

The Impact of State Innovation Policies on Innovation Quality in the Western Balkan Countries: The Role of Firms' International Orientation

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DOI: <https://doi.org/10.5281/zenodo.22281555>

Received: 10-06-2026

Accepted: 25-07-2026

Published: 02-09-2026

ABSTRACT

Innovation has become a central driver of competitiveness, technological upgrading, and sustainable economic development, particularly within transition economies facing institutional constraints and increasing global competitive pressures. Although prior studies have extensively examined the relationship between state innovation policies and firms' innovation performance, limited attention has been devoted to innovation quality and the conditions under which public innovation support generates higher-quality innovation outcomes in the Western Balkan region.

Drawing upon institutional theory and the international business literature, this study investigates the impact of state innovation policies on innovation quality in the Western Balkan countries, with particular emphasis on the moderating role of firms' international orientation. The study argues that firms with stronger international orientation are better positioned to utilise public innovation support effectively due to their greater exposure to international markets, advanced technological standards, external knowledge networks, and competitive learning opportunities.

The empirical analysis is based on firm-level data obtained from the World Bank Enterprise Surveys (WBES) covering six Western Balkan countries: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. Using regression analysis and moderation modelling, the study examines the direct effects of state innovation policies and international orientation on innovation quality, as well as the interaction effect between these variables.

The findings demonstrate that state innovation policies positively influence firms' innovation quality. Furthermore, firms' international orientation exerts a positive and statistically significant effect on innovation quality. Most importantly, the results reveal that international orientation significantly strengthens the positive relationship between state innovation policies and innovation quality, indicating that internationally oriented firms benefit more effectively from public innovation support in generating technologically sophisticated and commercially valuable innovations.

This study contributes to the innovation policy and international business literature in several important ways. First, it extends the discussion of innovation quality to the underexplored context of the Western Balkans. Second, it highlights the conditional role of firms' international orientation in enhancing the effectiveness of state innovation policies. Third, it provides important policy implications for transition economies seeking to strengthen innovation capability, technological upgrading, and international competitiveness through more effective alignment between public innovation support and firms' international engagement strategies.

Keywords: Public Innovation Support; Absorptive Capacity; Innovation Performance; Knowledge Transfer; Firm Competitiveness; Emerging Economies.

I. INTRODUCTION

Innovation has become a central driver of economic growth, technological upgrading, and long-term competitiveness in both developed and emerging economies. In increasingly knowledge-intensive markets, governments have intensified

the use of innovation policies, subsidies, and public support programmes to stimulate firms' innovative activities and address market failures associated with research and development (R&D) investments (Bloom, Van Reenen and Williams, 2019; Becker, 2015). Such interventions are particularly

important within transition economies, where institutional weaknesses, financial constraints, and underdeveloped innovation ecosystems often limit firms' innovation capabilities.

Despite the growing importance of state innovation policies, existing research provides mixed evidence regarding their effectiveness in improving firms' innovation outcomes. While some studies suggest that public innovation support enhances technological upgrading and innovation performance (Gao et al., 2021; Coad, Segarra and Teruel, 2016), others argue that excessive government intervention may generate inefficiencies, dependency effects, or resource misallocation (Dimos and Pugh, 2016). Moreover, prior research has predominantly focused on innovation quantity, including patent counts and R&D expenditures, while comparatively limited attention has been devoted to innovation quality, particularly within transition economy contexts.

Innovation quality reflects the technological sophistication, novelty, and commercial value of innovation outcomes rather than merely the volume of innovation activities (Dziallas and Blind, 2019). In transition economies, improving innovation quality is especially important because firms frequently operate under institutional uncertainty, limited technological capability, and resource constraints. Consequently, understanding the conditions under which state innovation policies contribute to higher-quality innovation outcomes represents an increasingly important research issue. This issue is particularly relevant in the context of the Western Balkan countries, including Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. Although governments across the region have increasingly introduced innovation support mechanisms, digital transformation initiatives, and SME development programmes, the effectiveness of these policies in improving firms' innovation quality remains insufficiently understood. At the same time, firms across the Western Balkans are becoming increasingly internationally oriented through export activities, foreign partnerships, participation in international value chains, and collaboration with European markets and institutions.

The international business literature suggests that firms with stronger international orientation are exposed to broader knowledge networks, advanced technological standards, and stronger competitive pressures, all of which may enhance firms' absorptive capacity and innovation capability (Sapienza et al., 2006; Wu et al., 2016). Internationally oriented firms are therefore more likely to utilise state innovation support effectively and transform public resources into technologically

sophisticated and commercially valuable innovations.

However, despite growing scholarly attention to innovation policy and internationalisation, limited research has examined how firms' international orientation influences the effectiveness of state innovation policies in transition economies. Existing studies have largely examined these relationships separately, with insufficient attention devoted to the interaction between public innovation support and firms' international orientation in shaping innovation quality. Furthermore, empirical evidence from the Western Balkans remains highly limited, despite the region representing an important and underexplored transition economy context.

To address these gaps, this study examines the impact of state innovation policies on innovation quality in the Western Balkan countries, with particular emphasis on the moderating role of firms' international orientation. Drawing on institutional theory and the international business literature, the study argues that the effectiveness of state innovation policies depends not only on the existence of public support mechanisms but also on firms' capability to absorb, utilise, and strategically leverage these resources. Specifically, firms with stronger international orientation are expected to benefit more from state innovation policies because of their greater exposure to international markets, external knowledge flows, and advanced business practices.

