Article

Study on the Impact of Supply Chain Dynamic Capabilities on Long-Term Performance of Enterprises

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Abstract: The risk of frequent disasters is becoming a huge challenge for enterprises and their supply chains. In particular, sudden global public health events have brought a great test to the supply chain. How to make sustainable planning and preparedness and smoothly carry out supply chain operations and obtain sustainable firm performance in the complex market environment requires urgent attention from industries and academia. The different effects of supply chain operational capability and dynamic capability on the long-term performance and short-term performance of enterprises are still unclear; therefore, a model was established to discuss this. Based on the theory of dynamic capability, a relational model between supply chain dynamic capability, supply chain operational capability, and firm performance was constructed, a hypothesis testing method and Amos software were used to verify the set model, and the mechanisms of supply chain dynamic capability and supply chain operational capability on firm performance were discussed. The empirical results show that supply chain operational capability has a mediating effect on supply chain dynamic capability and firm performance, and supply chain dynamic capability has a moderating impact on supply chain operational capability and firm performance. The supply chain and its enterprises should cultivate and continuously improve the supply chain dynamic capability as soon as possible, so that in the face of emergencies, the supply chain operation capability can be reasonably configured to avoid damage, improve firm performance, and gain competitive advantages.

Keywords: public health emergencies; supply chain dynamic capability; supply chain operational capability; firm performance; moderating effect

1. Introduction

In recent years, various emergency disasters have occurred frequently around the world, which have seriously affected enterprises and supply chain management in various countries. This will not only cause the interruption of the supply of raw materials (e.g., the ZTE incident in 2018, the various US controls on Huawei Technologies Co., Ltd. that continue to this day), but also the huge fluctuations in demand (e.g., the shortage of medical protection materials and medicines during the SARS period), unavailability or delayed use of transportation facilities (e.g., American air transportation after 9/11), unavailability of factories, warehouses, and office equipment (e.g., factories producing computer motherboards after the 921 Taiwan earthquake), direct damage to goods or services (e.g., the impact of the nuclear spill on food during the March 2011 earthquake in Japan), and the blockage of information channels, etc. Data from the Gartner Group (2021), an international investigative agency, have also shown that two out of five companies that experienced a major disaster that caused a system outage never resumed operations, and one-third of the remaining companies within two years went bankrupt. The facts in countries around the world have shown that traditional business management methods and processes are often vulnerable to a single blow in the event of a disaster, and may even...
collapse at any time. Moreover, Hendricks and Singhal (2005) reported that, on average, companies that suffer from supply disruptions due to emergency disasters face a 107% drop in operating income, a 114% drop in sales, a 93% drop in return on assets, and a 7% drop in sales growth, with cost increased by 11% and inventory increased by 14% [1]. Public health emergencies have a huge impact on the supply chain. Regarding the COVID-19 outbreak, the impact of the epidemic on the global economy has been enormous. The shutdown of production greatly reduced productivity, and the global unemployment rate is rising day by day. COVID-19 has brought great damage to the global economy, especially in economically developed regions, which has eroded the world like a financial storm, and its impact has been small on individuals and large on national subjects. Many supply chain operations have been greatly hindered. Taking the pharmaceutical supply chain as an example, due to the special needs of the COVID-19 epidemic, it has been widely concerned and greatly tested. For example, the cold medicine market with a market value of hundreds of billions has been greatly impacted. Even some companies’ market demand has dropped by more than half, and as almost all medicine manufacturers produce cold medicine, 15% of the enterprise customers lost more than 30% [2]. It was found on the “National enterprise bankruptcy information disclosure platform” that from 1 January 2020 to 23 August 2022, there were 8482 bankruptcy review cases and 169,012 bankruptcy cases in the national courts.

The decline in sales, the increase in operating costs, the closure of enterprises, and even the stagnation of the supply chain all indicate that the COVID-19 epidemic has had a significant impact on the daily operation of the supply chain and the vulnerability of the supply chain to large-scale public health emergencies. This has also exposed the common problem of the supply chain’s weak ability to respond to emergency disasters, and the lack of sustainable planning and preparedness for emergency disasters. The epidemic has been going on for three years, and it requires companies and their supply chains to strengthen their operational capabilities, make constant adjustments to respond to the ever-changing environment, and carry out sustainable planning and preparedness. Crisis opportunities always coexist, and if you overcome a crisis, it is an opportunity. In the face of emergency disasters, there are many issues that require urgent consideration, including how companies in the supply chain should respond, carry out sustainable planning and preparedness, turn crises into opportunities, maintain their daily operations, and maintain competitive advantages and even breakthroughs.

Supply chain operational capability and supply chain dynamic capability are the company’s ability to respond to changes in the external environment [3]. Based on dynamic capability theory, firms develop hard-to-replicate firm capabilities to adapt to changing environments by “coordinating” their ability to sustain competitive advantages [4,5]. High-level supply chain operation capabilities and dynamic capabilities are conducive to promoting the allocation and complementation of internal and external resources of the enterprise, transmitting information, perceiving the external environment, and coordinating the operation of the enterprise, so as to obtain differentiated advantages from competitors [6,7].

