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RESEARCH PAPER

Just go green: The effect of green innovation on competitive advantage with the moderating role of 'access to finance'

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ABSTRACT

Goal: This study explores the connection between green innovation components and the competitive advantage of the manufacturing sector in China through the mediating role of green organizational culture and the moderating role of access to finance.

Methodology: A self-administered survey with 310 respondents was used to collect data from the industrial sector. Data were examined using SmartPLS, and a bootstrapping method was used.

Results: The findings demonstrated that the suggested moderated mediation model was accepted because the associations between the constructs were statistically significant. The mediating effect of green organizational culture and the moderating effect of access to finance were performed. The results showed that the proposed moderated mediation model was accepted because the relationships between the constructs were statistically significant. The results of the data analysis supported a positive relationship between green innovation and competitive advantage as well as a mediating effect of green organizational culture.

Limitations: The study is limited to the Chinese economy; hence future studies can replicate these results on developing and developed economies. Furthermore, large sample size, different industrial sector and more advance analysis techniques can also be used in future studies.

Practical Implications: The study has practical implication of green innovation and green organizational culture in enhancing competitive advantage in the Chinese manufacturing sector, considering access to finance.

Originality / Value: This study contributes to the current vain of literature by examining the noval connection between competitive advantage and green innovation components of manufacturing sector in China through the mediating role of green organizational culture and the moderating role of access to finance.

Keywords: Green innovation; Green organizational culture; Access to finance; Competitive advantage and SMEs.

1 INTRODUCTION

Over the past few years, authorities all over the globe have been very interested in establishing standards and guidelines for making goods and services as environmentally friendly as possible. As a result of fast industrial growth, increasing environmental challenges are becoming a severe concern for corporations, governments, and society as a whole (Pan et al., 2022). Organizations are under pressure from a range of diverse factors to pay greater attention to environmental management (Abbas & Dogan, 2022).

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One school of thought in the field of sustainability demonstrates that businesses are motivated to implement environmentally friendly policies due to social and legal pressures (Saragih, et al. 2017). On the other hand, another school of thought contends that being environmentally conscious has many positive effects on an organization, including contributing to an increase in productivity, an improvement in long-term financial performance, a reduction in costs, environmental preservation, and the creation of a favourable public image for the business (Qu et al., 2021). Following this, many companies have realized the significance of green innovation and have begun incorporating it into their operations as a viable strategy for gaining a competitive edge.

In recent years, environmental concerns in China have taken center stage, encompassing issues such as pollution, smog, energy consumption, and the greenhouse effect. These pressing environmental challenges have emerged as significant barriers to both social and economic development, significantly impacting the performance of businesses. China's manufacturing sector, which has undergone substantial transformations over the last several decades, is now driven by increased consumer awareness and stringent government regulations. This growing environmental consciousness has created a sense of urgency to protect the environment (Hena et al., 2019; Lin & Kim, 2022, Bashir et al., 2021).

Furthermore, the Chinese government has responded with a multifaceted approach, incorporating not only regulatory measures but also market-incentive environmental regulations. These include tax reductions and financial support, designed to encourage businesses to adopt eco-friendly practices and technologies (Song et al., 2020; Zhang et al., 2019). This comprehensive strategy, alongside the aforementioned environmental regulations such as the 2013 Air Pollution Prevention and Control Action Plan, the 2014 revision of relevant laws by the National People's Congress, the 2015 modification of the Law on Prevention and Control of Atmospheric Pollution, and the Three-Year Action Plan to Win the Blue Sky Defense War introduced in June 2018, serves as a framework for combating air pollution and guiding China's ongoing efforts. In this evolving landscape, enterprise managers are grappling with the challenge of balancing economic development with environmental conservation, recognizing the pivotal importance of this equilibrium for sustainable progress (Song et al., 2020; Zhang et al., 2019).

A growing number of businesses see green innovation (GI) as a valuable strategy for creating a competitive edge. As a new invention mode, GI may successfully address carbon emissions prevention programs, energy saving, the advancement of green technology, and green industrial management (J. Wang, Xue, & Yang, 2020), and it helps enhance businesses' environmental reputations, fostering sustainable growth and reaping financial rewards. The majority of researchers from the past have classified GI into two categories: green product innovation and green process innovation (Lisi et al., 2020). Some researchers feel that GI encompasses not just green technological innovation but also green managerial innovation and sustainable marketing innovation (Abu Seman et al., 2019). However, the ambidexterity of environmentally friendly innovation has mainly been ignored by academicians. Consequently, following the ambidexterity principle, this article categorizes GI as exploitative or exploratory(J. Wang, Xue, Sun, et al., 2020). A new way of looking at GI has been developed through the lens of the ambidexterity fractal dimension, which helps develop and expand both ambidexterity theory and GI because it sidesteps the classification problem of older GI dimensions like green product innovation, and process innovation.

Despite the increased interest in the notion of GI (J. Wang, Xue, & Yang, 2020; J. Wang, Xue, Sun, et al., 2020) and its connection to firm Performance (Abu Seman et al., 2019), the exact nature of the link between GI and competitive advantage (CA) is still ambiguous. Some academics have stated that environmental strategy (GI) is costly and reduces a company's competitive edge (Gürlek & Tuna, 2017). However, some scholars have argued that environmental strategy (GI) aids businesses in meeting consumer needs and improving resource use (Rhou & Singal, 2020). As the association between green innovation and performance is inconclusive and needs further study, this study employs green culture (mediator) and access to finance (moderator) in the relationship between green innovation and competitive advantage to clarify and strengthen the relationship.

