

The Moderating Effect Of Business Environment On The Supply Chain Management Practices And Competitive Advantage Of The Chinese Construction Industry In Kunming, The People's Republic Of China

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The purpose of this study was 1) to study the importance level of supply chain management practices, business environment, and competitive advantage of construction enterprises, 2) to study the effect of supply chain management practices, and business environment toward the competitive advantage of the Chinese construction enterprises, and 3) To test the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. It is quantitative research. The sample consisted of 350 business owners registered with the Kunming City Commercial Office, China in 2023. The research tool is an online questionnaire. Collect data through websites, WeChat, and applications. Data were analyzed by descriptive statistics including mean and standard deviation. Inferential statistics were analyzed with SEM.

The results showed that all factors were very high important. It should be arranged from the most important to the least important. including competitive advantage (4.55), business environment (4.52), and supply chain management practices (4.46). The result of the effect of supply chain management practices had a direct effect on competitive advantage, with a path coefficient equal to 0.829, followed by the business environment, is the moderating effect of supply chain management practices to competitive advantage, with a path coefficient equal to 0.007. The results of a study moderating the effect of the business environment on supply chain management practices and competitive advantage were found to be statistically significant at the 0.01 level. This means that the Chinese construction industry must consider the business environment, especially since external conditions can be unpredictable and can impact their competitive advantage in Kunming.

Index Terms—Business Environment, Supply Chain Management Practices, Competitive Advantage, The Chinese Construction Industry.

I. INTRODUCTION

As global competition becomes more intense, companies must develop and maintain a competitive strategy to stay ahead [1]. This applies to all organizations, including those in China's construction sector, who must adapt to stay competitive in the market. To succeed both locally and internationally, businesses must understand the importance of the business environment and how it affects strategic management. The environment is constantly changing, and this can have a significant impact on a company's success or failure. Therefore, it's essential to analyze both the macro and micro-environment. The macro-environment includes factors such as the economy, technology, innovation, politics, legislation, regulations, societal values, lifestyles, and population demographics. The micro-environment includes internal management, customers, marketing, finances, production, suppliers, labor supply, partnerships, and competitors, all of which can have positive or negative impacts. Business owners should assess the business's strengths, weaknesses, opportunities, and threats to establish a competitive advantage.

The construction industry needs supply chain management practices as an important mechanism to drive the country's economy. Because it is the source of the most efficient use of resources in the area. employment generates income for stakeholders and distributes resources to various sectors thoroughly, so logistics is an activity related to the delivery system, company items, or resources. The process of planning, processing, storage, control, and packaging. The movement of both back and forth from the point of production to the point of use. Accurately and appropriately, including time, quality, quantity, cost, and place. Therefore, successful entrepreneurs must know that implementing a fully integrated supply chain management practice is a key success factor of businesses that allow operations that can adapt to keep up with the ever-changing needs of customers resulting in a competitive advantage as well [2].

According to the China Government Network, the construction industry in China is projected to grow by 3.6% in real terms in 2023, mainly due to a surge in infrastructure and energy and utilities construction. The industry's business activity index rose to 63.9 in March 2023, indicating growth, up from 60.2 in February and 56.4 in January. Out of 31 Chinese provinces, 28 provinces reported year-on-year growth in construction output during Q1 2023, with Jiangsu, Zhejiang, and Guangdong recording the highest growth rates. The construction industry is expected to maintain an average annual growth rate of 4.4% between 2024 and 2027, supported by investment in infrastructure projects under the 14th Five-Year Plan (2021-2025). The plan outlines 20 quantitative targets in five categories: economic development, innovation, people's well-being, green development, and food and energy security [3].

China Evergrande, a significant player in the real estate development industry, has recently applied for U.S. bankruptcy to reorganize its debt. The company faced a default on \$300 billion of debt in 2021, indicating one of the initial major indications of China's real estate sector's distress. Moreover, the sector's difficulties are extending to China's financial trust firms, which provide investment opportunities with greater returns than typical bank deposits and frequently invest in real estate initiatives. A study conducted by [4] revealed that both the legal environment and market environment have a positive influence on entrepreneurship and the competitiveness of business start-

ups. The research also found that cross-border ability plays a significant role in moderating the relationship between the legal environment and entrepreneurship, but not in moderating the market environment and entrepreneurship. Moreover, the study identified entrepreneurship as a partial mediator between the business environment and the competitiveness of start-ups. These findings highlight the vital role of the business environment in the entrepreneurial ecosystem and offer new insights into enhancing the competitiveness of businesses.

