

MODEL OF THE MEDIATING EFFECT OF GREEN INNOVATION STRATEGY BETWEEN TECHNICAL INNOVATION AND INNOVATION PERFORMANCE

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ABSTRACT

Innovation performance is subordinate belong to a multidimensional open concept, there is no unified standard about the definition of innovation performance concept and degree content system. The current conceptual definition of innovation performance generally has three major categories such as outcome perspective, capability perspective, and behavior perspective, among which the latter two categories are used to make up for the deficiency of single performance outcome. The objectives of this research were to develop a model of the mediating effect of green innovation strategy between technical innovation and innovation performance. This research utilized mixed research methods combining quantitative and qualitative methods. Research paper that has constructed a model of relationship among technical innovation, green innovation strategic, and Innovation performance. At the same time, the mediating role of green innovation strategic and Innovation performance is analyzed. This study can provide a theoretical explanation for the nature of small business explosion phenomenon and provide relevant stakeholders of small business with empirical evidence of the driving factors for the popularity of small business and how to enhance marketing strategic influence on strategic decisions which were not available to them before.

Keywords: Green innovation strategy; Technical innovation; Innovation performance

INTRODUCTION

Since innovation and performance to which innovation performance is subordinate belong to a multidimensional open concept, there is no unified standard about the definition of innovation performance concept and degree content system. The current conceptual definition of innovation performance generally has three major categories such as outcome perspective, capability perspective, and behavior perspective, among which the latter two categories are used to make up for the deficiency of single performance outcome. Currently there is no uniform definition of innovation performance, but in terms of the research purpose and factors of individual innovation performance and other research objects, there are generally two types of definitions: one is the product definition, and the other is the process definition. Amabile (1983) proposed the first definition of innovative performance, namely, a consistent definition of innovative rating, in which Amabile argued that the level of innovative ability is reflected in whether an individual creates a novel and socially valuable product, and that innovative outcomes can be either small improvements in work plans or product processes or major breakthroughs in research theory or technology. This suggests that innovation outcomes are diverse and hierarchical. Subsequently, researchers have developed leading definitions to argue that innovation performance is the production of a unique and useful product or service. Gruber and Wallace et al. (1999) state that innovative work includes novelty and value, and that innovative products should be new and assigned value. Lumsden (1988) argues that innovative performance is the ability to come up with something that is perceived as novel and meaningful, that this process of innovation can exhibit certain mental models, and that innovative performance should include certain personality and intellectual characteristics that

individuals exhibit. Argues that one of the distinguishing characteristics of the outcome of innovation performance is novelty, while usefulness, appropriateness, or social value is another characteristic that characterizes innovation performance as novel and valuable. This suggests that innovation outcomes are an important reference indicator of the level of innovation capability. The definition emphasizes that innovative outcomes are produced by individuals in the process of practice, which suggests that teachers should not only focus on the quality of learners' innovative outcomes, but also observe the process of learners' innovation.

By combining the different perspectives mentioned above, two typical defining characteristics of innovation performance can be found to be uniqueness and usefulness. Uniqueness means that it is unusual and new in comparison with others in the cross-section; usefulness means that it has value and is meaningful for the development of the country, society, and individuals. At the same time, most scholars agree that innovative performance is the result of an individual's innovative activities and his or her ability to solve problems routinely. There are two important and observable research perspectives on innovative performance - the internal and external output results of people, and thus performance is measured both in terms of external things such as external products or services, and internal qualities such as motivation, personality, and thinking such as the internal operation of creative thinking.