This study contributes to the literature in several important ways. First, it extends the innovation policy literature by shifting attention from innovation quantity towards innovation quality within transition economy contexts. Second, it contributes to the international business literature by highlighting the moderating role of firms' international orientation in strengthening the effectiveness of state innovation policies. Third, it provides empirical evidence from the Western Balkans, an underexplored regional context within the broader innovation and transition economy literature. Finally, the study offers practical implications for policymakers seeking to improve innovation capability, technological upgrading, and international competitiveness across the Western Balkan region.

II. LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 State Innovation Policies and Innovation Quality

Innovation is widely recognised as a critical determinant of productivity growth, technological upgrading, and long-term competitiveness in modern economies (Bloom, Van Reenen and

Williams, 2019). In response to increasing global competition and rapid technological change, governments have intensified the implementation of innovation policies aimed at stimulating firms' innovative activities and supporting technological development. Such policies commonly include R&D subsidies, innovation grants, tax incentives, digitalisation programmes, and technological assistance schemes designed to reduce market failures associated with innovation investments (Becker, 2015).

The theoretical rationale for state intervention in innovation activities originates primarily from market failure theory, which argues that firms may underinvest in innovation because of high uncertainty, long investment horizons, and knowledge spillovers that cannot be fully appropriated privately (Arrow, 1962; Hall and Lerner, 2010). Consequently, public innovation support may reduce financial constraints, encourage risk-taking behaviour, and improve firms' capability to engage in technological upgrading and innovation activities.

Existing empirical evidence generally suggests that state innovation policies positively influence firms' innovation performance. Public support mechanisms may stimulate R&D investment, increase technological capability, and strengthen firms' competitiveness (Gao et al., 2021; Castellacci and Lie, 2015). Moreover, government support may generate signalling effects that improve firms' credibility and facilitate access to additional external resources (Chen et al., 2018). Such effects are particularly important in transition economies characterised by underdeveloped financial markets, institutional instability, and limited innovation ecosystems.

However, the effectiveness of public innovation support remains debated within the literature. Some studies argue that excessive state intervention may generate dependency effects, inefficient allocation of public resources, or crowding-out effects that reduce firms' incentives for independent innovation (Dimos and Pugh, 2016). In certain contexts, firms may pursue innovation primarily to access public funding rather than to achieve sustainable technological advancement.

Importantly, much of the existing literature has focused primarily on innovation quantity rather than innovation quality. While innovation quantity typically refers to the number of patents, products, or innovation activities generated by firms, innovation quality reflects the sophistication, novelty, technological advancement, and commercial value of innovation outcomes (Dzillas and Blind, 2019). Firms may increase the volume of innovation activities without necessarily

generating technologically advanced or economically valuable innovations.

This distinction is particularly important within transition economies such as the Western Balkan countries, where firms frequently operate under financial constraints, limited technological capability, and institutional uncertainty. Under such conditions, improving innovation quality rather than merely increasing innovation quantity becomes essential for sustainable competitiveness and long-term economic development. Despite increasing government support for innovation activities across the Western Balkans, empirical evidence regarding the effectiveness of state innovation policies in improving innovation quality remains highly limited.

Accordingly, this study argues that examining the relationship between state innovation policies and innovation quality requires consideration of broader organisational and institutional conditions influencing firms' capability to utilise public support effectively.

2.2 International Orientation and Innovation Quality

International orientation has become an increasingly important strategic dimension influencing firms' innovation capability and competitiveness. Within the international business literature, international orientation generally reflects firms' engagement with foreign markets, export activities, international partnerships, and participation in cross-border business networks (Sapienza et al., 2006). Firms with stronger international orientation are typically exposed to broader knowledge flows, advanced technological standards, and intensified competitive pressures that may strengthen their innovation capability.

Existing studies suggest that international orientation positively influences innovation through several important mechanisms. First, firms operating internationally gain access to diverse external knowledge sources, technological expertise, and international best practices unavailable within domestic markets (Wu et al., 2016). Exposure to foreign customers, suppliers, and international business partners increases opportunities for technological learning and organisational capability development.

Openness to external knowledge sources and international networks further enhances firms' innovation performance and learning capability (Laursen and Salter, 2006).

Second, international orientation may strengthen firms' absorptive capacity, defined as the ability to recognise, assimilate, transform, and exploit external knowledge effectively (Cohen and Levinthal, 1990; Zahra and George, 2002). Firms

exposed to international markets are continuously required to adapt to evolving technologies, international standards, and competitive environments. Such exposure may improve firms' organisational learning capability and enhance innovation efficiency.

Third, international competition frequently requires firms to prioritise innovation quality rather than merely increasing innovation quantity. Firms participating in international markets often face stricter technological, regulatory, and quality standards, particularly within European markets. Consequently, internationally oriented firms may be more likely to develop technologically sophisticated and commercially valuable innovations.

This argument is consistent with the born-global literature, which suggests that internationally oriented firms develop stronger innovation capabilities and competitive advantages through early and intensive international market engagement (Knight and Cavusgil, 2004).

The role of international orientation may be especially important within transition economies. Firms operating in such contexts often face institutional weaknesses, limited technological infrastructure, and restricted access to advanced knowledge resources. International engagement may therefore compensate for domestic structural deficiencies by enabling firms to access external knowledge networks and international learning opportunities.

