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RESEARCH ARTICLE

Evaluating Innovation and Entrepreneurship Policies Through a Supply–Demand Matching Framework: Evidence from Firm-Level Data

Muzhipeng[1], Aweewan Mangmeechai[1], Wang Si Ya[2]*

[1]National Institute of Development Administration, Bangkok 10240, Thailand
[2]Universiti Kebangsaan Malaysia, Bangi 43600, Malaysia

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***Corresponding Author:**

P147243@siswa.ukm.edu.my(W.S.Y.)

ABSTRACT

Innovation and entrepreneurship policies play a critical role in promoting economic development, employment creation, and social governance. However, the effectiveness of such policies depends not only on the intensity of policy support but also on the extent to which policy supply aligns with the actual needs of enterprises. In practice, mismatches between policy provision and enterprise demand may reduce policy utilization efficiency and weaken governance outcomes. This study evaluates the effectiveness of innovation and entrepreneurship policies by adopting a policy supply–demand matching perspective and provides firm-level empirical evidence. Based on a systematic analysis of innovation and entrepreneurship policy documents and enterprise survey data, this study constructs a multidimensional policy element framework comprising seven primary policy dimensions and multiple sub-indicators, including technology introduction and knowledge diffusion, research and development support, production and manufacturing support, new product market development, talent support, financial and operational funding, and service and institutional environment. A quantitative supply–demand matching model grounded in structural alignment principles is employed to measure the degree and direction of alignment between policy supply and enterprise demand. Using firm-level data, the study empirically examines overall policy matching performance as well as differences across enterprises with heterogeneous characteristics, including firm size, ownership type, and development stage. The results indicate that innovation and entrepreneurship policies generally exhibit a relatively high level of supply–demand matching, particularly in capability-oriented policy dimensions such as financial support, research and development, and talent policies. In contrast, production and manufacturing support policies show comparatively lower matching levels. Significant heterogeneity is observed across enterprise groups: large, mature, and state-owned enterprises demonstrate higher matching degrees, while small, micro, and early-stage enterprises experience lower alignment between policy supply and demand. In most policy dimensions, enterprise demand exceeds the level of policy support received. The findings suggest that improving innovation policy effectiveness requires not only increasing policy support intensity but also enhancing policy targeting, communication, and implementation mechanisms. By providing a quantitative approach to measuring policy supply–demand alignment, this study contributes to public policy evaluation and offers practical implications for strengthening inclusive and effective innovation governance.

INTRODUCTION

Innovation and entrepreneurship have become central drivers of economic growth, social transformation, and employment creation in both developed and developing economies. Governments increasingly rely on innovation-oriented public policies to stimulate entrepreneurial activity, enhance firm competitiveness, and improve long-term governance performance. In this context, innovation and entrepreneurship policies are expected not only to provide financial and institutional support but also to respond effectively to the heterogeneous needs of enterprises operating at different stages of development. However, policy effectiveness does not solely depend on the intensity of support; it is critically shaped by the degree to which policy supply aligns with enterprise demand (Wang et al., 2023).

Existing research on innovation and entrepreneurship policy has primarily focused on policy design, institutional evolution, and comparative policy frameworks at the macro level. While these studies provide valuable insights into policy intentions and structural characteristics, relatively limited attention has been paid to the demand side of policy implementation—particularly how enterprises perceive and utilize policy instruments in practice. As a result, there remains an important gap between policy formulation and policy outcomes, raising concerns about mismatches between what governments provide and what enterprises actually need. Such mismatches may lead to inefficient resource allocation, uneven policy accessibility, and suboptimal social and economic outcomes (Ding, 2022).

From a social governance perspective, innovation policy effectiveness should be evaluated through the interaction between policy supply and enterprise demand. Enterprises differ significantly in terms of size, ownership structure, and growth stage, leading to heterogeneous policy demand patterns. Early-stage and small firms often face stronger constraints in financing, talent acquisition, and market access, whereas mature and large firms tend to demand advanced Research And Development (R&D) support, technology upgrading, and high-level human capital. Uniform policy packages may therefore fail to address these differentiated needs, resulting in uneven policy impacts across enterprise groups. Measuring the degree of alignment between policy supply and enterprise demand is thus essential for understanding policy effectiveness and improving governance performance (Irisarri, 2025).

Despite the growing recognition of supply–demand alignment in public policy research, quantitative approaches to measuring policy matching remain underdeveloped, particularly at the firm level. Most existing studies rely on qualitative assessments or descriptive indicators, which limit comparability and empirical rigor. Moreover, few studies systematically integrate multidimensional policy elements—such as technology diffusion, R&D support, production and manufacturing assistance, market development, talent policies, financial support, and service environment—into a unified analytical framework. This methodological gap constrains the ability to evaluate policy effectiveness comprehensively and to identify specific areas of mismatch (Wei et al., 2024).

To address these limitations, this study develops a policy supply–demand matching framework grounded in similarity and structural alignment principles and applies it to firm-level data. Based on a systematic analysis of innovation and entrepreneurship policy documents and enterprise survey data, the study constructs a multidimensional policy element framework comprising seven primary policy dimensions and multiple sub-indicators (Dechezleprêtre & Kruse, 2022). A quantitative matching model is then employed to measure the degree and direction of alignment between policy supply and enterprise demand across different enterprise groups. By incorporating enterprise heterogeneity into the analysis, the study provides a nuanced evaluation of policy effectiveness from a social and economic governance perspective (Ranasinghe, 2014). Using firm-level empirical data, this research examines overall policy matching performance as well as differences across enterprise size, ownership type, and development stage. The findings aim to offer empirical evidence for improving innovation and entrepreneurship policy design, enhancing policy targeting, and strengthening governance mechanisms. By shifting the focus from policy intensity alone to supply–demand alignment, this study contributes to the broader literature on public policy evaluation and provides practical implications for policymakers seeking to promote inclusive and sustainable innovation-driven development (Fried, 2018).

