

# STRENGTHENING CIVIL SOCIETY ENGAGEMENT IN REGIONAL INNOVATION POLICY: A QUADRUPLE HELIX PERSPECTIVE

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## Abstract

Following the established triple helix concept, civil society has become an essential part of regional innovation policy models and the building of quadruple helix structures. Despite the growing literature on this topic, findings are still diverse and fragmented. This study aims to address the gap in the literature by systematically presenting the role of civil society as an element of the quadruple helix in regional innovation policy. It discusses the successes achieved, the contributing factors, the challenges faced, and solutions to overcome those challenges. A systematic literature review protocol was applied to identify the most relevant papers and a critical review of the main content of the articles was conducted according to the designed research questions. The main findings of this study revealed two key points to improve civil society engagement in local innovation policies: *knowledge/information resources and communication/coordination mechanisms*. Addressing these two key points is thought to enhance participation and transparency in the policy process and promote more robust innovation collaboration.

**Keywords:** Civil society engagement, Regional innovation policy, Quadruple helix, Challenges, Driving factors, Systematic literature review.

## 1. INTRODUCTION

Compared to the triple helix model, which has been developed for over three decades (Cai & Etzkowitz, 2020; Etzkowitz, 2011; Leydesdorff & Etzkowitz, 1998), the quadruple helix model is a relatively new concept that is still evolving, particularly in the last decade (Carayannis & Campbell, 2010; Quartey & Oguntoye, 2021). The triple helix model revolves around three main elements in the innovation system: the government, which typically acts as policymaker, mediator, or facilitator (Todeva, 2013; Yun & Liu, 2019); universities or higher education research and development institutions as the source of knowledge (Etzkowitz & Leydesdorff, 1995; Etzkowitz & Zhou, 2017), and industry and entrepreneurs as key actors that accelerate the knowledge transfer process from universities and government to users or society (Etzkowitz, 2003; Pan & Guo, 2022). These three actors have become established elements in the triple helix structure. The triple helix concept does not assign society a dominant role compared to the other three innovation actors (Ranga & Etzkowitz, 2015). The quadruple helix concept, however, proposes adding civil society as a fourth helix element and giving it a prominent role with regard to social and regional aspects (Carayannis & Campbell, 2010, 2011). The inclusion of a fourth element in the helix model results in a less hierarchical relationship between innovation actors. This fourth element can be

comprised of specific groups from civil society or organized community representatives, such as non-governmental organizations, within the innovation system. Moreover, their presence aims to facilitate collaboration among the other three innovation actors, particularly in terms of understanding local issues that are better comprehended by civil society (Bellandi et al., 2021), and creating participatory and democratic regional innovation policies (Carayannis & Rakhmatullin, 2014).

The literature on the quadruple helix and regional innovation systems suggests that the fourth helix plays an important role in complementing the other three. Empirical evidence supporting this claim has been presented in various studies (e.g. Carayannis & Grigoroudis (2016); Lew et al. (2018)). Additionally, research has explored different methodologies to demonstrate the significance of the fourth helix in regional innovation policy (e.g. (Höglund & Linton, 2018; Lerman et al., 2021)). However, early-stage research results are often fragmented. Presenting these results systematically and comprehensively is a challenge, but doing so makes it easier for policymakers, practitioners, and academics to use this literature for various policy and academic purposes. The question then is how exactly is the role of civil society in the quadruple helix structure and in the context of regional innovation policy. Have they successfully promoted capacity building and regional innovation goals? If so, what are the reasons for their success and how can their role be strengthened to maintain the sustainability of the regional innovation system? If their presence has not yielded the expected results, what challenges arise when involving civil society in the regional innovation policy process, and how can these challenges be overcome?

Nordberg et al. (2020) conducted a study on the role of community groups in the quadruple helix structure for social innovation in rural development in Finland. The study found that even informal community groups can strengthen the relationship between the helix. The success of social innovation projects in this program depends on the direct involvement of local communities. According to Roman et al. (2020), leveraging local knowledge in the entrepreneurial discovery process (EDP) is a challenge for engaging local societies in the context of the Research and Innovation Strategy for Smart Specialization (RIS3) in the European Union region. The study found technical limitations in the entrepreneurial discovery process. These limitations hinder the channeling of community-derived potential, ideas, and aspirations related to local issues and conditions. Roman & Felinhofer (2022) highlighted the importance of local government support in increasing civil society participation in RIS3. This support should focus on facilitating knowledge transfer and building collaboration through an effective process. In a recent study, Hakeem et al. (2023) showed that the concept of regional innovation development based on the quadruple helix has become an essential foundation in regional innovation projects in Japan aimed at creating sustainable regional development. The study revealed a significant gap between theoretical knowledge and practical