In the Western Balkan countries, firms are becoming increasingly integrated into international markets through exports, foreign direct investment, regional value chains, and European integration processes. However, firms across the region vary considerably in their degree of international orientation and international market exposure. While some firms remain primarily domestically focused, others actively participate in international business activities and foreign market networks.

Drawing on the international business literature, this study argues that internationally oriented firms are more likely to generate higher-quality innovation outcomes because of their stronger exposure to advanced technologies, external knowledge flows, and competitive learning environments. International orientation may therefore positively influence innovation quality directly while simultaneously strengthening firms' ability to utilise public innovation support effectively.

2.3 The Moderating Role of International Orientation in the Relationship Between State Innovation Policies and Innovation Quality

Although state innovation policies are designed to stimulate firms' innovation activities and technological upgrading, firms differ substantially in their capability to utilise public innovation support effectively. Existing research increasingly suggests that the effectiveness of innovation policies depends not only on the existence of public support mechanisms but also on firms' internal capabilities, strategic orientations, and organisational learning capacity (Yi, Fang and Wang, 2021).

International orientation may therefore represent an important moderating mechanism influencing the relationship between state innovation policies and innovation quality. Firms with stronger international orientation are more likely to possess the absorptive capacity, technological competence, and organisational capability necessary to transform public support into technologically sophisticated and commercially valuable innovations.

First, internationally oriented firms are generally exposed to stronger competitive pressures arising from participation in international markets and global value chains. Such pressures encourage firms to utilise public innovation support strategically in order to improve technological capability and maintain international competitiveness. Public innovation support may therefore generate stronger effects on innovation quality among firms with higher levels of international orientation.

Second, firms engaged internationally often benefit from broader access to external knowledge networks and advanced technological practices. Exposure to foreign markets and international business relationships may improve firms' capability to identify valuable innovation opportunities and utilise state support more efficiently (Sapienza et al., 2006; Wu et al., 2016). International orientation may therefore strengthen firms' capability to convert public innovation support into higher-quality innovation outcomes.

Third, internationally oriented firms frequently operate under stricter technological and regulatory standards, particularly within European markets. Such firms may prioritise innovation quality because maintaining international competitiveness requires continuous technological upgrading and product sophistication. Consequently, public innovation support may become more effective when firms possess stronger international exposure and organisational learning capability.

This moderating relationship may be particularly important within the Western Balkan countries, where firms operate under conditions of institutional transition, increasing European integration, and uneven innovation capability.

While governments across the region have expanded innovation support mechanisms, firms vary considerably in their capability to absorb and utilise such support effectively. International orientation may therefore represent a critical factor explaining why some firms benefit more strongly from state innovation policies than others. Drawing on institutional theory and the international business literature, this study argues

that internationally oriented firms are better positioned to convert state innovation support into higher-quality innovation outcomes. International orientation enhances firms' exposure to external knowledge networks, technological learning opportunities, and competitive pressures, thereby strengthening the effectiveness of state innovation policies in improving innovation quality.

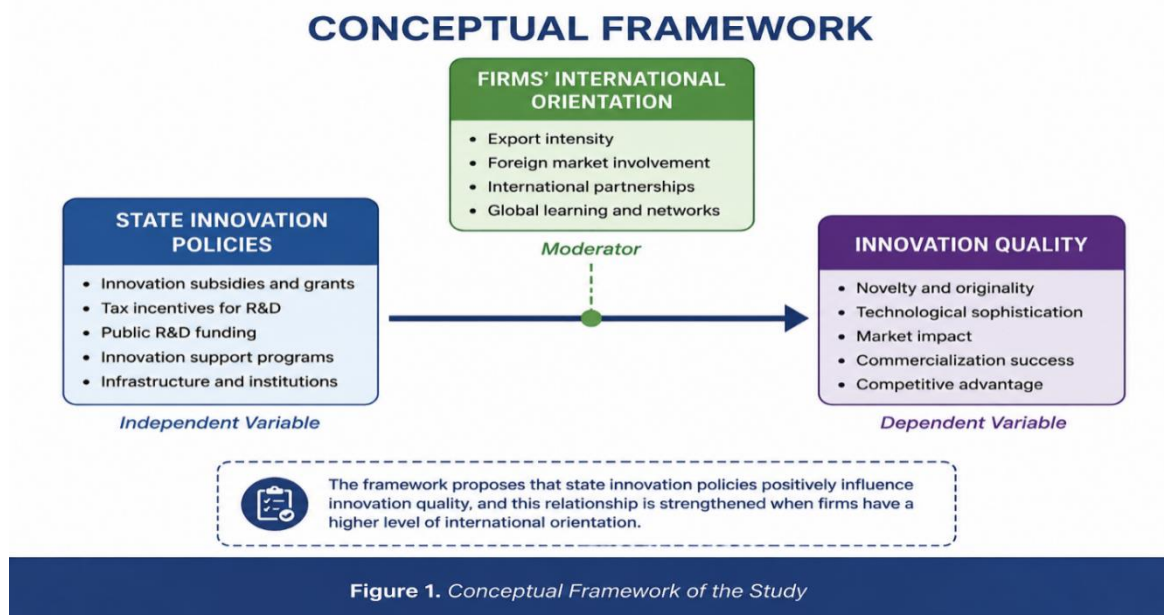


Figure 1 illustrates the proposed relationships among the main study variables. The framework suggests that state innovation policies positively influence firms' innovation quality in the Western Balkan countries. Furthermore, firms' international orientation is expected to strengthen this relationship by enhancing firms' absorptive capacity, exposure to international knowledge networks, technological learning capabilities, and ability to utilise public innovation support more effectively.