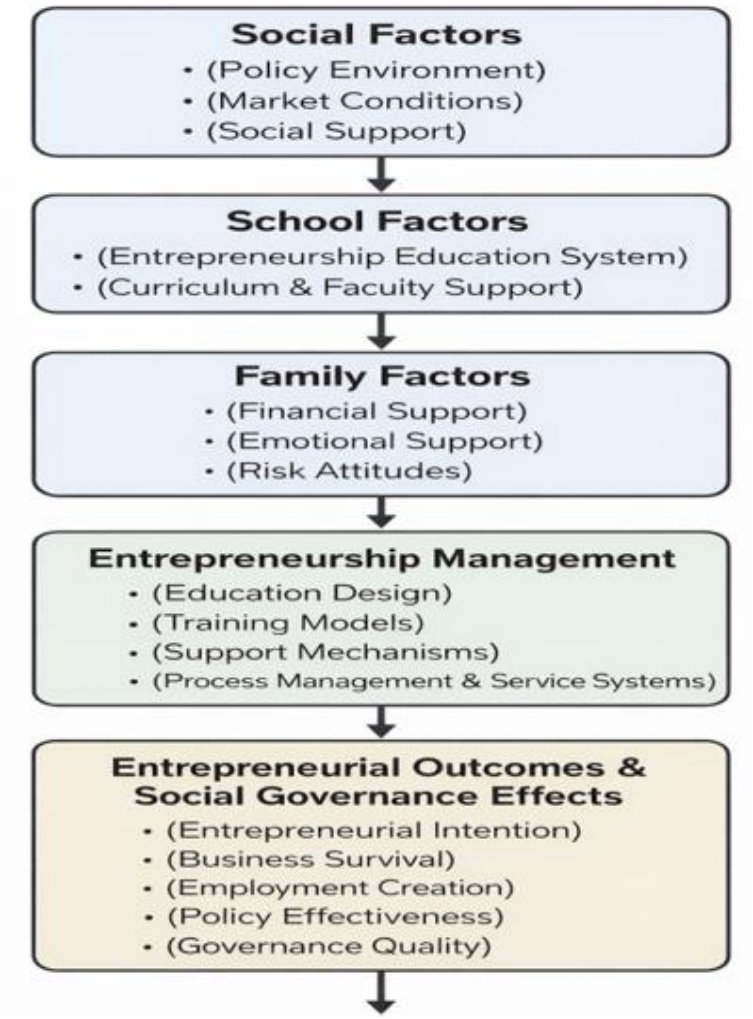

Figure 1. Conceptual framework

2.LITERATURE REVIEW AND HYPOTHESES

2.1 Innovation and Entrepreneurship Policy Effectiveness

According to Figure 1. Innovation and entrepreneurship policies have long been regarded as essential instruments for promoting economic growth, employment generation, and social stability (Campos et al., 2021). From a public governance perspective, such policies are designed to reduce market failures, alleviate resource constraints faced by firms, and stimulate innovative activities. Previous studies emphasize that policy effectiveness depends not only on policy design but also on implementation quality and institutional coordination (Bradley et al., 2021).

Early research mainly focused on macro-level policy frameworks, highlighting the role of government intervention in fostering entrepreneurial ecosystems. These studies suggest that financial subsidies, tax incentives, and regulatory support can significantly reduce entry barriers and encourage entrepreneurial activities. However, subsequent empirical evidence shows that policy outcomes vary substantially across firms and regions, indicating that uniform policy instruments may not generate consistent effects (Jia et al., 2019).

Recent literature increasingly recognizes that policy effectiveness is context-dependent and shaped by firm characteristics, institutional environments, and policy accessibility. From this perspective, innovation and entrepreneurship policies should be evaluated not merely by their scope or intensity but by their ability to respond to the actual needs of enterprises. This shift in focus has laid the foundation for demand-oriented and evidence-based policy evaluation approaches (Costa & Moreira, 2022).

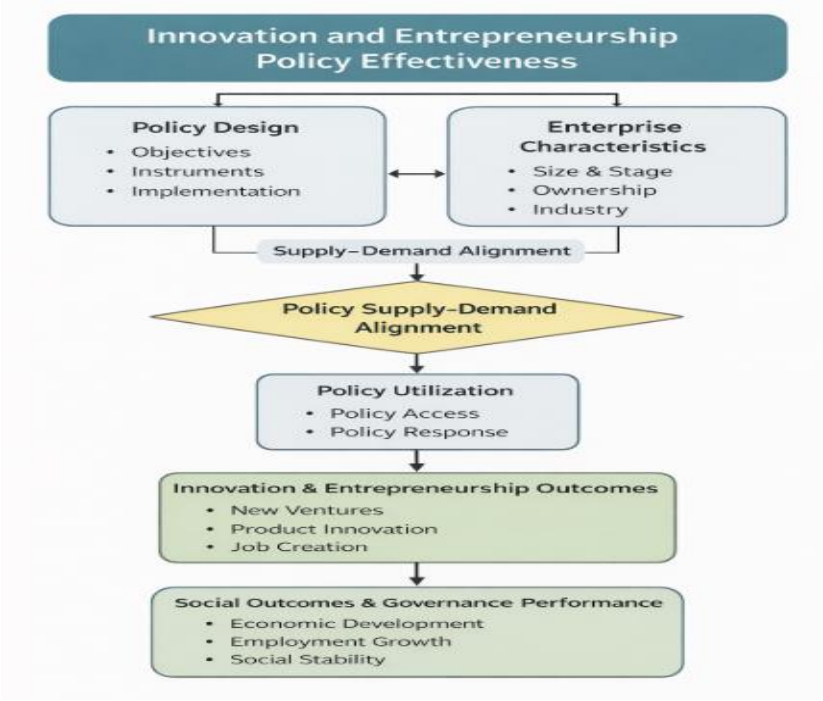

Figure 1. Innovation and Entrepreneurship Policy Effectiveness

2.2 Policy Supply–Demand Matching Perspective

The concept of supply–demand matching originates from resource allocation and management theories, emphasizing the alignment between resource provision and user needs. Applied to public policy analysis, supply–demand matching refers to the degree of correspondence between policy instruments supplied by governments and the demands expressed by policy beneficiaries (Al Rawaf & Alfalih, 2023).

Existing studies argue that policy mismatches can lead to low utilization rates, inefficient allocation of public resources, and weakened governance outcomes. In the context of innovation and entrepreneurship, enterprises demand diverse forms of support, including financial resources, technological assistance, talent development, market access, and institutional services. When policy supply fails to reflect these multidimensional demands, even well-funded policy systems may produce limited effects (Farinha et al., 2020).

Although qualitative discussions on policy mismatch are common, quantitative measurement of policy supply–demand alignment remains limited. Most studies rely on case analysis or descriptive statistics, lacking systematic frameworks to assess matching degrees across policy dimensions. This methodological limitation constrains comparative analysis and weakens empirical conclusions. Therefore, constructing a multidimensional and measurable policy supply–demand matching framework is essential for advancing policy evaluation research (Arrighetti et al., 2014).

