Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4, 779-793
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i4.6078

The impact of financial subsidies and tax incentives on corporate innovation: A systematic literature review based on Citespace

Qiuhong Liu[1,2], Rani Diana Othman[3], Siti Nurhazwani Kamarudin[4*]
[1]Faculty of Accountancy, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia.
[2]School of Economics and Management, Panzhihua University, China.
[3]Faculty of Accountancy, Universiti Teknologi MARA Cawangan Melaka, Kampus Alor Gajah, Malaysia.
[4]Faculty of Accountancy, Universiti Teknologi MARA Cawangan Terengganu, Kampus Dungun, Terengganu, Malaysia; hazwanikamarudin@uitm.edu.my (S.N.K.).

Abstract: From the global economic development perspective, innovation has become a crucial driving force for economic growth. The entire world is transitioning smoothly into the digital era and experiencing a profound wave of scientific innovation, with increased intensity in research and development investments worldwide. However, there is a lack of systematic analysis regarding the developmental trends of the impact of financial subsidies and tax incentives on corporate innovation. Employing CiteSpace, this study comprehensively utilizes bibliometric analysis and content analysis methods to review 51 articles selected from the Web of Science and Scopus databases. The analysis involves examining the characteristics and content of the literature. It identifies the overall publication landscape, trends in research hotspots, and clustering of research themes. The study also provides a qualitative analysis of research outcomes on the impact of financial subsidies and tax incentives on corporate innovation, considering dimensions such as research questions, research methods, and research conclusions. The findings reveal advancements in research on the impact of financial subsidies and tax incentives on innovation performance, innovation efficiency, innovation input and output, technological innovation, and innovations related to environmental sustainability. In conclusion, it looks forward to the future development trends of this research theme, focusing on the introduction of innovation quality, strengthening interactive impact analysis, and expanding the exploration of moderating variables.

Keywords: *Financial subsidies, Innovation, Systematic literature review, Tax incentives.*

1. Introduction

Currently, innovation has become a crucial driving force for economic development. Scholars believe that correcting externalities and promoting innovation can be achieved through public policies related to taxation, public expenditure, property rights protection, and technological systems, as well as national institutions [1]. It is evident that, due to potential market failures in the process of technological innovation and market development, government intervention is necessary to formulate relevant public policies. However, there is currently a lack of systematic literature review and analysis on the topic of the impact of financial subsidies and tax incentives on corporate innovation. Also, there is a deficiency in the comprehensive exploration of subdivided themes within the field of corporate innovation. In terms of research methods, existing literature primarily employs inductive and summary qualitative research methods. There is a deficiency in providing quantitative descriptions and analyses of objective data, such as literature characteristics and keywords. Although some studies utilize quantitative research methods in bibliometrics, there is a notable absence of thorough qualitative investigations into the content of the literature.

History: Received: 19 December 2024; Revised: 7 March 2025; Accepted: 20 March 2025; Published: 9 April 2025
* Correspondence: hazwanikamarudin@uitm.edu.my

Therefore, this paper aims to use a comprehensive qualitative and quantitative research method based on CiteSpace to review the current research status and explore future research directions. To achieve these objectives, the paper primarily focuses on four fundamental research questions and designs the subsequent content accordingly. The first question concerns the overall publication landscape of existing literature, including publication trends and journal distribution. The second question examines the research structure and main content of existing literature, encompassing research collaboration networks, keyword clustering, and other aspects. The third question delves into the existing literature's research framework, covering research questions, research methods, and research conclusions. The fourth question explores potential research directions and identifies shortcomings in the current study. This structured approach aims to provide a thorough analysis of the existing literature and set the stage for future research directions.

2. Research Methodology

2.1. Data Collection

The literature retrieval and selection process of this study are outlined in Table 1. The Web of Science Core Collection database and the Scopus database are the sources from which the selected literature is sourced to guarantee that it demonstrates great scientific rigor and excellent quality. The selected literature is exclusively composed of journal papers, excluding conference proceedings, reviews, and monographs. The determination of keywords involved literature queries and searches on Google Scholar, revealing keywords related to financial subsidies such as "financial subsidies" "government grants" "fiscal incentives" and those associated with tax incentives, including "tax incentives" and "taxation policy". Subsequently, the search terms in the Web of Science Core Collection were defined as ("financial subsidies" OR "grants" OR "fiscal policy" OR "government subsidies") AND ("tax incentives" OR "taxation policy" OR "tax*") AND (innovation*), leading to the retrieval of 231 articles between 2010 and 2023. Similarly, in Scopus, the same search terms were applied, resulting in 231 articles retrieved based on titles, abstracts, and keywords. To ensure relevance, each retrieved article underwent manual screening. During the literature selection process, combining relevance rankings provided by Web of Science and Scopus with Mendeley reference management software, the articles were carefully reviewed by reading titles, abstracts, keywords, and full-text content. Articles with low relevance or not primarily focusing on corporate innovation were excluded, as well as those exploring non-corporate innovation aspects like national or international innovation. After the screening process, 42 articles were selected from Web of Science, 37 from Scopus, and after automatic deduplication using Mendeley, a total of 55 unique articles were obtained. Subsequently, upon attempting to download specific articles, it was found that three Chinese articles and one English article were inaccessible. Ultimately, 51 articles were used for bibliometric analysis, including two Chinese articles.

Table 1.
Database retrieval and data selection process.

Database	**Web of science**	**Scopus**
Last retrieval date	February 8, 2024	February 8, 2024
Search terms	("financial subsidies" OR "grants" OR "fiscal policy" OR "government subsidies") AND ("tax incentives" OR " taxation policy " OR "tax*") AND (innovation*)	
Retrieval quantities	231	231
Number of articles after literature screening	42	37
Literature time span	2010-2023	2010-2023
Final number of literature	51	

2.2. Research Methods

This study adopts a dual approach, employing both bibliometric analysis and content analysis. Bibliometric analysis involves the use of mathematical and statistical principles along with computer analysis to quantitatively study the external features of literature. It includes quantitative analyses of

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

literature publication status, core authors, keyword clusters, references, and citation analyses. However, a drawback is the inability to conduct an in-depth analysis of the specific content of the literature [2]. Content analysis, on the other hand, is a widely used qualitative review method that aims to delve into more specific research status by scrutinizing, summarizing, and generalizing the basic content of literature [3]. Content analysis accurately reflects the internal characteristics of literature related to a particular research topic and clarifies the current development status of the relevant research topic by combining specific literature content. However, this method is limited by the data of the literature sample and is subject to certain subjective biases. Therefore, this study, based on CiteSpace, adopts a comprehensive research method that combines quantitative and qualitative approaches. It aims to investigate the current research status and future trends of the impact of financial subsidies and tax incentives on corporate innovation.

