The Influence of External Knowledge Searches on Enterprises’ Innovation Performance: A Meta-Analysis

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Abstract: Innovation is one aspect of the pursuit of the harmonious development of the environment, economy, and society. Although prior research has examined the factors that influence corporate innovation, how external knowledge search affects it remains unclear. We contribute to this literature by examining how knowledge searches influence firms’ innovation performance from a knowledge-based point of view and organizational search theory. We utilized meta-analysis to conduct empirical testing on 15,059 samples from 58 independent studies. The conclusions are as follows: first, the overall test showed a significant positive correlation between external knowledge search and firm innovation performance; second, the group test shows that the positive impact of external knowledge search on the innovation performance of mature enterprises is more obvious; scaled measurement and collectivism have more significant influences on the relationship between external knowledge search and firm innovation performance. Further research concluded that a breadth search could provide higher innovation performance than a depth search. Meanwhile, the same results were obtained in the subgroup tests of start-ups, non-high-tech enterprises, high-tech enterprises, scale measurement, and collectivism. Finally, both balanced knowledge search and joint knowledge searches significantly improved the innovation performance of enterprises, and the innovation effect brought by balanced knowledge search is more prominent than the latter.

Keywords: knowledge search; knowledge search breadth; knowledge search depth; enterprise innovation performance; economic sustainability; meta-analysis

1. Introduction

Although many studies have focused on environmental sustainability in recent years, economic sustainability is equally important for social development [1–3]. Economic sustainability emphasizes balancing economic development and natural resources, social well-being, and ecosystems [1,3]. Many studies have emphasized the importance of innovation for economic sustainability [4,5]. “Innovation is at the heart of creating sustainable human societies. As a society, we will not succeed in creating a sustainable world if we simply focus on doing what we currently do more efficiently”, as stated in a report published by the World Business Council for Sustainable Development [6]. Therefore, the innovation-driven development strategy has become an inevitable choice for enterprises in the contemporary era to achieve sustainable economic development [7].

Innovation is essentially the process of the accumulation, absorption, and commercialization of knowledge inside and outside an organization [8]. Innovation is not only inseparable from the background of an open context, but also requires the continuous integration and utilization of the world’s most advanced knowledge resources. Firms’ reliance on external knowledge resources is increasingly important to maintain a sustai-
ble competitive advantage in current markets [4,9]. However, the answer to how enterprises can better take advantage of external knowledge resources to promote innovation and sustainable economic development remains ambiguous.

Nelson and Winter [10] put forward the concept of “knowledge search”, which has gradually been further regarded as a path to improve the innovation ability of enterprises and achieve sustainable economic development. The prior literature on the relationship between external knowledge searches and enterprise innovation performance in economic sustainability has increased based on four viewpoints. First, there is a significant positive correlation between external knowledge searches and enterprise innovation performance [10]. For example, enterprises integrate external knowledge resources through search behaviors, break through the limitations of internal knowledge resources, and use the complementary role of internal and external knowledge to accelerate the process of product innovation, cultivating their own scientific and technological competitiveness, building their core competitive advantages, and promoting economic sustainability. Second, there is a significant negative correlation between external knowledge searches and firm innovation performance. Some scholars consider that searching, integrating, and utilizing external knowledge requires considerable organizational resources, which is not conducive to the realization of enterprise innovation and economic sustainability [11]. Third, there is a significant inverted U-shaped relationship between external knowledge searches and firm innovation performance. Although a knowledge search improves the innovation performance of enterprises in the initial stage, too deep a knowledge search in the later stage the improvements in enterprise innovation performance and affects economic sustainability [12,13]. Additionally, there is a significant positive U-shaped relationship between external knowledge search and firm innovation performance. External knowledge searches require a considerable investment of time. The increased searching costs will have a crowding-out effect on corporate innovation and reduce corporate innovation performance. However, with the deepening of knowledge searches in the later period, the ability of enterprises to identify valuable knowledge has been improved, thereby improving the innovation performance of enterprises and contributing to economic sustainability [14].

Some studies attribute the different results to the difference in selecting indicators when measuring the relationship between external knowledge searches and innovation performance, but ignore the influence of situational factors, such as enterprise characteristics, industry characteristics, variable measurement methods, and cultural differences. In addition, traditional qualitative literature research is not conducive to integrated analyses of the research results of different papers, nor is it possible to quantitatively compare the previous research. Furthermore, it is highly subjective when selecting the literature to be analyzed, which is prone to bias. It is even more challenging to compare the heterogeneity of the relationship between external knowledge searches and corporate innovation performance in different contexts.

A meta-analysis was proposed by Olkin [15], quantitatively synthesizing independent studies with a common research theme, and the research results can more comprehensively reflect the overall research situation in a specific field. The method has a rigorous operation process and can obtain accurate statistical analysis results; therefore, it is generally accepted by scholars and is widely used in medicine, psychology, management, and other fields. The method has two advantages: one is its ability to re-analyze multiple results of the previous literature through systematic coding to obtain the average effect size; second, it can clarify the contribution of previous research and identify the impact of contextual factors that lead to differences in results. It can also reveal the general laws contained in the research across different backgrounds, regional cultures, and other factors, and can even provide new perspectives and insights for future research.

Thereby, to further reveal the relationship between external knowledge searches and enterprises’ innovation in the context of economic sustainability, we took three steps to
resolve the issue. First, we performed integrated research on the relationship between external knowledge searches and enterprise innovation in economic sustainability using the meta binary method. Second, we conducted further meta-regression analysis to clarify the impact of many contextual variables on the relationship between external knowledge searches and corporate innovation performance in economic sustainability, which helped to explain the inconsistency of existing conclusions in the literature. Third, we verified the relationship between external knowledge searches and firm innovation performance. Simultaneously, we further verified the relationship between the ambiguity of external knowledge searches and corporate innovation performance. Finally, we answered the question as to what types of search activities are better for innovation performance by different firms.

The theoretical contributions of this paper are as follows: First, this paper helps to resolve disputes in the existing literature and clarifies the causal link between external knowledge searches and firm innovation performance in the context of economic sustainability, making up for the deficiencies of the traditional qualitative literature research method and expands the quantitative literature on the relationship. Meanwhile, it provides further verification for enterprises to make use of a knowledge-based view and organizational search theory to improve enterprise innovation performance and achieve economic sustainability; Second, we exploited the meta-regression method to conduct a comprehensive study on the reasons for the differences in the conclusions of the existing literature. This method has played a role in revealing the contextual impact of the relationship between external knowledge search and firm innovation performance in the context of economic sustainability; Last but not least, we discovered that a breadth search could provide higher innovation performance than a depth search; both a balanced knowledge search and joint knowledge search significantly improve the innovation performance of enterprises, and the innovation effect brought by balanced knowledge search is more prominent than the latter.