Companies adopting an active environmental strategy need to rely on innovative commercialization activities or outputs in order to obtain differentiated competitive advantages. Some scholars believe that innovation is "the first use of technology, strategy or management practice of the company, or the major restructuring or process improvement of the enterprise". When this concept is introduced into the field of green and environmental protection, roughly synonymous concepts such as green innovation, sustainable innovation, environmental innovation, and ecological innovation are derived. and related research. Essentially, green innovation is a knowledge-intensive, high-risk business activity that can help companies achieve significant improvements in economic, environmental, and operational benefits (Dai et al., 2017). Scholars still have different understandings of the connotation and definition of green innovation. Chen et al. (2006) believe that green innovation refers to the improvement of enterprise hardware or software in terms of green products or green processes, which may include the development of some new technologies to save energy, reduce pollution, increase waste recycling rates, and design green innovative products or Development of beneficial environmental management practices, etc. Some scholars have further expanded the scope of green innovation, defining it as any innovation that can improve the environmental performance of an enterprise in its production and operation activities (Aboelmaged, 2018), or the innovation object is not limited to products and processes, but also It can be service innovation or business model innovation that can bring lower negative externalities. But in general, green innovation refers to the innovation activities carried out by enterprises in terms of products and processes to reduce the negative impact of their business activities on the environment. It helps enterprises to shape their competitive advantages and achieve sustainable development in the context of green development. is of great significance. Based on this, this section expounds and summarizes related concepts and existing research results on environmental strategy, forward-looking environmental strategy, and green innovation, laying a good foundation for further understanding of green innovation strategy and related research on green innovation strategy.

Innovation management (IM) is based on ideas developed in the 1930s by the Austrian economist Joseph Schumpeter, who argued that innovation was an important factor in economic growth. Innovation management is the innovation process of portfolio management, change management. It mainly includes product, business process, marketing, and organizational innovation. Innovation management can promote enterprises to obtain long-term benefits through existing or newly invented technologies and can also promote enterprises to improve efficiency by meeting customer needs. Nowadays, the academic community generally agrees that the customer plays a more active role in the innovation management process. Customer management research has become an important research direction in the field of innovation management.

OBJECTIVE

To development model of the mediating effect of green innovation strategy between technical innovation and innovation performance

LITERATURE REVIEW

Green innovation

With the international and domestic society's advocacy of green and sustainable development for enterprises, domestic and foreign scholars. More and more attention has been paid to the green innovation strategy that brings competitive advantage and performance improvement to the industry, but the academic circle has not yet formed a broad consensus on the connotation of green innovation strategy. According to existing research, scholars also refer to green innovation strategy as environmental innovation strategy, sustainable innovation strategy and ecological innovation strategy.

It can be concluded that research on green innovation strategies has only begun to flourish in recent years. Different scholars define the connotation of green innovation strategy differently, but they generally believe that green innovation strategy is based on the consideration of environmental protection and sustainable development of enterprises, and managers try to reduce the impact of enterprise production practices on the environment through green production and operation behaviors. The negative impact of strategic choices. Although scholars have defined the connotation of green innovation strategy from different perspectives, at present, green innovation strategy has not yet formed a definition widely recognized by the academic community. Through sorting out and summarizing the existing research content, this study believes that the green innovation strategy emphasizes that enterprises can reduce the negative impact of production practices on the environment through innovative means and methods, and try to integrate new knowledge, new technology or new management. In terms of methods and other aspects, it creates new profit points and differentiated competitive advantages for enterprises. Therefore, this paper integrates the related research on environmental strategy, forward-looking environmental strategy, green innovation, and green innovation strategy, and draws lessons from scholars such as Eiadat et al. (2008), Tomomi (2010), Zhang Gang and Zhang Xiaojun (2014), Chen et al. (2006). From the point of view, the green innovation strategy is defined as a kind of green innovation in products and processes to weaken the adverse impact of enterprise production and operation practices on the environment, bring unique competitive advantages and profitability to enterprises, and realize sustainable development of enterprises active environmental strategy.

Technical innovation

Definition of technical innovation

Schumpeter (1912) pioneered the concept of innovation in his book "The Theory of Economic Development." He classified innovation into five cases: the introduction of a new product, the adoption of a new production method, the opening of a new market, the acquisition of new sources of supply for raw materials or intermediate goods, and the establishment of a new industrial organization. He believed that the essence of technical innovation lies in the recombination of production factors. Subsequently, different scholars have further enriched the connotation of technical innovation. Enos (1962) first explicitly defined Technical innovation, stating that it is "the result of a combination of several different activities, generally including the manufacture and certification of new inventions, obtaining funding,

establishing factories, employing managers and workers, market development, and production and distribution." Freeman (1973) defined Technical innovation in his article "Success and Failure in Industrial Innovation" as "the whole process of technology, process, and commercialization, which leads to the realization of new products in the market and the commercial application of new technological processes and equipment."