The vast majority of research studies that were carried out on the topic of entrepreneurship did not study the role that any mediator (green culture) and moderator (access to finance) plays in the connection between GI and CA. However, the current research contributes to the existing literature by strengthening the relationship between GI and CA by employing access to finance as a moderator and green culture as a mediator. In spite of this, the literature on entrepreneurship has given relatively little emphasis to studying the mediating role green culture and moderating role that access to finance plays in establishing the relationship between GI and CA.

In light of the conflicting and limited results about the effects that GI has on competitive advantage, this research focused on GI in small and medium-sized enterprises (SMEs) and investigated its influence on competitive advantage. The research has two objectives. To begin, this study aims to investigate how the Performance of SMEs in developing nations is impacted by GI

using a methodology that was based on natural resources. Second, it looked at how the connection between GI and CA was affected by green culture and access to finance. In light of this, the researchers sought to answer the following research questions: a) Is there a connection between GI and competitive advantage? b) Does the presence of green culture and access to finance have any kind of a mediating and moderating influence on the link between environmentally friendly innovation and CA?

A data survey was conducted in the Chinese industrial sectors to test the assumptions. There were 310 respondents from manufacturing SMEs, and their responses were collected using a non-probability (i.e., convenience) sampling method. Our focus is on the manufacturing industry for this reason since the management systems of manufacturing companies are well-suited to achieving environmental objectives. In terms of environmental impact, the manufacturing industry is unquestionably crucial (Rehman et al., 2016). In spite of this, manufacturers in developing countries continue to confront a wide range of environmental problems and are actively seeking GI initiatives that might considerably mitigate the effects of human activity. Therefore, a GI strategy seems to be a stabilizing element for the manufacturing industry in emerging nations (Trapp & Kanbach, 2021), adding value to green technical improvement in the production process.

The present research thus concentrated on the manufacturing sector in China. As a result, to protect the environment, Chinese manufacturers need to reevaluate their current business models and support GI programmes. GI is something that manufacturers may use to promote sustainable growth and protect the environment.

The current research is notably unique in two different ways based on the above mentioned gaps in the existing literature. First, this study claims a connection between GI and CA. The relationship between GI and firm performance has been the subject of much prior research (Abu Seman et al., 2019; J. Wang, Xue, & Yang, 2020; J. Wang, Xue, Sun, et al., 2020). However, the connection between GI and CA has received less attention. Based on the authors' knowledge, this research is the first to determine how GI might promote CA. Second, the research examines how green culture and access to finance influence the relationship between GI and CA. As a result, the current study proposed that organizations with greater green culture and access to finance might support GI strategies that enhance long-term performance. In a nutshell, this study aims to test a novel GI-CA research framework by investigating an unknown area of GI in the context of small and medium-sized manufacturing businesses in a developing country (China). The rest of the research will be as follows to fulfil our objectives. The hypothesis and literature review are presented in the next section. After that, the research methodology is described in the "Research Design" part, followed by the "Results" section's data analysis and findings. The research concludes with a discussion of its implications, limits, and future recommendations in the "Discussion and Conclusion section."

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Theoretical background

A company's resources and capabilities, in accordance with the firm's resource-based view (RBV), are what provides it with a competitive advantage over its competitors (Barney, 1991). The RBV has gained widespread acceptance as a powerful stance in various contexts, including the entrepreneurial world. The RBV has subsequently been expanded to the NRBV, highlighting how resources for sustainable development, pollution avoidance, and product stewardship provide businesses with a competitive edge (Hart, 1995).

According to Hart (1995), RBV theory has several flaws. For example, it excludes the organization's connection and natural environment. This exclusion was reasonable in the past, but it is clear that the natural environment contributes to achieving a competitive edge. According to Hart & Dowell (2010), natural resources and capabilities increase a company's profitability by reducing the amount of pollution generated. In addition, they acknowledged that organizational skills, tactics for preventing pollution, and environmental resources all contribute to an increase in SP (Hart & Dowell, 2010). Researchers may apply natural RBV theory to assess business performance by concentrating on GI. GI may be seen as intangible assets and capabilities of the company that provide businesses with a competitive advantage (Singh et al., 2019, Coutinho et al., 2018).

2.2 Competitive advantage

The common objective of many firms is to gain a significant competitive edge (Abderzag, 2021; Hussaien et al., 2021, Vafaei et al., 2019). Organizations place a strong emphasis on the development of competitive activities in order to gain a competitive edge, which may result in

improved firm Performance (Hermundsdottir & Aspelund, 2021; Wu et al., 2022). The resource-based perspective highlights the importance of the firm's distinctive resources and capabilities as major factors in competitive advantage and business success. In this sense, access to finance (Adegboye & Iweriebor, 2018), green corporate culture (C. H. Wang, 2019), and ambidextrous green innovation (Sun & Sun, 2021), may all lead to competitive advantage. The primary focus of competitive advantage is a company's comparative positioning dominance over its rivals in the market, which enables the company to achieve higher levels of success than its rivals (Porter, 1985). For instance, a company might be in a more advantageous position in comparison to its rivals if it maintains costs that are lower than those maintained by its rivals . Additionally, it may set itself apart from rivals by using cutting-edge methods in its product and manufacturing procedures (Zhou et al., 2009).