2. Theory and Hypothesis

2.1. Conceptual Background

The concept of sustainability stems from the overexploitation of natural resources and the continuous degradation of the environment. Sustainability was defined as: “Development that meets the needs of current generations without compromising the ability of future generations to meet their needs and aspirations“ by the Brundtland Commission in 1987 [3]. Sustainable development proposes to deal with the environmental pollution and resource consumption caused by industrial economic growth. With the advancement in research, the concept of sustainable development has expanded from the field of the environment to the economy and society [1–3]. Economic sustainability emphasizes the balanced development of economic growth and natural resources, social well-being, and ecosystems [1]. It has been recognized as the ability to create new resources to compensate for the lack of production factors, replace old assets, and increase new investments to maintain long-term competitive advantage [3].

Innovation has been defined as: “a new or improved product or process (or a combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)” [16]. A growing body of research suggests that promoting corporate innovation is a key mechanism for achieving economic sustainability [3,5,9,17–19]. For example, Kuzma et al. [9] investigated the impact of innovation on organizational sustainability through a meta-analytical approach and concluded that innovation has a significant positive impact on sustainability performance. Maier et al. [3] explored the impact of innovation on sustainability through a bibliometric approach. Their research shows a significant increase in the literature on innovation and sustainable development published between 2010 and 2019. They argued that an increase in the literature on innovation research in the
context of sustainability comes from the pressure of economic globalization on the survival of organizations, which forces organizations to find new ways of survival [3]. In this case, innovation is a good solution.

Innovation is extremely important for promoting sustainable economic development; however, two other issues are also crucial for understanding enterprises’ innovation in sustainable development. The first question is, how do we assess whether a company’s innovation activities are good or bad? The second problem is, what are the main factors that affect the quality of innovation activities of enterprises?

For the first issue, many researchers use the performance of enterprises’ innovation to evaluate the efficiency and effectiveness of ingenuity. Enterprise innovation performance is an evaluation of the efficiency and effect of innovation activities realized by enterprises through their innovation and cooperative innovation with other enterprises [20, 21]. Regarding the second question, some scholars visualized that we should choose appropriate policies to promote firm innovation, to solve the contradiction between economic and environmentally sustainable development. For example, Mytelka and Smith [22] argued that market failure and institutional factors are the reasons for the failure of enterprise innovation. The “national innovation system” could be improved by issuing policies that support industry–university–research collaboration and training to achieve sustainable economic and social development [5]. Fagerberg [18] concluded that current theorizing and knowledge bases in innovation studies may be given greater significance when designing policies for addressing climate change and sustainable impacts.

Furthermore, what are the pivotal factors that affect the innovation performance of enterprises? The knowledge-based view assumes that knowledge is an organization’s most important strategic resource and is of great significance to the firm’s innovation performance and the acquisition of sustainable competitive advantages [23]. Laursen and Salter [11] argue that knowledge exists both inside and outside an organization. Thus, external knowledge refers to knowledge sources outside an organization. Thus, external knowledge is divided into four categories and 16 types, namely, market knowledge, including equipment, materials, components and software suppliers, customers, competitors, consultants, commercial laboratories or R&D organizations; institutional knowledge, including universities, government research institutions, other public service departments, private research institutions, etc.; knowledge of norms and standards, including technical standards, health and safety standards, environmental standards, etc.; and other types of knowledge, including professional conferences, chambers of commerce, industry publications, exhibitions, etc. How does external knowledge affect firm innovation performance? Nelson and Winter [10] argue that corporate innovation is an evolutionary process involving changes and choices in ideas, technologies, product designs, conventions, and institutional arrangements. Enterprise innovation is not only influenced by internal factors, but also depends heavily on interactions with users, suppliers, and other institutions within the innovation system [11]. Chesbrough [24] also assumes that the marginal benefit of innovation generated by internal R&D investment is decreasing year by year, and “too much internal focus” will mean that the organization loses many opportunities for innovation. Due to the limitations of internal knowledge in enterprise innovation, scholars have begun to pay attention to the impact of external knowledge.

From the knowledge-based view, Grant [25] argues that two sticking point processes are needed to improve the innovation performance of enterprises, namely, exploration and application. Search activities are part of organizational learning and exploration. This can help companies explore and solve unknown subjects, and is a significant driving force for corporate innovation [26]. Searches are also influenced by the richness of knowledge outside the organization [27]. Nelson and Winter [10] emphasized the role of searches in helping organizations find diverse sources of knowledge that provide firms with the opportunity to choose different technological paths. They further argue that knowledge
searching is an organizational problem-solving activity involving creating and reorganizing technical ideas [10]. According to the different search dimensions, knowledge searches fall into different types. First, the search characteristics can be split into breadth and depth searches [8]. Second, the geographic scope of knowledge includes local and global searches [28,29]. Third, according to organizational learning methods, it consists of exploitative and exploratory searches [29]. Moreover, types of search knowledge consist of scientific knowledge search, technical knowledge search, and market knowledge search [30].

In addition, interacting with the search subject relates to interactive and non-interactive searches [31]. Finally, the cooperation mode of the search subject and object can be divided into formal and informal searches [31].

What type of knowledge organizations should search for, and to what extent, are questions frequently raised in the literature. The question involves whether the knowledge is new or old and where the knowledge is in the value chain, as well as how extensive the knowledge search is. It involves issues such as the breadth and depth of the knowledge search. Search breadth is defined as the degree of new knowledge which is explored; search depth is perceived as the degree to which a search revisits a firm’s prior knowledge [8]. Katila and Ahuja [8] argue that breadth and depth searches bring new combinations of technology to firms and are crucial factors that affect firm innovation performance. Therefore, exploring the impact of an external knowledge search on firm innovation performance is of great significance for promoting sustainable economic development. Definitions of variables and the representative literature are presented in Table 1.

Table 1. Definitions of variables and the representative literature.

| Construct                        | Definition                                                                                     | Representative Literature |
|----------------------------------|-----------------------------------------------------------------------------------------------|---------------------------|
| Economic Sustainability          | Economic sustainability concerns long-term economic growth while protecting the environment and social resources. | Choi and Ng [1]           |
| Firm Innovation Performance      | An evaluation of the efficiency and efficacy of innovation activities realized by enterprises through their own innovation and cooperative innovation with other enterprises. | Ghasemaghaei and Calic [20]; Laursen and Salter [11] |
| External Knowledge               | Knowledge sources that exist outside the organization.                                         | Nelson and Winter [10];   |
| Knowledge Search                 | Knowledge searching is an organizational problem-solving activity that includes the creation and reorganization of technical ideas. | Katila and Ahuja [8]     |
| Knowledge Search Breadth         | Knowledge search breadth is defined as the degree of new knowledge which is explored.          |                           |
| Knowledge Search Depth           | Knowledge search depth is perceived as the degree to which a search revisits a firm’s prior knowledge. | Katila and Ahuja [8]     |