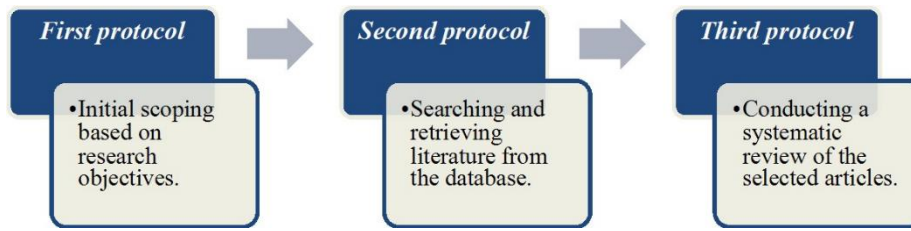
implementation during early-stage interactions related to regional innovation projects. The findings of these studies reveal the fact that the engagement of civil society in innovation-based regional development processes faces many challenges, even in the most basic preconditions of the level of knowledge of the society and the mechanisms and channels of information in the society. Several studies have shown that civil society engagement has a positive impact on regional innovation policies, but they have also identified a number of failures and significant challenges on the ground. The author argues that there is no existing study that systematically shows how civil society can play a role in enhancing the success of regional innovation projects, what factors lead to such success, what challenges are faced by those who have not succeeded, and what efforts are being made to overcome these challenges.

Against this background, this study aims to fill the literature gap regarding the role of civil society as an important element in the quadruple helix structure and in the context of regional innovation policy. The literature search and selection was carried out selectively and rigorously following the systematic literature review protocol and was based on reliable publication sources. A critical review of the selected articles was conducted to answer research questions about the role of civil society in regional innovation policy, the factors driving its success, the challenges it faces, and how to strengthen this role or overcome various challenges. The main contribution of this study is the synthesis of the critical findings from the critical review of the selected articles, namely the key points for improving civil society engagement in regional innovation policy. Additionally, some reflections are provided to suggest potential questions for future research.

The paper is organized as follows: The second section outlines the steps of a systematic literature review methodology to conduct a scoping and literature search process, select the most relevant articles, and conduct a critical review. The third section presents the results of the literature review, including a description and distribution of the selected articles and a critical review of the main content of the selected articles according to the research objectives. The study results are concluded in the fourth section.

## 2. METHODOLOGY

In this study, the author applied the three-step process (protocol) of conducting a systematic literature review by Wibisono (2023), which consists of scoping and searching the database, selecting the most relevant articles, and reviewing the selected articles (**Figure 1**). The author also refers to other similar methods in conducting the systematic literature review, especially studies related to regional innovation policies (e.g., Hughes et al. (2018; Martínez-Vergara & Valls-Pasola (2021); Shin et al. (2015)).



Source: Wibisono (2023).

FIGURE 1 - RESEARCH PROTOCOL.

In the first process, the literature search was conducted using the PICOC framework (population, intervention, comparison, outcome, context). This framework was used to guide the identification of articles according to the chosen main topic, namely "regional innovation". The population (P) of this study consisted of scientific articles on regional innovation published in reputable international journals. An intervention (I) was carried out on the population of "regional innovation" papers that talked about "civil society" in their studies. The author then compared (C) these two contexts of regional innovation and society in the context (C) of the specific terminology of the "quadruple helix" in regional innovation models. The expected outcome (O) of this study is the identification of important points such as challenges and solutions in the involvement of civil society in regional innovation policies and in the context of the quadruple helix innovation model.

The literature searching process was performed using the Web of Science database, considering that this database is one of the highly selective journal indexing databases that only indexes journals that have implemented a rigorous peer review process and adhere to the rules and ethics of scientific publication (Martín-Martín et al., 2018; Singh et al., 2021). Based on the PICOC framework, the searching process was applied using a combination of keywords found in the abstracts of the articles. The keywords used included "regional innovation" and "quadruple helix." The use of quotation marks in these keywords is because these two keywords are generally acknowledged terms and do not allow for the addition of syllables, prefixes, or suffixes to the word/phrase. Knowing the key words that are generally acknowledged (sensitive keywords) in a field of research also helps to facilitate the search process and retrieve the appropriate articles (Booth, 2016; Paez, 2017).

Exclusion and inclusion criteria were also applied at this stage. As the quadruple helix concept is a relatively new approach in regional innovation policy (Hasche et al., 2020; Kolehmainen et al., 2016), annual restrictions were not applied. Of the 37 articles included in the searching process, the earliest article was published in 2012 and the latest in 2023. In addition, all articles were required to be written in English (language restriction). The next restriction was the type of document. Only documents that were original research articles were selected, and articles published in the form of proceedings or conference

papers were excluded. These first two restrictions resulted in a total of 37 articles that were considered potentially relevant. The next step was to make an initial screening of the articles by carefully reading their abstracts. As mentioned in the PICOC framework that we will intervene on the role of (civil) society in the context of innovation policy and the quadruple helix innovation model, the initial screening of papers should include abstracts that discuss the role of (civil) society in this context. This focus eventually reduced the number of articles to 9 and excluded 28 articles that did not fit the context of the study. These excluded articles were generally related to innovation in a global (rather than regional) context, modeling or measuring innovation models on a global scale, discussing the quadruple helix context in entrepreneurship (not focusing on the role of the society), and some of the remaining research focus was significantly different from the context of the current study. All of these articles were excluded from the list of potentially relevant articles, leaving only the nine most relevant articles at the end of this screening. This process is summarized in the PRISMA flow diagram in **Figure 2**.