2.3 Multidimensional Structure of Innovation and Entrepreneurship Policies

Innovation and entrepreneurship policies are inherently multidimensional, encompassing a wide range of policy instruments and support mechanisms. Prior research identifies several core policy dimensions, including technology introduction and knowledge diffusion, research and development (R&D) support, production and manufacturing assistance, market development, talent support, financial funding, and institutional service environments (Bradley et al., 2021).

Studies suggest that capability-oriented policies—such as R&D support, talent development, and financial assistance—are more likely to influence firm innovation performance, while environment-oriented policies—such as service platforms and institutional support—play a critical role in reducing uncertainty and transaction costs. However, the effectiveness of these policy dimensions depends on their relevance to firm-specific demands (Verdú & Tierno, 2019).

The literature further indicates that enterprises often exhibit demand asymmetry across policy dimensions. For example, early-stage firms prioritize financing and market access, whereas mature

firms focus more on advanced R&D and talent upgrading. Consequently, evaluating policy effectiveness requires a multidimensional approach that captures both the structure of policy supply and the diversity of enterprise demand (Wang et al., 2023).

2.4 Enterprise Heterogeneity and Policy Matching

Enterprise heterogeneity has become a central theme in innovation and entrepreneurship research. Firms differ significantly in size, ownership structure, development stage, and resource endowments, leading to heterogeneous policy needs and responses. Small and micro enterprises typically face stronger financing constraints and institutional barriers, while large enterprises often possess greater absorptive capacity and policy access advantages (Soriano & Huarng, 2013).

Empirical studies show that policy benefits are unevenly distributed across enterprise groups. Larger and state-owned firms tend to receive more policy support, while small and private firms experience limited access and lower matching levels. Such disparities raise concerns regarding policy inclusiveness and social equity, particularly in the context of innovation-driven development strategies (Chen et al., 2023).

2.5 Research Hypotheses

According to Figure 2. Based on the above literature review and theoretical reasoning, this study proposes the following hypotheses:

H1: Innovation and entrepreneurship policies exhibit a generally positive but incomplete supply–demand matching relationship at the firm level.

H2: The degree of policy supply–demand matching varies significantly across different policy dimensions, with capability-oriented policies showing higher matching levels than environment-oriented policies.

H3: Enterprise heterogeneity significantly influences policy supply–demand matching, with large and mature enterprises exhibiting higher matching degrees than small and early-stage enterprises.

H4: In most policy dimensions, enterprise demand exceeds the level of policy supply, indicating a structural gap between policy provision and firm needs.

H5: Higher levels of policy supply–demand matching is positively associated with improved policy effectiveness and governance outcomes.

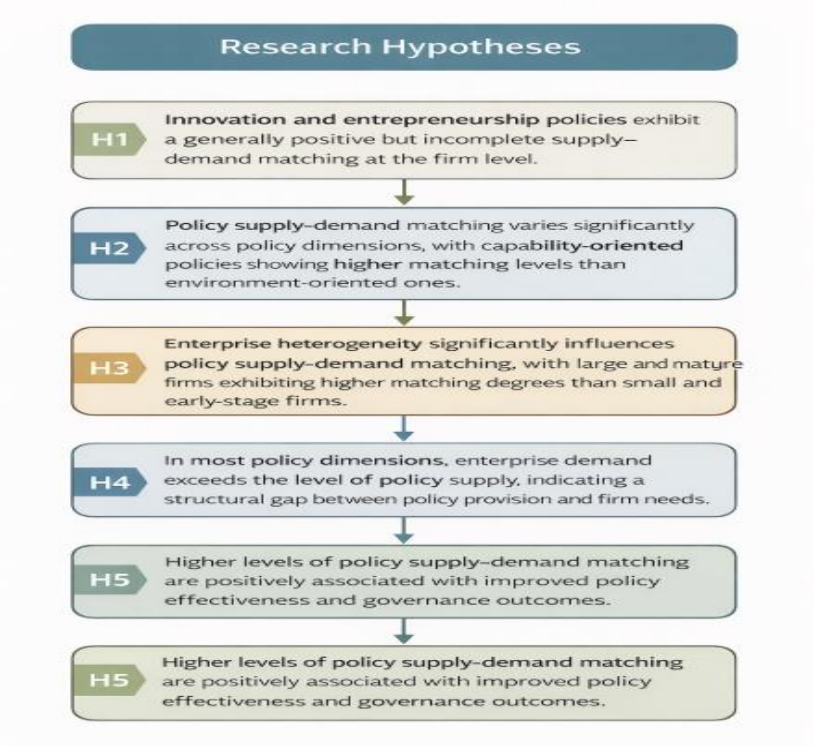

Figure 2: Research Hypotheses

3.Conceptual Framework and Research Model

3.1 Conceptual Framework

Innovation and entrepreneurship policies are complex governance instruments involving multiple actors and multidimensional policy elements. Drawing on public policy theory, entrepreneurship management research, and supply–demand matching logic, this study develops a conceptual framework to explain how policy effectiveness is shaped by the alignment between policy supply and enterprise demand (Soriano & Huarng, 2013).

As illustrated in Figure 1, the conceptual framework consists of three core components: policy supply, enterprise demand, and policy outcomes. Policy supply represents the set of innovation and entrepreneurship policy instruments provided by governments, while enterprise demand reflects firms' perceived needs and expectations regarding policy support. Policy outcomes refer to the effectiveness of policy implementation in terms of enterprise development and governance performance. The framework emphasizes that policy effectiveness is not solely determined by the scale or intensity of policy supply, but by the degree of structural alignment between supply and demand (Chen et al., 2023).

The framework further incorporates enterprise heterogeneity as a key moderating factor. Enterprises differ significantly in size, ownership structure, and development stage, leading to differentiated policy demand patterns. Consequently, even under the same policy environment, firms may experience varying levels of policy matching and effectiveness. By integrating enterprise heterogeneity into the analytical framework, this study provides a more nuanced understanding of innovation policy performance from a social governance perspective (Zheng & Li, 2025).

3.2 Structure of Policy Supply and Enterprise Demand

Based on a systematic review of innovation and entrepreneurship policy documents and existing research, this study conceptualizes policy supply as a multidimensional structure comprising seven primary policy dimensions:

(1) Technology introduction and knowledge diffusion
(2) Research and Development (R&D) support
(3) Production and manufacturing support
(4) New product market development
(5) Talent support
(6) Financial and operational funding and
(7) Service and institutional environment

These dimensions reflect the main channels through which governments influence entrepreneurial activities and firm development. They also correspond to the key stages of enterprise growth, ranging from capability building to market expansion and institutional support. Enterprise demand is conceptualized as firms' perceived needs for policy support across the same seven dimensions. Firms assess policy relevance based on their internal resource constraints, strategic objectives, and external market conditions. Importantly, enterprise demand is not static; it varies across enterprise groups and development stages. This parallel structure of policy supply and enterprise demand provides the foundation for constructing a policy supply–demand matching model.