III. HYPOTHESES DEVELOPMENT

Drawing on institutional theory and innovation policy literature, state innovation policies are expected to play an important role in improving firms' innovation outcomes, particularly within transition economies characterised by institutional constraints and limited innovation capability. Public innovation support mechanisms, including subsidies, grants, technological assistance programmes, and innovation incentives, may reduce financial barriers associated with innovation activities and encourage firms to invest in technological upgrading and product development (Becker, 2015; Bloom, Van Reenen and Williams, 2019). Such policies may be especially important in the Western Balkan countries, where firms frequently face restricted access to finance, limited R&D capacity, and underdeveloped innovation ecosystems.

Existing empirical studies generally indicate that government innovation support positively influences firms' innovation activities and

technological performance (Gao et al., 2021; Castellacci and Lie, 2015). Public support may improve firms' capability to undertake risky innovation projects, strengthen technological capability, and increase innovation-related investment. However, prior research has also emphasised that the effectiveness of public innovation support depends substantially on firms' internal capabilities and strategic orientations (Yi, Fang and Wang, 2021). Consequently, firms may differ considerably in their ability to transform public support into high-quality innovation outcomes.

International orientation may represent one of the most important organisational mechanisms influencing firms' innovation capability. Firms engaged in export activities, foreign partnerships, and international business networks are typically exposed to advanced technological standards, broader knowledge flows, and stronger competitive pressures (Sapienza et al., 2006; Wu et al., 2016). Such exposure may strengthen firms' absorptive

capacity and organisational learning capability, thereby improving their ability to develop technologically sophisticated and commercially valuable innovations.

Moreover, internationally oriented firms are more likely to utilise state innovation support strategically because of their stronger integration into international markets and external knowledge networks. Exposure to international competition may increase firms' incentives to pursue innovation quality rather than merely increasing the quantity of innovation activities. Public innovation support may therefore become more effective among firms possessing stronger international orientation and greater capability to absorb external knowledge resources.

Drawing on these theoretical arguments, this study proposes that state innovation policies positively influence innovation quality, while firms' international orientation both directly improves innovation quality and strengthens the effectiveness of public innovation support. Accordingly, the following hypotheses are proposed:

H1: State innovation policies positively influence firms' innovation quality in the Western Balkan countries.

H2: Firms' international orientation positively influences innovation quality in the Western Balkan countries.

H3: Firms' international orientation positively moderates the relationship between state innovation policies and innovation quality in the Western Balkan countries.

IV. METHODOLOGY

4.1 Research Design

This study adopts a quantitative research design to examine the relationship between state innovation policies, firms' international orientation, and innovation quality in the Western Balkan countries. Quantitative methods are considered appropriate because they enable systematic empirical examination of relationships between variables and facilitate hypothesis testing through statistical analysis.

The study focuses on firms operating in Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. These countries represent transition economies characterised by institutional transformation, increasing European integration, and relatively underdeveloped innovation ecosystems. At the same time, firms across the region exhibit substantial variation in

innovation capability and international orientation, making the Western Balkans an appropriate empirical context for examining the proposed relationships.

The empirical analysis utilises firm-level data obtained from the World Bank Enterprise Surveys (WBES), which provide internationally comparable information regarding firms' innovation activities, business environment conditions, technological capability, and international engagement. The study employs regression-based empirical analysis to examine both the direct relationship between state innovation policies and innovation quality and the moderating role of firms' international orientation. Interaction effects are incorporated into the regression models to examine whether internationally oriented firms benefit more strongly from state innovation support in generating higher-quality innovation outcomes. The methodological approach adopted in this study is consistent with prior empirical research examining innovation policy effectiveness and firm-level innovation performance in transition and emerging economies.

4.2 Data and Sample

The empirical analysis of this study is based on firm-level data obtained from the World Bank Enterprise Surveys (WBES) conducted across six Western Balkan countries: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. The WBES datasets provide internationally comparable information regarding firms' innovation activities, business environment conditions, technological capability, international engagement, and access to government support mechanisms.

The study utilises the most recent available survey waves covering the period between 2019 and 2024. After merging the country-level datasets and conducting data cleaning procedures, including the removal of incomplete observations and missing responses, the final sample consists of 608 firms operating across manufacturing, services, trade, and technology-related industries.

The use of firm-level cross-country data improves the robustness and generalisability of the empirical findings while allowing broader examination of innovation dynamics within the Western Balkan region. Consistent with prior innovation and international business research, the study adopts a cross-sectional empirical design using micro-level firm observations.

Table 1. Sample Distribution by Country

Country	Number of Firms	Percentage (%)
Albania	96	15.8
Bosnia and Herzegovina	101	16.7

Kosovo	82	13.5
Montenegro	61	10.1
North Macedonia	97	16
Serbia	171	27.9
Total	608	100

Notes: The sample distribution is based on merged firm-level observations obtained from the WBES datasets covering six Western Balkan countries. The final sample includes firms with complete information regarding innovation activities, international orientation, and government innovation support variables.

The selected firms vary substantially in terms of size, age, innovation capability, and degree of international orientation, thereby providing appropriate variation for empirical analysis. Serbia represents the largest proportion of the sample, followed by Bosnia and Herzegovina and North Macedonia. To ensure data reliability, firms with incomplete responses regarding innovation activities, government support, and international orientation variables were excluded from the final analysis.