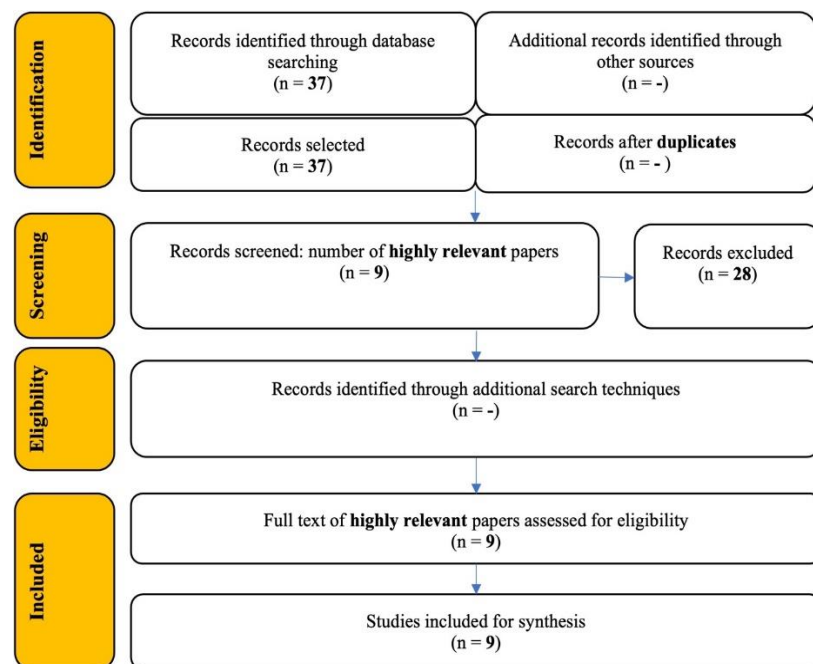


FIGURE 2 - PRISMA FLOW DIAGRAM.

Source: authors' elaboration (de Barcelos Silva et al., 2020; Page et al., 2021; Wibisono, 2022).

These nine articles are the final articles to be critically and systematically reviewed (third protocol). First, the articles were described according to specific categories such as sorting by year of publication as well as grouping by source and quality of journal publication according to the Scimago Journal & Country Rank (SJR 2022). Next, the main content of the selected articles was explored by focusing on two general and three specific questions as listed in **Table 1**. All answers to these questions will contain key points that will form the core of the critical review of the selected articles.

TABLE 1 - LIST OF QUESTIONS TO EXPLORE THE CONTENT OF THE ARTICLE.

General questions	Specific questions
What is the purpose of this study?	What (if any/how) are the main findings of this research related to civil society participation in regional innovation policies?
What is the research methodology used?	What are the most significant barriers/challenges in improving civil society participation in regional innovation policies?
	What are the suggestions/recommendations of this study to improve civil society participation in regional innovation policies?

Source: authors' elaboration.

### 3. CRITICAL LITERATURE REVIEW

#### 3.1. *Distribution and characteristics of the selected articles*

The nine selected articles included in this study, which were in line with the current research objectives, were published during the period 2018-2023 (**Table 2**). Two selected articles were published in 2018, and one selected article was published in 2019, 2020, and 2023, respectively. No selected articles were published in 2021. The most relevant articles were published in 2022 with four articles. Although the number of articles published each year basically did not increase as a trend, the appearance of a significant number of articles in 2022 indicates that the study of innovation policy with the quadruple helix model that emphasizes the role of society has its own place among these research topics, or it can also be stated that this topic is an emerging topic.

According to **Table 3**, the publication sources of the nine articles can be divided into seven publication sources or international journals. Five articles were published in top-ranked (Q1) journals in the subject categories of *Geography, Planning and Development*, and *Business and International Management*. The remaining four articles were published in Q2-ranked journals in the subject categories of *Economics and Econometrics, Geography, Planning and Development*, and *Development*. Based on these subject categories, these selected articles are mostly published in journals whose scientific scope is *Geography, Planning and Development*, and *Business and International Management*. It can be assumed that the selected articles discuss current topics in emerging or even advanced research topics. These articles are published in high-ranking and high-impact journals, and the scientific fields are close to each other. This systematic presentation of the selected articles not only shows the current position of these research topics, but can also help future studies to target the publication of their research papers based on the subject categories that match their research, or direct them to publish their work in these or other similar journals (Lin et al., 2014; Wendler, 2012; Xiao et al., 2023).