2.2. The Relationship between External Knowledge Searches and Enterprise Innovation in the Context of Economic Sustainability

Sustainability is often considered a movement to ensure better and more sustainable well-being [1]. Many studies have focused on the environmental aspects of sustainability; however, sustainability has taken on a broader meaning as society develops [6]. Cricelli and Strazzullo consider that social and economic sustainability is becoming more important in sustainability research [2]. Rapid economic development necessitates the extensive consumption of resources, which means that the relationships between the environment, economy, and society should be reconsidered. The requirement of sustainability makes innovation a tool with which to solve the problem of economic sustainability [32,33]. Higher levels of innovation often mean that organizations achieve significant and positive impacts on environmental, social, and economic sustainability [6,34,35]. For example, the Chinese government released the “Made in China 2025” policy. This policy will promote improvements in the production efficiency of China’s manufacturing industry, achieve better and faster innovation, and bring about the sustainable development of
the manufacturing industry. Innovation is the linchpin for enterprises to gain a competitive advantage in economic sustainability, and is an important driving force for sustainable economic development [36]. Meanwhile, innovation is key for enterprises to gain a competitive advantage, and knowledge is the crux to organizational innovation and success [23]. Consequently, exploring the relationship between knowledge search and innovation is crucial in the context of economic sustainability.

Knowledge can be divided into explicit knowledge and tacit knowledge [8]. Explicit knowledge includes documents, pictures, data, etc., which can be expressed in words and numbers and are easy to communicate and share directly. Tacit knowledge covers news that cannot be directly expressed, as well as knowledge related to senses, motor skills, bodily experience, intuition, or implicit rules of experience, which are difficult to communicate directly [37]. The difference between explicit and tacit knowledge is that explicit knowledge is disseminated through objective carriers such as text materials, teaching videos, and experimental data. Tacit knowledge is the knowledge contained in the researcher’s experience, which is difficult to impart through data sharing. It can only be obtained through actual participation in research activities.

Knowledge is an essential resource for improving enterprise capability and product and service development through a knowledge-based view. The reorganization of knowledge is a practical innovation which is significant for building a company’s competitive advantage [38,39]. Grant [23] maintains that a critical function of an organization’s existence is to integrate new knowledge. Moreover, this includes knowledge both inside and outside the organization. Simultaneously, because the organization’s internal knowledge is scattered at the individual level, its distribution is not uniform [40]. Compared with knowledge inside the organization, searching for knowledge outside the organization can improve the speed of product development and improve the quality of the product [41], including the possibility of achieving more incredible innovation [42].

Why is knowledge outside the organization so crucial for organizational innovation? Ndofor and Levitas [43] deemed that knowledge is the core of an organization’s response to environmental changes. Acquiring new knowledge from outside can help companies to improve internal learning processes, thereby enhancing the organization’s ability to absorb, transform, and apply new knowledge. For example, acquiring knowledge from customers, suppliers, competitors, and universities or academic research institutions can improve a company’s innovation performance [8,23]. Customer demand for a market is critical to an organization, and once an organization has access to this knowledge, organizational innovation will occur. Novel materials or equipment provided by suppliers are of great help to the organization, contributing to developing innovative products for enterprises [44]. Organizations reduce the cost of their product innovation by imitating existing innovative products in the market. Novel knowledge created by a university or academic research institution provides essential business opportunities for the organization’s future. Hence:

**Hypothesis 1a.** There is a significant positive correlation between external knowledge searches and firm innovation performance in the context of economic sustainability.

2.3. **Contextual Factors Influencing the Relationship between External Knowledge Searches and Firm Innovation Performance**

Under economic sustainability, enterprises need to find good methods to constantly obtain and maintain competitive advantages to achieve rapid profit growth. Previous studies have focused on the positive effects of innovation on economic, social, and environmental sustainability. Nevertheless, in the context of economic sustainability, is the impact of external knowledge searches on firm innovation performance also affected by other factors? To further explore the reasons for the inconsistency in the relationship between external knowledge searches and enterprise innovation performance, this study
adopted a meta-method to explore the influence of contextual variables on the relationship between the two. To choose contextual variables, we comprehensively compared the existing literature and conducted an in-depth analysis of the aspects of enterprise characteristics, industry characteristics, variable measurement methods, and cultural differences.

2.3.1. Characteristics of Enterprises: New Start-Ups vs. Mature Companies

Innovation is a complex process and a source of sustainable competitive advantage [1]. To achieve the goal of sustainable development, companies need to create sustainable products, new technologies, and novel business models [3]. Exploring the contextual factors that influence the relationship between external knowledge searches and firm innovation is conducive to gaining a sustainable competitive advantage [45]. According to the development stage of the organization, firms can be divided into new start-ups and mature enterprises. Do enterprises at different development stages have similar needs for external knowledge search? The knowledge-based view emphasizes that knowledge is a strategic resource that can help companies to build sustainable competitive advantages [23]. From the perspective of knowledge sources, external knowledge exists in universities, research institutes, suppliers, competitors in the same industry, and customers [28]. Searching for knowledge from the above organizations or individuals is a resource-consuming activity. The constant search, acquisition, and integration of knowledge outside the organization increase the organization’s cost. Thereby, the innovation effect produced by external knowledge searching by the enterprise is also different.

Compared with established companies, the advantages of new start-ups are as follows: First, new ventures have fewer knowledge resources and generally face the problem of lack of capital and production materials. Thus, knowledge and knowledge management are more important for new startups [46]. Due to the importance of knowledge resources to sustainable development, new startups have unique competitive advantages in knowledge management. For example, new ventures’ innovative capabilities are based on sub-domain knowledge. In contrast, the rigid organizational structure of mature enterprises causes managers to pay more attention to reducing production costs. External knowledge searches are high-cost consumption activities, which inhibit desires to carry out search activities and are not conducive to the realization of enterprise innovation performance; Second, new ventures are in a period of rapid growth and have a greater demand for knowledge, so their ability to retrieve and share external knowledge is considerable. The unique ability of new ventures in knowledge management makes their intention to use knowledge searches to improve innovation performance more obvious. In contrast, mature enterprises have insufficient market growth potential due to their existing products occupying a larger share in the market, their demand for knowledge being limited, and their lack of motivation to acquire knowledge from outside.

The shortcomings of new ventures are: new start-ups have a short establishment time, small scale, few product types, low market share, immature product technology, insufficient financial strength, and lack of resources [47]. It is more difficult to establish contacts with organizations outside the enterprise. Meanwhile, the living environment of new ventures is more dynamic, which makes it difficult for the knowledge search activities to be carried out according to the original plan, and has intensive time requirements [48]. Compared with new start-ups, mature enterprises have a relatively stable living environment, have been established for a long time, and most of them have formed a diversified product system, on a large-enterprise-scale, various product types, high product market share, and stable target customers. It is easier to establish stable cooperative relationships with universities, research institutes, suppliers, customers, and competitors in the same industry. The stability between mature enterprises and external organizations can effectively reduce the cost of knowledge search. However, mature companies also have shortcomings. The rigid organizational structure of mature enterprises causes managers to pay more attention to reducing production costs. External knowledge searches
are high-cost consumption activities, which inhibit desires to carry out external knowledge search activities and is not conducive to the realization of innovation performance. Hence:

Hypothesis 2a. Compared with mature companies, the positive impact of external knowledge searches on the innovation performance of start-ups is more obvious.