4.3 Variables Measurement

Dependent Variable: Innovation Quality

The dependent variable of this study is innovation quality. Consistent with prior innovation literature, innovation quality reflects the sophistication, novelty, technological advancement, and commercial value of firms' innovation outcomes rather than merely the quantity of innovation activities (Dziallas and Blind, 2019). Due to the limited availability of patent-based indicators within the Western Balkan context, innovation quality was operationalised using firm-level indicators related to product innovation, process innovation, technological upgrading, and innovation-related business improvements reported within the WBES datasets.

Independent Variable: State Innovation Policies

The independent variable captures firms' access to state innovation support mechanisms. Consistent with innovation policy literature, state innovation policies were measured using firm-level responses regarding government subsidies, innovation grants, technological assistance programmes, and other public support initiatives intended to stimulate firms' innovation activities and technological development.

Moderating Variable: International Orientation

The moderating variable of this study is firms' international orientation. International orientation reflects firms' engagement with foreign markets and international business activities. Following prior international business research, international orientation was operationalised primarily through export activities, export intensity, and firms' participation in international markets.

Control Variables

To improve the robustness of the empirical analysis, several control variables commonly employed in firm-level innovation studies were included in the regression models. These variables include firm size, firm age, R&D activities, industry sector, ownership structure, and human capital characteristics. Including control variables reduces the likelihood of omitted variable bias and improves the reliability of the estimated relationships among the main study variables.

Table 2. Variable Measurement and Operationalisation

Variables	Type of Variable	Measurement / Operationalisation	Source
Innovation Quality	Dependent Variable	Measured using WBES firm-level indicators related to product innovation, process innovation, and technological upgrading.	WBES / BEEPS
State Innovation Policies	Independent Variable	Measured through firms' access to government innovation support, subsidies, grants, and technological assistance programmes.	WBES / BEEPS
International Orientation	Moderating Variable	Measured using export activities, export intensity, and firms' participation in foreign markets	WBES / BEEPS
Firm Size	Control Variable	Measured by the total number of employees within the firm	WBES / BEEPS
Firm Age	Control Variable	Measured by the number of years since firm establishment	WBES / BEEPS
R&D Activities	Control Variable	Measured through firms' engagement in	WBES / BEEPS

Human Capital	Control Variable	research and development activities Measured through workforce qualification, employee training, and managerial capability indicators	WBES / BEEPS
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Notes: Table 2 presents the operationalisation and measurement of the main variables included in the empirical analysis. The selected variables are consistent with prior empirical studies examining innovation quality, international orientation, and innovation policy effectiveness within transition and emerging economy contexts.

4.4 Empirical Model

To test the proposed hypotheses, this study employs regression analysis examining the relationship between state innovation policies, international orientation, and innovation quality.

The baseline empirical model is specified as follows:

$$\begin{aligned} \text{InnovationQuality}_i &= \beta_0 \\ &+ \beta_1 \text{StateInnovationPolicies}_i \\ &+ \beta_2 \text{InternationalOrientation}_i \\ &+ \beta_3 (\text{StateInnovationPolicies}_i \\ &\times \text{InternationalOrientation}_i) \\ &+ \beta_4 \text{Controls}_i + \varepsilon_i \end{aligned}$$

where:

- $\text{InnovationQuality}_i$ represents firms' innovation quality;
- $\text{StateInnovationPolicies}_i$ captures firms' access to government innovation support mechanisms;
- $\text{InternationalOrientation}_i$ represents firms' level of international orientation;
- $(\text{StateInnovationPolicies}_i \times \text{InternationalOrientation}_i)$ captures the moderating effect of international orientation;
- Controls_i represents the vector of control variables;
- ε_i denotes the error term.

The interaction term is used to examine whether firms with stronger international orientation benefit more significantly from state innovation policies in generating higher-quality innovation outcomes. Regression diagnostics and robustness tests were conducted to ensure the validity and reliability of the empirical findings.

4.5 Ethical Considerations

This study is based exclusively on secondary data obtained from the World Bank Enterprise Surveys (WBES). The dataset is publicly available, anonymized, and does not contain personally identifiable information. No direct interaction with human participants was involved in the research process. Therefore, formal ethical approval or institutional review board approval was not required. The study was conducted in accordance with accepted academic research ethics principles, ensuring the responsible use of data, transparency of analysis, and integrity of reporting.

V. RESULTS AND ANALYSIS

5.1 Descriptive Statistics

Table 3 presents the descriptive statistics for the main study variables. The results indicate substantial variation among firms regarding innovation capability, access to state innovation support, and international orientation. On average, firms receiving greater public innovation support demonstrate higher levels of innovation activity and technological upgrading.

Variation is also evident across firm size, R&D activities, and human capital characteristics, suggesting considerable heterogeneity within the Western Balkan business environment. Such variability supports the suitability of the dataset for examining the proposed relationships between state innovation policies, international orientation, and innovation quality.

Table 3. Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
Innovation Quality	3.58	1.27	1	5
State Innovation Policies	2.76	1.14	1	5
International Orientation	3.21	1.33	1	5
Firm Size	64.18	41.52	5	310
Firm Age	16.47	9.82	1	51
R&D Activities	2.64	1.22	1	5
Human Capital	3.42	1.01	1	5

Table 3. Descriptive statistics are based on firm-level observations obtained from the WBES

datasets across six Western Balkan countries. The variation observed across the main variables

suggests substantial heterogeneity among firms regarding innovation capability, international engagement, and access to state innovation support.