The issue of business liquidity in the Chinese real estate sector continues to pose a significant challenge to the country's economy. This problem has impacted economic recovery after the Chinese government lifted strict measures to control the spread of the COVID-19 virus. As a result, many real estate entrepreneurs in China rely heavily on borrowing funds to operate their businesses. This lack of analysis of the changing external environment and the expansion of the real estate sector, which has led to the creation of numerous projects, increases the risk of a potential bubble forming, which could ultimately result in a loss of competitiveness. This is the main reason for conducting this research.

II. RESEARCH OBJECTIVES

1. To study the importance level of efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes, business environment, and competitive advantage of construction enterprises in Kunming, the People's Republic of China.
2. To study the effect of supply chain management practices, and business environment toward competitive advantage of the Chinese construction enterprises in Kunming, the People's Republic of China.
3. To test the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China.

III. RESEARCH SCOPE

The studies on the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. The study can be classified into 4 aspects as follows:

1. The scope of the population who have experts who are employed as supply chain managers in the different construction industries of Kunming, the People's Republic of China.
2. The scope of content is to focus on the business environment (external), supply chain management practices, and competitive advantage of the construction industry in Kunming, the People's Republic of China.
3. The area boundaries of research defined the area in this study as the construction industry in Kunming, the People's Republic of China.
4. Scope of time data collection between October 2023 and March 2024.

IV. RESEARCH CONTRIBUTIONS

1. Construction industry owners can use the results of this research to evaluate their supply chain management practices and gain a competitive edge. To achieve this, they should concentrate on specific

stakeholders within the industry, such as contractors, architectural and engineering consultants, real estate companies, raw material suppliers, and facility managers.

2. Some governments may provide subsidies or grants for the construction industry in order to promote specific types of projects, such as affordable housing or renewable energy installations. These incentives can assist in reducing some of the expenses and hazards linked to these projects.

3. Many governments provide support for training and educational programs that aim to develop a skilled workforce in the construction industry. Such support can take the form of funding for vocational schools or universities, related organization apprenticeship programs, and initiatives designed to attract younger individuals to the field.

V. LITERATURE REVIEW

The research identified four related variables: 1) Supply Chain Management Practices, (2) business environment, and (3) competitive advantage, as follows:

1. Supply Chain Management Practices Concept

The supply chain management practices (SCMP) factors may also enhance the competitive advantage of the organizations. Furthermore, the manager support may provide insight to manage the SCM activities which could aid in enhancing firm performance (FP) [5]. According to Chau [6], the OP, on the basis of practice, supply chain management is divided into three categories. The first is efficiency in terms of output. This means providing a high level of customer satisfaction and service. The second is resource efficiency. This means efficient use of the resources available to the company. The third is flexibility. And the extent to which the Company can satisfy the terms and conditions of the market. In the 1990s the competitive landscape became more intense and the challenge was to deliver products at lower cost to the right stakeholders. At the right time and in the right place due to the global market [7]. But it also needs to make all SCs competitive both locally and globally. Because nowadays there is global competition as a result of the globalization era.

SCMPs are used to integrate all the processes to supply goods and services to add value for consumers and to manage the supply chain effectively [8]. The constant flow of processes, sharing through information technology, and supplier partnership is the latest advancement of the SCMP. They are used in the list of supply chain practices such as quality of product, customer relationship, and purchasing of product. They also focus on the main competencies; maintaining the inventory levels and controlling excessive inventory by postponing customization methods and the system of shared information in their organization in the list of supply chain practices [9].

2. Business Environment Concept

The business environment refers to the external factors and conditions that influence a company's operations, decisions, and overall success. It plays a crucial role in shaping a company's strategies, performance, and ability to adapt to changes.

The importance of the business environment, specifically the external factors, can be understood through the following points [10]:

1) The economy plays a pivotal role in shaping the business environment and influencing the operations, strategies, and overall performance of businesses.

