

Research Article

Regional Research Cooperation, Innovation and the Third Mission: An Empirical Analysis of Western Balkan Universities

Oliana Sula¹ , Ermira Qosja¹ , Bledar Komina^{2*} , Luftim Cania¹ , Llambi Prendi³ 

¹Department of Management, Aleksandër Moisiu University Durrës, Durrës, Albania

²Quality Assurance, Canadian Institute of Technology, Tirana, Albania

³Department of Economic Sciences, Aleksandër Moisiu University Durrës, Durrës, Albania

*bledar.komini@cit.edu.al

Abstract

This study examines the perceptions of academic staff and PhD students in the Western Balkans regarding factors associated with university research and third-mission activities in the context of regional cooperation. A quantitative survey approach was employed, using an online questionnaire distributed to academic staff and PhD students at 13 universities across the Western Balkans. Of the 569 responses received, 555 were valid for analysis. The data were analysed using descriptive statistics, Pearson's correlation analysis, and analysis of variance (ANOVA). The results indicate that research capacity has the strongest association with regional cooperation, while innovation and third-mission activities also represent significant dimensions. The findings indicate strong perceived engagement among Western Balkan universities in research capacity, inter-university collaboration, innovation, and third-mission activities. The study provides empirical evidence for regional strategic priorities, particularly strengthening research capacity and institutionalizing innovation and third-mission mechanisms to enhance regional cooperation and societal impact.

Keywords: Research Capacity; Inter-University Cooperation; Innovation and Third Mission; Bureaucratic Obstacles; Perceptions.

INTRODUCTION

Cooperation between universities for research and innovation is a priority for WB universities due to the constant pressure of accomplishing EU (European Union) integration standards and the related EU integration chapter, especially in Albania and Montenegro, which aspire to EU integration in the near future. A dynamic global environment challenged by digital transformation, Artificial Intelligence (AI) revolution, sustainable development, and climate change re-quires universities in the WB to build an international competitive advantage that can be achieved through regional cooperation.

Traditionally, the majority of WB universities have focused on one of the primary activities of universities, which is education, neglecting research and third mission activities. In the region, there has been an increase in scientific production in STEM (Science, Technology, Engineering, and Mathematics), where results are somehow visible, but in other disciplines, results remain negligible [1]. The region has great potential for research cooperation, but it remains limited, and bilateral cooperation between countries and universities dominates [2]. Whereas the third mission of universities in the majority of the WB universities is at its nascent stage. Regionally, two important steps have been made in terms of research cooperation and the third mission of universities, the approval of the Western Balkans Agenda on Innovation, Research, Education, Culture, Youth, and Sport [3], and the elaboration of the Western Balkans Research and Innovation Infrastructure Roadmap [4]. Despite generally positive attitudes toward cooperation and strong support for strengthening the third mission, collaboration cannot be achieved because of uneven institutional capacities and bureaucratic obstacles [5]. This study aims to provide evidence from 13 universities in the WB region, combining perceptions of academic staff and PhD students on Research Capacity, Innovation, and Third mission and Inter-University cooperation as the main drivers of cooperation, and the practical implications for policy and institutional management are given.

The research objectives are:

- O1: To measure perceived levels of Research Capacity, Innovation, and Third Mission, and Inter-University Cooperation in WB universities.
- O2: To examine the relationships between the main indices (Research Capacity, Innovation and Third Mission, and Inter-University Cooperation).
- O3: To identify group differences in Research Capacity, Innovation and Third Mission, and Inter-University Cooperation in WB universities across respondents' country, institutional role, and years of research experience

Research questions:

- RQ1: How do academic staff and PhD students of WB universities perceive the levels of Research Capacity, Innovation, and Third Mission, and Inter-University Cooperation?
- RQ2: Does Research Capacity significantly influence Innovation and Third Mission?
- RQ3: Does Research Capacity significantly influence Inter-University Cooperation?
- RQ4: Is Innovation and Third Mission significantly related to Inter-University Cooperation?
- RQ5: Do perceptions on Research Capacity, Innovation, and Third Mission and Inter-University Cooperation vary across respondents' countries, institutional roles, and years of research experience?
- RQ6: How do bureaucratic obstacles affect the perceived Inter-University Cooperation?

Consequently, in the second section of this study, the theoretical background is analysed, the third section presents the research methods, followed by the presentation of

the results in the fourth section, and concludes with conclusions and recommendations in the fifth section.

THEORETICAL BACKGROUND

Factors Associated with Regional Research Cooperation and the University Third Mission

There is no single definition of regional scientific research cooperation, even though such a definition should start from the closest concept of cooperation, which is the concept of collaboration founded in collaboration theory developed by [6] that distinguishes between individual first collaboration (observing, turn taking and status seeking) and team first collaboration (influencing others, organizing and building group cohesion). The study in [7] refers to research collaboration as a form of collaboration that takes part within the scientific community, reuniting the interests of the researchers. Authors in [8] consider that the centre of re-search collaboration is joint scientific research and knowledge production. Collaborative research is gaining a lot of insights in the era of digital transformation, AI revolution, and sustainable development challenges because it involves the coordination and interest alignment of researchers, institutions, and communities [9]. Authors in [10] identify the main reasons for starting a research collaboration: opportunity to learn from new experiences, scrutiny for clarity and consistency, access to new samples and context, challenging conventional assumptions, expansion of networks, and opportunities for cultural enrichment. In terms of regional cooperation, universities are the main actors of fostering regional innovation and regional sustainable development [11].