3. Bibliometric Analysis of Literature Characteristics

3.1. Annual Distribution of Journal Publications

The year-wise distribution of journal publications on the research topic of this study from 2010 to 2023 is illustrated in Figure 1. It is observed that the annual average number of relevant publications was less than 5 from 2010 to 2019. Starting from 2020, there has been a gradual increase in the volume of literature published on this topic. Particularly noteworthy is the peak observed in 2023, reaching 18 publications, accounting for 35.3% of the total journal publications over the 14 years. This indicates a substantial increase in scholarly attention to this research topic.

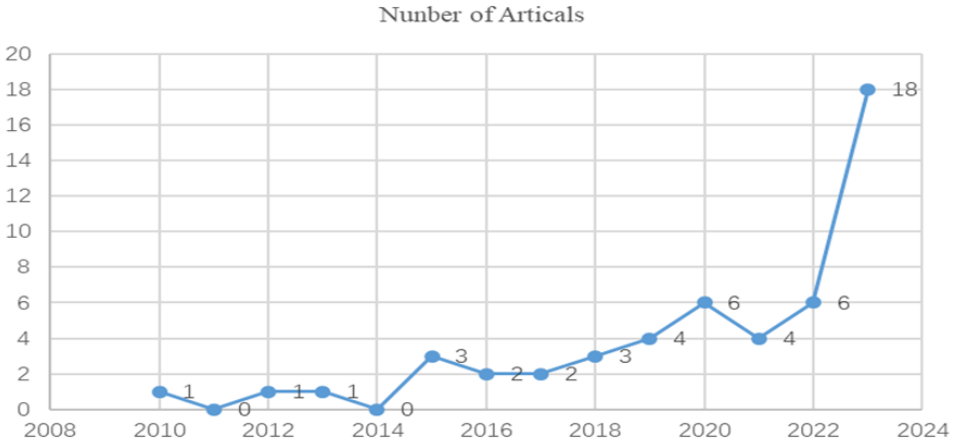

Figure 1.
Number of Articles from 2010 to 2023.

3.2. Journal Publication Overview

From the analysis of 51 articles, it was found that there are a total of 37 journals contributing to the literature. Overall, there is a considerable number of journals covering the topics of financial subsidies, tax incentives, and corporate innovation, but the distribution is somewhat scattered. Notably, 26 journals (70.3%) have published only one article on these subjects. The journals cover a range of disciplines, including management, economics, sociology, engineering technology, environmental science and ecology, computer science, and education. Top-tier journals in this field include Finance Research Letters, Business Strategy and The Environment, China Economic Review, Climate Policy, Renewable Energy, Resources Policy, and Technovation. The journal with the highest number of publications is Sustainability, contributing a total of five articles, accounting for 9.8%. Following closely is Science and Public Policy with three articles, making up 5.88% of the total publications.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

3.3. Research Collaboration Network

Focussing on financial subsidies, tax incentives, and corporate innovation, this study utilizes CiteSpace to conduct a micro-level research collaboration network analysis for the 51 literature articles.

3.3.1. Co-Citation Analysis of Authors of Cited Literature

By utilizing CiteSpace, this study conducts an identification of the co-citation network of authors of cited literature. Subsequently, based on the centrality and frequency of co-citation analysis, influential authors in the research field are identified. These are the authors with the highest citation weights, and their corresponding articles are also identified. The co-citation relationships among authors are then presented, revealing authors whose research topics are similar and closely linked [4]. CiteSpace is used for cluster analysis, and the silhouette index (S-value) is employed to assess the clustering effect. A silhouette index greater than 0.7 is considered to indicate high confidence in the clustering results [5]. In this study, a total of 9 clusters were identified, with the first 5 clusters presented in Table 2.

Table 2.
Summary of the largest 5 clusters.

Cluster ID	Size	Silhouette	Label
0	38	0.954	Subsidies
1	28	0.973	Incentive effect
2	28	0.921	Different policy instrument
3	27	0.937	Evidence
4	25	0.998	Government incentive

The largest cluster 0 has 38 members and a silhouette value of 0.954. It is labeled as a different supervision situation by Log-Likelihood Ratio, subsidies by Latent Semantic Indexing, and enhancing firm competitiveness (1.51) by Mutual Information. The major citing article of the other four clusters are Yuntian [6]; Wang, et al. [7]; Cheng, et al. [8]; Le and Jaffe [9]; Zhang and Guan [10].

Additionally, based on the co-citation analysis of authors of cited literature, the author with the highest centrality is Liu DY, with a centrality value of 0.48. Following Liu DY are authors such as Bronzini R, Becker B, and Dimos C, with centrality values of 0.35, 0.33, and 0.28, respectively, as detailed in Table 3. The collaboration among these top scholars is close, and they frequently cooperate, leading to a rich and comprehensive co-citation relationship structure. This suggests that these authors are the most interdisciplinary scholars in the research field, acting as connectors between different research groups and engaging in various thematic studies. The high centrality of the top-cited authors in the collaboration network further validates their significant impact and contribution to the development of research on the chosen topic.

Table 3.
Co-citation centrality analysis of cited authors.

Centrality	Node name	DOI	Cluster ID
0.48	Liu DY	10.1016/j.econmod.2018.11.027	0
0.35	Bronzini R	10.1016/j.respol.2015.10.008	2
0.33	Becker B	10.1111/joes.12074	2
0.28	Dimos C	10.1016/j.respol.2016.01.002	2
0.28	Boeing P	10.1016/j.respol.2016.05.007	2
0.23	Carboni OA	10.1016/j.techfore.2016.11.017	4
0.15	Chen L	10.1016/j.techfore.2019.05.018	1
0.15	Bai Y	10.1016/j.ecolind.2019.01.079	2
0.15	Broekaert W	10.1007/s11187-016-9760-7	2
0.15	Aldieri L	10.1016/j.resourpol.2020.101877	2

3.3.2. Analysis of Institutional and National Collaborations

Through the analysis of the collaboration network among institutions in the literature, it is observed that there is no emergence of a large cluster of highly collaborative institutions. Instead, there is a pattern of localized clustering and overall dispersed collaboration. In terms of node distribution and the degree of closeness of connections, there is currently no single central institution. The most closely connected institutions come from six organizations, including Lanzhou University, Sichuan Agricultural University, Chinese Academy of Social Sciences, G d'Annunzio University of Chieti-Pescara, Henan Agricultural University, and University of Chinese Academy of Social Sciences. The connections between other institutions are relatively loose.