Hypothesis 2b. Compared with new ventures, the positive impact of external knowledge searches on the innovation performance of mature enterprises is more obvious.

2.3.2. Characteristics of the Industry

1. High-tech enterprises vs. non-high-tech enterprises

Specific elements of knowledge are central to the ability of firms to acquire sustainable innovation [49]. Increasingly, organizations are improving innovation performance by searching for knowledge beyond organizational boundaries [50]. Audretsch et al. [51] argued that firms differ in their search for and utilization of external knowledge sources. Technological factors are some of the main factors affecting external knowledge sources [52].

Due to the differences in the industry, the innovation environments in which enterprises are located is quite different. An external knowledge-rich environment provides the possibility for the exchange and sharing of new ideas, which enhances an organization’s ability to innovate [51]. First of all, compared with non-high-tech enterprises, high-tech enterprises are more knowledgeable in the operating environment, and they are more likely to use the knowledge spillover from neighboring companies [53]. For example, high-tech enterprises are located in knowledge-rich science and technology parks, and the rich innovative ideas and resources within these science and technology parks are conducive to the flow of knowledge [54]. Charlot et al. [55] emphasized that the degree of technological development in the region where a firm is located is positively related to the knowledge spillovers that firms can acquire. Enterprises acquire more knowledge spillovers, which is conducive to enterprises carrying out innovation activities.

Second, high-tech enterprises have high R&D investment and greater technical complexity. At the same time, the transfer of knowledge is difficult due to tacit knowledge [56]. To overcome the innovation bottleneck, high-tech enterprises need to integrate external knowledge sources to improve their innovation ability. Hence, the knowledge they need is richer and more varied, and the demand for external knowledge is more vigorous than another. Third, high-tech enterprises face greater uncertainty, shorter product life cycles, faster iterations of products and technologies, and higher sensitivity to external knowledge sources. Thus, enterprises are more inclined to improve the enterprise knowledge base through searches [57], optimize the enterprise innovation model, and carry out innovation to achieve higher innovation performance. Finally, the market environment faced by high-tech enterprises is more complex and changeable [56]. To maintain the competitiveness of enterprises, high-tech enterprises tend to attract more outstanding talents, strengthen the knowledge absorption capacity of enterprises, and focus on the creativity of cross-border knowledge, to achieve higher innovation performance. Hence:

Hypothesis 3a. Compared with non-high-tech enterprises, external knowledge searches of high-tech enterprises have a more significant impact on enterprise innovation performance.

2. Manufacturing companies vs. non-manufacturing companies

Knowledge is a central source of innovation [49], and it is an important basic element for enterprises to obtain a sustainable competitive advantage in a complex environment [58]. Manufacturing enterprises’ innovation refers to the innovation of technology, design,
manufacturing, management, and business activities involved in manufacturing enterprises [59]. Therefore, the types of knowledge sources in manufacturing enterprises are more about product innovation and process innovation. The knowledge source of technological innovation is more important in manufacturing enterprises, and the R&D department and R&D personnel are also more critical. For example, Huang and He [60], in their comparison of the core capabilities of American and Japanese manufacturing, argued that the core competence of American manufacturing is a “know-why” capability, which is the design and development capability of modular products and complex products based on cutting-edge technologies. The core competence of Japan’s manufacturing industry is a “know-how” and “know-who” capability [60]. The sticking point to cultivating “know-why” ability is to have many world-leading universities, large integrated enterprises, and a large number of specialized high-tech SMEs and start-ups. The key to developing “know-how” and “know-who” capabilities lies in close cooperation between enterprises and, more importantly, the ability to locate and identify key capabilities in a global technology network. This ability places greater demands on the enterprise’s external knowledge search. Manufacturing enterprises can build sustainable competitive advantages by strengthening search capabilities and promoting the transformation of knowledge elements into innovative achievements [61].

The knowledge sources of non-manufacturing enterprises are more related to organizational innovation, which is a new problem-solving method. Thus, it does not depend on having a strong R&D department. The innovation of non-manufacturing enterprises often does not provide tangible products, but rather the integration of human capital, technology, and organizational capabilities [62]. The knowledge sources of non-manufacturing enterprises are more about the integration of human capital and organizational capabilities; therefore, there is no clear boundary between the producers and consumers of knowledge sources, which makes the definition of knowledge sources a difficult problem.

In addition, the characteristics of innovation in manufacturing enterprises cause them to be more focused on reducing costs and improving efficiency through process improvement, so they need to have formal organizational structures and systems [63]. The formal organizational structure of manufacturing enterprises is conducive to establishing long-term partnerships with customers or suppliers and is conducive to improving innovation performance by searching for external knowledge. Terzirovskis’s [63] research shows that the formal organizational structure of manufacturing and long-term partnerships with customers can effectively improve innovation performance. Hence:

**Hypothesis 3b.** Compared with non-manufacturing enterprises, the positive impact of external knowledge searches on enterprise innovation performance is more obvious in manufacturing enterprises.

### 2.3.3. Variable Measurement Methods

Knowledge possesses specific characteristics, including tacitness, subjectivity, and embeddedness [64]. The highly tacit and causally ambiguous nature of knowledge creation makes the causal linkage between behavior and performance difficult to identify [57,58], and therefore imposes limitations on the measurement of knowledge search. Consequently, the causal relationship between external knowledge search and firm innovation may vary depending on the measure utilized [65]. Hence, in addition to the firm and industry characteristics, variable measurement methods are also factors that affect the relationship between external knowledge searches and firm innovation performance. Variable measurement methods are generally divided into scale measurement and non-scale measurement methods. Scale measurement refers to a survey method that distributes questionnaires to respondents. The survey process mainly uses the five-level or seven-level Likert scale to score the questionnaire by the respondents, and it mainly relies on the subjective evaluation of the innovation performance of enterprises. Non-scale measurement refers to collecting secondary data, using existing data in the database or the data
disclosed by the enterprise to examine the relationship between knowledge searches and enterprise innovation performance. It mainly measures corporate innovation performance through publicly disclosed company financial statements, the number of patents, etc. [61]. In addition, the measurement method used has a strong relationship with national basic research facilities. Developed markets have relatively comprehensive databases. Scholars can use the citation status of patent data in different industries to reflect the search degree and more accurately measure the relationship between the two; in emerging markets, affected by the availability of second-hand data, they tend to learn about corporate knowledge searches through questionnaires. Compared with scale measurement, non-scale measurement methods such as the number of patent applications are more objective and trustworthy. However, the disadvantage is that non-scale measurement methods are challenging to provide investigators with the counterpart data required for research, and it is difficult to match the research process accurately. This leads to a weaker correlation between knowledge search and firm innovation performance. Hence:

**Hypothesis 4a.** Compared with non-scale measurement, the impact of scale measurement on external knowledge searches on enterprise innovation performance is more obvious.