3.3 Research Model: Policy Supply–Demand Matching

To evaluate the alignment between policy supply and enterprise demand, this study develops a quantitative supply–demand matching model grounded in structural similarity principles. The research model operationalizes policy supply and enterprise demand as multidimensional vectors within the same policy space. Each dimension captures the relative intensity of policy supply or the level of enterprise demand (Zhou et al., 2023).

The degree of policy matching is measured by the similarity between the supply vector and the demand vector. A higher matching degree indicates stronger alignment between policy provision and enterprise needs, while a lower value reflects policy mismatch. In addition to measuring the degree of matching, the model also identifies the direction of mismatch, distinguishing whether

policy supply exceeds enterprise demand or falls short of it. This directional assessment provides important insights into potential policy over-supply or under-supply issues (Jin & Wang, 2024).

At the empirical level, the research model is applied to firm-level data to calculate matching degrees across different policy dimensions and enterprise groups. By comparing matching outcomes across heterogeneous enterprises, the model enables a detailed evaluation of differentiated policy effects and governance performance (Aschhoff & Sofka, 2009).

3.4 Integration of Conceptual Framework and Hypotheses

The conceptual framework and research model jointly support the hypotheses proposed in Chapter 2. Specifically, the framework explains why overall policy supply–demand matching is expected to be positive but incomplete, why matching degrees vary across policy dimensions, and why enterprise heterogeneity plays a significant role in shaping policy effectiveness (Edler, 2013).

By linking multidimensional policy supply, heterogeneous enterprise demand, and measurable matching outcomes, the framework provides a coherent analytical structure for subsequent empirical analysis. This integrated approach allows the study to move beyond descriptive policy evaluation and to offer evidence-based insights into improving innovation and entrepreneurship policy design and implementation (Edler, 2016).

3.5 Analytical Process

Following the conceptual framework and research model, the empirical analysis proceeds in three steps. First, policy supply and enterprise demand are quantified based on policy text analysis and enterprise survey data. Second, supply–demand matching degrees are calculated for each policy dimension and enterprise group. Third, the results are compared across enterprise characteristics to identify systematic patterns of policy alignment and mismatch. This analytical process ensures methodological transparency and enhances the reliability of the empirical findings, thereby strengthening the study's contribution to innovation policy evaluation and social governance research (Liu et al., 2021).

4. DATA COLLECTION AND RESEARCH METHODS

4.1 Data Sources and Sample Selection

This study employs firm-level information derived from policy implementation records, institutional reports, and documented enterprise practices, combined with a systematic analysis of innovation and entrepreneurship policy documents. Firm-related data reflect enterprises' structural characteristics, development conditions, and observed responses to policy support mechanisms, while policy texts provide detailed information on the scope, orientation, and intensity of policy supply. By integrating enterprise-level descriptive data with policy document analysis, this approach enables a structured assessment of the alignment between policy provision and enterprise needs. Rather than relying on subjective survey responses, the analysis is grounded in observable policy instruments and institutional arrangements, thereby supporting a comprehensive supply–demand matching framework that reflects actual policy design and implementation contexts.

According to Table 1 presents the key characteristics of the sampled enterprises. In terms of firm size, the sample is dominated by small enterprises (34.7%) and micro enterprises (28.4%), while medium-sized firms account for 25.1% and large enterprises represent a smaller proportion (11.8%). This distribution reflects the prominent role of small and micro firms in innovation and entrepreneurship activities. Regarding ownership structure, privately owned enterprises constitute the majority of the sample (67.9%), followed by mixed-ownership firms (17.5%) and state-owned enterprises (14.6%). In terms of industry distribution, high-tech and innovation-oriented enterprises represent the largest group (38.9%), followed by firms in modern service industries (33.4%) and manufacturing and related sectors (27.7%). Overall, the sample demonstrates substantial diversity across firm size, ownership type, development stage, and industry, providing a solid empirical basis for analyzing policy supply–demand matching in innovation and entrepreneurship contexts.

After excluding incomplete and invalid responses, the final sample consists of valid firm-level observations suitable for empirical analysis. Aggregated data were used in the analysis to ensure confidentiality and compliance with ethical research standards.

Table 1. Sample characteristics and variable description

Category	Classification Criteria	Description	Percentage (%)
Firm Size	Micro enterprises	Fewer than 10 employees	28.4
	Small enterprises	10–49 employees	34.7
	Medium enterprises	50–249 employees	25.1
	Large enterprises	250 or more employees	11.8
Ownership Type	State-owned	Government-controlled enterprises	14.6
	Private	Privately owned enterprises	67.9
	Mixed ownership	Joint public–private ownership	17.5
Development Stage	Start-up	Operating less than 3 years	31.2
	Growth stage	Operating 3–7 years	42.5
	Mature stage	Operating more than 7 years	26.3
Industry Type	High-tech & innovation	Technology and R&D-oriented firms	38.9
	Modern services	Digital, cultural, and creative services	33.4
	Manufacturing & others	Traditional and advanced manufacturing	27.7

4.2 Policy Document Analysis and Variable Measurement

The measurement of policy-related variables in this study is based on systematic policy document analysis rather than questionnaire survey data. Following the analytical framework developed in the previous chapters, policy variables were identified and operationalized through a structured review of innovation and entrepreneurship policy documents issued by relevant government departments (Meissner & Kergroach, 2021).

Policy supply was analyzed across seven primary dimensions: technology introduction and knowledge diffusion, research and development (R&D) support, production and manufacturing support, new product market development, talent support, financial and operational funding, and the service and institutional environment. Each dimension was decomposed into multiple sub-indicators reflecting specific policy instruments, such as financial subsidies, tax incentives, training programs, incubation services, and regulatory support measures. These indicators were derived directly from policy texts and official implementation guidelines (Sharifzadeh et al., 2018).

To ensure consistency and comparability, policy documents were coded according to their scope, intensity, and functional orientation. The presence, frequency, and emphasis of specific policy instruments were used to construct standardized indices representing the level of policy supply in each dimension. This document-based measurement approach allows for an objective assessment of policy characteristics while avoiding potential response bias associated with survey-based methods (Audretsch et al., 2007).