Through the analysis of the collaboration network among countries in the literature, it is evident that China is the largest node, representing the highest number of publications by scholars in this research field. Moreover, China exhibits close collaboration with scholars from other countries, indicating a broad influence. In terms of clustering centrality, China has the highest centrality, with a value of 0.15. Following China is Malaysia, with a centrality of 0.06. Countries that collaborate closely with China include Malaysia, America, Spain, Italy, and Pakistan. This is illustrated in Figure 2.

Figure 2.
National collaboration network diagram.

4. Systematic Analysis of Literature Content

Keywords in literature provide a highly summarized and condensed overview of the main content, reflecting the core themes and research focal points of the respective documents. In this study, CiteSpace is utilized for co-occurrence and cluster analysis of keywords in the literature.

4.1. Analysis of Literatures' Keywords

4.1.1. Strategic Coordinate Chart of Keywords

The strategic coordinate chart, introduced by Law, et al. [11] is used to analyze the current state of research on different topics within a specific research area. It reflects the internal connections and relationships among the research content in a particular field, identifying research priorities and trends. In this study, the strategic coordinate chart is plotted as a two-dimensional coordinate system with Count and Centrality as parameters, where the X-axis represents Count, and the Y-axis represents Centrality. The count represents the frequency of keyword occurrence, and a higher Count indicates greater attention and maturity of the keyword in the research field. Centrality reflects the degree to which a keyword is concentrated in the co-occurrence network, with higher Centrality indicating that the keyword is more centrally positioned in the research field, with closer connections to other topics. Based on the co-occurrence analysis of keywords, this study plots the strategic coordinate chart using the parameters of Count and Centrality for the main keywords. Keywords with a Count less than 2 and Centrality less than 0.03 are excluded, as they are out of great attention and central position, resulting

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

in the retention of 23 keywords. Additionally, the chart is drawn with an average Count of 5.78 and an average Centrality of 0.1 for the main keywords as the origin. This allows the keywords to fall into different quadrants. The specific results are shown in Figure 3.

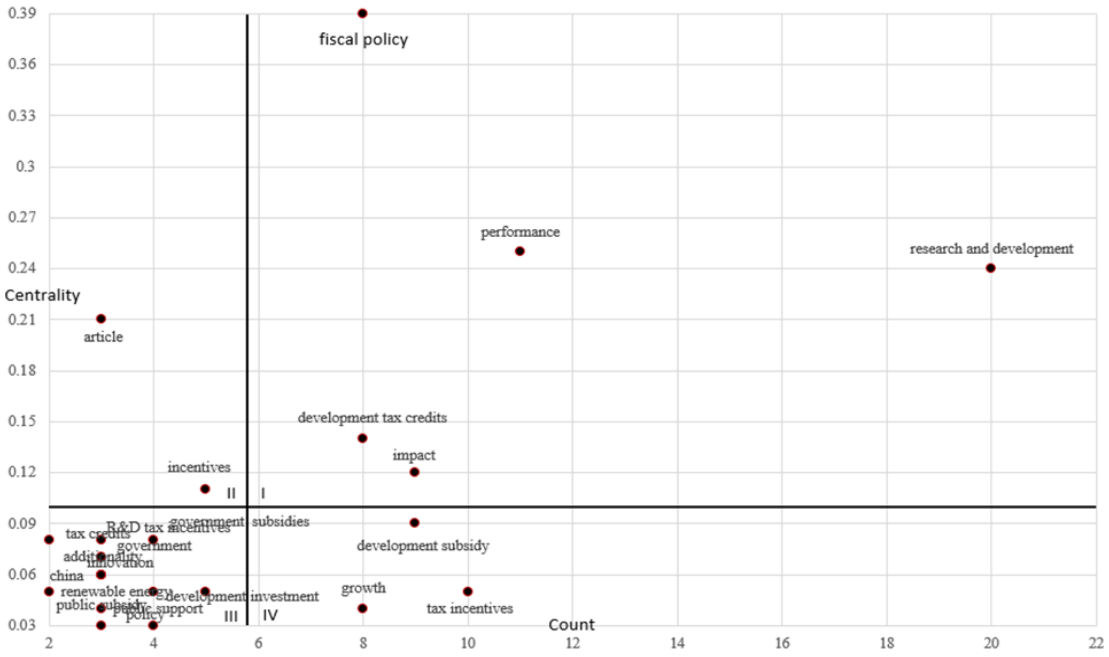

Figure 3.
Main keywords strategy coordinate chart.

From the distribution of quadrants, Quadrant I contains 5 keywords, which exhibit characteristics of high frequency and high centrality. This suggests that keywords in Quadrant I, such as "fiscal policy" "development tax credits" and "research and development" are not only hot topics in the current research field but also closely connected to other research topics. Quadrant II includes 2 keywords, "incentives" and "article" which have low frequency but high centrality. Although these research topics may not receive high attention and lack maturity, their close connections to other research topics indicate significant research potential. For instance, the combination study of "incentives" and "corporate income tax" or "turnover tax" could potentially form new research hotspots.

Keywords in Quadrant III exhibit characteristics of low frequency and low centrality, with a total of 13 keywords in this quadrant. This indicates that the current research field has relatively low attention to topics such as "R&D tax incentives" and "development investment". Additionally, these research topics have low connectivity with other fields. Whether these topics gradually become marginalized or further develop depends on whether they can be deeply explored or connected with other fields in the future. Furthermore, Quadrant III has the highest number of keywords, accounting for 56.5% of the total, indicating a major characteristic of the research field, while there are many subdivided areas of study, the interconnectivity between these areas is limited, reflecting a lack of in-depth exploration in the research.