Research capacity is considered one of the main factors that can strengthen not only regional but also international research collaboration with a direct impact on policy and practice [12]. In [13] consider that designing and participating in joint projects affects research collaboration and research capacity. External grant proposals and funding are among the key factors for building research capacity for academic staff [14], but early career researchers appear to be successful when supported by more experienced academic staff. Building research capacities and research readiness requires an equitable distribution of research funding and transparency and accountability governance mechanisms for project participation [15]. The availability of funding for research projects is at the same time a driver and a barrier to building research capability, especially in developing countries. Developing regional collaboration through research capacity means not only pre-paring academic staff and PhD students (people) but also depends on the level of the institutional capacity (university) [16]. Building on this, [17] suggest a transferable logic for Western Balkan universities: academic staff and PhD students' perceptions can meaningfully influence the feasibility of regional research cooperation and the effective strengthening of the third mission. Institutional capacity and institutional support to academic staff and PhD students are intertwined, as support mechanisms for academic staff and PhD students feed the broader development of institutional capacity. The absence of institutional support is a barrier to the process of knowledge transfer and prompt application of research results [18]. Continuous institutional support, together with

appropriate capacity-building activities such as training with a broad curriculum and mentoring activities, influences not only collaboration but also research impact, especially for early career researchers and PhD students [19]. The implementation of suitable institutional strategies and policies supporting the concrete application of research results is crucial even for the societal impact of academic research [20]. Support structures for regional research collaboration are not limited to their physical form; digital platforms provide opportunities not only for research collaboration but also for fostering open research and open innovation in universities [21]. Moreover, [22] refer to the concept of platformisation of science caused by the emergence of scientific digital platforms, which is caused by digital trans-formation.

Digital competence became an urgent priority after COVID-19, boosting training and making hybrid/online learning a normal practice [23]. This suggests that perceptions of regional research cooperation and the third mission in Western Balkan universities depend strongly on institutional capacity and support structures that enable collaboration and social impact. Dedicated research institutional structures are essential in universities as research is one of their main activities. Traditionally, most research collaboration occurs within universities' departments, faculties, and research centres. The existence of internal collaboration, organisational routines, and structures is a precondition for establishing external regional or international collaboration. Authors in [24] argue that research-centre level collaboration can have a specific influence on collaboration in terms of collaboration with researchers who are not affiliated with a research centre. The study in [25] identifies different forms of organisation of research teams as core units of research collaboration, such as the individual-based research team, the backbone-based research team, and the representative research group, stressing that the representative research group has interdisciplinary characteristics. Most of the internal collaboration within universities often depends on hierarchy (vertical collaboration), even if most of the time academic staff and PhD students collaborate with their peers (horizontal collaboration) [26].

Third mission of universities has been often associated to regional development and regional co-operation as the definition of third mission itself contains elements such as research collaboration, spin-offs, entrepreneurial university, network and relationship development with non-academic stakeholders, life-long learning, knowledge, innovation and technology transfer, societal, community and cultural impact and the development of Helix Models (Triple, Quadruple or Quintuple Helix Models among others [27]). One of the most common forms of community engagement at universities is the use of training activities, stakeholder engagement, investments, public awareness, and projects as the main forms of incentives [28]. As referred in the definition of the third mission, the development of the Triple Helix Model (University- Government -Industry) and the Quadruple Helix Model (University-Government-Industry Civil Society). The Triple Helix Model was proposed by [29], aiming to explain the relationships between academia, government, and industry. This proposed model had a stronger ambition to be one of the main components of national and multinational strategies. Authors in [30] would further emphasise that university, government, and industry interaction in the Triple Helix Model

can reorganise innovation systems and transform knowledge production processes. The study in [31] add to the Triple Helix Model the dimension of civil society, resulting in the creation of the concept of the Quadruple Helix Model. Socio-ecological transition has been addressed by [32], adding a fifth dimension to the Quintuple Helix Model. The development of these Helix Models has empowered different stakeholders and diversified collaboration paths, especially in the context of internationalisation of universities, leading to strengthened regional development and regional cooperation [33, 34]. To develop and implement a third mission in the context of regional cooperation, universities need to have formalised institutional structures such as knowledge and technology transfer offices, which, apart from technology transfer activities, can provide commercialisation of research results and academic entrepreneurship, but a continuous upskilling and reskilling of their staff is needed [35]. Apart from commercialisation routines that should be clearly highlighted in the strategic goals of the knowledge transfer offices [36], even though non-commercialisation routines of application research results can generate social and community impact [37].

In a holistic perspective, as highlighted by [38], inter-university cooperation is a source not only of economic development but also of the main conditions for building a knowledge society. One of the catalysts of inter-university cooperation is networks, inter-university networks and intra-university networks, as suggested by [39], which have a better impact on the research performance of universities when there exists a synergy between these typologies of networks. Moreover, regional cooperation and regional projects strengthen inter-university networks [40, 41]. Authors in [42] consider that bureaucratic inefficiencies caused by misaligned regimentation, together with limited funding, are major obstacles to inter-university cooperation. Regional innovation systems of innovation [43], when developing the concept of regional innovation systems, highlight the importance of financial capacity, learning, and productive culture that can foster regional capacities of innovation. Within regional innovation systems, intra-university cooperation and university- industry cooperation are the primary conditions of existence of these regional innovation systems, where knowledge and technology transfer occur [44]. The study in [45] consider that bureaucratic obstruction is the main reason for the inefficiency of internal processes in universities, proposing that collaboration, adaptation of institutional policies, decentralising resources, and fighting corruption are the main ways of tackling these obstacles.