TABLE 2 - LIST OF ARTICLES BY YEAR OF PUBLICATION.

No.	Year of Publication	Number of Articles	Author(s)
1	2018	2	Höglund & Linton (2018); Lew et al. (2018)
2	2019	1	García-Terán & Skoglund (2019)
3	2020	1	Roman et al. (2020)
4	2022	4	Morawska-Jancelewicz (2022; Nguyen & Marques (2022; Roman & Fellnhofer (2022; Tomasi et al. (2022)
5	2023	1	González-Martinez et al. (2023)

Source: authors' elaboration.

TABLE 3 - SOURCES OF PUBLICATIONS.

No.	Source of publication - Publisher	No. of articles	Best quartile (SJR 2022)
1	Journal of the Knowledge Economy - Springer Verlag	2	Q2 - Economics and Econometrics
2	Land Use Policy - Elsevier Ltd.	1	Q1 - Geography, Planning and Development
3	Regional Science Policy & Practice - John Wiley & Sons Inc.	1	Q2 - Geography, Planning and Development
4	European Planning Studies - Routledge	1	Q1 - Geography, Planning and Development
5	R&D Management - Wiley-Blackwell Publishing Ltd.	2	Q1 - Business and International Management
6	Economies - Multidisciplinary Digital Publishing Institute (MDPI)	1	Q2 - Development
7	Technology in Society - Elsevier Ltd.	1	Q1 - Business and International Management

Source: authors' elaboration.

### 3.2. Critical review of the main content of selected articles

This subsection provides a critical review of the main content of the articles, which also answer the general and specific questions formulated in **Table 1**. The author categorizes the nine articles into two groups based on their focus on the implementation of the quadruple helix concept in regional innovation policy (**Figure 3**). Four articles focused on discussing the success of the early stages of societal engagement according to the quadruple helix innovation model in regional innovation policy. This group of articles also explains the important role of civil society presence in regional innovation policy, as well as supporting suggestions on how to strengthen its role and successfully overcome the challenges that arise. Meanwhile, the next five articles discuss the implementation of the quadruple helix concept that has not been successful due to various challenges and constraints, and at the end of the discussion they suggest some critical points to improve the success of civil society engagement in regional innovation.



FIGURE 3 - CATEGORIZATION OF ARTICLES BASED ON KEY POINTS HIGHLIGHTED.  
 Source: authors' elaboration.

**3.3. Early successful experiences: the critical role of civil society and how to strengthen it**

The study by Lew et al. (2018) highlights the role of civil society in complementing and strengthening the role of triple helix actors in RIS in Trentino, Northeast Italy, and emphasizes international efforts to strengthen regional innovation capacity. This study makes a significant contribution to the conceptualization and promotion of internationalization in regional innovation policy in Italy. The main findings of the study show a shift from the established triple helix model to an evolving quadruple helix model in the context of regional innovation. Civil society plays a key role in shaping an inclusive regional innovation system. In the context of the internationalization process of regional innovation, for example through the involvement of community groups in international exhibitions of innovation products, civil society plays an important role in innovative and collaborative activities that highlight diverse regional characteristics. The presence of civil society in RIS also helps to increase mutual trust among innovation actors and to strengthen social support for the implementation of regional innovation policies at the national and international levels. The main challenge in involving civil society in the internationalization process is generally related to a lack of information or confidence about the importance of their role in international innovation activities. However, these obstacles can be overcome by strengthening the dialogue between the elements of the quadruple helix and harmonizing perceptions of the goals of internationalizing innovation. Partnership and collaboration are key to the relationship between innovation actors. However, to improve the inclusiveness and sustainability of relationships between them, it is necessary to build a culture of open discussion, develop a dedicated platform for the dissemination of information and ideas, and improve mutual understanding of the vision and goals of internationalizing regional innovation.

Roman et al. (2020) noted that involving civil society in the quadruple helix innovation model not only can improve regional innovation capacity, but is also important for creating inclusive and sustainable innovation policies. A case study was conducted by interviewing regional authorities in Finland and



Sweden on the involvement of civil society in the Entrepreneurial Discovery Process (EDP) for smart specialization. The main recommendations of the study related to mechanisms that can facilitate civil society participation in EDP and regional development include creating an innovation environment that supports openness to various knowledge, optimizing public knowledge and expertise on innovation and technology, creating effective communication strategies among innovation partners (e.g. conducting workshops and seminars), and encouraging public participation in various activities related to regional innovation strategies. However, in the process of facilitating the role of civil society in regional innovation, several challenges have been identified, including the level of knowledge base and access to sources of knowledge and technology such as universities and industry, as well as the lack of incentives that can increase the participation of the society. Therefore, a tailored approach and the creation of an environment that suits the character of the society is required to sustainably encourage their participation in the quadruple helix structure. Another important recommendation relates to efforts to adopt best practices for enhancing civil society participation in other regional innovation policies and adapt them to local needs and contexts.