Although Technical innovation has received extensive attention and research by scholars, there is still no unified view on the concept of technical innovation. Based on an analysis of over 300 literature sources on Technical innovation, Mueser (1985), an American scholar, proposed his own understanding of Technical innovation, highlighting two aspects: novelty of the concept and successful implementation. He believed that technical innovation is a series of meaningful discontinuous events. Liu (1993) defined Technical innovation as activities related to the first commercial application of new products, new process techniques, or equipment, including product innovation, process innovation, and diffusion. Process innovation, also known as process technology innovation, refers to the transformation of production technology. Product innovation refers to the commercialization of products with technological changes. Fu (2000) provided a new definition of Technical innovation in his article, stating that it refers to the means by which companies explore and utilize potential business opportunities in the market through Technical innovation. It involves the recombination of old production methods, resulting in a new system that is more efficient and profitable. However, its essence is for commercial profit, achieved by reducing production costs, improving work efficiency, opening new markets, and supplying new materials to new companies, which is the embodiment of the commercialization process of technical innovation. Ren (2018) believes that technical innovation is a complete process from innovation input to the commercialization of new products. This "process perspective" suggests that the content of technical innovation should include the research and formation process of new inventions and creations, as well as the application and implementation process. The process of commercializing new technological achievements should also be included. Qiao (2021) argues that Technical innovation should encompass a series of creative activities, including basic scientific research, technological experimentation and application, and business practices. It is not just a technical means but also an application oriented towards the market, and it should be viewed from an "economic perspective" and an "industrial perspective." Chege et al. (2020) suggest that Technical innovation includes various creative aspects such as the introduction of new processes, new products, or new services; research and development investments; and technological progress. Bu (2021), from the perspective of tourism products, defines Technical innovation as the identification and development of new products to meet market demands. It refers to a new item or service that is perceived by the market. Innovation forms are not limited to tangible objects but also include intangible services. Du (2021) views Technical innovation from a product perspective, stating that it is the subjective judgment of consumers that a particular product is distinguished.

Based on the above analysis, the concept of technical innovation can be traced back to the early 20th century. Through a review of previous literature, it is evident that the formation of the concept of

technical innovation has undergone a lengthy process. Despite extensive research by scholars from various perspectives, there is still no unified view on the concept of technical innovation. Based on the research conducted in this article, technical innovation is defined as the process of identifying and developing new products to meet market demands. It involves the reorganization of production conditions and factors in practical production activities, as well as the creative application of knowledge, experience, and skills accumulated through scientific experimentation and production processes. This process encompasses product innovation, process innovation.

Dimensions of technical innovation

According to different criteria and dimensions, technical innovation can be classified into different types. Based on the intensity of innovation, Freeman & Soete(1997) creatively divided technical innovation into incremental and radical innovation. Building upon this, Christensen & Rosenbloom (1995) elaborated on the differences between these two types and traditional innovation in terms of "value system change." Li Aimei (2019), in her study on the impact of different types of product innovation on consumers' willingness to share content and engage in cooperative innovation, also categorized technical innovation into incremental and radical innovation. Tushman & Nadler(1986) approached technical innovation from the perspective of enterprise products and proposed that it includes both product innovation and process innovation. Since then, more and more scholars have divided technical innovation into product innovation and process innovation (Yang, 2021; Han, 2017; Zhang, 2021). Fu (1993) classified technical innovation into three types: independent innovation, collaborative innovation, and imitative innovation, based on the different subjects of technical innovation within enterprises. Zhang et al. (2010) argued from the perspective of the connotation and extension of technical innovation that, in addition to the development of new products or processes, technical innovation should also encompass changes in organization and market. Fang (2021), in his exploration of the impact of technical innovation on the quality of export products in Guangdong Province's manufacturing industry, divided technical innovation into the dimensions of product innovation, process (technological) innovation, market innovation, organizational innovation, and institutional innovation. Chege et al. (2020), in their discussion of the influence of technical innovation on the performance of small and medium-sized enterprises in the context of sustainable environmental practices in Kenya, included three aspects: product innovation, process innovation, and market innovation. This article has compiled various scholars' classifications of the dimensions and types of technical innovation.

