcomings in customer service, propose improvement measures to enhance the level of digital applications. 3. Strengthen digital transformation awareness; Enhance enterprises' understanding of the importance of digital transformation and promote it as a key means to improve operational management efficiency.

3) Based on the results and conclusions of SOP3: 1. Develop differentiated digital strategies: Each industry should develop differentiated digital strategies based on its own characteristics to enhance the efficiency of major activities, support activities, and operational management; 2. Digital upgrading of manufacturing industry: The manufacturing industry should focus on introducing digital tools such as ERP systems, human resource management systems (HRMS), and electronic procurement systems to enhance the digital level of supporting activities; 3. Innovation in the retail and technology industries: The retail and technology industries should fully utilize digital tools such as digital marketing and customer management platforms to enhance the digitalization level of their main business activities, increase customer growth rates, and response speeds.

4) Based on the results and conclusions of SOP4: 1. Emphasize the improvement of digital level: Enterprises should fully recognize the important impact of digital level on the efficiency of major activities, supporting activities, and operational management; 2. Balance digital investment and returns: In digital construction, enterprises should balance the relationship between digital investment and digital incremental returns to ensure that digital investment can bring substantial returns; 3. Enhance market competitiveness: Improve operational management efficiency through digital construction, thereby enhancing the market competitiveness of enterprises.

5) Based on the results and conclusions of SOP5: 1. The manufacturing industry should focus on resource integration and process optimization in digital transformation, by increasing investment in digital tools such as ERP systems, intelligent manufacturing equipment, and IoT technology, and actively introducing advanced digital management systems; 2. The retail industry lies in improving customer experience and marketing efficiency. Retail enterprises should make full use of e-commerce platforms, social media, big data analysis and other tools to accurately target customer groups, implement personalized marketing strategies, and improve customer satisfaction and loyalty; 3. The technology industry should continue to promote technological innovation and application, utilizing cutting-edge technologies such as artificial intelligence, big data, and cloud computing to create intelligent products, services, and solutions. Enterprises should strengthen customer management and service system construction, and use digital tools to improve customer satisfaction and operational efficiency. 4.Other industries should focus on improving service quality and operational efficiency in digital transformation. By introducing digital management tools such as customer relationship management systems (CRM), online appointment platforms, and intelligent customer service.

6) For future study: 1. In depth study of digital transformation paths: Future research can further explore the specific paths and strategic choices of different industries and enterprise sizes in the process of digital transformation; 2. Evaluating digital investment returns: Future research can establish a more comprehensive evaluation system to quantitatively analyze the economic benefits of digital investment and provide more scientific basis for enterprise decision-making; 3. Pay attention to digital risks and challenges: With the acceleration of the digital process, future research should focus on the risks and challenges brought by digitalization, such as data security, privacy protection, and explore corresponding response strategies; 4. Cross industry comparative analysis: Future research can conduct cross industry comparative analysis to reveal the commonalities and differences of different industries in the process of digital transformation, providing inspiration for mutual learning and reference between industries.

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