Quadrant IV includes 3 keywords, "development subsidy" "tax incentives" and "growth". Keywords in this quadrant exhibit characteristics of high frequency and low centrality. Despite the relative maturity of study on these subjects, there aren't many links between them and other research areas. There is a possibility of gradually being marginalized into Quadrant III, but there is also an opportunity for them to combine with other fields and develop more deeply.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

4.1.2. Keyword Cluster Analysis

The results of keyword cluster analysis reveal the key research themes. The clusters are organized based on the number of associated documents, with smaller clusters excluded to focus on significant themes. The clustering outcomes, sorted by the number of relevant literature, are presented in Table 4.

Table 4.
Summary of the largest 9 clusters

Classification	Cluster ID	Silhouette	Label
Innovation	0	0.879	Enterprise innovation
	6	0.908	Technological innovation
	8	0.913	Innovation efficiency
Fiscal and tax policies	1	0.905	Tax incentive
	3	0.812	Different fiscal policies
	7	0.997	Financial subsidies
Industry and enterprise	2	0.916	Manufacturing industry
	4	0.827	Medium enterprises
	5	0.913	Pharmaceutical industry

Overall, the literature keywords can be broadly categorized into 9 themes based on academic research topics: Corporate Innovation, including Cluster 0 "Enterprise Innovation", Cluster 6 "Technological Innovation" and Cluster 8 "Innovation Efficiency". Fiscal and Tax Policies, including Cluster 1 "Tax Incentive", Cluster 3 "Different Fiscal Policies" and Cluster 7 "Financial Subsidies". Industry and Enterprises, including Cluster 2 "Manufacturing Industry", Cluster 4 "Medium Enterprises" and Cluster 5 "Pharmaceutical Industry".

Based on the analysis of the clustering graph, this study further provides a summary of the representative literature and their main contents for each clustering theme. The results are presented in Table 5. From the content of representative literature, it is evident that existing research has evolved from general fiscal and tax policies to specific research and development subsidies, and individual tax types, and from the overall impact of policy formation to the differentiated influences on technological innovation, innovation output, and green innovation. This indicates a continuous trend of in-depth and detailed research in the field.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

Table 5.
Analysis of representative literature.

Cluster ID	Major citing article	Article content
0 Bronzini and Piselli [12]		Assessed the impact of an R&D subsidy program, which was introduced in a northern Italian region during the early 2000s, on the innovative outcomes of the companies who took part in it.
1 Ferraro, et al. [13]		Assessed the measurable influence of income tax on innovation and the overall increase in productivity.
2 Testa, et al. [14]		Examined the impact of research and development funds on firm employment, economic and inventive performance, and business innovation activities.
3 Lu, et al. [15]		Studied the impact of reducing the direct tax burden within the tax reduction and fee reduction framework on innovation output.
4 Radas, et al. [16]	Radas, et al. [16]	Investigated how tax incentives alone or in conjunction with direct subsidies affected R&D spending in small and medium-sized businesses.
5 Wang and Meng [17]		Studied the factors that influence how government subsidies affect technological innovation in the pharmaceutical sector.
6 Zhong, et al. [18]		Analyzed the impact of government subsidies, tax credits, and loan support on corporate technological innovation, and further investigated the combined effects.
7 Xin, et al. [19]		Investigated the financial subsidies and indirect tax breaks' incentive impact on R&D expenditures in traditional Chinese medicine businesses.
8 Li and Rao [20]		Conducted a study on the effects of environmental levies and government subsidies in China on the development of green innovation, and assessed the interplay between these policies.

4.2. Analysis of Literatures' Research Framework

4.2.1. Analysis of Research Fields in Literature

From the perspective of the involved research field, the 51 articles primarily revolve around five aspects related to innovation, including innovation performance, innovation efficiency, innovation input and output, technological innovation, and innovations in green and environmental protection.

4.2.1.1. Innovation Performance

This section encompasses the assessment of innovation performance and its subsequent impact. Since 2016, a cumulative total of 12 research papers have examined the influence of financial subsidies and tax incentives on the performance of innovation, representing approximately 23.5% of the overall research conducted. In 2023, the number of papers reached its peak at 3, making it the highest recorded. Out of the 12 articles, 8 specifically examined samples from China, making up 66.7% of the total. The research inquiries encompass investigations explicitly focused on the influence of R&D subsidies on innovation performanceand investigations simply centered on the influence of government subsidies on innovation performance [9, 12, 21]. The remaining studies are thorough examinations of the effects of both financial subsidies and tax incentives on innovation performance.

4.2.1.2. Innovation Efficiency

This section covers innovation efficiency and R&D efficiency. From 2012 onwards, a cumulative 13 research papers have examined the influence of financial subsidies and tax incentives on innovation efficiency, constituting around 25.5% of the overall research conducted on the subject. The highest number of papers was in 2022 and 2023, each with three papers. Among these 13 papers, five had research samples from China, accounting for 38.5%, while other countries included the United States, the United Kingdom, Russia, Kazakhstan, Malaysia, and Croatia. Some scholars individually analyzed the impact of tax incentives on innovation [22, 23] and there were specific studies on corporate income tax [13] property tax [24] and value-added tax [25] on innovation. Most of the publications conducted a simultaneous analysis of the effects of financial subsidies and tax incentives on innovation efficiency.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

4.2.1.3. Innovation Input and Output

This section covers innovation input, innovation output, R&D investment, and R&D intensity. Since 2010, a total of 13 research studies have examined the effects of financial subsidies and tax incentives on innovation input and output, accounting for approximately 25.5%. The year 2023 has the highest number, with a total of 4 papers. Among the 13 papers, 8 are based on samples from China, accounting for 61.5%. Other countries involved include the United Kingdom, India, Cuba, and Croatia. Some scholars conducted individual analyses on the impact of R&D tax incentives on innovation scale [26] or studied the improvement of financing constraints by reducing the burden of direct taxes, ultimately enhancing the innovation output capability of enterprises [15]. Some scholars researched the effects of using direct subsidies alone or in combination with tax incentives on R&D orientation and innovation output [16]. The remaining research focuses on conducting a simultaneous examination of the influence of fiscal subsidies and tax incentives on innovation input and output.

4.2.1.4. Technological Innovation

This section includes technological innovation and technological efficiency. Since 2017, a total of 7 research publications have examined the effects of fiscal subsidies and tax incentives on technological innovation and efficiency, representing approximately 13.7% of the total studies conducted. The year 2023 has the highest number of publications, with a total of 4 papers. All 7 papers in this section focus on samples from China. One of the studies focuses solely on examining the influence of tax reduction on technical innovation [27] while the other papers examine the combined effects of fiscal subsidies and tax incentives on technological innovation.