2) **Competitive Landscape:** The external environment provides insights into competitors' actions, strengths, weaknesses, and strategies. Understanding the competitive landscape allows businesses to position themselves effectively, differentiate their offerings, and create a unique value proposition.

3) **Social factors** are crucially important to businesses as they provide insights into the values, attitudes, behaviors, and demographics of the society in which the business operates. These factors shape consumer preferences, employee dynamics, market trends, and even regulatory frameworks. Here's why the social aspect is significant to businesses: consumer behavior and preferences, cultural sensitivity, and ethical and social responsibility.

4) **Regulatory and Legal Compliance:** Laws and regulations within the external environment can impact how businesses operate. Staying informed about legal requirements ensures compliance, avoiding legal disputes, fines, and reputational damage.

5) **Technological Advancements:** External factors include technological advancements that can disrupt industries and markets. Embracing new technologies can lead to efficiency improvements, innovation, and enhanced customer experiences.

6) **Stakeholder Expectations:** External factors encompass the expectations of various stakeholders, such as investors, shareholders, customers, employees, and the community. Meeting these expectations is vital for maintaining positive relationships and a strong reputation.

7) **Globalization and Trade:** The global business environment is shaped by international trade agreements, economic alliances, and geopolitical developments. Understanding these factors is crucial for businesses engaged in global operations or trade.

In summary, the business environment's external factors significantly influence a company's success, growth, and sustainability. By staying attuned to changes and trends in this environment, businesses can make informed decisions, mitigate risks, capitalize on opportunities, and remain competitive in an ever-evolving marketplace.

3. Competitive Advantage Concept

Having a competitive advantage is crucial for achieving business sustainability. This advantage is created by formulating a strategy that provides value to customers, whether through cost leadership, product/service differentiation, or speedy customer service in a particular market niche. Competitive advantage is defined as a firm's ability to stand out from its competitors [11]. Jones [12] outlined three generic strategies for achieving competitive advantage: cost leadership, differentiation, and focus. These strategies are widely used by firms and are effective in meeting business objectives.

A competitive advantage means having a strong and defensible position over similar businesses and competitors [13]. Making effective management decisions and having unique capabilities can help differentiate a business from its competition [14]. In previous literature, flexibility, pricing, delivery, and competitive capabilities have been frequently discussed [15]. More recent studies have highlighted the importance of time-based competition. Competitive capabilities can include pricing, quality, production innovation, reliable delivery, and premium pricing, as described in various studies [16].

4. The direct effect SCMP on competitive advantage.

A company can have one or more competitive advantages over its competitors, such as

lower prices, higher quality, and quick response. Ultimately, a company's competitive advantage will enhance its overall performance [17].

One effective way for a company to gain a competitive edge is by implementing supply chain management practices. SCMP involves a series of actions that a company takes to ensure efficient management of its supply chain. According to a study referenced as [18]. When suppliers and consumers collaborate at all levels in the supply chain, the company is more likely to gain a competitive advantage. The impact of SCMP is not limited to the overall performance of the company but also extends to its competitive advantage. By focusing on factors such as price/cost, quality, response time to market, and product innovation, the company can enhance its competitive advantage.

Competitive advantage is the ability of an organization to establish a defensible position against its competitors. According to Porter [19] and McGinnis and Vallopra [20], firms can achieve competitive advantage by pursuing a cost leadership or differentiation strategy. Other authors have suggested various dimensions of competitive advantage. Koufteros et al. [21] proposed five dimensions, including competitive pricing, premium pricing, value-to-customer quality, dependable delivery, and production innovation. Li et al., [22] found that SMEs commonly use dimensions such as price/cost, quality, delivery dependability, product innovation, and time to market to achieve competitive advantage. On the other hand, SCM practices refer to the activities that a firm undertakes to efficiently manage its supply chain [23],[24]. From these reviews, it can be concluded that SCMP has a positive impact on the competitive advantage. As hypothesis 1

Hypothesis: 1 SCMP has a positive impact on the competitive advantage.