Supply chain dynamic capability may play an important role between supply chain operational capability and firm performance, and can guide them to better adjust operational resources and gain competitive advantages in the unexpected external environment [8]. However, the mechanism of supply chain dynamic capability and supply chain operational capability action on corporate performance is still unclear [9], which needs further research. In particular, the difference between their mechanism of action on long- and short-term performance needs further verification. Therefore, this study discusses the different effects of supply chain operation capability and supply chain dynamic capability on long-term performance and short-term performance, respectively, as well as the relationship between supply chain operation capability and supply chain dynamic capability, to fully demonstrate the impact of supply chain operational capability and supply chain
dynamic capability on firm performance, and provide some suggestions for supply chain operations, from the perspective of supply chain dynamic capability.

The rest of this paper is arranged as follows. The second section is the relevant literature and hypotheses, the third section is the research design and the results, and the last section is the conclusion and discussion.

2. Literature Review and Hypotheses Development

The earliest concern about the impact of emergencies on the operating system is the reliability research in the engineering field, which mainly responds to the risk of system failure through reliability design, such as the reliability research of power system, computer communication network, and road traffic network in the face of emergencies. The manifestation of emergencies in different fields is slightly different. There are five manifestations of supply chain emergencies: natural disasters, terrorist incidents, crisis incidents in certain industries, accidents, and emergencies in operations [10]. Many scholars have mentioned that sudden infectious diseases are a major risk to the supply chain and will have a significant impact on the normal operation of the supply chain [11,12]. Most studies consider that supply chain emergency risk is different from ordinary operational risk, and has the characteristics of low probability-high consequences [13]. The risk of emergencies has a relatively large impact on a company’s operations in terms of supply and demand [14,15]. The purpose of each participant in the supply chain (suppliers, manufacturers, distributors, and retailers) is to improve performance [16] or maintain normal operation in the face of emergency disasters. This not only requires companies in the supply chain to have resources, but also the ability to deploy resources and make sustainable plans and preparations in advance.

Capability is a superior and unique way to coordinate, deploy, and allocate resources. Organizational capabilities are divided into operational capability and dynamic capability [6,17,18]. The improvement of organizational performance comes from the combined effect of these two types of capabilities [6,19]. Operational capability is also called ordinary capability. It is “a specific set of skills, processes, and routines, developed within the operations management system that is regularly used in solving its problems through configuring its operational resources” [6]. Dynamic capability is the ability of an organization to cope with the change in an external environment, which can integrate, construct, and reallocate resources and competitiveness, so as to maintain performance in a changing business environment [7]. Operational capability is the daily viability of an organization, while dynamic capability is the ability of an organization to modify its operational capability to adapt to environmental changes [20]. The dynamic capability view has been extended beyond the boundaries of the enterprise and may also be applied to the cross-organizational management of the supply chain system. Supply chain dynamic capability enables supply chain partners to perceive and seize new opportunities by changing supply chain design and infrastructure, thereby achieving consistency with expected market changes [21]. Many scholars have confirmed that dynamic capability can help the supply chain gain a competitive advantage and improve firm performance [20]. A number of studies have established the relationship between operational capability and firm performance [22]. The general consensus is that supply chain operational capability in the form of cost, delivery, quality, and product portfolio flexibility affects firm performance [23,24].

In a general sense, firm performance is an important manifestation of corporate change and development in a certain period of time, and it is the embodiment of corporate strategy. It usually includes financial performance and non-financial performance. For example, it is measured in terms of productivity, market performance, and financial performance [25]. The measurement of firm performance includes the realization of corporate internal goals and the improvement of corporate external competitiveness [26]. The measurement of it has always been the focus of academia, but most of the studies did not distinguish firm performance into short-term performance and long-term performance, and
it is difficult to fully show the development status of the enterprise [27,28]. In fact, in the short term, the flexible use of operational capability can accelerate market response, reduce costs, and meet consumer needs, thereby improving the short-term performance of enterprises. In the long run, performance and competitive advantages can be achieved through dynamic capacities [29]. Strong supply chain dynamic capability is very important for enhancing and realizing the value of the strategic plan and long-term performance of the enterprise [30,31]. A recent case study by Deloitte (2017) [32] confirmed that even static organizational capabilities can affect sustainable competitive advantage, but the agility and robustness of dynamic capabilities enable businesses to reconfigure and transform in response to market challenges and opportunities, which is a key factor in maintaining a competitive advantage in an ever-changing business environment [33].