Like several studies (Baker et al., 2022; Horng et al., 2022; C. H. Wang, 2019; Zhou et al., 2009), this study addresses competitive advantage from the resource-based viewpoint and employs the following definition. Competitive advantage is that the organization stands at a position where its strategies cannot be imitated by its current or potential competitors and that it obtains more sustainable benefit from those strategies compared to its competitors (Barney, 1991; Porter, 1985). The primary justification for using this definition is that comparative positioning superiority is an indication of competitive advantage in any industry.

2.3 Ambidextrous Green Innovation

Environmentally friendly goods, procedures, and services are referred to as "green innovation" (GI). It is a process in which businesses consistently implement green initiatives, including pollution prevention, waste reduction, and environmental quality improvement, and ultimately enhance their economic and environmental Performance (J. Wang, Xue, Sun, et al., 2020). Enterprises need to engage in both exploitative GI and exploratory GI to meet environmental concerns. This not only lessens their negative influence on the environment but also boosts their productivity, public perception, and bottom line (Salim et al., 2019). In this study, we use the ambidexterity theory to GI and classify it as either exploratory or exploitative (J. Wang, Xue, Sun, et al., 2020). The term "exploitative green innovation" was coined to describe the process of finding and using previously untapped environmental knowledge and expertise to enhance existing sustainable products, processes, and services to satisfy the demands of today's consumers (J. Wang, Xue, & Yang, 2020), The term "exploratory green innovation" is used to describe the process of gaining and applying new environmental knowledge and experience to design the green products, processes, and services to satisfy the needs of a growing market and demanding client (J. Wang, Xue, & Yang, 2020). Businesses get a competitive edge from this strategy since it is tough to replicate and outperform in the near future (Péra et al., 2019).

H1: Ambidextrous Green Innovation has a positive effect on Competitive advantage

H2: Ambidextrous Green Innovation has a positive effect on green organizational culture

2.4 Organizational green culture

Recent years have seen a considerable rise in the number of environmental movements, and increased environmental awareness has led to the incorporation of ecological practices into the agendas of many organizations (Delmas & Toffel, 2004; Hoffman, 2001). The organizations have been seeking a solution to the following question: "How can we undertake environmental tasks more efficiently? This issue could be answered by the organizational culture that drives the company's strategic decisions (Harris & Crane, 2002; Levy & Marans, 2012). Organizations with a green organizational culture may help to safeguard the environment more (Levy & Marans, 2012; C. H. Wang, 2019; S. Wang et al., 2022). A key factor influencing environmental behaviours is organizational culture. Ecological practices and environmental challenges are shaped by company culture (Delmas & Toffel, 2004; Hoffman, 2001) because culture has the ability to influence the settings that allow for the development of sociocultural discourse (Anuar et al., 2017). Culture exerts a force on individuals, which compels them to act in a manner that is congruent with the cultural norms and expectations. By supporting environmentally responsible business management practices and fostering a culture inside the firm that promotes green values and beliefs, an organization's approach to doing business may be transformed as a result (Benson & Craig, 2014; Poland & Dooris, 2010).

Green innovation strategy needs more than just compliance with legal rules and the judgments of top management on how to improve environmental Performance (Crane, 1997). According to research on corporate culture, common values are essential for developing and putting into practice company plans (Marshall et al., 2015; Salvioni & Almici, 2020; Schönborn et al., 2019). In this respect, companies need to cultivate green organizational culture if they want their

environmental practices to be effective in order to achieve their goals (Schönborn et al., 2019). To protect the environment in an effective manner, environmental activities need to be ingrained in a culture that prioritizes ecological values. Otherwise, the management's and investors' efforts in environmentally sound procedures will be rendered ineffective (Fernández et al., 2010). Therefore, green organizational culture has to be prioritized as essential if an organization is serious about maximizing its positive impact on the environment

Green organizational culture is an emerging area of academic study. As a result, there is no unanimous consensus over the meaning of the term "green organizational culture." However, according to experts, the definitions of traditional organizational culture may be simply modified to describe green corporate culture (Norton et al., 2015). To define green organizational culture, this research uses the reasoning provided above. The definition of the organization's culture is "a set of shared mental assumptions that guide interpretation and action in organizations by defining appropriate behaviour for various situations" (Ravasi & Schultz, 2006). In contrast, a green organizational culture is described as "the pattern of shared basic assumptions about environmental management and environmental problems" (Marshall et al., 2015). The culture of an environmentally conscious company includes things like social stereotypes, shared beliefs, and symbols. Culture in the workplace is intangible, yet valuable, asset that is difficult to replicate. As a result, a green corporate culture could boost a company's competitive advantage. In addition to making environmental policies easier to execute, it also creates a barrier for competing companies. Hence, we propose that

H3: Green organizational culture has a positive effect on Competitive advantage

H4: Green organizational culture mediates the relationship between ambidextrous green innovation and competitive advantage