In the WB region, there is no previous research focusing on the factors of inter-university cooperation in terms of research and third mission activities of universities. Authors in [46] suggest that strengthening international networks is crucial for WB countries to achieve their full research potential [2]. In terms of the third mission of universities, [47] suggest that strengthening the third mission of universities should be a priority for WB universities. These gaps in the research require a further exploration of the perception of the underlying factors of regional research collaboration and the third mission mentioned in the above paragraphs by the academic staff and students of the WB

universities. The unit of analysis is academic staff and PhD students because they are the main target of brain drain, migration, and also of talent retention in WB universities.

Consequently, the identified gaps are as follows:

Despite previous studies on inter-university collaboration and third mission engagement, there are still gaps in the WB. The region is in the nascent stages of establishing structures for the third mission and the importance of inter-university collaboration. The previous research offers limited empirical evidence on how academic staff and PhD students perceive the relationship between research and the third mission. Previous work has not sufficiently examined these dimensions together within a regional comparative framework across the many higher education institutions of the WB region.

This study addresses these gaps by providing an empirical assessment based on the perceptions of staff and PhD students.

Hypotheses Development

Previous studies indicate that research capacity creates conditions for innovation and development of the third mission of universities [14]. Furthermore, universities with high research capacities are more likely to participate in joint initiatives and develop inter-university collaborations [48].

Innovation and the third mission rely on collaboration with external actors and the exchange of knowledge. Bureaucracy is frequently reported as an obstacle that makes collaboration more difficult and less efficient [49]. Studies also demonstrate that perceptions of these procedures may vary according to respondents' structural roles and levels of experience [50].

Although the existing literature addresses research collaboration, institutional capacity, third mission, and bureaucratic obstacles in higher education, empirical evidence for Western Balkan universities remains limited. Studies that analyse the perceptions of academic staff and doctoral students on research capacity, third mission, and inter-university collaboration are not found; these dimensions are treated separately. To address this gap, the following hypotheses are elaborated:

- H1. Research Capacity is positively related to Innovation and Third Mission.
- H2. Research Capacity is positively related to Inter-university Collaboration.
- H3. Innovation and the Third Mission are positively related to Inter-University Collaboration.
- H4. Bureaucratic obstacles are negatively related to ease of collaboration
- H5. Perceptions vary according to the institutional role of the respondents.
- H6. Perceptions vary according to years of research experience.

Conceptual Framework

The figure 1 presents the proposed conceptual framework of the study. The framework assumes that Research Capacity positively influences both Innovation and Third Mission activities and Inter-University Cooperation. In turn, Innovation and Third Mission are expected to strengthen Inter-University Cooperation and increase the practical and societal applicability of research activities.

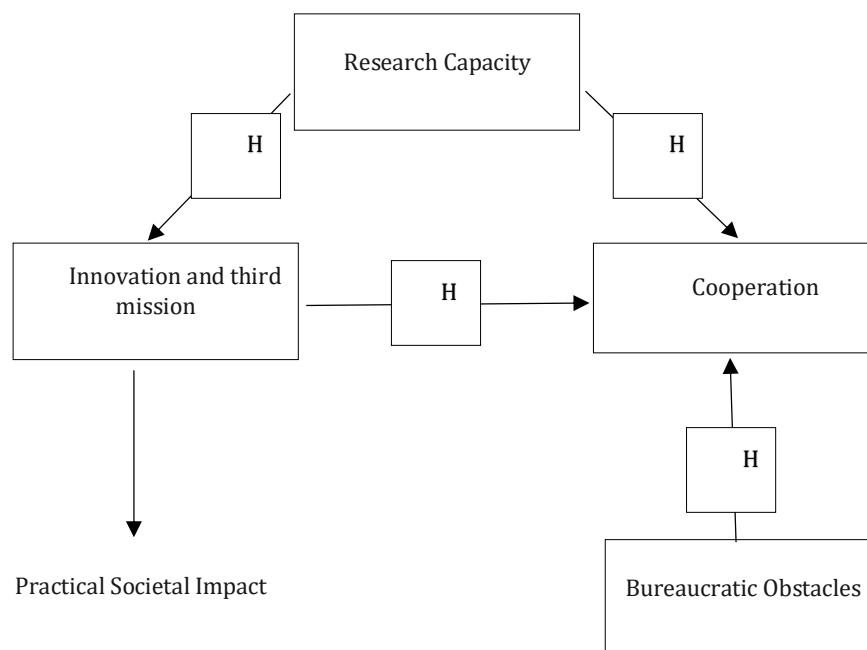


Figure 1. Conceptual Framework

RESEARCH METHODOLOGY

Sample description

This study uses a quantitative approach using an online questionnaire to collect perceptions of academic staff and PhD students on Research Capacity, Innovation, and Third mission, as well as Inter-University cooperation in the WB countries. Similar studies in the higher education con-text apply a questionnaire-based quantitative design and Likert scales to measure perceptions related to the third mission and institutional factors [51]. This approach was used to compare groups and to see the statistical relationships between variables and statements. Academic staff and PhD students from thirteen universities from the WB participated in this study including Canadian Institute of Technology (CIT), University of Shkodra “Luigj Gura-kuqi” (UNISHK), Alekandër Moisiu University, Durrës (UAMD), Mother Teresa University, Skopje, Alekandër Xhuvani University, Elbasan, Haxhi Zeka University, Peja (UHZ), Kadri Zeka University, Gjilan (UKZ), AAB College, Prishtina(AAB), Ismail Qemali University, Vlora(UV), University of Sports of Tirana (UST), Mediterranean University, Podgorica(MUP), University of Novi Pazar, Serbia (DUNP), and University of Tuzla, Bosnia and Herzegovina.(UNTZ).