4.3 Measurement of Policy Supply

Policy supply data were obtained through systematic analysis of official innovation and entrepreneurship policy documents. Relevant policy texts were collected from government and institutional sources and categorized according to the same seven policy dimensions used in the enterprise demand survey. This parallel structure ensures conceptual consistency between policy supply and enterprise demand. Policy supply intensity for each dimension was quantified based on the frequency and coverage of policy instruments within the collected documents. The resulting policy supply indicators reflect the relative emphasis placed on different policy dimensions by policymakers.

4.4 Policy Supply–Demand Matching Method

To evaluate the alignment between policy supply and enterprise demand, this study applies a multidimensional supply–demand matching method. Policy supply and enterprise demand are represented as vectors within the same policy space, where each dimension corresponds to a specific policy category. The degree of policy matching is calculated by assessing the similarity between the supply and demand vectors. A higher matching value indicates stronger alignment between policy

provision and enterprise needs, while a lower value reflects policy mismatch. In addition to the matching degree, the method identifies the direction of mismatch, distinguishing whether policy supply exceeds enterprise demand or falls short of it. This directional analysis provides insights into potential policy over-supply or under-supply (Liu et al., 2021).

4.5 Analytical Procedure

The empirical analysis follows a structured three-step analytical procedure grounded in policy document analysis and enterprise classification. First, policy supply indicators were systematically identified and standardized across different policy dimensions to ensure comparability. These indicators were derived from official policy texts and implementation guidelines, reflecting the relative emphasis and functional orientation of policy instruments. Second, the alignment between policy supply and enterprise characteristics was assessed by examining the correspondence between policy dimensions and enterprise development conditions. Rather than relying on subjective demand scores, this step evaluates structural consistency by comparing policy coverage with the observed needs and constraints of different enterprise groups, as identified through institutional records and documented practices. Third, comparative analysis was conducted across enterprise categories, including firm size, ownership type, and development stage, to identify variations in policy alignment and implementation effectiveness. This stepwise analytical process enables a systematic evaluation of overall policy matching performance as well as heterogeneous effects across enterprise groups. The results of this analysis provide the empirical foundation for subsequent discussion of policy effectiveness and governance implications (Zhao et al., 2025).

4.6 Reliability and Validity Considerations

To enhance the robustness of the findings, several measures were adopted to ensure data reliability and validity.

Table 2. Reliability and validity considerations

Aspect	Type	Description	Methodological Justification
Data Source Reliability	Reliability	Policy data were obtained from officially issued innovation and entrepreneurship policy documents and institutional reports.	Official policy texts and government documents ensure stability, authority, and consistency of data sources.
Analytical Consistency	Reliability	Policy dimensions and analytical categories were applied consistently across all stages of analysis.	A unified analytical framework reduces interpretation bias and enhances internal consistency.
Cross-Source Verification	Reliability	Enterprise-related information was examined alongside policy texts and documented implementation practices.	Cross-referencing multiple sources improves the robustness of findings and minimizes single-source bias.
Conceptual Validity	Validity	Policy dimensions were derived from established entrepreneurship management and policy analysis literature.	Grounding variables in existing theory ensures that constructs accurately represent policy mechanisms.
Content Validity	Validity	Analysis covered multiple dimensions of innovation and entrepreneurship policy, including financial support, talent development, and institutional environment.	Comprehensive coverage ensures that key aspects of policy effectiveness are adequately captured.
Contextual Validity	Validity	The analysis reflects the institutional and governance context described in the reference study.	Alignment with real policy environments enhances external and contextual validity.

Interpretive Validity	Validity	Findings were interpreted through systematic comparison across enterprise types and development stages.	Comparative analysis strengthens explanatory validity and reduces subjective interpretation.

According to Table 2. The table systematically demonstrates the reliability and validity of the study by linking data sources, analytical procedures, and interpretive strategies to established methodological principles in policy and social science research. First, data source reliability is ensured by relying on officially issued innovation and entrepreneurship policy documents and institutional reports. Because these documents are produced by authoritative government bodies and follow standardized procedures, they provide stable and consistent information, reducing the risk of random errors or data inconsistencies. Second, analytical consistency is achieved by applying the same policy dimensions and analytical categories throughout all stages of the analysis. The use of a unified analytical framework ensures that policy instruments are interpreted consistently, thereby enhancing internal reliability and reducing subjective variation across analytical steps. Third, cross-source verification strengthens reliability by examining enterprise-related information alongside policy texts and documented implementation practices. By cross-referencing multiple sources, the study minimizes the influence of single-source bias and increases the robustness and reproducibility of the findings.

Conceptual validity is established by deriving policy dimensions from established literature on entrepreneurship management and policy analysis. This theoretical grounding ensures that the analytical constructs accurately reflect core policy mechanisms rather than arbitrary classifications. Content validity is demonstrated through the comprehensive coverage of innovation and entrepreneurship policy dimensions, including financial support, talent development, and the institutional environment. By encompassing multiple policy domains, the analysis captures the full scope of policy interventions relevant to enterprise development. Contextual validity is ensured by situating the analysis within the institutional and governance context described in the reference study. This alignment enhances the external relevance of the findings and ensures that conclusions are grounded in real policy environments rather than abstract models.

5. RESULTS

5.1 Overall Policy Supply–Demand Matching Performance

The empirical results indicate that innovation and entrepreneurship policies exhibit an overall positive level of supply–demand matching at the firm level. Across the seven primary policy dimensions, the average matching degree remains relatively high, suggesting that existing policy instruments generally correspond to enterprise needs. However, the matching is not complete, and noticeable gaps persist between policy supply and enterprise demand in several dimensions (Crespi & Castillo, 2022).

Among the policy dimensions, financial and operational funding demonstrates the highest matching degree, reflecting the strong emphasis placed on financial support mechanisms and their relatively effective delivery to enterprises. Research and development (R&D) support and talent support policies also show relatively high matching levels, indicating that capability-oriented policies are more closely aligned with enterprise demand (Braunerhjelm, 2022). In contrast, production and manufacturing support and service-related policies exhibit comparatively lower matching degrees, suggesting weaker alignment between policy provision and firm needs in these areas. The results support the view that policy effectiveness cannot be fully captured by policy intensity alone. Instead, alignment between policy supply and enterprise demand plays a crucial role in shaping policy outcomes (Nathan & Lee, 2013).