2.5 Access to finance

Studies have shown that financial management and access to capital play a crucial role in deciding whether or not SMEs will survive and expand (Khan, 2022). Riding et al (2006), state that SMEs have trouble obtaining the credit they need from traditional financial institutions because they lack the necessary business plans, organizational systems, collateral assets, and accountability issues related to business risk management. Access to financing has been highlighted as a crucial issue, not just in developing nations but also in rich ones, in deciding whether or not SMEs succeed or fail. Previous research indicates that having enough access to financial resources is critical for SMEs since this enables them to invest in productive assets and the most recent technologies. Increased access to finance results in increased rates of entrepreneurship, new business development, and overall economic growth (Okello Candiya Bongomin et al., 2017). Credit availability to micro companies fosters economic development in the shadow economy by supporting higher capitalization of the business, producing job possibilities, and promoting long-term income growth (Sutter et al., 2019). State-owned banks provide low-interest loans to promote green technology investments and sustainability initiatives among emerging SMEs, reflecting their commitment to environmental consciousness (Muganyi et al., 2021). These banks play a pivotal role in facilitating environmentally-focused initiatives for SMEs, which in turn contributes to their success and bolsters overall economic growth. Furthermore, it's noteworthy that commercial banks in China place a significant emphasis on the value of green management. Companies that adopt comprehensive green management strategies can access substantially larger lines of credit, further fostering environmentally responsible practices and supporting economic expansion (Muganyi et al., 2021). Providing low-cost loans to financially vulnerable households and expanding access to other sources of capital, utilized for company expansion, may reduce poverty and create jobs (Okello Candiya Bongomin et al., 2017). The studies suggest that the Performance SMEs with greater access to financial resources is superior to those with financial resources hampered by specific problems (Bilal et al., 2022; Dutta & Banerjee, 2018). Therefore, these studies show a link between SMEs' Performance and access to financing.

Despite the increased interest in the notion of GI (J. Wang, Xue, & Yang, 2020; J. Wang, Xue, Sun, et al., 2020) and its connection to firm Performance (Abu Seman et al., 2019), the exact nature of the link between GI and competitive advantage is still ambiguous. Some academics have stated that environmental strategy (GI) is costly and reduces a company's competitive edge (Gürlek & Tuna, 2017). However, some scholars have argued that environmental strategy (GI) aids businesses in meeting consumer needs and improving resource use (Rhou & Singal, 2020). Accordingly, there is a need for a moderating variable to be placed between GI and competitive advantage. Access to finance is used in this current study as a moderating variable between GI and competitive advantage. We suggest

H5: Access to finance has a positive effect on Competitive advantage

H6: Access to finance moderate the relationship between ambidextrous green innovation and

competitive advantage

3 RESEARCH METHOD

A technique, layout, and structure known as a research design are used to address a research problem. Additionally, studies revealed that research methodology is essential for achieving study goals. In order to accomplish research goals and address theoretical and practical issues, it is necessary to use the right analysis techniques (Ali et al., 2019). In order to gather data for the current study, which is quantitative and cross-sectional, respondents were given questionnaires. The target population of this study consists of (the CEO, executive director, director of the environment, operation manager, general manager and procurement manager) working in the manufacturing companies located in China. Purposive random sampling was employed to obtain data for this study because this research focuses on only organizations considering SP. Before distributing questionnaires to participants, a pre-test was conducted. The pre-test was designed to check the variables' validity and consider that the questions on the questionnaire were precise, accurate, and logical. Four individuals were chosen; two had professional experience, and the remaining two were academic experts. The results of the pre-test helped to improve the questionnaire's content. Following a pre-test, researchers gave out questionnaires to participants. Scholars claim that many sample size ranges have varying degrees of strength, such as sample sizes between 51 and 100 being weak, 101 and 200 being adequate, 201 to 300 being good, 500 being very good, and 1,000 being exceptional (Comrey & Lee, 2013). So, this study had a sample size of 550, which exceeded the acceptable range. There was a total of 550 questionnaires given out to managers, and each company received one questionnaire. Several organizations fail to respond because their managers are short on time. So, to address this problem and boost response rates, researchers returned to companies 14 days later. A total of 322 questionnaires were received back, of a possible total of 500. In this study, only 310 of the 322 questionnaires were used for the final analysis because nine contained some misleading values. The demographic breakdown of the respondents is shown in Table 1.

All of the measurements were borrowed from prior research and matched the contextual considerations of study. Closed-ended statements made up the questionnaire, and the replies were scored on a seven-point Likert scale (1 being "strongly disagree" and 7 being "strongly agree"). Access to finance consists of six items. Ambidextrous GI includes two dimensions. It has 8 items, i.e., exploitative GI (4 items) and exploratory GI (4 items) borrowed from (Sun & Sun, 2021). Green culture consists of five items and competitive advantage contains three items.