5.2 Correlation Analysis

Table 4 reports the correlation matrix among the main study variables. The results indicate positive correlations between state innovation policies, international orientation, and innovation quality. Firms receiving government innovation support generally demonstrate higher innovation quality,

while internationally oriented firms also exhibit stronger innovation outcomes.

Importantly, the correlation coefficients do not indicate severe multicollinearity concerns. The highest observed correlation coefficient remained below commonly accepted threshold levels, supporting the suitability of the dataset for regression analysis. Variance Inflation Factor (VIF) tests additionally confirmed the absence of significant multicollinearity problems within the estimated models.

Table 4. Correlation Matrix

Variables	1	2	3	4	5	6	7
1. Innovation Quality	1						
2. State Innovation Policies	0.418**	1					
3. International Orientation	0.493**	0.327**	1				
4. Firm Size	0.254**	0.201**	0.291**	1			
5. Firm Age	0.147*	0.132*	0.116*	0.239**	1		
6. R&D Activities	0.517**	0.364**	0.401**	0.278**	0.173*	1	
7. Human Capital	0.392**	0.241**	0.336**	0.219**	0.128*	0.384**	1

Notes: p < 0.05 / ** p < 0.01

Table 4. Correlation Matrix reports the correlation coefficients among the main study variables. The results reveal positive and statistically significant relationships between state innovation policies, international orientation, and innovation quality. In particular, firms with stronger international orientation and greater access to public innovation support tend to demonstrate higher levels of innovation quality. The correlation coefficients

remain below commonly accepted multicollinearity thresholds, indicating that multicollinearity is unlikely to represent a significant concern in the regression analysis.

5.3 Regression Results

Table 5 presents the regression results examining the relationship between state innovation policies and innovation quality.

Table 5. Regression Results

Variables	Model 1	Model 2	Model 3
State Innovation Policies	0.271***	0.223***	0.184***
t-values	-3.76	-3.31	-2.87
International Orientation		0.296***	0.241***
t-values		-4.02	-3.58
State Innovation Policies × International Orientation			0.173**
t-values			-2.49
Firm Size	0.114*	0.103*	0.091*
Firm Age	0.068	0.059	0.051
R&D Activities	0.281***	0.254***	0.236***
Human Capital	0.176**	0.164**	0.151**
Constant	1.694***	1.472***	1.361***
R ²	0.35	0.43	0.51
Adjusted R ²	0.33	0.41	0.49
F-statistic	17.26***	22.41***	28.63***

Notes: p < 0.05 / ** p < 0.01 / *** p < 0.001

Table 5 presents the regression results examining the relationship between state innovation policies, international orientation, and innovation quality. Model 1 demonstrates that state innovation policies

positively and significantly influence innovation quality, providing support for Hypothesis 1. Firms receiving greater public innovation support are more likely to generate technologically

sophisticated and commercially valuable innovation outcomes.

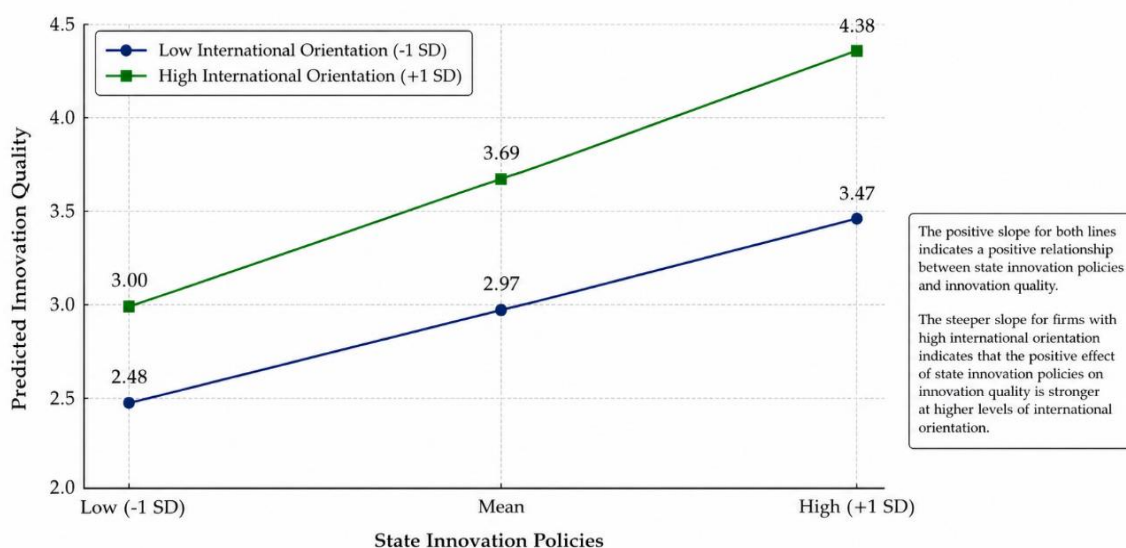
Model 2 introduces firms' international orientation, which also exerts a positive and statistically significant effect on innovation quality, thereby supporting Hypothesis 2. This finding suggests that firms engaged in international markets benefit from broader knowledge networks, advanced technological exposure, and stronger organisational learning capabilities.

Model 3 incorporates the interaction term between state innovation policies and international

orientation. The interaction effect is positive and statistically significant, indicating that internationally oriented firms benefit more strongly from state innovation support in generating higher-quality innovation outcomes. Accordingly, Hypothesis 3 is also supported.