In summary, numerous scholars from various fields and perspectives have discussed the connotations and dimensions of technical innovation, affirming the "process view" of technical innovation. This "process innovation" specifically involves significant changes in technology, equipment, or software. The intensifying market competition drives equipment manufacturing companies to continuously update their products. How to achieve product innovation has attracted increasing attention, and technical innovation is closely related to product innovation, process innovation, and market innovation. Narrowly defined technical innovation refers to technical innovation that includes product and process innovation. However, the broader perspective suggests that it should also include management innovations such as market, policy, and institutional changes. Considering the focus of this study in the field of marketing, the main references would be Chege & Wang (2020), Zhang

et al. (2010), and Fang (2021), who argue that technical innovation encompasses product innovation, process innovation, and market innovation.

Innovation Performance

In the era of the knowledge explosion, innovation means staying competitive, and innovation performance becomes a representation of the outcome of innovation and is increasingly valued by knowledge-intensive team organizations. Amabile, Nystrom (1993), and others have argued that individual innovation performance is the basis for embodying the ability to generate innovation and actual innovation. Existing research has been conducted on the individual innovation characteristics of individuals, as well as the contextual factors that enhance innovation, and the interaction between the two.

Definition of Innovation Performance Measurement

Existing studies have concluded that innovation performance focuses on two core characteristics, uniqueness and usefulness, and therefore, there are various measurement theories developed around these two characteristics. Min-Yang Han (2014) identified knowledge traits, thinking traits, personality traits, and behavioral traits as the four sub-dimensions of innovation capability. Jihong Xu (2016) argued that innovation capability includes a common element of innovative personality, knowledge structure, innovative thinking, and innovative practice.

This study agrees with the implicit and explicit theories about Amabile innovation, and innovation performance measurement should be divided into two major parts: explicit performance (i.e., innovation outcomes) and implicit performance (innovation motivation, innovation personality, and innovation thinking).

Motivation for innovation

The most indispensable factor for achieving the quality of an individual's innovative performance is a strong motivation to innovate, which is the source of motivation and the basis for the implicit part of innovative performance. According to Amabile's (1997) theory, innovation motivation is measured in two categories: internal motivation and external motivation; Amabile suggests that internal motivation should reflect the degree to which an individual focuses on the original challenge of the job and derives self-drive from it, while external motivation should reflect the fact that an individual engages in a job mainly to achieve some purpose other than the job, such as reward, gaining external satisfaction, etc., which is more The focus on external motivation, praise, is oriented to the outside of the job. Thus, internal motivation to innovate has been considered as a personality trait that contributes to the development of innovation, while external motivation is an incentive to innovate, which indirectly enhances internal motivation to innovate and thus drives up the level of performance. Internationally, the measurement of innovation motivation commonly utilizes the Job Preference Scale developed by Amabile et al. This scale facilitates the identification of intrinsic and extrinsic motivation characteristics, including intrinsic motivation such as curiosity, self-determination, commitment to the task, competence, pleasure, and interest, and extrinsic motivation such as evaluation, concern for competence, expectation of specific inducements, expectation of recognition, and external constraints. This study agrees with Amabile's theory on the categorical measurement of innovation motivation, and measures innovation motivation into two aspects: internal innovation motivation and external innovation motivation. Since the research subjects are college students, their identities are different from those of the Amabile Job Preference Scale, and different from those of full-time workers, combining the identity characteristics of school students and the Chinese university context, the internal motivation and external rational matching should be the question items of the Job Preference Scale were modified by deletion.

Innovative personality

Innovative personality, also known as innovative personality, is an important personal attribute of an individual for high innovative performance to function successfully, including self-efficacy. It corresponds to Creativity-Relevant Processes in Amabile's Componential Theory of Creativity. Existing research on the theory of innovative personality is divided into two main branches: one branch is under

the presence theory, which considers innovative behavior as a product of the interaction between personality and environment, to divide innovative personality into two parts: personality and environment; the other is based on the affective domain, which argues that innovation requires a great deal of total commitment, great cost and effort, and responsibility (Pervin & John, 1999). In research measurements, innovative personality is measured in four areas: thinking flexibility, drive, ambition, achievement motivation, and social traits such as assertiveness, arrogance, hostility, self-confidence, autonomy, introversion, and independence (Bland et al., 2006). In China, it has been suggested that for students, innovative individuals should consist of five elements such as curiosity, challenging, exploratory, willpower, and self-belief (Shen, 2005).