Therefore, it is reasonable to believe that the impact of supply chain operational capability on short-term performance is more obvious, but the impact on the long-term is not obvious. In addition, the impact of dynamic capability on short-term performance is not obvious, and the impact on long-term performance is more obvious [34]. Throughout the existing research, it can be found that scholars mostly examine short-term performance such as financial performance, but there is little literature on long-term performance, which makes it difficult to fully demonstrate the impact of supply chain operational capability and supply chain dynamic capability on enterprises. In view of these, the following hypotheses were proposed:

**H1.** Supply chain operation capability (SCOC) has a positive impact on short-term performance (STP).

**H2.** Supply chain operation capability (SCOC) has a positive impact on long-term performance (LTP).

**H3.** Supply chain dynamic capability (SCDC) has a positive impact on short-term performance (STP).

**H4.** Supply chain dynamic capability (SCDC) has a positive impact on long-term performance (LTP).

The relationship between them is complex, complementary, and alternative [35,36]. Dynamic capability is the ability that an organization should have when dealing with the change in an external environment, and it is a strategic level of ability, while operational capability is reflected in the ability of the organization at the operational level [27]. Dynamic capability helps an organization align with the external environment, while operational capability is often internal [6,17,37]. Operational capability provides unity, integration, and guidance for resources and operation practices [6]. An organization can gain a competitive advantage through an efficient logistics process, prudent use of assets, and the acquisition and dissemination of superior process knowledge [6,38]. Superior operational capability improves the efficiency of the delivery process, reduces operating costs, and realizes the competitive advantage [39]. Dynamic capability copes with a dynamic environment by constantly changing organizational management and reconfiguring inflexible operational capability [35].

From the perspective of operation strategy, the reference regarded operation capability as organizational capability with a generalized structure, and defined operational capability as a collection of unique technologies, processes, and practices developed in an operation management system. They are usually used in the process of solving enterprise problems by configuring their operational resources. The management and control in the process of product manufacturing, and the updating of various technologies, processes, and practices related to quality are all within the scope of operation capability [40]. From the perspective of the relationship between dynamic capability and operational capability, the literature holds that operational capability is the ability to perform daily activities, while dynamic capability works “to help an organization expand, modify and reconstruct
its existing operational capability to make it a new operational capability that best matches the changing environment” [25]. Based on the above two viewpoints, the key points to understand the operational capability of an enterprise are as follows: The existing operational capability of an enterprise is expanded, modified, and reconstructed through the dynamic capability of the enterprise, and new operational capability is generated [41]; the operational capability of an enterprise is a collection of unique technologies, processes, and conventions [42]; the operational capability of an enterprise is a resource tool for configuring the operation management system [43]. The biggest difference between dynamic capability and operational capability lies in its dynamic capability, the capability that an enterprise should have when dealing with the change in an external environment, and it belongs to the capability at a strategic level. The operational capability is more reflected in the capability possessed by the enterprise at the operational level [44,45].

Some literature points out that one of the mechanisms of dynamic capability is to indirectly create value by changing and strengthening operational capability, and to influence firm performance by enabling or strengthening existing operational capability [46,47]. Moreover, the value of dynamic capability depends on specific circumstances, rather than formulas or formulas for general validity [36,48]. However, it has not studied how different levels of supply chain operational capability affect firm performance in a supply chain with different levels of supply chain dynamic capability. In view of these, the following hypotheses were proposed.

H5. Supply chain operational capability (SCOC) has a positive mediating effect on supply chain dynamic capability (SCDC) and short-term performance (STP).
H6. Supply chain operational capability (SCOC) has a positive mediating effect on supply chain dynamic capability (SCDC) and long-term performance (LTP).
H7. Supply chain dynamic capability (SCDC) has a positive moderating effect on supply chain operation capability (SCOC) and short-term performance (STP).
H8. Supply chain dynamic capability (SCDC) has a positive moderating effect on supply chain operation capability (SCOC) and long-term performance (LTP).

Based on the above hypotheses, we established a theoretical model, collected data through questionnaires, and then conducted empirical analysis using Amos software to verify them.

3. Methodology

To verify the above hypotheses, we established a structural equation model to examine the relationship between the four indicators, namely, supply chain dynamic capability, supply chain operation capability, long-term performance, and short-term performance. It is shown in Figure 1. Both supply chain dynamic capability (SCDC) and supply chain operational capability (SCOC) have an impact on long-term performance (LTP) and short-term performance (STP). Supply chain dynamic capability (SCDC) has an impact on supply chain operational capability (SCOC), and supply chain dynamic capability (SCDC) has a moderating impact on supply chain operational capability (SCOC) and enterprise performance (STP and LTP).

Then the questionnaire was designed according to the indicators to investigate, distribute, and collect the data through the network, and analyze its reliability and validity, and then the Amos software was used for analysis.
3.1. Variable Measurement

The measurement of the indicators is shown in Table 1. For the measurement of supply chain dynamic capability, we referred to the scale adopted by Ju et al. [49,50], which included four respective measurement scales: supply chain information sharing (SCIS), supply chain cooperation (SCC), supply chain integration (SCI), and supply chain agility (SCA), each composed of four items. For the measurement of supply chain operation capability, we referred to the scale adopted by most scholars, which included four respective measurement scales: cost, delivery, quality, and product portfolio flexibility, with a total of 19 items. For the measurement of firm performance, we referred to the measurement adopted by Fawcett et al. [51–53], including short-term performance and long-term performance, with a total of seven items.