4.2.1.5. Innovation in Green Environmental Protection

This section encompasses green innovation, green technological innovation, sustainable innovation, and ecological product innovation. Since 2018, six research papers have examined the effects of financial subsidies and tax incentives on green environmental innovation, representing approximately 11.8% of the overall research conducted on this topic. In 2023, the maximum number of publications reached a record high, with a total of four papers. Out of the six papers, five originated from China, and one from Brazil. One study examined the invigorating impact of tax incentive policies on sustainable innovation [20] while another analyzed the influence of tax reduction policies on green innovation in energy-saving firms [28]. The four remaining publications provided thorough evaluations of the impact of financial subsidies and tax incentives on green environmental innovation.

4.2.2. Analysis of Research Methods in Literature

The development of the effect of tax incentives and financial subsidies on company innovation has spanned several years, with research content continuously deepening and expanding, and research methods consistently becoming more enriched and refined. Currently, research on this topic is predominantly empirical. Based on the classification of research methods by Williams [29] and Paes, et al. [30] this study summarizes existing literature from four perspectives: quantitative research, qualitative research, modeling simulation, and case studies.

Out of the 51 reviewed articles, 42 utilized quantitative research methods to investigate the topic, accounting for 82.4%. Among them, 4 articles employed questionnaire survey methods. The methods used include multiple regression analysis [31] difference-in-differences framework [11] propensity score matching method [32] panel estimation method [33] Generalised Method of Moments [34] Hodrick-Prescott [35] DEA model [36] static panel model with fixed effects [37] entropy weight method [38] the Vensim DSS review model [28] and the super-efficiency SBM model [20]. The data used in these research methods mainly consists of balanced or unbalanced panel data, with fewer analyses based on cross-sectional data [39]. In summary, quantitative research methods encompass methodologies from the field of management studies and various other disciplines.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

Regarding qualitative research, there are a total of 7 articles, accounting for 13.7%. Among them, 2 articles are literature reviews. The publication years of these articles are mainly concentrated in 2020 and earlier, with no qualitative research literature in the last three years. It can be observed that the current mainstream research method is quantitative research. Concerning modeling and simulation, only one article was identified, employing a system dynamics model to assess the impact of government support on technological innovation in the pharmaceutical industry [17]. As for case studies, there is also only one article, focusing on the support provided by the government of the Republic of Kazakhstan to innovative enterprises [40].

4.2.3. Analysis of Research Conclusion in Literature

Currently, there is no consensus on the impact of financial subsidies and tax incentives on innovation. This section will summarize findings based on the five research questions outlined earlier.

Regarding innovation performance, overall, the literature concludes that financial subsidies and tax incentives are conducive to improving innovation performance, and the conclusions are relatively consistent. It's crucial to remember that [10] contend that while direct government subsidies help businesses perform better in terms of innovation in the short term, they don't in the long run. Conversely, long-term and short-term innovation performance benefits from indirect tax benefits. The issue of moderation should also be considered, meaning that more government funding is not always better. To prevent wastage, an appropriate funding ceiling must be set [41]. Furthermore, it is worthwhile to examine the combined impact of financial subsidies and tax incentives on innovation performance, as they have synergistic consequences. Pang, et al. [42] suggest that financial subsidies, tax incentives, and government procurement all exert a positive influence on innovation. These three policies mutually reinforce, and promote each other, and work together to drive innovation in a synergistic manner. Testa, et al. [14] also reach a similar conclusion, suggesting that tax incentives and grants work together to influence firm growth and innovation activities.

In the aspect of innovation efficiency, the literature's conclusions are not consistent overall, with seven articles specifically studying the impact of tax incentives. There is notable disagreement regarding the influence of tax incentives on innovation efficiency. One perspective suggests that tax incentives significantly stimulate innovation efficiency. For instance, in their study, Wang, et al. [7] suggest that tax incentives exert a substantial stimulating impact on innovation within high-tech businesses. Furthermore, the influence of tax incentives on the performance of both small and large firms is not considerably different. Liu and Zhou [43] contend that tax incentives exert a consistent and substantial impact on enhancing research and development efficiency within the manufacturing sector. Qian [36] determines that tax incentives are more efficacious than financial subsidies for new energy vehicle firms. Additionally, tax incentives have a greater impact on enhancing innovation efficiency in private enterprises compared to state-owned enterprises. The second perspective suggests that the impact of tax incentives on innovation efficiency is not significant. For instance, Garnov, et al. [24] suggest that reducing tax rates does not incentivize investment, and the tax rate for corporate income tax does not affect investment activities significantly. Lowering the property tax rate is also not particularly attractive to investors. Regarding the impact of financial subsidies on innovation efficiency, Mello-Sampayo, et al. [44] argue that subsidizing innovation can enhance the growth rate of innovation. Fang, et al. [45] find that government innovation subsidies are a crucial mechanism for identifying policy impacts on innovation, significantly boosting innovation in Chinese high-tech enterprises. In addition, Wang, et al. [7] argue that financial subsidies exert a substantial incentivizing impact on innovation within high-tech firms. They further suggest that the implementation of industrial subsidy programs specifically targeted at high-tech enterprises can lead to advantageous outcomes. However, Liu and Zhou [43] contend that the direct impact of subsidies on the current R&D efficiency in the manufacturing industry is not significant, only becoming positive after a lag of two years.

When it comes to innovation input and output, the primary perspective is that providing financial subsidies and tax incentives has a substantial impact on encouraging innovation. However, specific

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

analyses reveal some differences in the effects produced by the two. Radas, et al. [16] discovered that the utilization of direct subsidies alone or in conjunction with tax incentives improves enterprises' focus on research and development and increases their output of innovative products. According to Xin, et al. [19] tax incentives significantly boost R&D spending in Chinese traditional medicine businesses. R&D costs rise by 0.99% for each 1% decrease in corporate tax expenditures. Financial subsidies have a considerable stimulating influence on R&D investment, while the calculated coefficient is only 0.24. Financial subsidies have less of an encouraging effect on R&D investment when they coexist with financial subsidies and tax incentives. According to research by Kang, et al. [35] financial subsidies dramatically raise the level of R&D expenditure made by businesses, increase their propensity to innovate, encourage more domestic and international patent applications, and enhance the volume of innovation output. Furthermore, tax incentives boost R&D investment intensity greatly but have little effect on both domestic and international patent applications. Cheng, et al. [8] believe that subsidies have a greater impact on output than tax incentives. Different opinions also exist, for example, according to Jiang, et al. [46] government subsidies are asserted to exert a notable crowding-out impact on R&D investment in agricultural enterprises, whereas tax rebates are highlighted for their significant stimulative effect on R&D investment in the same sector.