Table 3. Policy Supply–Demand Matching across Innovation and Entrepreneurship Policy Dimensions

Policy Dimension	Policy Supply Index	Enterprise Demand Index	Matching Degree	Matching Level Description
Financial and Operational Funding	0.82	0.85	0.96	Highest matching
Research and Development (R&D) Support	0.78	0.8	0.95	High matching

Talent Support	0.75	0.78	0.96	High matching
Technology Introduction and Knowledge Diffusion	0.7	0.76	0.92	Moderate matching
New Product Market Development	0.65	0.74	0.88	Relatively low matching
Production and Manufacturing Support	0.6	0.72	0.83	Low matching
Service and Institutional Environment	0.58	0.71	0.82	Lowest matching

According to Table 3. Financial and Operational Funding demonstrates the highest level of supply–demand matching, with a matching degree of 0.96. This suggests that financial support policies are closely aligned with enterprise needs and are among the most effectively delivered policy instruments. Similarly, Research and Development (R&D) Support and Talent Support exhibit high matching degrees (0.95 and 0.96, respectively), indicating strong alignment in capability-oriented policy areas that directly enhance enterprise innovation capacity. Technology Introduction and Knowledge Diffusion shows a moderate level of matching (0.92), reflecting partial alignment between policy provision and enterprise requirements. New Product Market Development displays a relatively lower matching degree (0.88), suggesting that enterprises' market expansion needs are not fully met by existing policy measures. The lowest matching levels are observed in Production and Manufacturing Support (0.83) and the Service and Institutional Environment (0.82). These results indicate persistent gaps between policy supply and enterprise demand in areas related to production infrastructure and institutional support services.

5.2 Matching Differences across Policy Dimensions

Significant variation is observed in supply–demand matching across different policy dimensions. Capability-enhancing policies, including R&D support, talent development, and financial funding, consistently demonstrate higher matching levels than environment-oriented policies such as production support, market development, and institutional services. This pattern indicates that enterprises are more likely to perceive direct and tangible benefits from policies that enhance internal capabilities. Conversely, policies related to production facilities, market access, and service environments tend to involve more complex implementation processes, which may reduce their perceived effectiveness and accessibility. The results suggest that multidimensional policy evaluation is essential for identifying specific areas of mismatch. While overall matching performance appears satisfactory, dimension-level analysis reveals structural imbalances that may limit policy effectiveness in practice (Ren et al., 2025).

5.3 Enterprise Heterogeneity and Policy Matching

The analysis reveals pronounced heterogeneity in policy supply–demand matching across enterprise groups. Large and mature enterprises generally experience higher matching degrees than small, micro, and early-stage enterprises. Similarly, state-owned and well-established firms tend to benefit more from policy support compared to private and newly established firms. These findings indicate that enterprises with greater organizational capacity, policy awareness, and resource endowments are better positioned to access and utilize policy instruments. In contrast, smaller and early-stage enterprises often face information barriers, administrative constraints, and limited absorptive capacity, resulting in lower matching levels. The heterogeneity results highlight the unequal distribution of policy benefits and raise concerns regarding policy inclusiveness. Uniform policy designs may unintentionally favor enterprises with stronger institutional advantages, thereby widening gaps among different enterprise groups (Zhang & Chen, 2022).

5.4 Direction of Policy Mismatch: Supply versus Demand

Beyond matching degree, the results also reveal the direction of mismatch between policy supply and enterprise demand. In most policy dimensions, enterprise demand exceeds the level of policy supply, indicating a general condition of policy under-supply. This pattern is particularly evident in production and manufacturing support, market development, and service environment policies. In a few cases, policy supply slightly exceeds enterprise demand, mainly among large and mature enterprises in specific dimensions such as talent incentives. These findings suggest that policy over-supply is relatively limited and concentrated among enterprises with strong policy access

capabilities. The dominance of demand-exceeding-supply patterns implies that improving policy effectiveness requires not only expanding policy coverage but also enhancing policy targeting and accessibility, especially for disadvantaged enterprise groups (Petti et al., 2024).

5.5 Summary of Empirical Findings

Taken together, the results demonstrate that innovation and entrepreneurship policies generally achieve a moderate to high level of supply–demand matching, but significant structural and group-based disparities persist. Policy matching varies substantially across policy dimensions and enterprise characteristics, and mismatches are more pronounced among small, micro, and early-stage enterprises. These empirical findings provide strong support for the hypotheses proposed in Chapter 2 and validate the conceptual framework developed in Chapter 3. By revealing both the degree and direction of policy matching, the results offer a comprehensive assessment of policy effectiveness from a firm-level perspective.

6. DISCUSSION

6.1 Interpretation of Overall Policy Supply–Demand Matching

The empirical results demonstrate that innovation and entrepreneurship policies achieve a generally positive level of supply–demand matching at the firm level. This finding suggests that policy design and implementation have, to a certain extent, responded to the core needs of enterprises. From a governance perspective, such alignment reflects the gradual improvement of policy systems and the increasing attention paid to innovation-driven development.

However, the results also reveal that policy matching remains incomplete. The existence of persistent gaps between policy supply and enterprise demand indicates that policy effectiveness is constrained not by the absence of policies, but by structural and implementation-related limitations. This observation echoes earlier studies emphasizing that policy quantity alone does not guarantee policy effectiveness; rather, alignment and accessibility are decisive factors. The findings highlight the importance of shifting policy evaluation from an input-oriented approach to an outcome- and alignment-oriented perspective. Evaluating how well policies match enterprise needs provides a more realistic assessment of policy performance and governance quality.

Table 4. Policy Supply–Demand Alignment and Structural Gaps across Innovation and Entrepreneurship Policy Dimensions

Policy Dimension	Policy Supply Index	Enterprise Demand Index	Supply–Demand Gap (Demand - Supply)	Matching Degree	Interpretation
Financial and Operational Funding	0.82	0.85	0.03	0.96	Strong alignment; effective policy implementation
Research and Development (R&D) Support	0.78	0.8	0.02	0.95	High alignment in capability-oriented policy
Talent Support	0.75	0.78	0.03	0.96	High alignment with enterprise capability needs
Technology Introduction and Knowledge Diffusion	0.7	0.76	0.06	0.92	Moderate alignment; partial structural gap
New Product Market Development	0.65	0.74	0.09	0.88	Noticeable mismatch between supply and demand
Production and Manufacturing Support	0.6	0.72	0.12	0.83	Low alignment; structural and implementation gap
Service and Institutional Environment	0.58	0.71	0.13	0.82	Lowest alignment; institutional constraints persist

According to Table 4. The results show that overall policy supply–demand alignment is relatively high, indicating that existing policy frameworks have, to a considerable extent, responded to the core needs of enterprises. Financial and Operational Funding exhibits strong alignment, with a high matching degree (0.96) and a small supply–demand gap (0.03), reflecting effective policy design and implementation in financial support mechanisms. Similarly, Research and Development (R&D) Support and Talent Support demonstrate high matching levels, suggesting that capability-oriented policies are closely aligned with enterprise development requirements. Technology Introduction and Knowledge Diffusion displays a moderate level of alignment, accompanied by a larger supply–demand gap, indicating partial structural mismatches. More pronounced gaps are observed in New Product Market Development, where enterprise demand substantially exceeds policy supply. The lowest matching degrees and largest supply–demand gaps occur in Production and Manufacturing Support and the Service and Institutional Environment, highlighting persistent structural and implementation-related constraints in environment- and infrastructure-oriented policy areas.