Table 1. Variable items.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Secondary Indicators</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIS (supply chain information sharing)</td>
<td></td>
<td>supply chain information sharing; sharing demand information with partners; sharing cost information with partners; sharing risks and performance with partners; clarifying roles and responsibilities with partners;</td>
</tr>
<tr>
<td>SCC (supply chain cooperation)</td>
<td></td>
<td>reach business agreements with partners; make joint decisions with partners; solve problems with partners; improve relationships with partners; data standardization with partners;</td>
</tr>
<tr>
<td>SCI (supply chain integration)</td>
<td></td>
<td>integration with partners’ information systems; elimination of duplicate business with partners; data consistency with partners;</td>
</tr>
</tbody>
</table>
### SCA (Supply Chain Agility)
- Supply chain synchronization;
- Identify changes in the market environment;
- Develop new supply chain processes;
- Establish supply chain contingency plans and crisis management systems;

### SCOP (Supply Chain Operation Capability)

#### Cost
- Reduce inventory;
- Improve production capacity utilization;
- Increase equipment utilization;
- Reduce production costs; reduce management costs;

#### Delivery
- Provide fast delivery;
- Fulfill delivery promise;

#### Quality
- Use statistical process control methods;
- Use real-time process control systems;
- Timely update process equipment and technology;
- Develop new processes for new products;
- Develop new processes for old products;
- Reduce defect rates;
- Obtain quality certification;

#### Flexibility
- Shortening of lead time;
- Change in product mix;
- Processing of customer order changes;
- Change product design according to customer requirements;
- Quickly adjust production capacity in a short time;

### Firm Performance

#### STP (Short-term Performance)
- The company’s products/services have received more praise in the industry;
- The company’s operating costs continue to decrease;
- The company’s delivery speed continues to increase.

#### LTP (Long-term Performance)
- The company can continuously increase the speed of technological innovation;
- The company can continuously reduce production costs;
- The company’s reputation continues to improve.

### Sample and Data Collection

From June to July 2022, a survey in the form of a questionnaire (it is shown in Appendix A) was conducted, which was made into a web link and then sent to the respondents by email and WeChat. The items included in the questionnaire were evaluated by the interviewee according to a five-point Likert scale (1, totally disagree; 5, totally agree). Of the 250 questionnaires sent out, excluding those that were invalid or unresponsive, 200 valid questionnaires were finally obtained by early August 2022, with a return rate of 80%. The basic information of the interviewees was as follows: The research sample was a relatively average sample from the industry, and the top-ranked industries were the science and technology industry, pharmaceutical industry, electronic information industry, and automobile industry, with the manufacturing industry and distributors with the majority, with 78 and 64 companies, respectively. The majority of the sample included 83 and 60 companies with scales of 20–100 million and 100–400 million, respectively. Among the subjects of this study, middle managers were the most, with 87 persons, followed by senior managers with 61 persons, and grassroots managers with 52 persons. The subjects were mostly in the production department and R&D department, with 61 and 50 people, respectively, followed by the procurement department with 38 people.
3.3. Reliability and Validity

Reliability refers to the degree of consistency of the results obtained when measured repeatedly on the same object using the same method. The reliability index is mostly expressed as the correlation coefficient, and the Cronbach alpha is the most commonly used confidence coefficient at present. American statisticians Hair et al. [54] pointed out that a reliability index above 0.6 is acceptable. If the Cronbach’s alpha coefficient is below 0.6, we must consider recompiling the questionnaire. All the estimates of the structural equation model in this paper were done by AMOS21.0 software, and the reliability test of the questionnaire is shown in Table 2.

Table 2. Reliability statistics.

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>N of Items</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.932</td>
<td>16</td>
<td>SCDC</td>
</tr>
<tr>
<td>0.957</td>
<td>19</td>
<td>SCOC</td>
</tr>
<tr>
<td>0.829</td>
<td>3</td>
<td>STP</td>
</tr>
<tr>
<td>0.842</td>
<td>4</td>
<td>LTP</td>
</tr>
<tr>
<td>0.908</td>
<td>42</td>
<td>Total</td>
</tr>
</tbody>
</table>

It can be seen from the reliability test table of the research variables that Cronbach’s alpha values were all greater than 0.8. It can be seen that the measurement indexes of the research variables had a high internal reliability.

Validity is a measure of the effectiveness of the results measured by measurement tools or methods, and the degree of agreement between the measurement results and the content of the investigation. In general, the higher the degree of agreement between the measurement result and the investigation content, the higher the validity. The methods for evaluating effectiveness mainly include the following two aspects: content validity and structural validity. Among them, content validity refers to the degree of matching between the measurement item and the measurement target to determine whether the measured behavior field is representative. Structural validity refers to the measurement tool to measure the degree of the internal structure of theoretical concepts and propositions, and to compare and evaluate theoretical hypothesis with the measurement results.

KMO and Bartlett sample measurements were used to test the validity of the data. The closer the KMO is to 1, the more effective the data. Experience has shown that a KMO greater than 0.9 indicates that the data are very effective, a KMO greater than 0.8 and less than 0.9 indicates that the data are more effective, a KMO greater than 0.7 and less than 0.8 indicates that the data are valid, and below 0.5, it is necessary to consider recollecting data. Table 3 is the test table of the KMO and Bartlett measurements.