Table 1 - Demographic Profile

Respondent Profile	Frequency 310	Percentage%
Job Title		
Chief executive officer	55	17.74
Chief strategy officer	63	20.32
Chief financial officer	48	15.48
Production manager	67	21.61
General manager	39	12.59
Purchase manager	38	12.26
Job Experience		
Less than 8 years	53	17.09
8-12	158	50.96
12-15	80	25.80
Over 15 years	19	6.15
Education		
Undergraduate	60	19.35
Graduate	52	16.78
Post-Graduate	136	43.87
Diploma/Professional	62	20.00

4 DATA ANALYSIS AND RESULTS

The research framework (see Fig. 1) is analyzed in this study using partial least squares structural equation modelling (PLS-SEM). In addition, PLS-SEM is especially useful for examining highly complex models' path since covariance-based SEM approaches often cannot estimate them (Ali et al., 2020). The concern of common method variance (CMV) was also resolved by PLS-SEM via VIF collinearity (Kock, 2015). Moreover, this research focuses on examining SP via Ambidextrous GI and Entrepreneurial Finance (Hair et al., 2014), which requires PLS-SEM as a prediction-oriented SEM technique. The SmartPLS 3 software is used in this research to examine the PLS path model. Following (Hair et al., 2014), two steps were used in interpreting the results: a measurement model and a structural model.

4.1 Measurement Model

We evaluate the construct reliability in addition to the convergent and discriminant validity to evaluate the measurement model. First, we examine the construct's composite reliability in order to gauge the construct's overall reliability. As a result of our measurements, we revealed that the composite reliability of the construct ranged from 0.918 to 0.771 (see Table 2), which is higher than the cutoff value of 0.7. Because this value is greater than 0.7, it indicates that constructs are reliable. Second, an analysis of the convergent validity was performed with the help of the average variance extracted (AVE) (Fornell & Larcker, 2018). The results reveal that AVE values for all of the constructs are in the range between 0.691 and 0.551, which is above the criterion of 0.50 and shows that convergent validity is widely acceptable (Hair et al., 2014). The HTMT ratio has been used in this study to examine the discriminant validity, which should have a threshold value of less than 0.85 in order to be considered valid. In accordance with the criterion, it can be seen that the HTMT ratio is lower than 0.85 for each variable presented in Table 3. Consequently, the discriminant validity of the variables is determined to be appropriate for assessing the overall result.

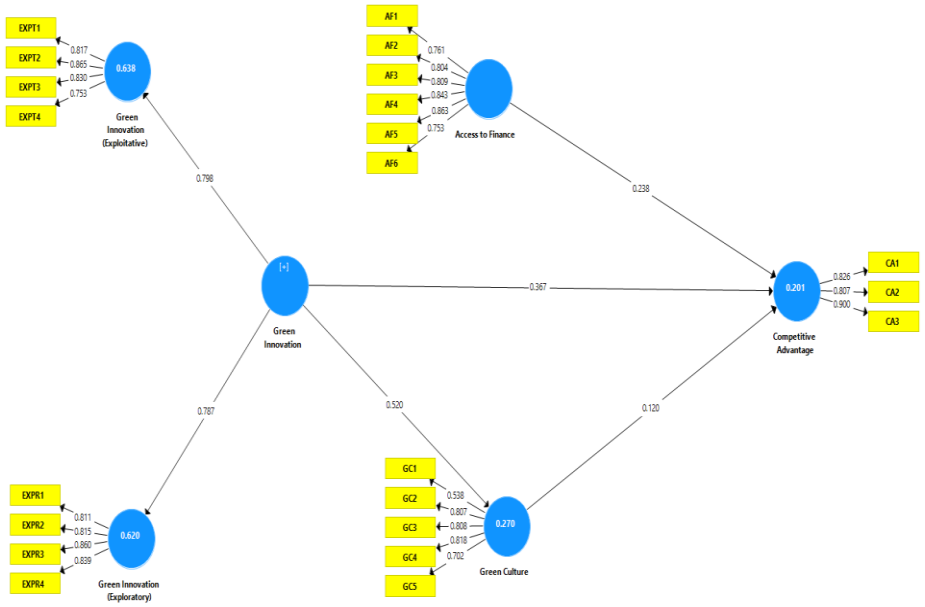

Figure1 - Measurement Model

Table 2 - Factor Loading, Reliability analysis and Convergent Validity

1st order Constructs	2nd Order Constructs	Items	Loadings	CR	AVE
Green Culture		GC1	0.538	0.857	0.551
		GC2	0.807		
		GC3	0.808		
		GC4	0.818		
		GC5	0.702		
Access to Finance		AF1	0.761	0.918	0.652

		AF2	0.804		
		AF3	0.809		
		AF4	0.843		
		AF5	0.863		
		AF6	0.753		
Green innovation (exploitative)		EXPT1	0.817	0.889	0.668
		EXPT2	0.865		
		EXPT3	0.830		
		EXPT4	0.753		
Green innovation (Exploratory)		EXPR1	0.811	0.889	0.691
		EXPR2	0.815		
		EXPR3	0.860		
		EXPR4	0.839		
	Green Innovation	GI-Exploit	0.798	0.772	0.628
		GI-Explora	0.787		
Competitive Advantage		CA1	0.826	0.881	0.652
		CA2	0.807		
		CA3	0.844		

Table 3 - Discriminant Validity- HTMT

	GI-EXPT	AF	CA	GC	GI- EXPR
GI- EXPT					
AF	0.350				
CA	0.146	0.366			
GC	0.762	0.441	0.191		
GI-EXPR	0.295	0.294	0.606	0.246	