In the context of innovation policy on advanced technologies, Höglund & Linton (2018) explored the role of civil society in collaboration with the other three helix actors (universities, industry, and government) in promoting and improving a robotics regional innovation center in the Malardalen region of Sweden. Using a longitudinal case study approach, the study identifies Robotdalen's strategic robotics innovation practices that have evolved over ten years and presents a new perspective of the fourth helix (civil society) in the regional innovation system. The study argues that civil society involvement in regional innovation policy can support and enhance the success of smart specialization research and innovation policies that have massively developed in the context of innovation policy in the European Union. This is due to the fact that civil society has more diverse knowledge potential and perspectives than other innovation actors with their specialized competencies. Civil society is also considered to have a better understanding of market needs and can provide strong public support at the regional level. Their participation is an essential factor in the development of a strong regional innovation system in the Malardalen region. Civil society's collaboration and interaction with the other three helix actors can fill knowledge gaps related to regional issues that may not have been discovered in the triple helix collaboration. However, the different backgrounds and experiences of civil society can lead to different perspectives, interests and expectations of other innovation actors. Such challenges drive the need for effective, open and inclusive communication processes with all stakeholders. Effective communication is also important to ensure that their participation is indeed important, recognized and valued. Civil society participation needs a lot of encouragement. Involving and integrating them from the beginning of the policy process is an important step to further involve them in any policy process. At the same time, their capacity in innovation knowledge

needs to be continuously developed to raise their awareness of their importance in the regional innovation system.

In the recent study, González-Martínez et al. (2023) identified the variables that can influence the role of civil society in mediating innovation processes within the quadruple helix framework in Chile. This study applied partial structural equation modeling. The results of which showed that innovation would be more successful with an increased role of civil society in the process and that the success of civil society involvement in the innovation process was strongly influenced by the quality of its human resources. The study also applied a qualitative comparative analysis (fsQCA) approach to configure the solutions offered to promote innovation. The study results emphasize that civil society participation is critical because it is most likely to be directly involved in utilizing the outcomes of innovation policies. Civil society can represent the aspirations rather than the needs related to local interests and problems and thus can be directly involved in the collaboration process for innovation. It is important to delve deeper into the needs and preferences of the people who represent the region, for example, their needs for certain types or levels of technology and what kind of innovation policy can have a direct impact on fulfilling their needs. Participation of the local society is also important to open up alternative possibilities for innovations that are needed now or potentially in the future. Therefore, relevant communication mechanisms such as consultations and discussion forums are strongly encouraged to enhance their involvement in innovation processes. However, bridging communication between civil society and the other three helical actors may not be a trivial matter, given their limited experience and knowledge of local innovation policies. Treating civil society as an equal partner within the quadruple helix framework may encourage their meaningful participation in regional innovation. Their presence in the regional innovation process must also be equally recognized by directly involving them in all processes of innovation policy design up to final decisions. According to the results of this study, social and political factors and different levels of government also influence how civil society will interact with other innovation actors.

### **3.4. *Unsuccessful experiences: challenges and how to overcome them***

García-Terán & Skoglund (2019) explored the collaboration between the four elements of the quadruple helix in the implementation of renewable energy innovations in Uppsala, Sweden. Qualitative data, such as interviews and participant observations in dialogue forums, were collected and analyzed to identify the dynamics that occurred in the implementation process of innovations. The processual approach used to analyze the innovation process indicates the failure of the four-helix collaboration in the commercialization of renewable energy innovations in Uppsala. The major causes identified include coordination problems between actors who have not been able to create an appropriate innovation environment or what is referred to as a pro-innovation ecosystem. The involvement of civil society in the commercialization

process of renewable energy innovation in Uppsala is shown through the democratic or political process, where the government provides space for civil society to participate significantly in political processes. This study emphasizes the need for a strong dialogue between civil society and all stakeholders through the use of electronic media or holding regular meetings to discuss relevant issues, for example by involving specific communities that are directly related to the actual users or beneficiaries of the innovation outcomes. Considering and recognizing the presence of civil society in the innovation process needs to be done at an early stage if regions wish to create a civil society-friendly innovation ecosystem. This process may demand time and effort, but the stronger relationships created through regular dialogue and communication will influence the formation of an innovation ecosystem that supports civil society engagement in the context of the quadruple helix.