Table 3. KMO and Bartlett’s test.

<table>
<thead>
<tr>
<th>Kaiser–Meyer–Olkin Measure of Sampling Adequacy</th>
<th>0.894</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett’s Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>5545.761</td>
</tr>
<tr>
<td>df</td>
<td>210</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>

It can be seen from the Table 3 that the KMO validity value is 0.894, which is greater than 0.8, indicating that the research data were more effective. The significance value of the Bartlett sphere test is 0.000, which is less than 0.01, which shows that the variables are significantly correlated. Therefore, the data validity of this study was relatively good.
4. Computational Results

4.1. Hypothesis Testing Results

The maximum likelihood method was used for confirmatory factor analysis. When using confirmatory factor analysis to evaluate model fit, it is best to consider multiple indexes such as absolute fit, value-added fit, and simple fit. (1) We used the Chi-square degree of freedom ratio (X^2/df). Generally, a X^2/df between 1–3 indicates that the model has a degree of concise fitting, and a stricter fitting criterion is between 1–2. (2) We also use the root mean square error of approximation (RMSEA). An RMSEA <0.08 indicates good model fitting. (3) The three indexes of value-added fit, TLI (Tucker–Lewis index), IFI (incremental fit index), and CFI (comparative fit index), are all > 0.8 to indicate good model fitting. (4) The other two indexes, PGFI (Parsimonious goodness-of-fit index) and PNFI (Parsimonious normed fit index) of simple fit, are all expressed as acceptable models with >0.5. AMOS21.0 was used to perform confirmatory factor analysis on the variables, and the results are shown in Table 4.

Table 4. Multi-factor structural validity analysis.

<table>
<thead>
<tr>
<th>Degree of Fitting</th>
<th>Standard</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/DF</td>
<td>&lt;3.00</td>
<td>1.963</td>
</tr>
<tr>
<td>RMSEA</td>
<td>&lt;0.08</td>
<td>0.055</td>
</tr>
<tr>
<td>IFI</td>
<td>&gt;0.80</td>
<td>0.944</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt;0.80</td>
<td>0.944</td>
</tr>
<tr>
<td>TLI</td>
<td>&gt;0.80</td>
<td>0.938</td>
</tr>
<tr>
<td>PNFI</td>
<td>&gt;0.50</td>
<td>0.782</td>
</tr>
<tr>
<td>PGFI</td>
<td>&gt;0.50</td>
<td>0.692</td>
</tr>
</tbody>
</table>

From the Table 4, it can be seen that all the hypothetical model fit index values were within the acceptable range and reached the ideal standard. Therefore, the theoretical model can fit the structure of the empirical data, and the model fit well.

The path coefficients between the indexes were estimated by the variance calculation and covariance calculation results of the variables. The recursive form was generally used in the selection of the model, and the observation scalar in the regression equation was generally linear, so maximum likelihood estimation could be used to estimate all path coefficients. Figure 2 shows the calculation results of the coefficients with Amos software. It mainly verifies that in the theoretical model, both supply chain dynamic capability (SCDC) and supply chain operational capability (SCOC) had an impact on long-term performance (LTP) and short-term performance (STP). Supply chain dynamic capability (SCDC) had an impact on supply chain operational capability (SCOC).
Table 5 is a summary table of standardized regression coefficients and their significance test on the model. The estimated value in the second column is the standardized regression coefficient, and the third column is the standard error of the estimated parameter calculation. C.R. (critical ratio) in the fourth column is the test statistic; the critical ratio is the t-value of the t-test. When the value is greater than 1.96, it means that the previous regression coefficient has reached the 0.05 significant level. The \( p \)-value in the fifth column is significant: if \( p < 0.001 \), it is represented by the symbol ‘***’, if \( p \)-value > 0.001, the \( p \)-value is displayed directly.

As can be seen from Table 5, the five regression coefficients had a direct impact which was shown in the theoretical model and was significant. Among the independent variables, the \( p \)-value of SCOC to STP was less than 0.05, reaching a significant level of 0.05,
and the coefficient was positive, which indicates that SCOC had a significant positive impact on STP, and H1 was verified and supported.

The $p$-value of SCOC to LTP was less than 0.05, reaching the significant level of 0.05, and the coefficient was positive, which indicates that SCOC had a significant positive impact on LTP, and H2 was verified and supported.

Moreover, the impact of SCOC on STP was greater than the impact of SCOC on LTP. The $p$-value of SCDC to STP was less than 0.05, reaching a significant level of 0.05, and the coefficient was positive, indicating that SCDC had a significant positive impact on STP, and H3 was verified and supported.

The $p$-value of SCDC to LTP was less than 0.05, reaching a significant level of 0.05, and the coefficient was positive, indicating that SCDC had a significant positive impact on LTP, and H4 was verified and supported.

Moreover, the impact of SCDC on LTP was greater than the impact of SCDC on STP. The $p$-value of SCDC on SCOC was less than 0.05, reaching a significant level of 0.05, and the coefficient was positive, indicating that SCDC had a significant positive impact on SCOC, and H5 and H6 were verified and supported.