These findings are consistent with institutional theory and international business literature, which emphasise the importance of absorptive capacity, external knowledge exposure, and international market engagement in strengthening firms' innovation capability.

Figure 2. Interaction Effect of State Innovation Policies and International Orientation on Innovation Quality



Notes: The figure illustrates the moderating effect of international orientation on the relationship between state innovation policies and innovation quality. Predicted values are calculated at one standard deviation below the mean (Low), at the mean, and one standard deviation above the mean (High).

Figure 2 illustrates the moderating role of firms' international orientation in the relationship between state innovation policies and innovation quality. The figure demonstrates that the positive effect of state innovation policies on innovation quality becomes stronger among firms with higher levels of international orientation.

5.4 Robustness Checks

Several robustness checks were conducted to ensure the validity and reliability of the empirical findings. First, Variance Inflation Factor (VIF) tests were performed to assess potential multicollinearity issues among the explanatory variables. The VIF values remained below the commonly accepted threshold of 5, indicating that multicollinearity does not represent a significant concern within the estimated models.

Second, alternative model specifications were estimated by sequentially introducing control variables and interaction terms into the regression analysis. The results remained largely consistent across the different model specifications, thereby strengthening confidence in the stability and robustness of the empirical findings.

Third, additional analyses controlling for firm size, firm age, R&D activities, and human capital

characteristics produced similar coefficient directions and significance levels. These findings suggest that the observed relationships between state innovation policies, international orientation, and innovation quality are not driven by omitted variable bias or firm-specific effects.

Furthermore, heteroskedasticity-consistent standard errors were employed to improve the reliability of the estimated coefficients. The overall consistency of the results across different robustness procedures confirms the stability of the study's main conclusions and supports the reliability of the proposed empirical model.

VI. DISCUSSION

The findings of this study provide important insights into the relationship between state innovation policies, firms' international orientation, and innovation quality within the Western Balkan

countries. Consistent with prior innovation policy literature, the results demonstrate that state innovation policies positively influence firms' innovation quality. Firms receiving greater public innovation support exhibit stronger technological upgrading and more sophisticated innovation outcomes, suggesting that government intervention may play an important role in reducing financial and institutional barriers to innovation activities within transition economies.

The findings further indicate that firms' international orientation positively influences innovation quality. Firms engaged in export activities, international partnerships, and foreign market integration appear more capable of generating technologically advanced and commercially valuable innovations. This finding supports arguments from the international business literature emphasising that international exposure enhances firms' access to external knowledge, technological learning opportunities, and advanced business practices (Sapienza et al., 2006; Wu et al., 2016).

Most importantly, the study demonstrates that firms' international orientation strengthens the effectiveness of state innovation policies in improving innovation quality. Internationally oriented firms appear better positioned to utilise public innovation support strategically because of their stronger absorptive capacity, broader knowledge networks, and greater exposure to international competition. These findings are consistent with institutional theory, which suggests that firms' organisational capabilities and strategic orientations influence their ability to benefit from external institutional support mechanisms.

The findings also contribute to the growing literature examining innovation dynamics within transition economies. Although governments across the Western Balkans have increasingly introduced innovation support programmes and technological development initiatives, firms differ substantially in their capability to transform public support into high-quality innovation outcomes. The results suggest that public innovation policies may become more effective when firms simultaneously possess stronger international engagement and organisational learning capabilities.

From a policy perspective, the findings imply that innovation policies within the Western Balkans should extend beyond direct financial support mechanisms and place greater emphasis on strengthening firms' international integration, export capability, and participation in international knowledge networks. Policymakers should therefore encourage stronger collaboration between domestic firms and international markets, institutions, and innovation ecosystems to improve

firms' technological capability and long-term competitiveness.

Overall, this study highlights the importance of considering both institutional support mechanisms and firms' strategic orientations when examining innovation quality within transition economy contexts. The findings suggest that innovation policy effectiveness depends not only on the existence of public support programmes but also on firms' capability to absorb, utilise, and strategically leverage such support within increasingly internationalised business environments.

VII. CONCLUSION

This study examined the impact of state innovation policies on innovation quality in the Western Balkan countries, with particular emphasis on the moderating role of firms' international orientation. Drawing on institutional theory and international business literature, the study investigated how public innovation support and firms' international engagement jointly influence higher-quality innovation outcomes within transition economy contexts.

The empirical findings demonstrate that state innovation policies positively influence firms' innovation quality, while firms' international orientation also exerts a significant positive effect on innovation outcomes. Most importantly, the results indicate that internationally oriented firms benefit more strongly from public innovation support in generating technologically sophisticated and commercially valuable innovations. These findings suggest that firms' capability to absorb and strategically utilise external support mechanisms plays a critical role in determining innovation policy effectiveness.

This study contributes to the innovation policy and international business literature in several important ways. First, it extends existing research by shifting attention from innovation quantity towards innovation quality within transition economies. Second, it highlights the importance of firms' international orientation as a moderating mechanism strengthening the effectiveness of state innovation policies. Third, it provides empirical evidence from the Western Balkans, an underexplored regional context characterised by institutional transformation and increasing international integration.

The findings also generate important policy implications. Governments across the Western Balkans should strengthen innovation support mechanisms while simultaneously encouraging firms' international integration, export capability, and participation in international knowledge networks. Policies aimed at improving firms' absorptive capacity, technological learning, and

international competitiveness may enhance the effectiveness of public innovation support and contribute to sustainable innovation-driven development within the region.