The number of partipants per university was as it follows:

UAMD 50, USH 53, UST 39, UNIEL 43, UVI 40, UHZ 42, UKZ 42, AAB 40, MTU 44, UNIMED 24, një rresht i dytë për UKZ me 28, UTuzla 17, NPU 28 dhe CIT 79. The total number of respond-ents was 569, and the targeted number of respondents was N = 2000. The number of valid questionnaires was 555.

This distribution of universities across the WB helps to obtain results from the data distributed throughout the region. The questionnaire used is structured with 4 sections that measure, through a Likert scale of 1–5, perceptions on scientific research capacities, innovation/third mission, and inter-university cooperation in the WB. It also collects basic demographic and professional back-ground data (country, institution, age, gender, role, and research experience) to enable comparisons between groups. The four sections of the questionnaire were as follows:

- General information (demographic/institutional)
- Research capacity (5 statements)
- Innovation and third mission (5 statements)
- Inter-university cooperation (5 statements)

Participants completed the questionnaire voluntarily, with complete anonymity guaranteed, after receiving information about the study's purpose and providing prior consent. From October to December 2025, the Google Forms platform was utilized to distribute the questionnaire. Listwise removal was used to eliminate cases with missing data on the variables used in the analysis, giving a valid sample of 555 cases. The accompanying author may provide the anonymized dataset and SPSS syntax that support the study's findings upon reasonable request, see Table 1.

Four indices were created based on the questionnaires obtained from the sum of each statement as follows:

- Research Capacity – constructed by summing the values of the five statements related to research capacity.
- Innovation and Third Mission – constructed by summing the responses to the five statements related to innovation and the third mission.
- InterUniversity Cooperation – constructed by summing the values of the five statements related to inter-university cooperation.
- Cooperation Easiness – constructed by summing the values of the four statements related to the ease of cooperation.

Since these indices were created as summaries of statements, it is understood that higher values indicate a more positive perception and lower values indicate a lower positive perception. Internal consistency of the multi-item scales was assessed using Cronbach's alpha [23].

Before full data collection, the questionnaire was piloted with 30 respondents to test the clarity, understandability, and coherence of the items. The pilot data were analysed in SPSS using frequencies and Cronbach's Alpha. Based on the results, minor improvements were made to the wording of some questions before the final administration.

The KMO value exceeded the recommended threshold of 0.70, indicating adequate sampling adequacy, while Bartlett's Test was statistically significant ($p < .001$), confirming that the correlation matrix was suitable for factor analysis.

Table 1. Indices Explanation

Index name	Acronym	Calculation based on EFA	Statements in the questionnaire
Innovation and Third Mission	SEC3_ITT	(RC3 + RC5 + ITT1 + ITT2 + ITT3 + ITT4)	RC3: There are functional structures for research and innovation in my institution. RC5: I have regular access to scientific platforms and research resources. ITT1: My university is engaged in the community through projects or trainings. ITT2: There are collaborations with the private sector or non-profit organizations. ITT3: There are dedicated structures for innovation and technology transfer. ITT4: Scientific research has led to applicable products or services in practice.
Research Capacity and Inter-University Cooperation	SEC2_RC	(RC1 + RC2 + RC4 + EIUC3 + EIUC4 + EIUC5)	RC1: I have had real opportunities to participate in international research projects. RC2: My university actively supports scientific research. RC4: I am informed about my institution's policies on research and innovation. EIUC3: I have had professional contacts with colleagues from other universities in the region. EIUC4: My university encourages participation in international projects. EIUC5: There is great potential for joint research in the Western Balkans.
Third Mission Orientation (	SEC3_ITT	(ITT5)	ITT5: I believe that the third mission of universities should be further strengthened.
Inter-University Cooperation / Bureaucratic Obstacles	EIUC2	(EIUC2)	EIUC2: Bureaucratic obstacles affect regional research cooperation.
Cooperation Easiness	CO-OP_POS	(EIUC1)	EIUC1: Inter-university cooperation in the region is easy to achieve.

Data Analysis

To show that the indices are supported by the statements, reliability analysis was performed for each group using Cronbach's Alpha. Exploratory Factor Analysis (EFA) was conducted to examine whether the questionnaire items were grouped into the expected latent dimensions and to assess the factorial structure of the scales. The factor analysis helped verify whether the items were empirically aligned with the main constructs used

in the study. The statistical analysis followed this procedure: initially, a descriptive analysis of the data was performed by calculating the mean, skewness, and kurtosis to see the general trends of perceptions in the elections. After this phase, factor analysis was applied to identify the main components underlying the questionnaire items, then Pearson Correlation was used to test the correlation between the main indices, and comparisons between groups were used to test differences according to location, role, and experience with the created indices. When ANOVA was significant, Tukey HSD was applied to identify which groups differed from each other.

RESULTS

Reliability (Cronbach's Alpha)

The results of the reliability analysis show that the constructed scales are stable and suitable for use in further analyses, see Table 2. The Innovation and Third Mission scale (SEC3_ITT) presented strong internal consistency (Cronbach's $\alpha = 0.855$), and the Research Capacities scale (RC1–RC5) resulted in high internal consistency (Cronbach's $\alpha = 0.866$).

Table 2. Cronbach's α

Scales	Cronbach's α
SEC3_ITT	0.855
SEC2_RC	0.866
Questionnaire	0.929

Cronbach's Alpha was calculated only for multi-item scales. Single-item indicators were not subjected to reliability analysis, as internal consistency cannot be estimated for a one-item measure.