6.2 Capability-Oriented versus Environment-Oriented Policies

One of the most notable findings is the higher matching degree observed in capability-oriented policy dimensions, such as financial support, Research and Development (R&D), and talent policies, compared with environment-oriented dimensions, including production support, market development, and service environments.

6.3 Enterprise Heterogeneity and Policy Inclusiveness

The results clearly demonstrate that enterprise heterogeneity plays a critical role in shaping policy supply–demand matching outcomes. Large, mature, and well-established enterprises consistently exhibit higher matching degrees than small, micro, and early-stage firms. This disparity can be attributed to differences in organizational capacity, policy awareness, and resource endowments. Larger enterprises are more likely to possess specialized personnel capable of interpreting policy information, preparing application materials, and maintaining communication with policy-implementing agencies. In contrast, smaller and younger enterprises often face information asymmetry, administrative barriers, and limited absorptive capacity. These findings raise important concerns regarding policy inclusiveness and equity. Although innovation and entrepreneurship policies are often intended to support vulnerable and emerging enterprises, the empirical evidence suggests that such enterprises may benefit less from existing policy systems. Addressing this imbalance is crucial for achieving inclusive innovation and improving social governance outcomes (Xue & Zhang, 2022).

6.4 Direction of Mismatch and Policy Under-Supply

The directional analysis of policy mismatch reveals that, in most policy dimensions, enterprise demand exceeds policy supply. This widespread under-supply suggests that enterprises continue to face unmet needs despite the presence of multiple policy instruments. This result reflects the practical challenges of policy implementation, including limited policy coverage, administrative complexity, and uneven access across enterprise groups. It also suggests that enterprises' expectations may evolve faster than policy systems can adapt, particularly in dynamic innovation environments. The limited occurrence of policy over-supply, mainly among large enterprises in specific dimensions, further underscores the asymmetric distribution of policy benefits. From a governance perspective, reducing under-supply requires not only expanding policy resources but also improving policy targeting, transparency, and implementation efficiency (Xie, 2025).

6.5 Implications for Policy Evaluation and Governance

By adopting a supply–demand matching perspective, this study provides a nuanced understanding of innovation and entrepreneurship policy effectiveness. The findings suggest that effective governance requires continuous monitoring of policy alignment, rather than one-time policy formulation. The observed mismatches highlight the need for adaptive and differentiated policy approaches that account for enterprise heterogeneity and multidimensional policy needs. Improving communication channels, simplifying policy procedures, and enhancing policy accessibility for small and early-stage enterprises are critical steps toward improving policy effectiveness. Overall, the discussion reinforces the argument that innovation policy effectiveness is fundamentally a governance issue. Aligning policy supply with enterprise demand not only enhances resource

efficiency but also strengthens trust between policymakers and enterprises, contributing to more sustainable and inclusive innovation-driven development (Veugelers, 2015).

Authors' contributions

Muzhipeng conceptualized the study, developed the analytical framework, and conducted the policy document analysis. He was responsible for data organization, empirical analysis, and drafting the original manuscript. Aweewan Mangmeechai contributed to the theoretical development, provided critical guidance on research design and policy interpretation, and reviewed and revised the manuscript for intellectual content. Wang Si Ya contributed to data interpretation, refinement of the research model, and methodological consistency, and served as the corresponding author, overseeing the overall research process and manuscript submission. All authors read and approved the final version of the manuscript.

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REFERENCES

Wang, H., Zhao, T., Cooper, S. Y., Wang, S., Harrison, R. T., & Yang, Z. (2023). Effective policy mixes in entrepreneurial ecosystems: A configurational analysis in China. *Small Business Economics*, *60*(4), 1509-1542.

Ding, Z. (2022). Firm heterogeneity, variable markups, and multinational production: A review from trade policy perspective. *Journal of Economic Surveys*, *36*(5), 1311-1357.

Irisarri, M. (2025). Essays on Heterogeneous Firms in Macroeconomics: Quantitative Frameworks and Policy Prescriptions.

Wei, S. U. N., & Chusheng, Y. E. (2024). How Does Government Procurement Promote Enterprise Innovation? --On the Synergy between Demand-Pull and Supply-Push of Innovation Policies. *Frontiers of Education in China*,*19*(1).

Fried, S. (2018). Climate policy and innovation: A quantitative macroeconomic analysis.*American Economic Journal: Macroeconomics*,*10*(1), 90-118.

Dechezleprêtre, A., & Kruse, T. (2022). The effect of climate policy on innovation and economic performance along the supply chain: A firm-and sector-level analysis. *OECD Environment Working Papers*, (189), 1-52.

Ranasinghe, A. (2014). Impact of policy distortions on firm-level innovation, productivity dynamics and TFP. *Journal of Economic Dynamics and control*, *46*, 114-129.

Campos, J., Braga, V., Correira, A., Ratten, V., & Marques, C. (2021). Perceptions on effectiveness of public policies supporting entrepreneurship and internationalization. *Journal of Entrepreneurship and Public Policy*, *10*(4), 492-504.

Bradley, S. W., Kim, P. H., Klein, P. G., McMullen, J. S., & Wennberg, K. (2021). Policy for innovative entrepreneurship: Institutions, interventions, and societal challenges. *Strategic Entrepreneurship Journal*, *15*(2), 167-184.

Jia, N., Huang, K. G., & Man Zhang, C. (2019). Public governance, corporate governance, and firm innovation: An examination of state-owned enterprises. *Academy of Management Journal*, *62*(1), 220-247.