4.2. Analysis of Moderating Relations

In the analysis of moderating relations, it is usually necessary to centralize the independent variables and moderating variables, perform regression analysis on independent variables, moderator variables, and interaction terms, and analyze the moderating effects of moderator variables in independent variables and dependent variables.

4.2.1. Analysis of the Moderating Impact of SCDC in SCOC and STP

The analysis result of the moderating impact on SCDC in SCOC and STP is shown in Table 6.

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>T</td>
</tr>
<tr>
<td>SCOC</td>
<td>0.517</td>
<td><strong>8.683</strong></td>
</tr>
<tr>
<td>SCDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCDC × COC</td>
<td>0.277</td>
<td><strong>4.845</strong></td>
</tr>
<tr>
<td>R²</td>
<td>0.267</td>
<td>0.531</td>
</tr>
<tr>
<td>F</td>
<td><strong>75.401</strong></td>
<td><strong>126.095</strong></td>
</tr>
</tbody>
</table>

Note: ** represents the significance level of 1% respectively.

It can be seen from Model 1 that the significant $p$-value of SCOC was less than 0.05, reaching a significance level of 0.05, and the coefficient was positive, which indicates that SCOC had a significant positive impact on STP. Model 2 shows that the significant $p$-value of the interaction term SCDC×SCOC was less than 0.05, reaching a significance level of 0.05, and the coefficient was positive, which indicates that the interaction term SCDC×SCOC had a significant positive impact on STP. In summary, SCDC had a positive moderating effect on SCOC and STP: That is, the larger the SCDC, the greater the impact of SCOC on STP. It can also be clearly seen from the moderating effect diagram (Figure 3) that the larger the SCDC, the greater the impact of SCOC on STP, and H7 was verified and supported.
4.2.2. Analysis of the Moderating Impact on SCDC in SCOC and LTP

The analysis result of the moderating impact on SCDC in SCOC and LTP is shown in Table 7.

Table 7. Moderating Impact on SCDC in SCOC and LTP.

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>T</td>
<td>Beta</td>
<td>T</td>
</tr>
<tr>
<td>SCOC</td>
<td>0.47</td>
<td>7.671 ***</td>
<td>0.387</td>
<td>5.944 ***</td>
</tr>
<tr>
<td>SCDC</td>
<td>0.268</td>
<td>4.714 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCDC × SCOC</td>
<td>0.262</td>
<td>4.456 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.221</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>58.846 ***</td>
<td>55.811 ***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *** represents the significance level of 1% respectively.

It can be seen from Model 1 that the significant p-value of SCOC was less than 0.05, reaching a significance level of 0.05, and the coefficient was positive, which indicates that SCOC had a significant positive impact on STP. Model 2 shows that the significant p-value of the interaction term SCDC × SCOC was less than 0.05, reaching a significance level of 0.05, and the coefficient was positive, which indicates that the interaction term SCDC × SCOC had a significant positive impact on LTP. In summary, SCDC had a positive moderating effect on SCOC and LTP: That is, the larger the SCDC, the greater the impact of SCOC on LTP. It can also be clearly seen from the moderating effect diagram (Figure 4) that the larger the SCDC, the greater the impact of SCOC on LTP, and H8 was verified and supported.
5. Discussion and Conclusions

This research made some exploratory attempts and efforts to study the relationship between supply chain dynamic capability, supply chain operational capability, and sustainable firm performance. The results of data analysis show that: (1) Supply chain operational capability had a positive impact on firm performance, and the impact on firm short-term performance was greater than the impact on long-term performance. That is, supply chain information sharing, supply chain cooperation, supply chain integration, and supply chain agility had a significant positive impact on firm performance. In the actual supply chain management process, it needed to pay attention to the integration of these four dimensions in order to achieve the ultimate goal of improving firm performance. (2) Supply chain dynamic capability had a positive impact on firm performance, and the impact on long-term performance was greater than the impact on short-term performance. It was also evidenced that cost, delivery, quality, and product portfolio flexibility had a significant positive impact on firm performance. This was evidenced by the fact that in supply chain operations, companies should not only pay attention to a single element, but also pay more attention to the comprehensive level of these elements. (3) Supply chain dynamic capability had a positive impact on firm performance through supply chain operational capability; The higher the level of supply chain dynamic capability, the greater the impact of supply chain operational capability on firm performance. This result provides strong support for the definition and description of dynamic capability by Teece et al. [7]. At the same time, it was also verified that dynamic capability is the assertion that the enterprise integrates and reconstructs resources and realizes the adaptation to environmental changes through information-based internal and external coordination. At the same time, it also verified the theory that dynamic capability is the ability that enterprises must adapt to environmental change through integration, reconstruction, and internal and external coordination based on information. (4) In the relationship between supply chain dynamic capability and firm performance, supply chain operation capability had a mediating effect. The supply chain operational capability is one of the paths through which the supply chain dynamic capability affects the firm performance, and it is the key for the supply chain member companies to improve their performance through daily operations. They must use supply chain dynamic capability to adjust operations in time according to environmental changes.