In terms of technological innovation, there are certain differences in the impact of financial subsidies and tax incentives. Wang and Meng [17] argue that direct government funding in applied research areas has a crowding-out effect on enterprises' funding for technological innovation. On the other hand, tax deductions for technological innovation and direct funding in basic research areas stimulate enterprises to increase investment in technological innovation, creating a leverage effect. Song and Wen [37] argue that financial subsidies have a negative impact on technological innovation in the integrated circuit industry, whereas the positive influence of tax incentives is less significant. Yang, et al. [38] found that the tax burden does not significantly impact technological innovation in new energy vehicle companies, but financial incentives stimulate technological innovation in the new energy vehicle industry.

In the context of green environmental innovation, most studies have conducted comparative analyses of financial subsidies and tax incentives. Gramkow and Anger-Kraavi [31] propose that financial policies can promote green innovation in developing countries. Li, et al. [47] find that the intensity of tax incentives has a positive effect on sustainable innovation in enterprises. Both the policy of deducting R&D expenses and the policy of providing tax rate incentives can greatly facilitate sustainable innovation. However, there is a trade-off between these two policies, as they can be mutually exclusive. Long and Liao [39] find that both direct subsidies and tax deductions positively impact eco-product innovation in enterprises, with direct subsidies having a stronger influence. Liao and Zhu [48] claim that tax incentives promote radical environmental innovation in firms, but environmental subsidies impede incremental environmental innovation in the same enterprises. Government subsidies have the potential to drown out or substitute business R&D expenditures in addition to having spillover effects [18].

5. Conclusions

This study focuses on the literature on the influence of financial subsidies and tax incentives on innovation. The research material is gathered from the Web of Science and Scopus databases. The study utilizes bibliometric approaches to analyze the features and research content of papers pertaining to this topic. The primary findings can be summarized as follows:

First, the number of publications experienced a significant increase in 2023, showing a growth rate of 200% compared to the previous year, indicating that the research topic is receiving increasing attention. Second, the literature covers a diverse range of journals, mainly focusing on the fields of economics, management science, and basic science, encompassing areas such as innovation performance, innovation input and industry, green innovation, and sustainable innovation [49]. Third, in terms of scientific collaboration networks, the hierarchical structure of scholars' co-citation relationships is rich,

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

but the cooperation relationships among literature authors are relatively shallow with low expansiveness. The density of institutional and national cooperation networks is low, and a large number of clustered cooperative institutions have not yet emerged, with China showing relatively strong performance in this regard. Fourth, the strategic coordinate plot of literature keywords indicates that the current research focus revolves around fiscal policy, with tax credits at the center of the studies. Fifth, the clustering results of literature keywords indicate that the current research hotspots include innovation, fiscal and tax policies, and industry-specific studies of enterprises. Sixth, the main research fields involve exploring the impact of financial subsidies and tax incentives on innovation performance, innovation efficiency, innovation input and output, technology innovation, and green environmental innovation. A wide range of research methods are employed, including quantitative studies, qualitative studies, modeling and simulation, and case studies. Empirical research predominates, with a significant number of publications utilizing panel data for their studies. In terms of research conclusions, the impact of financial subsidies and tax incentives on innovation performance tends to be consistent, reflecting a positive incentive effect. However, there are variations in their impact on innovation efficiency, innovation input and output, technology innovation, and green environmental innovation.

6. Research Direction and Shortcomings

6.1. Research Prospect

In the context of global economic development, innovation has emerged as a pivotal catalyst for fostering economic growth. Hence, there is a requirement for ongoing and extensive research on the influence of financial subsidies and tax incentives on innovation. Anticipating future investigations:

a. The current research questions involve innovation performance, innovation efficiency, etc. It would be beneficial to introduce innovation quality, forming a comprehensive reflection of the enterprise's innovation activities in terms of process and results, including capabilities, performance, efficiency, and value.

b. Strengthen the analysis of the interactive effects of financial subsidies and tax incentives, especially in specific industries. By subdividing specific tax types within tax incentive policies and further analyzing their interactions, more in-depth research results can be obtained to provide differentiated policy recommendations.

c. In the research process, the currently introduced moderating variables mainly include financing constraints, the proportion of government spending to R&D spending in specific regions, financial support, etc. In future research, the introduction of Environmental, Social, and Governance (ESG) considerations can be considered to enhance in-depth research on green innovation and sustainable innovation.

6.2. Research Limitations

The article has the following limitations: Firstly, although a comprehensive qualitative and quantitative research method was applied to detail the analysis of relevant literature, there is still room for improvement in the breadth and depth of the literature analysis. Subsequent research can enhance the current results by employing more literature review tools and methods, as well as expanding the scope of literature searches. Secondly, due to the interdisciplinary nature of the impact on innovation and the rapid evolution of research hotspots, the suggestions for future research development directions formed in this study may need further validation in subsequent studies.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