Roman & Fellnhofer (2022) examined the role of civil society in the regional development planning process and specifically in the context of the Smart Specialization policy in Finland. The study used qualitative research methods by conducting semi-structured interviews with representatives of elements of the quadruple helix (universities, industry, government, and civil society) in 18 mainland regions in Finland. The study argues that the fourth helix in the innovation policy process can promote diversification of innovation types, such as non-technical or social innovation. This type of innovation is a limitation that has not been addressed in the more established triple helix model. This study also shows that there is a shift in the regional innovation model from the triple helix model to the quadruple helix model, which includes civil society as the fourth helix, although this model approach is still at an early stage. The study found that many innovation policy processes in these regions are still far from being participatory and transparent. Due to complexity and sometimes conflicts of interest, policy decisions have not been made fairly for all stakeholders. This is a major challenge for the civil society engagement process, which requires more transparency and participation in its processes. This participatory nature will make the policy process more inclusive and democratic. Meanwhile, transparency will build trust among stakeholders. Another major obstacle to involving civil society in local policy development is their limited knowledge of local planning processes and their ability to understand the key issues that are often discussed in local development policy planning. Given these significant limitations, the use of simplified forms of information channeled through the most effective communication mechanisms is a critical approach. This process can then be followed by regular meetings with civil society representatives to further enhance their understanding and involvement in the policy process. In this way, their presence will eventually be recognized in the form of direct participation in various regional innovation policy planning processes.

Tomasi et al. (2022) examines the challenges faced by five public universities in five European regions involved in the Erasmus+ project, a project supported by the European Commission that aims to develop a tool to assess the contribution of universities to regional innovation policy processes (RIS3 period 2014-2020). Using a reflexive narrative research approach, this study examines the extent to which universities engage and interact in the context of the quadruple helix. The results of this study conclude that in the regional innovation policy process with the quadruple helix model, the lowest involvement in this process comes from civil society participation due to their low level of understanding of regional innovation policy (RIS3). In order to increase the engagement of partners in the innovation policy process, it is crucial to increase the intensity of relationships within the partner network and to implement innovative information dissemination methods, such as the use of digital media and the creation of user-friendly institutional websites, in order to disseminate various information related to regional innovation (RIS3) to civil society. Such steps are important to build trust between innovation partners and to create social capital that can be sustained over time. Another important challenge in the process of involving stakeholders in the RIS3 process is to create careful and mature arrangements in organizing regular and consistent meetings that do not burden the partners. Some partner members may not realize the importance of their participation in the project due to their limited knowledge. The study also emphasizes the need to appoint the right experts who have a broad understanding of regional innovation policy and RIS3 and at the same time have the ability to communicate the objectives of the project to all innovation partners and create an equal understanding among innovation actors.

In the same innovation-type approach, Morawska-Jancelewicz (2022) examines the implementation of social innovation in Polish regions using a sample of 63 public universities in Poland and proposes the structure of a model university that can be socially responsible in creating innovation in the region and at the same time improve the welfare of society. This refers to the mission of universities in relation to their role in regional knowledge networks. The main findings of this research emphasize the importance of improving the capacity of universities to bridge and strengthen their relationships with various representatives of the scientific community, the business sector and civil society in the context of social innovation. The involvement of civil society in the knowledge transfer process is still relatively low compared to the other two elements of the helix (government and private sector). Therefore, adopting the quadruple helix model to increase the impact of innovation on the environment and social welfare would be a significant step change. Collaboration also needs to be cross-sectoral to have a broader environmental and social impact. On the other hand, universities face the challenge of involving the civil society in this process, especially in terms of finding a common balance in solving global problems in a local context. The initiative and multi-stakeholder approaches implemented by several universities are one of the solutions offered to overcome the problem of involving civil society in the innovation process,

namely by including elements of social innovation in the vision and mission of the university. This will ultimately encourage universities and civil society to make a greater joint contribution to the development of the region. The facilitation of civil society aspirations is done through various communication channels provided by universities, building mechanisms for public dialogues to discuss specific problems facing the region, and collaborating to create various social innovation projects.

Nguyen & Marques (2022) explored the implementation of the quadruple helix collaboration by taking the viewpoints of all regional innovation stakeholders in the Catalonia region of Spain to obtain information on the expectations, benefits and challenges of innovation collaboration, also known as living labs. The main findings of the study highlight the importance of civil society as an end user of knowledge and innovation. Although the helix model has been widely used in innovation policy-making processes, in practice there are still discrepancies in innovation collaboration and a gap between the expectations and the reality desired by all stakeholders. In general, civil society faces limited knowledge and access to knowledge and information networks related to innovation processes. There are also factors related to the low level of trust and understanding between the four elements of the helix due to weak communication and the lack of effective communication channels or tools that can be used by all parties. This challenge points to several solutions, including the creation of an effective platform for the exchange of information and experiences related to the innovation process, which can promote a more meaningful involvement of civil society in the innovation process along with the other three helix actors. Also, the dissemination of surveys and participatory research involving civil society has the potential to explore different phenomena and needs that are unique to regions. Coordination can be more effective when actors have established links or relationships through interaction on certain media or platforms.