Factor Analysis

Factor analysis identified four factors that explain 70.339% of the variance. The first factor, "In-novation and Third Mission", includes: community engagement, collaboration with the private sector and innovation structures. The second factor, "Research Capacity and Inter-University Cooperation", includes: institutional support for research, participation in international projects, and academic cooperation. The third factor, "Third Mission Orientation", includes support and strengthening of the third mission, while the fourth factor, "Bureaucratic Obstacles to Cooperation", includes the perception of bureaucratic obstacles to regional research cooperation.

To see which elements, make up the factors, as well as their loadings and their role within the factor, see Table 3. Rotated Component Matrix in the appendix

Table 3. Explained Variance According to the Factors

Components	% of variance after rotation
1	27.369%
2	24.287%
3	9.850%
4	8.834%

Descriptive Analysis

The descriptive analysis shows that there is a positive trend towards Research Capability, Collaboration Easiness, Innovation, and the third mission. The majority of the statements have a value greater than 3, the neutral level of the Likert scale. However, the overall values of the skewness coefficient are negatively skewed, which shows that the statements mostly go towards agreement, while regarding the kurtosis coefficient, there is a consensus among the respondents (see Table 1A in the Appendix). Based on the questionnaire responses for Research Capability, there is strong institutional support with a high average (MEAN=4.24), and the information about institutional policies on research and innovation also results in high scores (MEAN=4.15). In universities, the existence of support structures is positively assessed (MEAN=3.95), and access to scientific platforms and research resources is also assessed (MEAN=3.82). However, internationalization is perceived as present, but not equal or guaranteed for all (MEAN=3.66). Innovation and third mission have an average (MEAN=4.09), which means that there is a positive approach and cooperation with the private sector is seen as positive (MEAN=3.95). Regarding innovation and applicable results, some statements have a lower average but above neutral (Mean=3):

- “There are structures dedicated to innovation and technology transfer” (MEAN=3.62)
- “Scientific research has produced products or services that can be applied in practice” (MEAN=3.62).
- This data shows us that there is a mismatch between commitment and capacity to transform re-search into practice. One of the most significant findings in this research is that all universities have a broad regional consensus among academic staff and PhD students that there is a need to increase their social contribution towards the third mission. This is clearly seen from the results of the statement:
- “The third mission of universities should be further strengthened” results in a very high mean (MEAN=4.44; skewness = -1.71; kurtosis = 3.34).

This is a very important indicator for the future of policymaking in higher education, scientific research, and smart specialisation in WB countries.

In the assessment of Inter-University Cooperation, the perception that “cooperation in the region is easy to achieve” is more moderate (MEAN=3.57), which suggests that cooperation exists, but is not perceived as simple for academic staff and PhD students. In parallel, “bureaucratic obstacles affect regional research cooperation” is rated above neutral (MEAN=3.69), confirming that bureaucracy is perceived as a real barrier. Regarding Inter-University collaborations, there is a general perception that collaboration exists but remains affected by bureaucracy. These are seen from the statements in fig 1 in the appendix as:

- “Collaboration in the region is easy to achieve” is more moderate (MEAN=3.57)
- “Bureaucratic obstacles affect regional research cooperation” (MEAN=3.69)

Academic staff and PhD students report that they have professional contacts with colleagues from other universities in the WB region (MEAN=3.83) and are also supported by the university they are part of, and this is confirmed by the statement:

- “My university encourages participation in international projects” (MEAN=4.36).

The perception that there is room for collaboration between universities is not absent in this analysis, suggesting that there should be an expansion of collaborations despite bureaucratic or administrative hurdles. We see the potential in the statement:

- “Great potential for joint research in the Western Balkans” (MEAN=4.28).

From the above findings of this research, it can be suggested from the perceptions of the academic staff and students that improving institutional cooperation mechanisms, institutional climate, strengthening the third mission, and regional cooperation should be a priority for universities of the WB region. On the other hand, the results show that intervention is needed in innovation, technology transfer, and increasing the applicability of research results. Also, reducing bureaucratic obstacles appears as a priority for the efficiency of inter-university research cooperation in the WB region.

Correlations Between Indices

To answer the 3 RQs, correlation analysis was used to test:

- whether support and research capacities (SEC2_RC) are related to Inter-University Cooperation (SEC4_EIUC/COOP_POS),
- whether Innovation and Third Mission (SEC3_ITT) are related to practical research results, and
- whether bureaucratic obstacles (EIUC2) are negatively related to cooperation.

Table 2A in the appendix shows that there is a positive, statistically significant relationship between the three main indices, indicating that Research Capacities are closely associated with Innovation and Third Mission ($r=.776$, $p<.001$) and Inter-University Cooperation ($r=.741$, $p<.001$). At the same time, Innovation and Third Mission are positively related to Inter-University Cooperation ($r=.690$, $p<.001$), which suggests that a favourable research environment and innovation mechanisms go hand in hand with increased academic cooperation in the WB. A very important result is that Inter-University cooperation is moderately and positively related to the perception that Research Capacity has generated products or services that can be applied in practice ($r=.522$, $p<.001$). Also, the relationship between cooperation and bureaucratic obstacles was positive ($r=.385$, $p<.001$), indicating that respondents have encountered bureaucratic obstacles at high levels of cooperation. Strengthening Research Capacities and the Third Mission are of particular importance, and on the other hand, bureaucratic barriers need to be reduced.

One-Way ANOVA- Comparisons by Country

One-way ANOVA was conducted to examine differences across WB countries in the three composite indices such as research capacity, innovation and third mission, and cooperation easiness, see Table 4. The results indicated no statistically significant differences between countries for Research Capacity, $F(5,562)=1.229$, $p=.294$. Differences

for Innovation and Third Mission, $F(5,562) = 2.015$, $p = .075$, and Cooperation Easiness, $F(5,562) = 2.025$, $p = .073$, approached significance but did not meet the conventional 0.05 threshold. Effect sizes were small ($\eta^2 \approx 0.011$ – 0.018), suggesting that country-level variation explains only a limited proportion of the variance in these perceptions.