References
[1] P. Patel and K. Pavitt, "National innovation systems: Why they are important, and how they might be measured and compared," *Economics of Innovation and New Technology*, vol. 3, no. 1, pp. 77-95, 1994. https://doi.org/10.1080/10438599400000004
[2] C. Pickering and J. Byrne, "The benefits of publishing systematic quantitative literature reviews for PhD candidates and other early-career researchers," *Higher Education Research & Development*, vol. 33, no. 3, pp. 534-548, 2014. https://doi.org/10.1080/07294360.2013.841651
[3] M. Petticrew, "Systematic reviews from astronomy to zoology: Myths and misconceptions," *The BMJ*, vol. 322, no. 7278, pp. 98-101, 2001. https://doi.org/10.1136/bmj.322.7278.98
[4] M. B. Synnestvedt, C. Chen, and J. H. Holmes, "CiteSpace II: visualization and knowledge discovery in bibliographic databases," in *AMIA Annual Symposium Proceedings*, 2005, p. 724.
[5] C. Chen and M. Song, "Visualizing a field of research: A methodology of systematic scientometric reviews," *PloS One*, vol. 14, no. 10, p. e0223994, 2019. https://doi.org/10.1371/journal.pone.0223994
[6] X. Yuntian, "The impact of R&D subsidies on firm innovation in different supervision situations: Analysis from pharmaceutical companies in China," *Technology Analysis & Strategic Management*, vol. 36, no. 8, pp. 1792-1809, 2024. https://doi.org/10.1080/09537325.2022.2115882
[7] S. Wang, F. Ahmad, Y. Li, N. Abid, A. A. Chandio, and A. Rehman, "The impact of industrial subsidies and enterprise innovation on enterprise performance: Evidence from listed Chinese manufacturing companies," *Sustainability*, vol. 14, no. 8, p. 4520, 2022. https://doi.org/10.3390/su14084520
[8] H. Cheng, Z. Zhang, Z. Liao, Y. Wei, and J. M. Nkongo Mvondo, "Different policy instruments and the threshold effects on collaboration efficiency in China," *Science and Public Policy*, vol. 47, no. 3, pp. 348-359, 2020. https://doi.org/10.1093/scipol/scaa016
[9] T. Le and A. B. Jaffe, "The impact of R&D subsidy on innovation: Evidence from New Zealand firms," *Economics of Innovation and New Technology*, vol. 26, no. 5, pp. 429-452, 2017. https://doi.org/10.1080/10438599.2016.1213504
[10] J. Zhang and J. Guan, "The time-varying impacts of government incentives on innovation," *Technological Forecasting and Social Change*, vol. 135, pp. 132-144, 2018. https://doi.org/10.1016/j.techfore.2018.04.012
[11] J. Law, S. Bauin, J. Courtial, and J. Whittaker, "Policy and the mapping of scientific change: A co-word analysis of research into environmental acidification," *Scientometrics*, vol. 14, no. 3-4, pp. 251-264, 1988.
[12] R. Bronzini and P. Piselli, "The impact of R&D subsidies on firm innovation," *Research Policy*, vol. 45, no. 2, pp. 442-457, 2016. https://doi.org/10.2139/ssrn.2464525
[13] D. Ferraro, S. Ghazi, and P. F. Peretto, "Implications of tax policy for innovation and aggregate productivity growth," *European Economic Review*, vol. 130, p. 103590, 2020. https://doi.org/10.2139/ssrn.2966933
[14] G. Testa, K. Szkuta, and P. N. Cunningham, "Improving access to finance for young innovative enterprises with growth potential: Evidence of impact of R&D grant schemes on firms' outputs," *Research Evaluation*, vol. 28, no. 4, pp. 355-369, 2019. https://doi.org/10.1093/reseval/rvz016
[15] Y. Lu, Y. Zhao, Y. Li, and Y. Cao, "Direct tax burden, financing constraints, and innovation-based output," *Sustainability*, vol. 15, no. 21, p. 15275, 2023. https://doi.org/10.3390/su152115275
[16] S. Radas, I.-D. Anić, A. Tafro, and V. Wagner, "The effects of public support schemes on small and medium enterprises," *Technovation*, vol. 38, pp. 15-30, 2015. https://doi.org/10.1016/j.technovation.2014.08.002
[17] B.-Z. Wang and G.-X. Meng, "Analysis and modeling of system dynamics for the influence of government subsidy on technological innovation of the pharmaceutical industry," *Chinese Journal of New Drugs*, vol. 27, no. 22, pp. 2598–2601, 2018.
[18] M. Zhong, Q. Lu, and R. He, "The heterogeneous effects of industrial policy on technological innovation: Evidence from China's new metal material industry and micro-data," *Resources Policy*, vol. 79, p. 103107, 2022. https://doi.org/10.1016/j.resourpol.2022.103107
[19] Q. Xin, Y. Zheng, X. Gong, and L.-H. Sun, "A comparative study on impact of tax incentives and financial subsidies on R&D investment of Chinese materia medica enterprises," *Chinese Traditional and Herbal Drugs*, pp. 2215-2220, 2018.
[20] L. Li and M. Rao, "The impact of government intervention on innovation efficiency of green technology—a threshold effect analysis based on environmental taxation and government subsidies," *Frontiers in Energy Research*, vol. 11, p. 1197158, 2023. https://doi.org/10.3389/fenrg.2023.1197158
[21] M. Feng and Y. Wang, "More government subsidies, more innovation of new energy firms? Evidence from China," *Sustainability*, vol. 15, no. 11, p. 8819, 2023. https://doi.org/10.3390/su15118819
[22] S. Hodžić, "Research and development and tax incentives," *South East European Journal of Economics and Business*, vol. 7, no. 2, pp. 51-62, 2012.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

[23] F. Ehsan, "Boosting innovation in small-and medium-sized enterprises through tax incentives: Lessons from the UK," *Science and Public Policy*, vol. 48, no. 5, pp. 712-726, 2021. https://doi.org/10.1093/scipol/scab034

[24] A. P. Garnov, E. Y. Kamchatova, N. A. Prodanova, D. G. Perepelitsa, M. A. Markov, and L. A. Badalov, "Efficiency of tax incentives for innovation in the development of the industrial economy (on the example of the chemical and pharmaceutical sphere)," *Systematic Reviews in Pharmacy*, vol. 11, no. 12, pp. 1379-1382, 2020.

[25] K. Ding, H. Xu, and R. Yang, "Taxation and enterprise innovation: Evidence from China's value-added tax reform," *Sustainability*, vol. 13, no. 10, p. 5700, 2021. https://doi.org/10.3390/su13105700

[26] J. Mitchell, G. Testa, M. Sanchez Martinez, P. N. Cunningham, and K. Szkuta, "Tax incentives for R&D: Supporting innovative scale-ups?," *Research Evaluation*, vol. 29, no. 2, pp. 121-134, 2020. https://doi.org/10.1093/reseval/rvz026

[27] Y. Cui, Y. Jiang, Z. Zhang, and S. Xu, "Tax reduction, technological progress, and energy efficiency improvement: A quasi-natural experiment from China," *Economic Analysis and Policy*, vol. 78, pp. 618-633, 2023. https://doi.org/10.1016/j.eap.2023.04.004

[28] W. Fan, M. K. Anser, M. H. Nasir, and R. Nazar, "Uncertainty in firm innovation scheme and impact of green fiscal policy; Economic recovery of Chinese firms in the post-Covid-19 era," *Economic Analysis and Policy*, vol. 78, pp. 1424-1439, 2023. https://doi.org/10.1016/j.eap.2023.04.002

[29] C. Williams, "Research methods," *Journal of Business & Economics Research*, vol. 5, no. 3, pp. 65-72, 2007.