4.2 Structural Model

For estimating the structural model, the current study used the technique outlined by researchers (Hair et al., 2014). All variance inflation factor (VIF) scores are much below the threshold of 5. The analysis demonstrates that each predictor exhibits negligible collinearity in the structural model (Hair et al., 2014). After that, researchers find the hypothesized relationship. Based on the results, it has been found that all the hypotheses are accepted. As expected, hypothesis H1 postulated that Green Innovation (GI) significantly and positively influences Organizational Competitive Advantage. The results indicate a significant positive influence ($\beta = 0.367$, $t = 5.820$, $p = 0.000 < 0.05$), consistent with the findings of prior research (Gürlek & Tuna, 2018; Tu & Wu, 2021; C. H. Wang, 2019). Moreover, hypothesis H2 proposed that GI significantly and positively influences Organizational Green Culture. The analysis reveals a significant positive impact ($\beta = 0.520$, $t = 10.555$, $p = 0.000 < 0.05$), in line with previous studies (Abbas & Khan, 2023; S. Wang et al., 2022). Hypothesis H3 suggested that Green Organizational Culture significantly and positively influences Organizational Competitive Advantage, a relationship supported by the data ($\beta = 0.120$, $t = 2.173$, $p = 0.000 < 0.05$), consistent with prior research (Gürlek & Tuna, 2018; C. H. Wang, 2019). Hypothesis H4 proposed that Green Organizational Culture mediates the relationship between Ambidextrous Green Innovation and Competitive Advantage. The results demonstrate significant mediation ($\beta = 0.065$, $t = 2.052$, $p = 0.041 < 0.05$), in accordance with the findings of previous studies (Gürlek & Tuna, 2018; S. Wang et al., 2022). Hypothesis H5 postulated that Access to Finance significantly and positively influences Organizational Competitive Advantage, a relationship supported by the data ($\beta = 0.238$, $t = 4.388$, $p = 0.000 < 0.05$), in line with previous research (Amadasun & Mutezo, 2022). Additionally, Hypothesis H6 investigated the moderating influence of Access to Finance on the

relationship between Ambidextrous Green Innovation and Organizational Competitive Advantage. The analysis reveals significant moderation (β = 0.354, t = 6.779, p = 0.000 < 0.05), in line with prior studies (Amadasun & Mutezo, 2022; Guzmán-Barquet & Guevara-Sánchez, 2023). In addition, hypothesis H6, the interaction impact on ambidextrous GI and organizational competitive advantage, as shown in Figure 3, is employed to investigate the moderating influence of access to finance. The findings show that access to finance moderates the association between ambidextrous GI and organizational CA considerably (β = 0.354, t = 6.779 > 1.64, p 0.05) (Amadasun & Mutezo, 2022; Guzmán-Barquet & Guevara-Sánchez, 2023). This moderation has improved the model's coefficient of determination (i.e., R^2). However, the R^2 value of long-term organizational performance has risen from 0.201 to 0.247. This suggests that the model explains more variance in organizational competitive advantage after including access to finance. Even though the difference between the variations is not particularly substantial, it is still a very important part of studying the moderation impact. Further, in accordance with the general rule of thumb, the R^2 values of organizational competitive advantage (0.201), surpass the minimal value of 0.10 suggested by (Falk & Miller, 1992), which is a sufficient degree of predictability as shown in Table 4. Moreover, researchers have also used the Q^2 test to examine the predictive relevance of the research model. However, results show that the Q^2 value is 0.153, which is more than 0, confirming the models' predictive validity as recommended by (Hair et al., 2014). In addition, the f^2 results presented in table 4 demonstrate that model has a large effect size as recommended by (Cohen, 1988).