### **3.5. *The critical role of civil society engagement, challenges and solutions: further discussion***

Based on a critical review of the main content of the selected articles, there are several things that can be the focus of attention when discussing civil society engagement in regional innovation policy or in the context of the quadruple helix. There are at least two important things in both successful and unsuccessful experiences of applying the quadruple helix concept in regional innovation models that can make it a success if managed well, or a cause of failure if not provided adequately. The *first* aspect is *knowledge and information resources*. In almost all cases, knowledge serves as the primary basis for engaging civil society in regional innovation policy. Civil society possesses diverse levels of knowledge and potential. This diversity can enrich perspectives in decision-making. However, it can also make it difficult to harmonize perspectives and align the vision and goals of innovation (Doberstein, 2016; Lovan et al., 2017). According to Carayannis & Grigoroudis (2016), knowledge of the actors is a key prerequisite for building an innovation ecosystem. In the context of the quadruple helix, stakeholders should strive to have

a similar level of knowledge (Borghys et al., 2020; Carayannis et al., 2022). It is important to enhance the public's understanding of innovation policy in general. Therefore, a *second* factor is necessary: *communication and coordination mechanisms*. The main purpose of this mechanism is that the knowledge transfer process related to regional innovation policies can reach the public in an easy way and the government or certain stakeholders can also easily coordinate even though they do not have to meet face-to-face (Feldman & Stewart, 2006; Pinto & Fernández-Esquinas, 2018). Electronic or digital media can be utilized as a tool to distribute various knowledge and information to the public. For instance, offering a well-designed website that is easily accessible and provides fundamental information for those interested in the regional innovation policy approach being implemented. In addition, local governments and other innovation actors, such as universities, can act as mediators of the quadruple helix. They can accommodate various community aspirations through websites or digital platforms that can be easily accessed via computers or mobile devices. Online surveys have been carried out in various regions to capture community aspirations, thanks to the sophistication of today's technology. This method can help speed up the process of communication and information delivery (Fricker & Schonlau, 2002; Sammut et al., 2021).

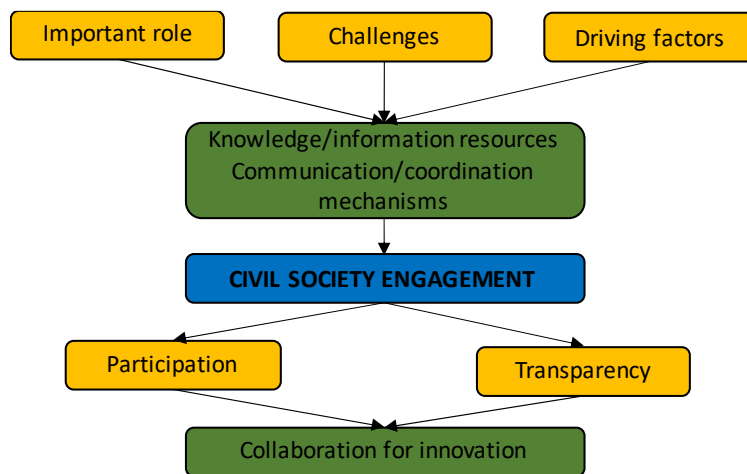


FIGURE 4 - KEY POINTS FOR CIVIL SOCIETY ENGAGEMENT IN REGIONAL INNOVATION POLICY.

Source: Author's elaboration

**Figure 4** summarizes the key findings from the selected articles. The role of civil society in the quadruple helix innovation model is discussed in these studies, emphasizing two main points. The experiences of implementing this concept, both successful and unsuccessful, and the challenges and alternatives suggested are closely related to the importance of knowledge and information about innovation policy. These challenges and alternative suggestions are closely related to the importance of knowledge and information about regional innovation policies. It is crucial to have easy access to these sources of knowledge through communication mechanisms that are simple to follow and apply. Transparency in

decision-making in the public policy process can be demonstrated through effective communication mechanisms (Gonçalves, 2017; Grimmelikhuisen, 2010). Knowledge and information must be openly accessible to civil society as one of the stakeholders who can actively participate in the innovation policy process, starting from the planning, implementation, monitoring and evaluation of policies.

#### 4. CONSIDERATIONS FOR FUTURE RESEARCH

Nguyen & Marques (2022) recommends conducting further research to analyze civil society engagement in innovation policy. This can be achieved by exploring their preferences, needs, and interests through surveys or participatory research. The results of these surveys can reflect the level of knowledge or understanding of civil society regarding innovation policy at the local level. Such surveys or participatory research can also measure the success or failure of community participation in regional innovation (Roman et al., 2020). By paying attention to the results of surveys or participatory research, local governments can direct civil society participation toward factors that can increase success and work to overcome obstacles that have the potential to cause failure. According to Roman & Fellnhofner (2022), civil society plays an important role in realizing a shared vision of regional innovation. Therefore, future research should also explore the perspective of civil society innovation knowledge.