Table 4. One-Way ANOVA Results Across Western Balkan Countries

	Research Capacity			Innovation and Third Mission			Cooperation Easiness		
	Between	Within	Total	Between	Within	Total	Between	Within	Total
	Groups	Groups		Groups	Groups		Groups	Groups	
Sig.		0.294			0.075			0.073	

One-Way ANOVA, Comparisons by Role

One-way ANOVA revealed statistically significant group differences across the eight categories for all main constructs, see Table 5. Perceived bureaucratic obstacles differed modestly between groups, $F(7,549) = 2.137$, $p = .038$ ($\eta^2 \approx .027$). Research Capacity also varied significantly, $F(7,549) = 3.824$, $p < .001$ ($\eta^2 \approx .046$), as did Innovation and Third Mission, $F(7,549) = 3.399$, $p = .001$ ($\eta^2 \approx .042$). The strongest differences were observed for Cooperation Easiness, $F(7,549) = 6.001$, $p < .001$ ($\eta^2 \approx .071$), indicating that group membership explains the largest share of variance in perceived cooperation.

Table 5. One-Way ANOVA Results Across Eight Categories

Bureaucratic obstacles affect regional research cooperation.	Research Capacity			Innovation and Third Mission			Cooperation Easiness		
	Between Groups	Within Groups	Total	Between Groups	Within Groups	Total	Between Groups	Within Groups	Total
Sig.		0.038					0.001		

Analysis Post-Hoc Tukey HSD

The analysis post-hoc Tukey HSD showed that the institutional role is accompanied by significant changes in terms of the perception about Research Capacity, Innovation and Third Mission, and Cooperation Easiness, see Table 6.

Table 6. Tukey HSD Post-hoc Comparisons by Institutional Role

Construct / Variable	Group with higher mean	Compared to (groups with lower mean)	p-value	Interpretation
Bureaucratic obstacles	Researchers	PhD Students	$p = .037$	Researchers, being more directly involved in research processes, report higher awareness of administrative barriers.

Research Capacity	Researchers	Lecturers; PhD Students; Associate Professors; Assistant Lecturers	p = .027; .003; .034; .002	Direct research involvement is associated with higher evaluations of institutional research capacity.
Innovation and Third Mission	Researchers	Lecturers; PhD Students; Assistant Professors; Academic leadership positions	p = .002; .001; .036; .015	Researchers perceive universities' innovation and third-mission engagement more positively.
Cooperation Easiness	Researchers	Lecturers; PhD Students; Assistant Professors; Administrative staff	p = .001; < .001; < .001; .002	Exposure to research networks/projects is linked to perceiving inter-university cooperation as more feasible.
Cooperation Easiness	Professors	Students; Assistant Lecturers	p = .024; .046	Higher academic rank is associated with perceiving cooperation as easier to achieve

These findings suggest that exposure to research networks and direct involvement in projects influences more positive perceptions of the capacities, innovation, and feasibility of regional cooperation.

One-Way ANOVA- Comparisons by Experience

One-way ANOVA indicated statistically significant differences across the four groups in Research Capacity, $F(3,564) = 8.991$, $p < .001$, and Cooperation Easiness, $F(3,564) = 8.315$, $p < .001$, with small-to-moderate effect sizes ($\eta^2 \approx .046$ and $\eta^2 \approx .042$, respectively). In contrast, group differences in Innovation and Third Mission were not statistically significant, $F(3,564) = 2.075$, $p = .102$, suggesting relatively similar perceptions across groups for this construct. Post-hoc comparisons were conducted for the significant outcomes to identify which groups differed from each other, see Table 7.

Table 7. One-Way ANOVA Results Across Experience

	Research Capacity			Innovation and Third Mission			Cooperation Easiness		
	Between Groups	Within Groups	Total	Between Groups	Within Groups	Total	Between Groups	Within Groups	Total
Sig.		0			0.102			0	

Analysis Post-Hoc Tukey HSD

Analysis post-hoc Tukey HSD (Table 8) showed that the levels of research experience influence are accompanied with significant changes in the perception of the Research Capacities and Cooperation Easiness.

Table 8. Tukey HSD Post-hoc Comparisons by Institutional Experience

Construct / Variable	Group with higher mean	Compared to (groups with lower mean)	p-value	Interpretation
Research Capacity	3–7 years	<3 years	0.006	Participants with ≥ 3 years of research experience report significantly higher perceived research capacity than those in the earliest experience group.
Research Capacity	8–15 years	<3 years	<.001	Mid-experience researchers perceive stronger research capacity than early-stage respondents, suggesting capacity builds after initial years.
Research Capacity	Over 15 years	<3 years	<.001	Highly experienced respondents report higher research capacity than early-stage respondents, indicating sustained advantages in access/resources/structures.
Cooperation Easiness	8–15 years	<3 years	<.001	Cooperation is perceived as easier among mid-experience respondents than early-stage respondents, likely due to stronger networks and project exposure.
Cooperation Easiness	Over 15 years	<3 years	<.001	The most experienced group perceives cooperation as easier than early-stage respondents, consistent with established collaborations and familiarity with procedures.
Innovation and Third Mission	—	No significant differences across groups (<3, 3–7, 8–15, >15)	>.05 (all)	Perceptions of innovation/third mission are broadly similar regardless of research experience, suggesting a more institution-wide (rather than experience-driven) assessment.