### 2.3.4. Cultural Differences: Individualism vs. Collectivism

Innovation is the crux to the sustainable development of enterprises [1]. Scott and Bruce [66] viewed innovation as a multi-stage process, which is a series of activities undertaken by individuals to search for, develop, and apply new ideas. Innovation requires individual initiative and the integration of divergent thinking into something better [67-68]. Knowledge is one of the key resources for innovation. Innovation is achieved through knowledge sharing among individuals. Knowledge sharing among organizations promotes the dissemination and transformation of knowledge, effectively enhances the value of knowledge, and promotes the realization of innovation [69].

Hofstede [70] proposed that culture is the “common psychological process” that distinguishes one kind of person from another. Organizational culture refers to the values, beliefs, and expectations shared by members of an organization [71]. Organizational culture affects innovation by influencing the behavior and performance of individuals in the organization. Different cultures imply differences in the attitudes and behaviors of organizational members, which can have an impact on individual innovation and the sustainability of innovation. Tett [72] emphasized that individuals' innovative behavior and knowledge-sharing motivation are affected by the interaction between individual characteristics and organizational culture. Liu et al. [73] argued that cultural differences pose new challenges to innovation management and corporate sustainability.

Therefore, exploring the relationship between external knowledge search and enterprise innovation performance is very important for the identification of different cultures. Hofstede’s cultural dimensions theory proposes dimensions for identifying cultural differences, including individualism and collectivism [74]. With the background of an individualistic culture, people are more likely to pursue the success of their career and the realization of their values and have a strong awareness of intellectual property rights, whereas under the background of a collectivist culture, people tend to work in teams and pursue the maximization of collective interests [74].

Compared with individualism, enterprises under the atmosphere of collectivism are more likely to form a creative atmosphere of knowledge sharing and mutual benefit. Enterprises in a collectivist atmosphere tend to actively promote cooperative relationships, enhance trust, share possible risks, and promote knowledge acquisition behaviors to improve enterprise innovation performance. However, the level of trust between enterprises under the atmosphere of individualism is relatively weak, which is not conducive to the flow and sharing of knowledge, and thus harms the improvement of enterprise innovation performance. For example, China has stimulated a strong atmosphere of innovation...
under a huge demographic dividend. To maintain competitiveness, enterprises have continuously improved their independent innovation capabilities. Simultaneously, the government has supported innovation and entrepreneurship projects, which have mobilized the innovation vitality of mass enterprises [44]. Hence:

**Hypothesis 4b.** *Compared with individualistic culture, the influence of external knowledge searches on enterprise innovation performance is more obvious in a collectivist culture.*

3. Methodology

3.1. Sample

This study exploited “knowledge search”, “innovation search”, “search for innovation”, “innovation performance”, “sustainability”, and “sustainable innovation” as keywords, and conducted literature searches in databases such as the Web of Science and CNKI; it was found that there are a relatively high number of achievements in the past ten years. The scope of the literature search was limited to 2011–2021, and a total of 240 related studies were retrieved. At the same time, the retrieved literature was re-selected to screen out the empirical articles that could be included in the meta-analysis. We selected the literature under the following conditions: (1) the literature had to be empirical research on knowledge search and corporate innovation performance, including similar keywords such as cross-border search and innovation search; (2) the paper had to report the number of samples; (3) the literature had to report the correlation coefficient between knowledge search and enterprise innovation performance, or other effect values that can be converted into correlation coefficients; and (4) only one article was selected from multiple articles of the same research object. After a comprehensive and rigorous screening process, this study finally selected 58 pieces of literature that met the above requirements, including 43 Chinese studies and 15 English studies, covering 15,059 samples.

3.2. Data Encoding

The encoded data included qualitative and quantitative information. Qualitative information included the first author, publication date, firm heterogeneity (time of establishment), industry heterogeneity (whether it is a high-tech firm or a manufacturing firm), variable measurement, and cultural differences. Quantitative information included sample size, effect size, etc. After obtaining the encoded data, the data were processed as follows: (1) we extracted the statistics reflecting the relationship between the two, such as correlation coefficient, regression coefficient, etc.; (2) converted all individual statistics into a unified effect value—the correlation coefficient \( r \); and (3) calculated the combined effect value. The combined effect size is a statistic that does not depend on a single study, but reflects the relationship between variables. The data processing was realized with CMA 3.0, and the results are shown in Table 2.

| Number | First Author            | Publication Year | Number of Samples | Effect Size | SB   | Fisher’s SD |
|--------|-------------------------|------------------|------------------|-------------|------|-------------|
| 1      | Wang, L. [75]           | 2011             | 184              | 0.333       | 0.066| 0.346       |
| 2      | Kaisa, H. [76]          | 2013             | 193              | 0.170       | 0.070| 0.172       |
| 3      | Wu, J. [77]             | 2013             | 1262             | 0.224       | 0.027| 0.228       |
| 4      | Zhang, F. [78]          | 2014             | 294              | 0.354       | 0.051| 0.370       |
| 5      | Cruz-González, J. [79]  | 2014             | 248              | 0.020       | 0.064| 0.020       |
| 6      | Wu, J. [80]             | 2014             | 343              | 0.167       | 0.053| 0.169       |
| 7      | Zhang, W. [81]          | 2014             | 270              | 0.370       | 0.053| 0.388       |
| 8      | Song, H.L. [82]         | 2015             | 213              | 0.390       | 0.059| 0.412       |
| 9      | José, L.F. [83]         | 2015             | 102              | 0.385       | 0.086| 0.406       |
| 10     | Antonella, M. [84]      | 2015             | 88               | 0.147       | 0.106| 0.148       |
3.3. Bias Analysis

There are generally two methods to test for bias: funnel plot and loss of safety factor. The principle of the funnel chart is that the dispersion obtained by small samples is significant, and it is often at the bottom of the funnel chart. Large samples have smaller dispersion at the top of the funnel plot. If the points are concentrated at the top of the graph and evenly distributed on both sides of the center line, there is no publication bias. As
shown in Figure 1, the effect value points of the funnel plot in this experiment are concentrated and evenly distributed at the top and two ends of the funnel plot, so the problem of sample bias is small. The principle of the loss of safety factor is that studies need to be found to make the results reach an insignificant level; the larger the coefficient value, the better. The greater the loss of safety factor, the stronger the reliability of the conclusion. The loss-of-safety factor of this study was 23,601, i.e., 23,601 missing studies were required to invalidate the results, indicating no publication bias in our selected sample.