5. The moderating effect of the business environment on supply chain management practice to competitive advantage.

The dynamic business environment plays a crucial role in the success of innovation initiatives undertaken by organizations to enhance their performance [25]. From a contingency perspective, the stability and dynamism of the business environment are key factors that determine the company's performance. The studies by Chemma [26] and Lumpkin and Dess [27] suggest that competitive dynamics put pressure on companies to innovate in order to survive and thrive. This means that in a highly unpredictable environment, companies must adopt a strong entrepreneurial posture, particularly focused on innovation, to survive. Kraus et al., [28] also found that innovative companies perform better in turbulent environments.

The uncertain business environment motivates companies to focus more on innovation. This leads to gaining a competitive advantage by offering goods and services that meet customer needs and expectations [29]. Through innovation, companies can produce and sell goods that meet consumer expectations. By continuing to innovate, companies build a better position to expand their market share, sell more, and consistently satisfy their customers amidst environmental uncertainty.

From these reviews, it can be concluded that the moderating effect of the business environment on supply chain management practices to competitive advantage. As hypothesis 2

Hypothesis:2 The moderating effect of business environment on supply chain management practice to competitive advantage.

Therefore, from the literature review, the researcher can summarize the concept as follows: SCMP has a positive impact on the competitive advantage. The moderating effect of business environment on supply chain management practice to competitive advantage. As Fig. 1

Conceptual Framework.

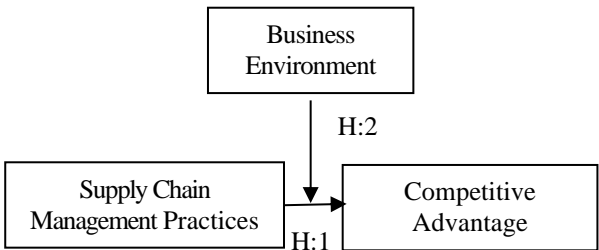


Figure. 1 Conceptual Framework

VI. RESEARCH METHODOLOGY

The research design and its methods are introduced. The research design can be developed on the basis of the research objectives.

1. Population and Sample

The researcher considered the sample size determination based on the concept of Hair et al. [30] who suggested using a sample size of between 10-20 samples per 1 predictive parameter. In this study, there were 3 latent variables, where the number of observational variables 10 aspects per 1 latent variable. Thus, there were 30 observational variables when applying the concept of sample size determination by Hair, et al., [31] to integrate and calculate. Then a sample group (30 x 10 times) of 300 people will be obtained. After that, there are 300 online business owners registered with the Kunming City Commercial Office, China, in 2023, which does not cover sole proprietorships. Because the number of employees is relatively small, organizational management is not possible, so it is described as 1,284 companies [31] who are employed as supply chain managers in the different construction industries of Kunming, and answered the questionnaire.

2. Research Tools

Part 1 General information of the respondents

Part 2 is a measure of latent variables, consisting of 3 aspects: (1) supply chain management practices (2) business environment, and (3) competitive advantage of owners in the construction industry. The questions were closed-ended questions using a 5-point Likert Scale [32].

Part 3 is an open-ended questionnaire for respondents to express their importance on the issues studied.

3. Data Collection

The researcher has collected data from primary sources by using a closed-ended questionnaire and collecting data according to the sample group that was defined with an online questionnaire. Then contact via electronic mail (e-mail) of online entrepreneurs to Kunming City Commercial Office. Data were collected using a Website, WeChat, and Link Forms. The researcher spent approximately 3 weeks collecting questionnaires. 350 questionnaires were

obtained. After that, 15 incomplete questionnaires were selected, leaving 300 complete questionnaires, representing 100 percent of which still remain is a sufficient sample size [33]. The researcher conducted a quality inspection of the research tool before conducting the actual survey. This involved measuring compliance with the objectives and indicators (Item Objective Congruency: IOC) using the opinions of three experts. The results showed that the IOC value of total income ranged from 0.77 to 1.00, which is greater than the minimum acceptable value of 0.50 for all items. This indicates that the content of every item in the questionnaire is valid. The researcher also used Cronbach's method to calculate the alpha coefficient (α -coefficient) to determine the overall confidence value of the questionnaire. Nunnally [34] recommended a reliable measure of 0.70 or greater. The Cronbach's alpha coefficient of the between scores ranged from 0.924 to 0.939, with a total value of 0.926. This exceeds the acceptable threshold of 0.70, indicating that the questionnaire is reliable.