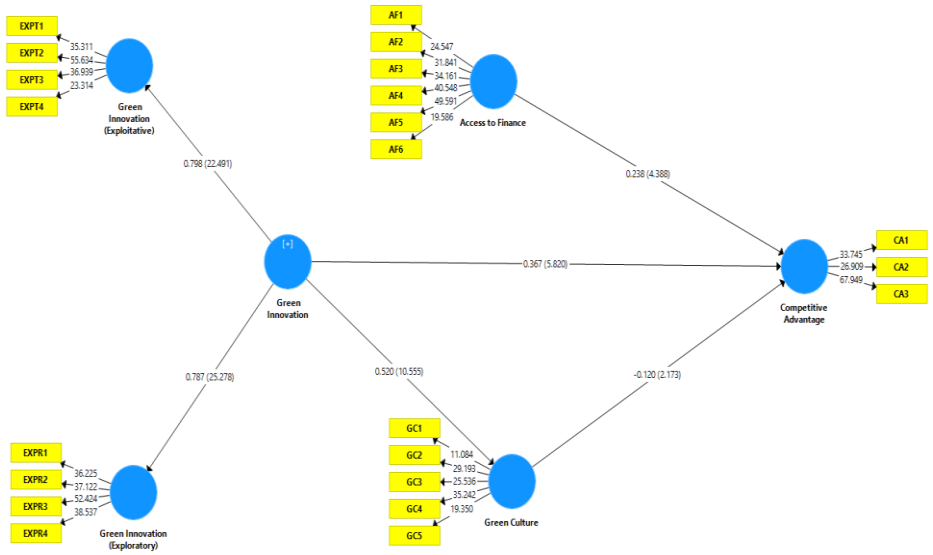

Figure 2 - Structural Model

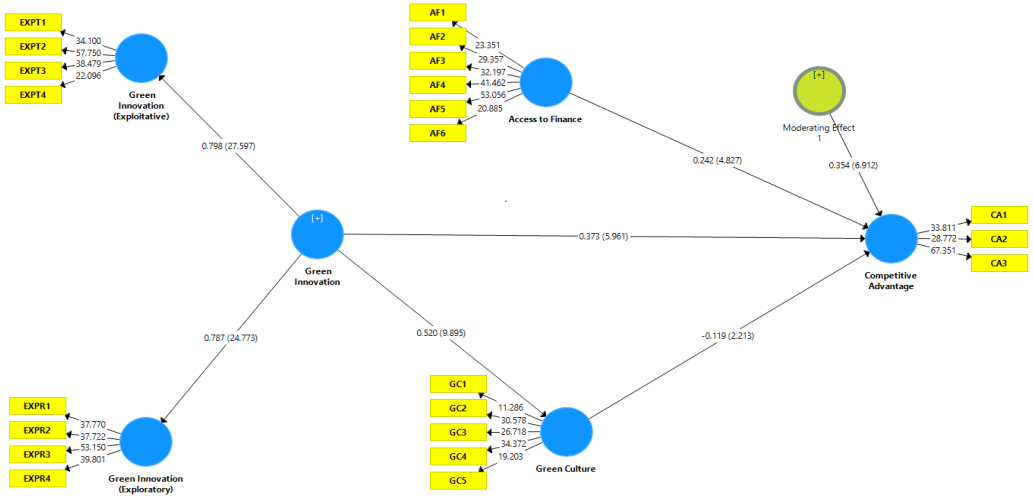

Figure 3 - Moderation effect

Table 4 - Structural Model Results

Hypothesis	Relationship	Path Coefficient	T Value	P Values	Results	R^2	F^2	Q^2
H1	Green Innovation -> organizational competitive advantage	0.367	5.820	0.000	✓	0.201	0.122	0.157
H2	Green Innovation -> organizational green culture	0.520	10.555	0.000	✓		0.372	
H3	Green organizational culture -> organizational competitive advantage	0.120	2.173	0.000	✓		0.012	
H4 Mediation	Green Innovation -> organizational green culture -> organizational competitive advantage	0.065	2.052	0.041	✓			
H5	Access to finance -> organizational competitive advantage	0.238	4.388	0.000	✓		0.057	
H6 Moderation	Green Innovation -> access to finance -> organizational competitive advantage	0.354	6.912	0.000	✓	0.247		

5 DISCUSSION, IMPLICATIONS AND LIMITATIONS OF THE STUDY

5.1 Discussion

The current study employed a multi-faceted theoretical framework, incorporating elements from ambidexterity theory, contingency theory, and the natural resource-based perspective to probe the research questions. The primary objective was to scrutinize the impact of ambidextrous Green Innovation (GI) on the competitive advantage (CA) of manufacturing Small and Medium-sized Enterprises (SMEs), with particular focus on the mediating role of green organizational culture and the moderating influence of access to finance.

Consistent with previous literature (Chae & Olson, 2013; Khattak, 2020; Sun & Sun, 2021; C. H. Wang, 2019), the results of this study affirm a positive and substantial relationship between ambidextrous GI and organizational competitive advantage. It is noteworthy that both exploratory and exploitative dimensions of innovation are significantly influenced by ambidextrous GI. This observation can be attributed to the growing emphasis on addressing environmental degradation in China, prompting industrial firms to adopt a range of environmentally friendly practices. The adoption of ambidextrous GI allows businesses to bolster their investments in green resources, positioning themselves as leaders in the market and standard-setters in the realm of environmentally conscious practices. This finding accentuates the potential of both exploratory and exploitative aspects of innovation in driving competitiveness, especially in the context of environmentally conscious industries.

Furthermore, the study delved into the mediating role of green organizational culture in the connection between green innovation and organizational competitive advantage. It became evident that a robust green organizational culture plays a pivotal role in translating green innovation into a competitive edge. This underscores the significance of not only implementing green initiatives but also fostering an internal culture that values and sustains environmentally conscious practices. Within SMEs, the awareness and commitment of employees to sustainability emerge as significant factors that drive innovation, thereby shaping the organization's competitive advantage.

In addition to these findings, the research extended its focus to the moderating impact of access to finance on the relationship between ambidextrous GI and CA, with a particular emphasis on Chinese SMEs. The analysis, in conjunction with previous research (Anwar et al., 2020; Kerr et al., 2014; Khattak, 2020), revealed that access to finance serves as a crucial moderator in shaping the relationship between ambidextrous GI and CA within Chinese SMEs. This finding complements earlier research outcomes (Fraser et al., 2015), further emphasizing the role of access to finance in the realm of ambidextrous GI and CA in Chinese manufacturing enterprises.