To gain a comprehensive understanding of the factors that contribute to innovation, it's important to go beyond an individual's psychological perceptions of their social environment and consider their personal characteristics. Each person may have a different approach to the same social environment or event, which can affect their creativity and training outcomes. These differences can be attributed to unique creative traits and expressions among individuals. Therefore, it's reasonable to assume that the same social environment or event may yield significantly different outcomes depending on the orientation of the individuals involved (Hennessey & Amabile, 1988). Individual orientation is also strongly linked to the outcomes or products of creative performance and training (Besemer & O'Quin, 1987). To establish a relationship between creative performance and college students, it's essential to consider not only their creative personality but also traits such as teamwork and determination.

Innovative thinking

Innovative thinking is the reflection of innovation in the development of thinking, which is the core element of the implicit part of the innovative performance of college students, reflecting the process of advanced integrated activities of thinking in which college students break the constraints of thinking and seek new solutions to problems on the basis of existing knowledge. The Guilford theory, which has a great influence in the field of thinking, believes that the measurement of innovative thinking can be divided into two dimensions: divergent thinking and convergent thinking, divergent thinking generally consists of imaginative thinking and intuitive thinking, which reflects the intuitive perception of individuals without relying on definite logical reasoning, and intuitive thinking mainly reflects personal insight and understanding of things; convergent thinking is based on logical thinking and focuses on the relationship between things. Convergent thinking is based on logical thinking, focusing on the disconnectedness of things, focusing on problem solving, and is a kind of convergent thinking with organization and scope. In contrast, Chinese scholars (Guiqing Qian, 2008) and others believe that innovative thinking should be composed of logical thinking, non-logical thinking and inspiration. Logical thinking, also known as abstract thinking, reflects the use of traditional formal logic rules, the information obtained from perceptual cognition into abstract concepts, reasoning in accordance with certain logical relationships to form a new cognitive thinking ability; non-logical thinking, also known as image thinking, mainly reflects the individual's inner mental activity, from information processing, representation, intuition, imagination and other thinking ability to grasp and understand the essence of the object from the image; inspiration also called epiphany, reflects the individual's brain in a sudden whim, suddenly find a new way to solve the problem thinking ability.

High-quality and productive thinking is commonly referred to as creative thinking, which plays a vital role in our lives (Paul & Elder, 2019). As noted by Hadar and Tirosh (2019), creative thinking involves the capacity to generate novel ideas or solutions while problem-solving. According to Munandar (2004), the traits of creative thinking comprise of (1) fluency, which encompasses the ability to generate ideas, solve problems, and provide answers to questions; (2) flexibility, which involves the capacity to produce multiple ideas, answers, and solution strategies; (3) originality, which pertains to the ability to think in unconventional ways to generate unique and innovative expressions; and (4) elaboration, which involves the ability to refine and enrich ideas, making them more fascinating and detailed.

This study starts from the localization of innovative thinking, combines the development characteristics of college students' own thinking, and agrees with Qian Guiqing et al. (2008) that the development of innovative thinking of graduate students should be based on the comprehensive development of all thinking in the Chinese university context, about the innovative thinking measurement from two aspects of problem identification and problem solving, while adding the thinking performance of college students when they encounter academic difficulties, such as calmness, etc. .

Innovation Achievement

Innovation outcomes are the ultimate external results of college students' innovation performance and the most directly observable measurement indicators to the outside world.

McCloy's (1983) systems theory argues that the evaluation of innovative things that exist in various forms such as ideas, products, algorithms, etc. must be marked by social evaluation, and the lack of a certain social evaluation makes it impossible to distinguish between weirdness and innovation. For college students, innovation achievements are novel products or services with value that will be produced in the daily study and research process of scientific research or competition teams. Any creative ideas, services and products, etc. produced in these academic activities must be expressed through certain words or things and need to be evaluated by peer experts in this discipline in order to determine their social value and innovation. At present, domestic universities generally consider innovation competitions, cases, academic papers, conference publications, etc. as important indicators of whether innovation performance is achieved for college students' innovation achievements.