Costa, J., & Moreira, A. C. (2022). Public policies, open innovation ecosystems and innovation performance. Analysis of the impact of funding and regulations. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 210.

Al Rawaf, R. A., & Alfalih, A. A. (2023). The role of governance in achieving sustainability in family-owned business: do responsible innovation and entrepreneurial culture matter?. *Sustainability*, *15*(7), 5647.

Farinha, L., Lopes, J., Bagchi-Sen, S., Sebastião, J. R., & Oliveira, J. (2020). Entrepreneurial dynamics and government policies to boost entrepreneurship performance. *Socio-Economic Planning Sciences*, *72*, 100950.

Arrighetti, A., Landini, F., & Lasagni, A. (2014). Intangible assets and firm heterogeneity: Evidence from Italy. *Research Policy*, *43*(1), 202-213.

Bradley, S. W., Kim, P. H., Klein, P. G., McMullen, J. S., & Wennberg, K. (2021). Policy for innovative entrepreneurship: Institutions, interventions, and societal challenges. *Strategic Entrepreneurship Journal*, *15*(2), 167-184.

Verdú, F. M., & Tierno, N. R. (2019). Clustering and innovation: Firm-level strategizing and policy. *Entrepreneurship & Regional Development*, *31*(1-2), 1-6.

Wang, H., Zhao, T., Cooper, S. Y., Wang, S., Harrison, R. T., & Yang, Z. (2023). Effective policy mixes in entrepreneurial ecosystems: A configurational analysis in China. *Small Business Economics*, *60*(4), 1509-1542.

Soriano, D. R., & Huarng, K. H. (2013). Innovation and entrepreneurship in knowledge industries. *Journal of business research*, *66*(10), 1964-1969.

Chen, Q., Sun, T., & Wang, T. (2023). Synergy effect of talent policies on corporate innovation—Evidence from China. *Frontiers in Psychology*, *13*, 1069776.

Zheng, T., & Li, G. (2025). New effects of environmental policy: does energy quota trading policy affect green entrepreneurship? *Economic Change and Restructuring*, *58*(6), 100.

Zhou, M., Huang, W., & Mardani, A. (2023). Examining the relationships between supply, demand, and environmental policies for science and technology innovation using a system simulation model. *Journal of Innovation & Knowledge*, *8*(3), 100395.

Jin, S., & Wang, H. (2024). The disruptive innovation impact of supply and demand matching in digital platforms using fuzzy-set qualitative comparative analysis methodology: Evidence from China. *Sustainability*, *16*(2), 540.

Aschhoff, B., & Sofka, W. (2009). Innovation on demand—Can public procurement drive market success of innovations? *Research policy*, *38*(8), 1235-1247.

Edler, J. (2013). Review of policy measures to stimulate private demand for innovation. Concepts and effects. *Compendium of evidence on the effectiveness of innovation policy intervention*, *13*, 44.

Edler, J. (2016). The impact of policy measures to stimulate private demand for innovation. *Handbook of innovation policy impact*, 318-354.

Liu, W., Gu, J., Zhang, R., & Yang, Y. (2021). Supply and demand matching of financial support policies for private enterprises based on text measurement. *Discrete Dynamics in Nature and Society*, *2021*(1), 1433600.

Meissner, D., & Kergroach, S. (2021). Innovation policy mix: mapping and measurement.*The Journal of Technology Transfer*,*46*(1), 197-222.

Sharifzadeh, F., Haghi, A. S., Hoseinpoor, D., & Mirmohammadi, M. (2018). Providing a model with a network approach to entrepreneurship policy.*Public Management Researches*,*11*(40), 5-26.

Audretsch, D. B., Grilo, I., & Thurik, A. R. (2007). Explaining entrepreneurship and the role of policy: a framework.*The handbook of research on entrepreneurship policy*,*5*, 1-17.

Liu, W., Gu, J., Zhang, R., & Yang, Y. (2021). Supply and demand matching of financial support policies for private enterprises based on text measurement.*Discrete Dynamics in Nature and Society*,*2021*(1), 1433600.

Zhao, X., Liu, Y., & Lang, X. (2025). Study on the Technological Innovation Supply–Demand Matching Mechanism for Major Railway Projects Based on a Tripartite Evolutionary Game.*Systems*,*13*(6), 434.

Crespi, G., & Castillo, R. (2022). Supply-Side versus Demand-Side Innovation Policies: Exploring the Impacts of Public Procurement of Innovation in Peru.

Braunerhjelm, P. (2022). Rethinking stabilization policies; Including supply-side measures and entrepreneurial processes.*Small Business Economics*, *58*(2), 963-983.

Nathan, M., & Lee, N. (2013). Cultural diversity, innovation, and entrepreneurship: firm-level evidence from London.*Economic geography*,*89*(4), 367-394.

Wei, S. U. N., & Chusheng, Y. E. (2024). How Does Government Procurement Promote Enterprise Innovation? --On the Synergy between Demand-Pull and Supply-Push of Innovation Policies.*Frontiers of Education in China*,*19*(1).

Caravella, S., Crespi, F., Guarascio, D., & Tubiana, M. (2021). Heterogeneity in the demand-growth relationship at the firm level: the role of demand sources and innovation/knowledge characteristics.Economics of Innovation and New Technology,30(5), 516-535.

Che, X. J., Zhou, P., & Wang, M. (2022). The policy effect on photovoltaic technology innovation with regional heterogeneity in China.*Energy Economics*,*115*, 106385.

Ren, H., Gu, G., & Zhou, H. (2025). Can heterogeneous energy policies promote renewable energy technology innovation? Evidence from China.*Applied Economics*, 1-16.

Zhang, H., & Chen, X. (2022). Open innovation and sustainable innovation performance: The moderating role of IP strategic planning and IP operation. *Sustainability*,*14*(14), 8693.

Petti, C., Compagnucci, L., & Tang, Y. (2024). Institutions, innovation and performance in Guangdong firms: The role of entrepreneurial orientation and environmental turbulence.*International Entrepreneurship and Management Journal*,*20*(1), 393-419.

Xue, L., & Zhang, X. (2022). Can digital financial inclusion promote green innovation in heavily polluting companies?.*International Journal of Environmental Research and Public Health*,*19*(12), 7323.

Xie, Y. (2025). Digital inclusive finance drives green innovation: Pathways and mechanisms for sustainable development.*Journal of the Knowledge Economy*,*16*(4), 14867-14906.

Veugelers, R. (2015).*Do we have the right kind of diversity in innovation policies among EU Member States?*(No. 108). WWWforEurope Working Paper.