Despite its contributions, this study has several limitations. First, the analysis is based on cross-sectional firm-level data, limiting the ability to examine long-term causal relationships. Second, the study focuses primarily on the Western Balkan region, which may limit broader generalisability to other institutional contexts. Future research may therefore employ longitudinal datasets, comparative regional analysis, and alternative measures of innovation quality to provide deeper understanding of innovation policy effectiveness across transition and emerging economies.

Overall, this study demonstrates that the effectiveness of state innovation policies depends not only on the existence of public support mechanisms but also on firms' strategic capability to utilise such support effectively within increasingly internationalised business environments.

Conflict of Interests

The authors declare no conflict of interest.

Funding

This research received no external funding.

Use of AI

Artificial intelligence tools (ChatGPT, OpenAI) were used exclusively for language editing, grammar improvement, and manuscript formatting. All scientific interpretations, analyses, and conclusions remain the responsibility of the authors.

REFERENCES

- [1]. Arrow, K.J. (1962). Economic Welfare and the Allocation of Resources for Invention. In: Nelson, R.R. (ed.) *The Rate and Direction of Inventive Activity: Economic and Social Factors*. Princeton, NJ: Princeton University Press, pp. 609–626.
- [2]. Becker, B. (2015) 'Public R&D policies and private R&D investment: A survey of the empirical evidence', *Journal of Economic Surveys*, 29(5), pp. 917–942. <https://doi.org/10.1111/joes.12074>
- [3]. Bloom, N., Van Reenen, J. and Williams, H. (2019) 'A toolkit of policies to promote innovation', *Journal of Economic Perspectives*, 33(3), pp. 163–184. <https://doi.org/10.1257/jep.33.3.163>
- [4]. Castellacci, F. and Lie, C.M. (2015) 'Do the effects of R&D tax credits vary across industries? A meta-regression analysis', *Research Policy*, 44(4), pp. 819–832. <https://doi.org/10.1016/j.respol.2015.01.010>
- [5]. Chen, X., Liu, Z. and Suárez Serrato, J.C. (2018) 'Notching R&D investment with corporate income tax cuts in China', *American Economic Review*, 108(9), pp. 2535–2564. <https://doi.org/10.1257/aer.2017.1686>
- [6]. Coad, A., Segarra, A. and Teruel, M. (2016) 'Innovation and firm growth: Does firm age play a role?', *Research Policy*, 45(2), pp. 387–400. <https://doi.org/10.1016/j.respol.2015.10.015>
- [7]. Cohen, W.M. and Levinthal, D.A. (1990) 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, 35(1), pp. 128–152. <https://doi.org/10.2307/2393553>
- [8]. Dimos, C. and Pugh, G. (2016) 'The effectiveness of R&D subsidies: A meta-regression analysis of the evaluation literature', *Research Policy*, 45(4), pp. 797–815. <https://doi.org/10.1016/j.respol.2016.01.002>
- [9]. Dziallas, M. and Blind, K. (2019) 'Innovation indicators throughout the innovation process: An extensive literature analysis', *Technovation*, 80–81, pp. 3–29. <https://doi.org/10.1016/j.technovation.2018.05.005>
- [10]. Gao, Y., Yin, S., Ai, Y. and Zhang, H. (2021) 'Can government subsidies improve innovation quality? Evidence from Chinese firms', *Economic Research-Ekonomska Istraživanja*, 34(1), pp. 112–134. <https://doi.org/10.1080/1331677X.2020.1804423>
- [11]. Hall, B.H. and Lerner, J. (2010) 'The financing of R&D and innovation', in Hall, B.H. and Rosenberg, N. (eds.) *Handbook of the Economics of Innovation*. Amsterdam: Elsevier, pp. 609–639. [https://doi.org/10.1016/S0169-7218\(10\)01014-2](https://doi.org/10.1016/S0169-7218(10)01014-2)
- [12]. Knight, G.A. and Cavusgil, S.T. (2004) 'Innovation, organizational capabilities, and the born-global firm', *Journal of International Business Studies*, 35(2), pp. 124–141. <https://doi.org/10.1057/palgrave.jibs.8400071>
- [13]. Laursen, K. and Salter, A. (2006) 'Open for innovation: The role of openness in

- explaining innovation performance among UK manufacturing firms', *Strategic Management Journal*, 27(2), pp. 131–150. <https://doi.org/10.1002/smj.507>
- [14]. Sapienza, H.J., Autio, E., George, G. and Zahra, S.A. (2006) 'A capabilities perspective on the effects of early internationalization on firm survival and growth', *Academy of Management Review*, 31(4), pp. 914–933. <https://doi.org/10.5465/amr.2006.22527465>
- [15]. Wu, J., Wang, C. and Hong, J. (2016) 'Internationalization and innovation performance of emerging market enterprises: The role of host-country institutional development', *Journal of World Business*, 51(2), pp. 251–263. <https://doi.org/10.1016/j.jwb.2015.09.002>
- [16]. Yi, M., Fang, X. and Wang, Y. (2021) 'Government subsidies and enterprise innovation: Evidence from emerging economies', *Technology Analysis & Strategic Management*, 33(6), pp. 697–710. <https://doi.org/10.1080/09537325.2020.1849617>
- [17]. Zahra, S.A. and George, G. (2002) 'Absorptive capacity: A review, reconceptualization, and extension', *Academy of Manage*