4. Statistics for Data Analysis.

We used descriptive and inferential statistics, including mean, percentage, standard deviation, and Structural Equation Modeling (SEM) to analyze data.

VII. RESEARCH RESULTS

The research reveals that the majority of individuals who were business owners of the Chinese Contraction Industry in Kunming, Most of the 300 respondents were males. Aged between 41-50 years old, Married, and having a bachelor's degree.

1. To analyze the importance level of supply chain management practices, business environment, and competitive advantage of construction enterprises.

According to the findings, The supply chain management practices is of very high importance. The average score was 4.55 with a standard deviation of 0.554. The business environment is also crucial, with an average score of 4.52 and a standard deviation of 0.549. Lastly, competitive advantage is high important, with an average score of 4.46 and a standard deviation of 0.526.

2. To analyze the effect of supply chain management practices, and business environment toward the competitive advantage of the Chinese construction enterprises.

The result found that supply chain management practices had a direct effect on the competitive advantage of owners in the construction industry, with path coefficients equal to 0.829. The moderating effect of business environment on supply chain management practice to competitive advantage, with path coefficients equal to 0.007. The researcher has removed certain questions from the supply chain management practices (SCMP) variable, namely scmp7, scmp8, scmp9, and scmp10, as their loading value was less than 0.7. Similarly, for the business environment variables, the researcher has removed be6, be7, be8, be9, and be10 questions due to their loading values being lower than 0.7. Lastly, the dependent variable was a competitive advantage, and the researcher eliminated questions ca6, ca7, ca8, ca9, and ca10 because their loading values were less than 0.7. These criteria were based on the work of Hair et al. [31]. As Fig 1.

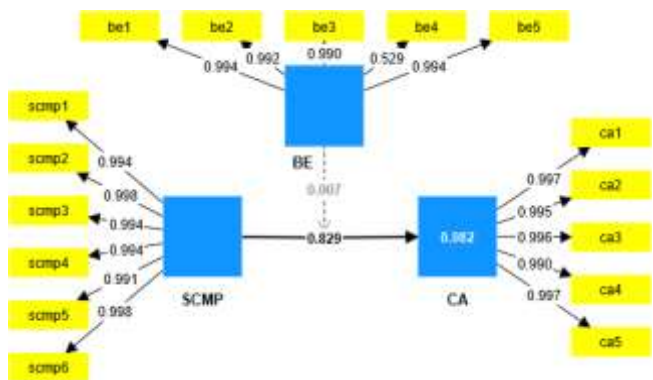


Fig 1. The result of Structural Equation Modeling

The conclusion of supply chain management practices had a direct effect on competitive advantage, with path coefficients equal to 0.007. Before an intermediary factor, the business environment has a relatively high path coefficient. See Table 1

Table 1 Research Hypothesis

Hypothesis	Path coefficients	T-stat	The Result
SCMP -> CA (before)	0.991	14.979	support
BE x SCMP -> CA	0.007	12.656	support
SCMP -> CA (after)	0.829	17.673	support

Remark: $|t| \geq 1.645$ mean $p\text{-value} \leq 0.10$, $|t| \geq 1.96$ mean $p\text{-value} \leq 0.05$, $|t| \geq 2.58$ mean $p\text{-value} \leq 0.00$

3) The result of testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese contraction industry. as Fig 2.

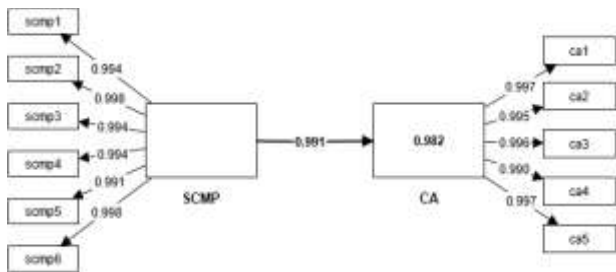


Figure 1. The result of supply chain management practices had a direct effect on competitive advantage.