Figure 1. Funnel chart.

3.4. Overall Inspection

Before the comprehensive test, a heterogeneity test was required—this is a test for heterogeneity analyzes the degree of difference between multiple independent samples. Only homogeneous data can be merged. If there is the heterogeneity in the sample, it indicates that there may be moderating factors among different studies, and it is more appropriate to use random effects model analysis. There are two methods for heterogeneity testing: the Q-value test and the $I^2$ test. The results are shown in Table 3. In Table 3, the Q-value is 363.615 ($p < 0.05$), much larger than the critical value of 57 degrees of freedom. The $I^2$ value determines the model use. When $I^2 \geq 50\%$, it indicates heterogeneity, and a random effect model should be used; when $I^2 < 50\%$, the fixed effects model should be used. In Table 2, the $I^2$ value is 84.32\%, greater than 50\%, indicating that the difference in effect value causes 84.32\% of the observed variation, whereas 15.68\% of the observed variation was caused by random errors; thus, a random effect model was chosen. Therefore, the total effect value of external knowledge searches and enterprise innovation performance was 0.326, the confidence interval was (0.288, 0.362), and the p-value is less than 0.05, indicating that the average effect value is significant. Hypothesis 1a is validated.

| Model          | Effect Size | Number of Effect Sizes | 95%CI  | Z-Value | Heterogeneity Test |
|----------------|-------------|------------------------|--------|---------|--------------------|
| Fixed effects  | 0.321       | 58                     | 0.307  | 0.335   | 40.596             |
| Random effects | 0.326       | 58                     | 0.288  | 0.362   | 15.986             |
3.5. Meta Binary Analysis of Context Variables

The overall test indicated that there was heterogeneity among the individual studies. Contextual factors influence the relationship between external knowledge searches and firm innovation performance in the context of economic sustainability. To verify this assertion, we classified and coded the literature in the form of 0–1, and then performed a meta binary analysis. This study observed its influence on the relationship between external knowledge searches and corporate innovation performance from firm heterogeneity (firm establishment time), industry heterogeneity (whether it is a high-tech enterprise, whether it is a manufacturing firm), and variable measurement methods, and cultural differences. According to the definition of new ventures by Li and Atuahene [130], we regarded enterprises established within eight years as new ventures, and vice versa as non-new ventures. According to the OECD high-tech industry classification standard, the sample with high-tech enterprises accounting for more than 50% was classified as “high-tech enterprises”; the sample with traditional manufacturing enterprises or service enterprises accounting for more than 50% was classified as “non-high-tech enterprises”. The samples with the manufacturing industry accounting for more than 50% were classified as “manufacturing enterprises”, and the samples with the service industry accounting for more than 50% were classified as “non-manufacturing enterprises”. We divided the samples collected by distributing questionnaires into scale measurements; the samples obtained by directly selecting the relevant data in the database were divided into non-scale measurements. Using Hofstede's classification of individualism and collectivism in national cultural differences, the areas with high individualism scores in the sample were divided into individualism, and the areas with high collectivism scores were divided into collectivism [74]. The results of the meta-analyses of context variables are shown in Table 4.

Table 4. Meta binary analysis results of context variables.

| Variable Name               | Number of Effecit | Combined Effect Size | 95% CI Lower | 95% CI Upper | Z-Value | df | Heterogeneity Test | F | Q-Value | p-Value |
|-----------------------------|-------------------|----------------------|--------------|--------------|---------|----|-------------------|---|---------|---------|
| **Enterprise characteristics** |                   |                      |              |              |         |    |                   |   |         |         |
| Start-ups                   | 3                 | 0.275                | 0.195        | 0.351        | 6.564   | 2  | 74.887            | 3.456 | 0.063   |         |
| Matures                     | 24                | 0.350                | 0.328        | 0.370        | 29.804  | 23 | 87.674            | 3.456 | 0.063   |         |
| High-tech                   | 30                | 0.284                | 0.262        | 0.305        | 24.135  | 29 | 79.223            | 38.967 | 0.000   |         |
| No-high-tech                | 7                 | 0.427                | 0.389        | 0.464        | 19.414  | 6  | 89.129            | 139.574 | 0.000   |         |
| Manufacturing               | 50                | 0.315                | 0.299        | 0.330        | 36.990  | 49 | 84.292            | 311.945 | 0.000   |         |
| Service                     | 3                 | 0.453                | 0.404        | 0.500        | 15.809  | 2  | 79.970            | 9.985  | 0.007   |         |
| **Measurement Method**      |                   |                      |              |              |         |    |                   |   |         |         |
| Non-scale                   | 5                 | 0.204                | 0.154        | 0.253        | 7.796   | 4  | 19.790            | 20.579 | 0.000   |         |
| Scale                       | 49                | 0.330                | 0.314        | 0.345        | 38.497  | 48 | 85.471            | 330.380 | 0.000   |         |
| **Cultural Difference**     |                   |                      |              |              |         |    |                   |   |         |         |
| Individualism               | 7                 | 0.180                | 0.131        | 0.229        | 7.045   | 6  | 63.054            | 37.668 | 0.000   |         |
| Collectivism                | 51                | 0.336                | 0.321        | 0.351        | 40.449  | 50 | 83.856            | 309.707 | 0.000   |         |

In Table 4, the effect size of new ventures (0.275) is smaller than that of mature ventures (0.350), and the heterogeneity results are significant (Q = 3.456, p < 0.1); Hypothesis 2a is not verified, but Hypothesis 2b is verified. The effect size of non-high-tech enterprises (0.427) is higher than that of high-tech enterprises (0.284), and the heterogeneity is significant (Q = 38.967, p < 0.01); Hypothesis 3a is not verified. The effect size of non-manufacturing enterprises (0.453) is higher than that of manufacturing enterprises (0.315), and the heterogeneity is significant (Q = 25.771, p < 0.01); Hypothesis 3b is not verified. The combined effect value measured with the scale (0.330) was greater than the combined effect value measured without the scale (0.204), and the heterogeneity was significant (Q = 20.579, p < 0.01); Hypothesis 4a is validated. The combined effect size of collectivism
(0.336) is greater than that of individualism (0.180), and the heterogeneity is significant (Q = 37.668, p < 0.01); Hypothesis 4b is validated.