[30] L. A. B. Paes, B. S. Bezerra, R. M. Deus, D. Jugend, and R. A. G. Battistelle, "Organic solid waste management in a circular economy perspective–A systematic review and SWOT analysis," *Journal of Cleaner Production*, vol. 239, p. 118086, 2019. https://doi.org/10.1016/j.jclepro.2019.118086

[31] C. Gramkow and A. Anger-Kraavi, "Could fiscal policies induce green innovation in developing countries? The case of Brazilian manufacturing sectors," *Climate Policy*, vol. 18, no. 2, pp. 246-257, 2018. https://doi.org/10.1080/14693062.2016.1277683

[32] Z. Aralica and V. Botrić, "Ievaluation of Research and Development Tax Incentives Scheme in Croatia," *Economic Research-Ekonomska Istraživanja*, vol. 26, no. 3, pp. 63-80, 2013. https://doi.org/10.1080/1331677x.2013.11517622

[33] Z.-J. Zhou, P.-Y. Zhang, M.-M. Lu, and Z. Gao, "The influence of government intervention on the performance of independent innovation under financial support based on data of listed companies in strategic emerging industries," *Mathematical Problems in Engineering*, vol. 2020, no. 1, p. 5063986, 2020. https://doi.org/10.1155/2020/5063986

[34] S. Mani, "Financing of industrial innovations in India: How effective are tax incentives for R&D?," *International Journal of Technological Learning, Innovation and Development*, vol. 3, no. 2, pp. 109-131, 2010. https://doi.org/10.1504/ijtlid.2010.034560

[35] F. Kang, Q. Yu, and M. Wan, "Corporate innovation incentive policy during business cycles: Fiscal subsidies or tax incentives?," *Emerging Markets Finance and Trade*, vol. 59, no. 7, pp. 2190-2203, 2023. https://doi.org/10.1080/1540496x.2023.2167488

[36] B. Qian, "Financial subsidies, tax incentives, and new energy vehicle enterprises' innovation efficiency: Evidence from Chinese listed enterprises," *Plos One*, vol. 18, no. 10, p. e0293117, 2023. https://doi.org/10.1371/journal.pone.0293117

[37] L. Song and Y. Wen, "Financial subsidies, tax incentives and technological innovation in China's integrated circuit industry," *Journal of Innovation & Knowledge*, vol. 8, no. 3, p. 100406, 2023. https://doi.org/10.1016/j.jik.2023.100406

[38] T. Yang, Z. Yuan, and C. Xing, "Research on China's fiscal and taxation policy of new energy vehicle industry technological innovation," *Economic Research-Ekonomska Istrazivanja*, vol. 36, no. 2, p. 2108100, 2023. https://doi.org/10.1080/1331677x.2022.2108100

[39] S. Long and Z. Liao, "Are fiscal policy incentives effective in stimulating firms' eco-product innovation? The moderating role of dynamic capabilities," *Business Strategy and The Environment*, vol. 30, no. 7, pp. 3095-3104, 2021. https://doi.org/10.1002/bse.2791

[40] S. A. Abdymanapov, A. N. Toxanova, A. H. Galiyeva, A. A. Muhamedzhanova, Z. S. Ashikbayeva, and A. S. Baidalinov, "Government support of innovative business in the Republic of Kazakhstan," *International Electronic Journal of Mathematics Education*, vol. 11, no. 5, pp. 1033-1049, 2016.

[41] A. Yu, Q. Zhang, R. Yu, and Y. Cheng, "More is better or in waste? A resource allocation measure of government grants for facilitating firm innovations," *Technological Forecasting and Social Change*, vol. 197, p. 122918, 2023. https://doi.org/10.1016/j.techfore.2023.122918

[42] S. Pang, S. Dou, and H. Li, "Synergy effect of science and technology policies on innovation: Evidence from China," *PloS One*, vol. 15, no. 10, p. e0240515, 2020. https://doi.org/10.1371/journal.pone.0240515

[43] Z. Liu and X. Zhou, "Can direct subsidies or tax incentives improve the R&D efficiency of the manufacturing industry in China?," *Processes*, vol. 11, no. 1, p. 181, 2023. https://doi.org/10.3390/pr11010181

[44] D. F. Mello-Sampayo, S. Vale, and F. Camoes, "Substitutability between drugs, innovation, and fiscal policy in the pharmaceutical industry," *Annals of Economics and Finance*, vol. 16, no. 2, pp. 273-289, 2015.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078

[45] H. Fang, X. Wu, J. H. Shen, and L. Zhao, "The impact of technology identification policy on firm innovation: Evidence from China," *China Economic Review*, vol. 76, p. 101866, 2022. https://doi.org/10.1016/j.chieco.2022.101866

[46] Z. Jiang, X. Zhao, and J. Zhou, "Does the supervision mechanism promote the incentive effects of government innovation support on the R&D input of agricultural enterprises?," *IEEE Access*, vol. 9, pp. 3339-3359, 2020. https://doi.org/10.1109/access.2020.3047839

[47] N. Li, J. Feng, and C. Zhang, "Macro tax incentives and corporate sustainable innovation: Evidence from Chinese Enterprises," *Environmental Science and Pollution Research*, vol. 30, no. 45, pp. 101546-101564, 2023. https://doi.org/10.1007/s11356-023-29268-0

[48] Z. Liao and X. Zhu, "The role of different fiscal policies in inducing environmental innovation and enhancing firm competitiveness," *Emerging Markets Finance and Trade*, vol. 59, no. 3, pp. 688-697, 2023. https://doi.org/10.1080/1540496x.2022.2119845

[49] C. Dimos, F. M. Fai, and P. R. Tomlinson, "The speed of the effects of publicly funded research on business R&D, innovation and innovation behaviour: Evidence from UK firms," *British Journal of Management*, vol. 35, no. 3, pp. 1468-1488, 2024. https://doi.org/10.1111/1467-8551.12767

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 4: 779-793, 2025
DOI: 10.55214/25768484.v9i4.6078