5.2 Theoretical Implications

The current research makes significant contributions to the existing body of knowledge in several key ways. First, it addresses a firm's strategic Green Innovation (GI) plan by adopting a natural resource-based approach and contingency theory. This approach adds depth and nuance to the understanding of how businesses can strategically leverage green innovation in the pursuit of competitive advantage. By grounding the research in these theoretical perspectives, the study provides a robust framework for assessing the complex relationships among GI, competitive advantage, green organizational culture, and access to finance.

Second, this study extends the existing theoretical landscape by utilizing the ambidexterity theory to categorize GI into two distinct dimensions: exploitative and exploratory. This classification offers valuable insights into how businesses can effectively balance short-term objectives with long-term strategic goals through GI management. In contrast to previous categorizations that often limited GI to green product or process innovation, or extended to green management or marketing innovation, this study introduces a more nuanced framework. The division into exploitative and exploratory GI, based on the ambidexterity theory, acknowledges the multifaceted nature of green innovation. It recognizes that developing green products necessitates not only technological innovation but also managerial and marketing innovation. The integration of GI and ambidexterity theory opens up a fresh perspective on the topic, expanding the theoretical foundation and practical applications of ambidexterity theory in the exploration of GI and its successful implementation.

Third, this research clarifies an area of ambiguity in the literature on strategic management by demonstrating the importance of entrepreneurial finance in the context of ambidextrous GI and its role in promoting competitive advantage. This insight showcases the interplay between access to finance, innovation, and competitiveness within the realm of SMEs. By highlighting the value of entrepreneurial finance in driving competitive advantage through ambidextrous GI, the study contributes to the evolving body of knowledge in the field of strategic management.

The theoretical implications of this research are multifaceted and provide valuable insights into the theoretical foundations underpinning green innovation, ambidexterity, and the role of entrepreneurial finance in enhancing competitive advantage. These contributions advance the theoretical landscape and offer a more comprehensive understanding of the dynamics at play in the context of environmentally conscious business practices.

5.3 Practical Implications

The rapid economic expansion witnessed in China has been accompanied by significant resource depletion and environmental degradation. It has become increasingly evident that businesses must incorporate environmental management into their long-term growth strategies to effectively address pressing environmental concerns and adhere to stringent environmental regulations. Enterprise managers are urged to actively consider the integration of environmental policies into their operational frameworks.

One of the key practical implications of this study is the recognition that businesses actively adopting ambidextrous Green Innovation (GI) strategies stand to gain a substantial competitive advantage over those that passively implement ecological policies. This proactive approach allows businesses to seamlessly integrate GI activities into their operations, differentiating themselves from competitors and enhancing their overall environmental efficiency. By reevaluating conventional practices and embracing exploitational GI, businesses can unlock new opportunities

to improve their existing products and services, reduce their environmental footprint, and align with environmental preservation goals. In this context, exploratory GI plays a crucial role in fostering creativity in green management and technology, facilitating the development of new environmentally conscious products and services, and meeting the evolving expectations of environmentally conscious consumers.

However, it is important to acknowledge the unique challenges faced by Small and Medium-sized Enterprises (SMEs), particularly regarding funding constraints that limit their ability to engage in community and environmental initiatives. Given their limited size and internal resources, SMEs often encounter difficulties in securing sufficient financial capital. Consequently, SMEs should place special emphasis on entrepreneurial financing, as it directly influences the social, environmental, and economic outcomes of their businesses. By leveraging innovative financial mechanisms and seeking support from various financial institutions, SMEs can overcome their resource limitations and pursue novel products and initiatives, ultimately contributing to their competitiveness and sustainability.

The practical implications of this research underscore the importance of proactive environmental management and the adoption of ambidextrous GI strategies by businesses. It encourages a shift in mindset towards exploitational GI, the fostering of creativity in green practices, and the active pursuit of environmental objectives. Furthermore, it highlights the significance of entrepreneurial financing for SMEs, offering them the means to overcome financial constraints and engage in environmentally conscious endeavors, thus aligning with broader societal, environmental, and economic goals.

5.4 Limitations and future directions

While this study has yielded valuable insights, it is imperative to acknowledge certain limitations that can guide future research endeavors. The utilization of a cross-sectional survey methodology, although efficient, may introduce biases in establishing causal relationships among the variables. Therefore, future investigations could benefit from the use of longitudinal data and experimental designs to provide a more robust understanding of the causal mechanisms at play. Furthermore, it's worth noting that this study primarily concentrated on the Chinese industrial sector. While the findings offer valuable insights, their generalizability to other countries and industries may be limited. To enhance the external validity of the results, future research could consider a more diverse array of countries and industries, providing a broader perspective on the dynamics of green innovation and its impact on competitive advantage.

With regard to the technology adoption in the manufacturing sector to tackle environmental issues, this presents a promising avenue for future research. Integrating technology adoption as a variable could offer a deeper understanding of its influence on environmental sustainability and its interplay with other factors explored in this study. This serves as a valuable recommendation for future research endeavors, where technology adoption can be analyzed in the context of environmental management and its potential contributions to achieving sustainability goals. Additionally, while the study controlled for various factors, there may still exist exogenous variables that influence the observed relationships. Future investigations should consider a more comprehensive examination of these potential confounding factors to gain a more nuanced understanding of the complex causal relationships involved in green innovation, green organizational culture, access to finance, and competitive advantage. This would contribute to a more holistic comprehension of the intricate dynamics in this context.

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