Alignment of Research Objectives, Questions, Hypotheses, and Empirical Findings

Table 9 depict the matrix of the relationship between objectives, research questions, hypotheses and empirical findings.

Table 9: Matrix O-RQ-H

Objective	RQ	Hypotheses	Analysis	Research result	Decision
□ O1	□ RQ1	—	Descriptive Statistics	Positive perceptions	□ Achieved
□ O2	□ RQ2	□ H1	Pearson Correlation	$r = .776, p < .001$	□ Supported
□ O2	□ RQ3	□ H2	Pearson Correlation	$r = .741, p < .001$	□ Supported
□ O2	□ RQ4	□ H3	Pearson Correlation	$r = .690, p < .001$	□ Supported
□ O2	□ RQ6	□ H4	Pearson Correlation	$r = .385, p < .001$	□ Not supported The positive association between bureaucratic obstacles and cooperation may indicate that respondents who are more actively engaged in regional collaboration are also more exposed to administrative and procedural barriers.
□ O3	□ RQ5	□ H5	ANOVA and Tukey HSD	Important difference	□ Supported
□ O3	□ RQ5	□ H6	ANOVA and Tukey HSD	Important difference for some constructs	□ Partially supported

Objective 1 is related to Research Question 1 and was addressed through descriptive statistics, which showed generally positive perceptions of Research Capacity, Innovation, and Third Mission, as well as Inter-University Collaboration. Objective 2 is related to research questions Q2, Q3, Q4, and Q6, and was tested through Pearson Correlation. The results supported H1, H2, and H3, showing positive and statistically significant relationships between the main constructs, while H4 was not supported, as the relationship between bureaucratic barriers and collaboration did not result in the expected direction. Objective 3 is related to Q5 and was tested through ANOVA and Tukey HSD, where H5 was fully supported, and H6 was partially supported, as differences by research experience were found only for some constructs.

Limits of the Study

This study has several limitations that should be considered when interpreting the findings. First, the analysis does not employ Structural Equation Modeling (SEM) to

examine the structural relationships among the study variables. Future research could apply SEM to investigate direct, indirect, and moderating effects and to provide a more comprehensive assessment of the proposed relationships. Second, the study uses cross-sectional data, which limits the ability to establish temporal relationships and does not permit causal inference. Third, although the sample covers universities across the Western Balkans, it may not be fully representative of the broader university population in the region, limiting the generalizability of the findings. Fourth, although the measurement instrument was assessed using Cronbach's alpha and exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and additional validity assessments were not performed. Fifth, the reliance on self-reported data may introduce common-method bias and response bias. Finally, the study does not incorporate qualitative evidence, which could provide deeper contextual insights into the institutional mechanisms underlying regional research cooperation, innovation, and third-mission activities. These limitations provide directions for future research involving longitudinal designs, broader and more representative samples, advanced measurement validation, mixed-method approaches, and structural modeling.

SUMMARY AND CONCLUSION

This research showed that there is a generalised positive perception of academic staff and PhD students toward Research Capacity, Inter-university Cooperation, and especially the strengthening of universities' Innovation and Third Mission in the WB. Descriptive statistics indicate that most items are rated above the neutral Likert midpoint, while the generally negative skewness values suggest responses cluster toward agreement, with kurtosis patterns indicating broad consensus across participants. Perceptions of institutional research support are strong (e.g., support for re-search and awareness of research/innovation policies), while access to resources and research infrastructure is also evaluated positively. At the same time, opportunities for participating in inter-national research projects are more moderate, suggesting that internationalization is present but not equally accessible across respondents and institutions. For innovation and technology transfer, engagement with the community and cooperation with external stakeholders are assessed positively, yet more formalized innovation structures and evidence of applied outputs receive lower, though still above-neutral ratings, pointing to a gap between general commitment and the institutional capacity to translate research into practice.

Correlation analysis reinforces these patterns: Research Capacity is strongly associated with Innovation and Third mission, and with Inter-University Cooperation, and Innovation and Third mission also relate positively to Inter-University Cooperation. Importantly, Inter-University Co-operation is moderately related to perceptions of research producing applicable results, supporting the idea that stronger collaboration accompanies greater practical impact. Comparisons by country show limited variation, suggesting that WB universities cope with the same issues, therefore suggesting the tailoring of proper mechanisms of cooperation to tackle the common obstacles. While differences by role and experience are more pronounced: researchers (and, in some cases,

professors) report higher perceived Research Capacity and Cooperation Easiness, this might be due to that the role given by academic grades and titles in the academic field can result in higher self-efficacy in terms of Research Capacity and Cooperation Easiness. Respondents with more than three years of research experience perceive significantly stronger Research Capacity and Cooperation than other participants. Early career researchers in the region need support in order not only to build their self-efficacy but also their self-perception and self-confidence. Tailored regional programs focused on early career researchers should be built based on funding opportunities, mobility, and building not only research capacities but also mentoring and capacity building activities.

Policy and institutional actions should prioritize: (1) strengthening Research Capacity across institutions especially for early-career researchers through improved access to resources, research plat-forms, mentoring, and equitable opportunities to joint international projects, mentoring and broader capacity building activities ; (2) institutionalising Innovation and Third-mission mechanisms by developing dedicated Technology Transfer/innovation units, clear procedures for partnerships, and incentives that reward applied outputs; and (3) reducing administrative obstacles in cross-institutional cooperation via simplified procedures, standardized documentation, and support offices that help researchers manage compliance and reporting, so that collaboration becomes not only possible but also faster and more efficient across the region.