Such research conclusions also confirm the importance of research on dynamic capability. As an important supplement to the resource-based view, dynamic capability theory does effectively explain how companies and even supply chains can obtain and maintain their own competitive advantage in a dynamic competitive environment, thus improving firm performance. In addition, this study further found that in different dimensions of firm performance, that is, supply chain dynamic capability and supply chain operational capability, both have a significant positive impact on companies, but supply chain dynamic capability has a more significant positive impact on long-term performance, while the positive impact of supply chain operation capability on short-term performance is more significant. This is mainly due to the formation and cultivation of dynamic capacity taking a long time, and the impact on short-term performance cannot have an immediate result. The supply chain operation capability mainly has an impact on the daily operation activity. It needs to be adjusted by constantly relying on the supply chain dynamic capability to adapt to the constantly changing environment of the supply chain, and its impact is mainly reflected in the short-term performance. Having a good supply chain dynamic capability means that the supply chain should be good at continuously integrating and restructuring resources according to the dynamic external environment, and improving and innovating in products, services, processes, and technologies. Faced with the rapidly changing market environment, companies must pay attention to the cultivation of supply chain dynamic capability. The cultivation of supply chain dynamic capability is not only to improve the short-term performance of a single enterprise, but also to accumulate...
strength for the long-term development of the entire supply chain by adjusting the company’s own operational capability and supply chain operational capability, as well as the ability of supply chain cooperation and responsiveness. Managers should accept the short-term cost pressure that may be brought about by the construction of supply chain dynamic capability, and with the long-term development of enterprises and supply chains as the priority.

In the face of frequent emergency disasters, especially public health emergencies, enterprises and their supply chain members should develop sustainable planning and preparedness, give full play to supply chain dynamic capability, make rational use of supply chain operation capability, improve performance, and gain a competitive advantage.

The following measures can be taken to improve and cultivate the dynamic capability of the supply chain: (1) Share demand information and cost information with partners, clarify their roles and responsibilities with partners, share risks and performance together, and thus strengthen supply chain information sharing. (2) On the basis of reaching business agreements with partners, make joint decisions, solve problems together, and continuously improve relations with partners, thereby strengthening supply chain cooperation. (3) Integrate information systems with partners as far as possible, achieve data standardization and consistency between the two sides, and eliminate duplication of business with partners, so as to achieve supply chain integration. (4) Synchronize with partners, continuously develop new supply chain processes, identify changes in the market environment in time, and establish supply chain contingency plans and crisis management systems. In particular, it is necessary to make targeted emergency plans for various emergencies.

The following measures can be taken to strengthen supply chain operation capability: (1) It is necessary to consider continuous operations, but also to prevent the spread of diseases, and pay special attention to the role of personnel in ensuring production and the possibility of spreading diseases, taking into account the particularity of public health emergencies. (2) Reduce costs by reducing inventory, improving production capacity utilization, improving equipment utilization, reducing production costs, and reducing management costs. (3) Strengthen delivery capabilities such as fast delivery and fulfilling delivery promises. (4) Use statistical process control methods, use real-time process control systems, update process equipment and technology in a timely fashion, develop new processes for new and old products in time, strive to reduce product defect rates, and strive to obtain quality certification, thus strengthening the quality of enterprise products. (5) Try to shorten the delivery time, flexibly configure the product portfolio, process changing customer orders in a timely manner, change product design according to customer requirements, and adjust production capacity in a short time, thus achieving product flexibility.

Although we made some exploratory attempts to study the dynamic capacity and operational capacity building of the supply chain under public health emergencies and some innovative discussions and analyses were made, there are still some areas worthy of improvement. First of all, due to the limitations of research conditions, this study is a quantitative study of small samples. Although the sample size has no substantial impact on the goodness of fit index of the structural equation model, the breadth and diversity of the sample have important implications for the universality of the conclusion. In addition, the data of more sample companies will help us reduce the measurement error of latent variables, and help us to investigate whether factors such as industry background and geographic distribution have an impact on the conclusions of this article. Due to the limitation of sample size, we failed to discuss and analyze whether factors such as geographical and industry background affect the relationship between supply chain dynamic capability, supply chain operational capability, and firm performance. We strive to improve and further advance in the following research.
Author Contributions: Conceptualization, B.Y. (Borui Yan) and Q.L.; data curation, B.Y. (Borui Yan); formal analysis, B.Y. (Borui Yan); funding acquisition, B.Y. (Bo Yao), Q.L., and Q.D.; investigation, B.Y. (Borui Yan); methodology, B.Y. (Borui Yan); project administration, B.Y. (Bo Yao) and Q.D.; software, B.Y. (Borui Yan); supervision, Q.D.; visualization, B.Y. (Borui Yan); writing—original draft, B.Y. (Borui Yan); writing—review and editing, B.Y. (Borui Yan). All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data that support the findings of this study are openly available in OSF at https://osf.io/xt9yd.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. The Questionnaire

Questionnaire on Supply Chain Capability

Dear ladies/gentlemen:

This is an academic questionnaire, mainly to discuss the impact of the COVID-19 epidemic on the supply chain, so as to put forward reasonable suggestions for supply chain management. I hope you can fill in this questionnaire seriously. It is only for academic research, and we will never disclose personal data. Please feel free to fill in and answer. Your truthful answers are very important to our research. I believe your full help and cooperation will make this research more perfect.