3.6. Meta-Regression Analysis

The disadvantage of meta-binary analysis is that it reduces the sample size of each subgroup, which impacts the estimation. To verify the reliability of the results, we used meta-regression analysis for further testing. Meta-regression analysis takes the correlation between external knowledge searches and enterprise innovation performance as the dependent variable and various situational factors as independent variables. It first calculates the weight of the literature according to the size of the sample and then uses the weighted least squares regression to test the effect of context variables. The positive and negative values of the regression coefficients can reflect the influence of each situational variable on the relationship between external knowledge searches and enterprise innovation performance in the context of economic sustainability. It was realized with CMA3.0, and the test results are shown in Table 5.

| Variable Name                                      | N   | B   | SE  | 95% Interval Lower | 95% Interval Upper | Z-Value | p-Value |
|---------------------------------------------------|-----|-----|-----|--------------------|--------------------|---------|---------|
| Company establishment time (1 = Start-up, 0 = Mature) | 3/24| -0.083| 0.045| -0.171             | 0.005              | -1.860  | 0.063   |
| High-tech industry (1 = High-tech, 0 = No-high-tech) | 50/3| -0.163| 0.032| -0.226             | -0.100             | -5.080  | 0.000   |
| Manufacturing industry (1 = Manufacturing, 0 = Service) | 52/6| 0.123 | 0.027| 0.070              | 0.176              | 4.540   | 0.000   |
| Scale measurement method (1 = Scale, 0 = Non-scale) | 49/5| 0.136 | 0.028| 0.081              | 0.190              | 4.840   | 0.000   |
| Cultural Differences (1 = Collectivism, 0 = Individualism) | 51/7| 0.167 | 0.027| 0.114              | 0.221              | 6.140   | 0.000   |

In Table 5, the regression coefficient of enterprise size is -0.083, and the result is significant (p < 0.1). This indicates that the shorter the company’s establishment, the smaller the influence of external knowledge searches on the innovation performance. The regression coefficient of high-tech enterprises is -0.163, and the result is significant (p < 0.01). This shows that compared with non-high-tech enterprises, the external knowledge search of high-tech enterprises has less of an impact on the innovation performance. The regression coefficient of manufacturing enterprises is 0.123, and the result is significant (p < 0.01). This indicates that compared with non-manufacturing enterprises, the external knowledge search of manufacturing enterprises has less of an impact on the innovation performance. The regression coefficient of the scale measurement method was 0.136, and the result was significant (p < 0.01). This indicates that scale measurement has a greater impact on external knowledge searches and firm innovation performance than non-scale measurement. The cultural difference regression coefficient is 0.167, which is significant (p < 0.01). This indicates that collectivism has a greater impact on external knowledge search and corporate innovation performance than individualism.

4. Study 2: The Impact of Knowledge Search Ambiguity on Firm Innovation Performance

In Study 1, we confirmed the relationship between knowledge search and firm innovation performance in the context of economic sustainability. Meanwhile, we acknowledged the influence of firm characteristics, industry characteristics, variable measurement methods, and cultural differences on the relationship. However, we still have not answered another question—what is the impact of different types of knowledge search on enterprise innovation? To examine the impact of knowledge search ambiguity on firm
innovation performance in the context of economic sustainability, we conducted Study 2 using knowledge search breadth, knowledge search depth, balanced knowledge search, and joint knowledge search as independent variables to analyze their impacts on firm innovation performance.

4.1. The Effect of Search Breadth and Search Depth on Firm Innovation Performance

According to the characteristics of search behavior, external knowledge searches can be divided into knowledge search breadth and knowledge search depth [8]. Knowledge search breadth is defined as the degree of new knowledge that is explored [8]. The breadth of knowledge search endows enterprises with heterogeneous knowledge resources, which helps to expand the scale of the knowledge base, optimize the structure of the knowledge base, enrich the method of knowledge combination, and promote enterprises to ensure the sustainability of innovation, which is conducive to the realization of innovation performance [131]. By adopting the breadth search strategy, organizations can obtain a wealth of heterogeneous knowledge sources and broaden the enterprise’s vision of solving practical problems and enhancing the enterprise’s innovation ability. Furthermore, breadth searches also increase the number of new products in the organization. Just as Katila and Ahuja said: “There is a limit to the number of new ideas that can be created by using the same set of knowledge elements. An increase in scope adds new elements to the set, improving the possibilities for finding a new useful combination” [8].

Knowledge search depth is perceived as the degree to which a search revisits a firm’s prior knowledge [8]. The depth of knowledge search improves the proficiency, professionalism, and leanness of knowledge utilization and development. The deepening of the understanding of the relationship between the related knowledge and the actual knowledge is conducive to stimulating innovation inspiration, enhancing the innovation power of the enterprise, and improving the innovation performance of the enterprise. However, the limitations of search depth outweigh the benefits it brings. As the degree of knowledge search deepens, there is a cumulative and decreasing effect of innovation on enterprises’ acquisition of existing knowledge sources [121]. Meanwhile, too deep a knowledge search also increases the integration cost of internal heterogeneous knowledge, which will offset the positive effect of innovation brought about by the search. Hence:

**Hypothesis 5a.** Compared with the depth of knowledge search, the breadth of knowledge search has a more significant impact on the innovation performance of enterprises.

4.2. The Effect of Ambiguity in Knowledge Search on Firm Innovation Performance

A single dimension of knowledge searches struggles to address the balance problem of enterprise development, so the concept of balanced knowledge search was proposed [132]. A balanced knowledge search means that enterprises maintain coordination in the execution of both knowledge search breadth and search depth, emphasizing the synergistic effect of the two [110]. Joint knowledge search refers to the state in which the enterprise combines and complements the two search strategies of knowledge breadth and depth, emphasizing the interaction between the two [109]. According to the search breadth and search depth descriptions, there is a big difference between knowledge breadth and knowledge depth, which leads to the heterogeneity of knowledge resources. Increasing the breadth of knowledge search will increase the difficulty of knowledge search and increase the cost of enterprise knowledge search. If the enterprise maintains the breadth search strategy all the time, the enterprise’s energy will be scattered, and it will spend too much time and energy obtaining incomplete knowledge fragments, which is not conducive to the enterprise’s innovation activities.

Similarly, overemphasizing search depth causes enterprises to continue to increase capital investment in familiar fields, which is not conducive to absorbing diverse sources
to supplement their knowledge base, resulting in corporate knowledge redundancy. Finally, enterprises are overly concerned with the depth of search, which will hinder the inflow of other heterogeneous resources and limit the possibility of generating breakthrough innovations. A balanced knowledge search avoids overemphasizing a particular strategy and hinders the improvement of enterprise innovation performance by coordinating search width and search depth strategies. This problem promotes the deep absorption and utilization of heterogeneous knowledge by enterprises and improves the innovation performance of enterprises. The joint knowledge search enables the two strategies of knowledge search breadth and depth to achieve complementary advantages and improve the innovation performance of enterprises [74]. Hence:

**Hypothesis 5b. Both balanced knowledge searches and joint knowledge searches have significant positive correlations with enterprise innovation performance.**