AUTHOR CONTRIBUTIONS

Conceptualization, O.S., E.Q., and B.K.; Methodology, O.S. and E.Q.; Validation, O.S., E.Q., B.K., L.C., and L.P.; Formal Analysis, O.S., E.Q., and L.P.; Investigation, O.S., E.Q., B.K., L.C., and L.P.; Resources, O.S., E.Q., and B.K.; Data Curation, O.S. and E.Q.; Writing – Original Draft Preparation, O.S., E.Q., and B.K.; Writing – Review & Editing, O.S., E.Q., B.K., L.C., and L.P.; Visualization, E.Q. and L.P.; Supervision, O.S. and L.P.; Project Administration, O.S. and B.K. All authors have read and agreed to the published version of the manuscript.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest associated with this publication.

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Appendix

Table 1A. Descriptive Statistics

Descriptive Statistics						
	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Country:	568	2.2588	0.770	0.103	-0.914	0.205
Institution where you work/study:	569	8.6432	0.234	0.102	-1.281	0.204
Age:	569	2.7663	-0.309	0.102	-0.766	0.204
Gender:	569	1.4025	0.399	0.102	-1.847	0.204
Your role:	557	3.5781	0.569	0.104	-1.143	0.207
Years of experience in scientific research:	568	2.9877	-0.652	0.103	-0.682	0.205
I have had real opportunities to participate in international research projects.	569	3.6608	-0.653	0.102	-0.648	0.204
My university actively supports scientific research.	569	4.2443	-1.346	0.102	1.288	0.204
There are functional structures for research and innovation in my institution.	569	3.9543	-0.910	0.102	0.306	0.204
I am informed about my institutional policies on research and innovation.	569	4.1459	-1.199	0.102	1.009	0.204
I have regular access to scientific platforms and research resources.	569	3.8207	-0.770	0.102	-0.270	0.204
My university is engaged in the community through projects or trainings.	569	4.0949	-0.934	0.102	0.328	0.204
There are collaborations with the private sector or non-profit organizations.	569	3.9473	-0.879	0.102	0.295	0.204
There are dedicated structures for innovation and technology transfer.	569	3.6239	-0.602	0.102	-0.165	0.204
Scientific research has led to applicable products or services in practice.	569	3.6169	-0.604	0.102	-0.249	0.204
I believe that the third mission of universities should be further strengthened.	569	4.4429	-1.706	0.102	3.336	0.204
Inter-university cooperation in the region is easy to achieve.	569	3.5747	-0.442	0.102	-0.143	0.204
Bureaucratic obstacles affect regional research cooperation.	569	3.6872	-0.520	0.102	-0.160	0.204
I have had professional contacts with colleagues from other universities in the region.	569	3.8295	-0.880	0.102	0.036	0.204

My university encourages participation in international projects.	569	4.3585	-1.717	0.102	2.782	0.204
There is great potential for joint research in the Western Balkans.	569	4.2759	-1.528	0.102	2.125	0.204
Valid N (listwise)	555					

Table 2A. Correlation

Correlations		Capacity for research	Innovation, third mission	interuniversity cooperation
Research Capacity	Pearson Correlation	1	.776**	.741**
	Sig. (2-tailed)		.000	.000
	N	569	569	569
Innovation and Third Mission	Pearson Correlation	.776**	1	.690**
	Sig. (2-tailed)	.000		.000
	N	569	569	569
Inter-University Cooperation	Pearson Correlation	.741**	.690**	1
	Sig. (2-tailed)	.000	.000	
	N	569	569	569

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2A/1. Correlation

Correlations		interuniversity cooperation	Scientific research has led to applicable products or services in practice.
Inter-University Cooperation	Pearson Correlation	1	.522**
	Sig. (2-tailed)		.000
	N	569	569
Scientific research has led to applicable products or services in practice.	Pearson Correlation	.522**	1
	Sig. (2-tailed)	.000	
	N	569	569

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2A/2. Correlation

Correlations		Cooperation	Bureaucratic obstacles affect regional research cooperation.
Cooperation	Pearson Correlation	1	.385**
	Sig. (2-tailed)		.000
	N	569	569
Bureaucratic obstacles affect regional research cooperation.	Pearson Correlation	.385**	1
	Sig. (2-tailed)	.000	
	N	569	569

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3A. Rotated Component Matrix

Rotated Component Matrix	Components			
	1	2	3	4
I have had real opportunities to participate in international research projects.	.130	.800	.058	.186
My university actively supports scientific research.	.460	.607	.372	.014
There are functional structures for research and innovation in my institution.	.596	.535	.187	-.048
I am informed about my institutional policies on research and innovation.	.522	.606	.236	-.042
I have regular access to scientific platforms and research resources.	.614	.523	.043	.002
My university is engaged in the community through projects or trainings.	.630	.426	.354	.030
There are collaborations with the private sector or non-profit organizations.	.726	.270	.296	.127
There are dedicated structures for innovation and technology transfer.	.865	.136	.107	.137

Scientific research has led to applicable products or services in practice.	.818	.195	.095	.140
I believe that the third mission of universities should be further strengthened.	.194	.207	.811	.244
Inter-university cooperation in the region is easy to achieve.	.460	.469	-.154	.427
Bureaucratic obstacles affect regional research cooperation.	.054	.115	.225	.864
I have had professional contacts with colleagues from other universities in the region.	.184	.638	.153	.444
My university encourages participation in international projects.	.365	.624	.393	.113
There is great potential for joint research in the Western Balkans.	.333	.570	.317	.180
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

Table 4A. Component Transformation Matrix

Component Transformation Matrix				
Component	1	2	3	4
1	.672	.635	.318	.211
2	-.608	.285	.255	.695
3	.404	-.688	.130	.588
4	.122	.205	-.904	.355
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				