Those with "*" are required questions.

1. The province where your company is located [fill in the blank] *

2. The industry in which your company operates [single choice] *
   ○ Agriculture, forestry, animal husbandry and fishery
   ○ Electronic information industry
   ○ Technology industry
   ○ Pharmaceutical industry
   ○ Automotive industry
   ○ Chemical industry
   ○ Real estate industry
   ○ Home appliance industry
   ○ Energy industry
   ○ Financial Industry
   ○ Beverage food and beverage industry
   ○ Metallurgical industry
   ○ Textile industry
   ○ Machinery industry
   ○ Paper packaging industry
   ○ Building materials industry
   ○ Utilities
   ○ Commercial industry
   ○ Comprehensive
   ○ Other __________________

3. Where is your company in the supply chain [single choice] *
   ○ Supplier
○ Manufacturer
○ Distributor
○ Retailer
○ Logistics
○ Other

4. The size of your company (annual operating income) [single choice] *
○ ≥400 million
○ ≥100 million
○ ≥20 million
○ ≥3 million
○ <3 million

5. Your position in your company [single choice] *
○ Senior manager
○ Middle manager
○ Basic manager
○ Ordinary employee

6. Your department [single choice] *
○ Sales department
○ R&D department
○ Production department
○ Purchasing department
○ Logistics department
○ Finance Department
○ Human resources department
○ Other

7. Your company’s main suppliers are located in [multiple choice] *
□ Abroad
□ Domestic (province)
□ Domestic (outside the province)

8. Your company’s main customers are located in [multiple choice] *
□ Abroad
□ Domestic (province)
□ Domestic (outside the province)

9. How is your company performing in supply chain information sharing? [matrix scale questions] *

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can share requirements information with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Can share cost information with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Share risk and performance with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Clear roles and responsibilities with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

10. How is your company performing in supply chain collaboration? [matrix scale questions] *

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating agreements with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Co-decision with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Solve problems with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Improve relationships with partners</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

11. How is your company performing in supply chain integration? [matrix scale questions] *
<table>
<thead>
<tr>
<th>12. How is your company performing in terms of supply chain agility? [matrix scale questions] *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td>Uniform standards with partner data</td>
</tr>
<tr>
<td>Integrate with partner information systems</td>
</tr>
<tr>
<td>Eliminate duplicate business with partners</td>
</tr>
<tr>
<td>Align with partner data</td>
</tr>
</tbody>
</table>

| Supply chain synchronization, such as synchronized production schedules with partners | ○ | ○ | ○ | ○ | ○ |
| Identify changes in the market environment | ○ | ○ | ○ | ○ | ○ |
| Develop new supply chain processes | ○ | ○ | ○ | ○ | ○ |
| Establish supply chain contingency plans and crisis management systems | ○ | ○ | ○ | ○ | ○ |

<table>
<thead>
<tr>
<th>13. What is your company’s focus and performance on cost? [matrix scale questions] *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td>Inventory reduction</td>
</tr>
<tr>
<td>Improve production capacity utilization</td>
</tr>
<tr>
<td>Improve equipment utilization</td>
</tr>
<tr>
<td>Reduce manufacturing cost</td>
</tr>
<tr>
<td>Reduce overhead</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. What is your company’s emphasis and performance on delivery? [matrix scale questions] *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td>Fast delivery</td>
</tr>
<tr>
<td>Fulfill delivery promises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15. What is your company’s emphasis and performance on quality? [matrix scale questions] *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td>Using statistical process control methods</td>
</tr>
<tr>
<td>Using a real-time process control system</td>
</tr>
<tr>
<td>Timely update of process equipment and technology</td>
</tr>
<tr>
<td>Develop new processes for new products</td>
</tr>
<tr>
<td>Develop new processes for old products</td>
</tr>
<tr>
<td>Reduce defect rate</td>
</tr>
<tr>
<td>Obtain quality certification</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>16. How important and how well does your company place flexibility? [matrix scale questions] *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td>Shorten delivery time</td>
</tr>
<tr>
<td>Product mix changes</td>
</tr>
<tr>
<td>Handling customer order changes</td>
</tr>
<tr>
<td>Change product design according to customer requirements</td>
</tr>
<tr>
<td>Quickly adjust capacity in a short period of time</td>
</tr>
</tbody>
</table>

| 17. How does your company perform in the following areas? [matrix scale questions] * |
Enterprise products/services have received more praise in the industry
Business operating costs continue to decrease
The company’s delivery speed continues to improve
The product qualification rate of the enterprise has consistently maintained a high level
Enterprises can make the speed of technological innovation continue to increase
Businesses can keep production costs down
Corporate reputation continues to improve

Thank you very much for your support! Good luck with your work! Good health!

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