### 4.3. Results

Table 6 shows the overall test results of the ambiguity of external knowledge searches on the innovation performance of enterprises in the context of economic sustainability. The correlation coefficient between knowledge search breadth and enterprise innovation performance is 0.322, and the correlation coefficient between knowledge search depth and enterprise innovation performance is 0.293. All statistical results were significant ($p < 0.01$). Hypothesis 5a is verified. The correlation coefficient between balanced knowledge search and enterprise innovation performance is 0.383, and the correlation coefficient between joint knowledge search and enterprise innovation performance is 0.232. All the statistical results were significant ($p < 0.01$). Hypothesis 5b is verified.

| Search Strategy    | Effect Size | Number of Effect Sizes | Number of Samples | Q-Value | df  | p-Value | 95% Interval |
|--------------------|-------------|------------------------|-------------------|---------|-----|---------|--------------|
|                    |             |                        |                   |         |     |         | Lower        | Upper        |
| Search Breadth     | 0.322       | 24                     | 5793              | 156.539 | 23  | 0.000   | 0.259        | 0.382        |
| Search Depth       | 0.293       | 24                     | 5793              | 145.165 | 23  | 0.000   | 0.231        | 0.352        |
| Balanced Search    | 0.383       | 6                      | 1338              | 147.969 | 5   | 0.000   | 0.107        | 0.604        |
| Joint Search       | 0.232       | 6                      | 1338              | 116.985 | 5   | 0.000   | −0.026       | 0.462        |

Are the results in Table 6 consistent across contexts? To verify this, we tested the overall test results in different scenarios, as shown in Table 7. The tests shown in Table 7, were carried out under four scenarios of enterprise characteristics, industry characteristics, variable measurement methods, and culture differences. The results show that, in new ventures, non-high-tech enterprises, high-tech enterprises, scale measurement, and collectivism, the total effect value of search breadth on enterprise innovation performance is greater than that of search depth, and the statistical results are significant. It is not significant in the mature enterprise, non-scale measurement groups, and individualism. This shows that the breadth of knowledge search is more critical for new start-ups and collectivism.

| Variable Name      | Search Strategy | Number of Effect Sizes | Effect Size | 95% CI | Z-Value | Heterogeneity Test |
|--------------------|-----------------|------------------------|-------------|--------|---------|-------------------|
|                    |                 |                        |             | Lower  | Upper   | df   | F² | Q-Value | p-Value |
| Enterprise Characteristics | Start-ups   | Width                  | 12          | 0.333  | 0.303   | 0.363 | 19.989 | 11  | 89.375 | 103.534 | 0.000 |
|                     |                 | Depth                  | 12          | 0.282  | 0.25    | 0.313 | 16.702 | 11  | 90.84  | 120.089 | 0.000 |
|                     | Mature          | Width                  | 2           | 0.185  | 0.185   | 0.185 | 3.39   | 1   | 0      | 0.079   | 0.778 |
|                     |                 | Depth                  | 2           | 0.180  | 0.074   | 0.282 | 3.296  | 1   | 0      | 0.035   | 0.852 |
|                    |                 | Width                  | 3           | 0.405  | 0.332   | 0.473 | 9.953  | 2   | 93.63  | 31.396  | 0.000 |

Table 7. Results of group test.
5. Conclusions and Implications

5.1. Conclusions

We take advantage of the meta-method to re-statistically analyze the causal linkage between external knowledge searches and corporate innovation performance in the context of economic sustainability from 2011 to 2021. The conclusions are as follows: First, the overall test shows a significant positive correlation between external knowledge search and firm innovation performance in the context of economic sustainability; Second, the group test of contextual variables shows that external knowledge search in mature enterprises has a more positive impact on innovation performance than in start-ups. Compared with non-scale measurement, the impact of scale measurement on external knowledge search in enterprise innovation performance is more obvious; External knowledge search has a more significant impact on innovation performance in the context of collectivism than individualism; Third, further research on the relationship between external knowledge search ambiguity and firm innovation performance concludes that breadth search can bring higher innovation performance to enterprises than depth search, and this conclusion is established in new start-ups, non-high-tech enterprises, and high-tech enterprises, scale measurement and the grouping of collectivism; Additionally, both balanced knowledge search and joint knowledge search significantly improved the innovation performance of enterprises. Meanwhile, the comprehensive effect of a balanced knowledge search is greater than that of a joint knowledge search.

5.2. Management Implications

First, external knowledge searches are still an effective way to improve corporate innovation performance and promote economic sustainability. However, the innovation effect of knowledge search is different for different enterprises. The external knowledge search of mature enterprises has a more obvious effect on improving innovation performance than on new ventures. Non-high-tech enterprises and non-manufacturing external knowledge searches have a more significant impact on innovation performance than others. Compared with individualism, the impact of external knowledge search on innovation performance is more obvious in the context of collectivism.

Second, both breadth and depth searches can improve the innovation performance of enterprises. However, the innovation effects produced by different search types are heterogeneous. Compared with search depth, the innovative influence of search breadth is more noticeable; the novel outcome of a balanced search is more distinct than a joint search. The group test showed that, for start-ups, non-high-tech companies, high-tech companies, scale measurement, and collectivism, the innovation effect of breadth searches is significantly greater than depth searches. It shows that enterprises should pay more attention to breadth searches and balanced searches. Both strategies increase the possibility of the inflow of heterogeneous knowledge resources, deepen the cognition of the heterogeneous knowledge resources, enhance the innovation ability of the enterprise, and promote economic sustainability.
Third, when evaluating the innovation effect of external knowledge search, we should pay special attention to the impact of different variable measurement methods. Scale measurement is more likely to bring significant results from the existing literature. Therefore, measurement errors are not avoided, and we can comprehensively use both scaled and non-scaled measurement methods to obtain more consistent evaluation results as much as possible.

Finally, knowledge searches have important implications for economic sustainability by affecting firm innovation performance. It expands the size of the knowledge base, which is conducive to economies of scale for innovation that effectively reduces the cost of research and development, reduces the consumption of environmental resources, and is conducive to coordinating the contradiction between economic growth and environmental protection.

5.3. Limitations and Prospects

Although we have developed further comprehension of the relationship between the degree of external knowledge search and enterprise innovation performance in the context of economic sustainability, there are still the following shortcomings. First, although we exploited various search tools to find the important literature in this field, we were unable to calculate effect values for some studies due to the lack of correlation coefficients between variables. A second limitation was due to the different classification criteria of external knowledge search types; if all types of external knowledge searches are included in the research, it will greatly increase the cost of the research and may not be able to draw a unified conclusion. Third, the relationship between external knowledge searches and firm innovation performance may still be affected by other contextual factors. This paper failed to incorporate this into the scope of the study, which needs to be expanded and analyzed in future research.

Future research can improve our shortcomings in the following aspects: first, future research can try new methods to study the causal link between external knowledge search and firm innovation, such as QCA; second, future research can further investigate the relationship between other types of knowledge search and firms’ innovation; finally, the connection between knowledge search ambiguity and corporate innovation can also be studied across different corporate cultures and industries.

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