The literature on the quadruple helix innovation model has not formally modeled innovation processes involving civil society, such as technology transfer or strategic management practices. García-Terán & Skoglund (2019) suggests that future research should use constructivist approaches and ethical dimensions to build or strengthen civil society partnerships in the quadruple helix innovation model context. Furthermore, Höglund & Linton (2018) indirectly suggest the need for future research on partnership patterns or forms of collaboration between stakeholders in the quadruple helix model, with civil society as one of the main actors. According to Lew et al. (2018), enhancing interaction between academic institutions and research institutes can facilitate the integration of fundamental industry knowledge and entrepreneurship into civil society. Societal groups with limited resources may possess innovative ideas. Their collaboration with universities and entrepreneurs can create new products that align with current market trends. Aspirations and requests for facilitation also can be channeled to local governments. The question that may arise is how this interaction can occur and what efforts can be made to ensure the effectiveness in overcoming knowledge gaps in society.

González-Martínez et al. (2023) suggest further research on the theoretical development and presentation of empirical evidence to explain civil society relations in the context of quadruple helix innovation in developed and developing countries, or the context of different social and cultural factors. The role of civil society in the context of regional innovation in developing versus developed countries, as well as in the context of developed versus less developed regions, may help to further confirm the

important role of civil society in regional innovation. Tomasi et al. (2022) have highlighted the limitations of explaining civil society's collaborative participation in innovation across different regional social, economic, and political contexts. Morawska-Jancelewicz (2022) also directs further studies to evaluate the economic impact of social innovations involving civil society. Future research needs to focus on the mechanisms needed to enhance the role of civil society in the innovation process and estimate the impact of these mechanisms, as suggested by Roman et al. (2020). Distinguishing between cultural, social, and political contexts of society may result in different recommendations, and the study results may also be more widely recognized in different regional contexts or at different levels of innovation in the region.

Figure 5 presents some potential questions that could be raised for future research.

Potential research questions		
How does civil society knowledge capital contribute to innovation strategies where they are one of the main innovation actors?	How do innovation partnerships or collaborative networks look like where civil society is one of the main innovation actors ( besides universities, R&D institutions, government and industry)?	How does the quadruple helix innovation model differ in developed and developing countries or or in the context of developed and less developed regions?

FIGURE 5 - POTENTIAL RESEARCH QUESTIONS.

Source: Author's elaboration

## 5. CONCLUSIONS

This study aims to bridge the gap in the literature regarding civil society engagement in regional innovation policy and the emerging quadruple helix model of innovation. Departing from the established concept of the triple helix, civil society engagement in regional innovation is modeled in a quadruple helix relationship along with universities or R&D institutions, industry or entrepreneurs, and government. Studies published in reputable international journals were explored using a systematic literature review approach that maintains transparency and adheres to strict review protocols. The objective was to determine the extent to which civil society plays a role in regional innovation policy or in the context of the quadruple helix relationship, the challenges faced in engaging them, and how to strengthen their role or overcome these challenges. The author categorizes critical reviews of the quadruple helix implementation based on different experiences. Successful experiences highlight the important role of civil society, while unsuccessful experiences reveal the various challenges faced in the field. Whether discussing how to strengthen the role of civil society or overcome challenges in involving it, both require attention to *two main factors: knowledge/information resources, and communication and coordination mechanisms*. On one side, these two important factors are seen as capable of strengthening the role of civil society to continuously improve the regional innovation capacity or to achieve the desired innovation goals. On the other side, it is a key driver to further increase confidence of civil society regarding the value of their role



in regional innovation policies and to encourage their active participation in innovation-based regional development processes.

This research is expected to have practical and academic implications. In the previous subsections, the author has identified some considerations that may guide future research on this topic. Public policy concepts have emphasized the role of civil society in promoting sustainable and resilient development (i.e., Kastrinos & Weber (2020); Mahajan et al. (2022); Mumtaz (2021); Ni'mah et al. (2021)). Similarly, regional innovation policies are closely linked to civil society engagement, as they are seen to provide a specialized perspective on regional needs and challenges. Due to the evolving nature of this topic, the reviewed literature sources currently do not yet provide much evidence in the field. Therefore, synthesizing research findings in specific contexts poses significant challenges, such as considering differences between developed and developing countries or between developed and less developed regions. It is important to note that the justification and synthesis of results presented in **Figure 4** and **Figure 5** have not taken this into consideration. Therefore, generalizations of the discussed cases should be avoided. The points made in this synthesis are still propositions that need to be validated or empirically tested in future studies.

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