Therefore, this study agrees with McCloy's system theory that the innovation performance level of college students should have a certain output of knowledge results, and for the innovation results of outward performance need to obtain peer evaluation of innovative ideas, products or services that have social value, and combine with the actual situation of Chinese universities, focus on measuring the ability to conduct peer-reviewed competition activities of innovative nature award-winning academic papers published, conference reports The focus is on the publication of academic papers, conference presentations, etc. that can be peer-reviewed for innovative competition activities.

Development of Hypothesis

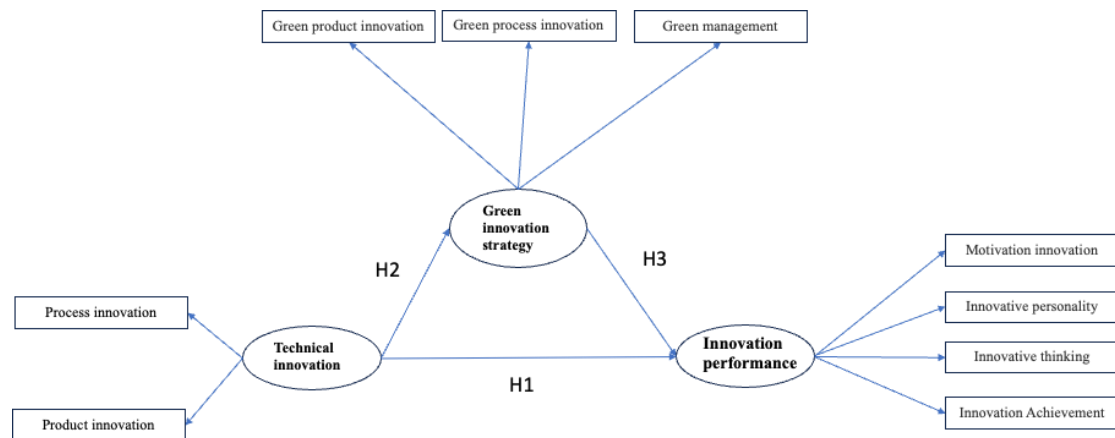
From a review of the literature and related research, the importance of the variables can be summarized as follows. The independent variable was found to measure the level of technical innovation. There are 2 indicators: 1. Process innovation, 2. Product innovation, that leads to studying the level of technical innovation from all 2 measures. The mediating variable was found to measure the level of green innovation strategic. There are 3 indicators: 1. Green product innovation, 2. Green process innovation, 3. Green management that leads to studying the level of green innovation strategic from all 2 measures. The dependent variable was found to measure the level of Innovation performance. There are 4 indicators: 1. Motivation innovation, 2. Innovative personality, 3. Innovative thinking, 4. Innovation Achievement, that leads to studying the level of Innovation performance from all 4 measures. In summary, the measures for every variable are 9 dimensions. The hypothesis development is as follows:

Hypothesis 1: Technical innovation positively influences Innovation performance.

Hypothesis 2: Technical innovation positively influences green innovation strategic.

Hypothesis 3: Green innovation strategic positively influences Innovation performance.

The overall research hypothesis framework is shown in Figure 1.

Figure 1**Overall Research Hypothesis Framework Diagram**

METHODOLOGY

Research Approach-Quantitative and Qualitative Mixed

This research is mixed research between quantitative research and qualitative research which can be described as follows:

For quantitative research, this research conducted data collection by using questionnaires on Independent Variables Technical innovation (1. Process innovation, 2. Product innovation), Mediating Variable Green innovation strategic (1. Green product innovation, 2. Green process innovation, 3. Green management), and Dependent Variable Innovation performance (1. Motivation innovation, 2. Innovative personality, 3. Innovative thinking, 4. Innovation Achievement). To use the collected data to analyze the Structural Equation Modeling (SEM) and statistical data analysis.

CONCLUSION

This is the first empirical research paper that has constructed a model of relationship among Technical innovation, Green innovation strategic, and Innovation performance. At the same time, the mediating role of Green innovation strategic and Innovation performance is analyzed. This study can provide a theoretical explanation for the nature of small business explosion phenomenon, and provide relevant stakeholders of small business with empirical evidence of the driving factors for the popularity of small business and how to enhance marketing strategic influence on strategic decisions which were not available to them before.

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