Table 2 The testing of the moderating effect of the business environment on the supply chain management practices and competitive advantage

Business Environment	Effect	HTMT	p-value	LLCI	ULCI
-1.0714 (low)	0.829	0.993	0.000	0.5206	0.6905
-0.0019 (normal)	0.834	0.999	0.000	0.5498	0.6679
0.9488 (high)	0.991	0.612	0.000	0.5302	0.6931

From Figure 2 According to Table 2, it has been discovered that there is a hidden factor, business environment (BE), which creates a relationship between supply chain management practices (SCMP) and competitive advantage (CA). However, the interaction between SCMP and BE is significant, meaning that overall, BE does have a significant impact on SCMP that leads to a competitive advantage. Instead, BE has a pick a point. It has been found that as more BE is analyzed in business operations, SCMP will gradually have more influence on competitive advantage, but the effect is not significant. Therefore, entrepreneurs should pay attention to the environment, especially the external environment which is volatile and can significantly affect competitive advantage.

VIII. DISCUSS THE RESULTS OF THE RESEARCH

The research objective 1. To study the importance level of supply chain management practices, business environment, and competitive advantage of construction enterprises. It found that supply chain management practices are of very high importance. Effective supply chain management is crucial for modern businesses to thrive. By optimizing their supply chain processes, companies can reduce costs associated with procurement, transportation, inventory management, and warehousing. This ultimately leads to enhanced profitability and improved customer satisfaction, making them more competitive in the market. The integration of all supply chain processes is a key component of supply chain management practices, as it adds value for consumers and enables efficient management of the supply chain. Advancements in information technology and supplier partnerships have enabled a constant flow of processes, leading to the latest progress in supply chain management practices. This idea is consistent with the conclusions drawn by references [8] and [9].

This is followed by the business environment because managers must have a clear understanding of the business environment to effectively devise strategies. The various factors such as market trends, competition, technological advancements, and regulatory changes all play a crucial role in shaping a company's next moves. The business environment acts like a compass for companies, guiding their decisions and actions. Ignoring its impact may result in missed opportunities, increased risks, and potential failure in adapting to changing circumstances. Therefore, keeping oneself updated with the business environment is critical for achieving sustained success.

Lastly, competitive advantage is high important because having a unique advantage gives a

company the ability to charge higher prices, increase sales, and ultimately improve profitability. It can also lead to cost savings through efficiency or innovation. Companies with a strong competitive advantage are often more appealing to investors because of their potential for long-term success and growth. Relation to the concepts of Sultan and Mason [12]. Jones [13] conclusion, that advantage is created by formulating a strategy that provides value to customers, whether through cost leadership, product/service differentiation, or speedy customer service in a particular market niche. Competitive advantage is defined as a firm's ability to stand out from its competitors outlined three generic strategies for achieving competitive advantage: cost leadership, differentiation, and focus. These strategies are widely used by firms and are effective in meeting business objectives.

The research objective 2. The research found that supply chain management practices had a direct effect on the competitive advantage of owners in the construction industry because the focus on effective supply chain management practices is crucial for timely completion, staying within budget, and achieving the desired quality standards in construction projects. Managers who focus on these practices play a foundational role in the success of construction projects by optimizing resources and minimizing disruptions. According to a study referenced as [19]. When suppliers and consumers collaborate at all levels in the supply chain, the company is more likely to gain a competitive advantage. Porter [20] and McGinnis and Vallopra [21] conclude that firms can achieve a competitive advantage by pursuing a cost leadership or differentiation strategy.

The research objective 3. The testing of the moderating effect of the business environment on the supply chain management practices and competitive advantage. The research found that the interaction between supply chain management practices and the business environment is significant, which means that the overall business environment has a significant impact on supply chain management practices, leading to competitive advantage, but the business environment has an impact only at pick a point. This must be taken into account by managers in certain situations where the environment is volatile.

1. Suggestion

It is important for managers to stay informed about the business environment, which includes factors such as the economy, society, political stability of governments, competition, and consumer behavior. These factors are constantly changing, so business operations must be adaptable while also managing risk. In order to achieve this, businesses need to engage in strategic planning that is appropriate to the situation.

2. Next future research

For future researchers who are interested in advancing this area of study, it is important to consider the various business environment variables that can affect the competitive advantage of the construction industry. Factors such as government policies, the experience economy, and business innovation can all have both positive and negative impacts on this industry. Despite previous research, there are still complicating factors that need to be taken into account to gain a comprehensive understanding of this complex industry.

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