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RESEARCH ARTICLE

Exploring team roles for social innovation labs: toward a competence-based self-assessment approach

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Recently, there has been a great interest in the development of innovations labs as intermediate means to fostering social innovative solutions to wicked problems. However, understanding how lab teams are assembled including the underlying competences and main roles inside of these organizational structures is still yet to be addressed. This aspect is of paramount importance at the early-design phase to foster the future development and consolidation of such initiatives. A competence-based role model is proposed as a basis for guiding the conformation of social innovation lab teams. The model has been structured from (1) a set of 14 competences for social innovation labs retrieved from the literature, (2) a comparison of 7 frameworks of innovation team roles and (3) authors experience. The proposed model is then operationalized through a self-assessment approach composed of an online questionnaire and a retrospective workshop aiming to allow team members to position themselves in terms of the potential role that they could perform for their team but also to elicit improvement strategies. The self-assessment methodology is then applied among 10 Latin American nascent social innovation lab teams with focus on climate change challenges. Insights and implications of this exploratory study for both researchers and practitioners are then discussed.

KEYWORDS:

innovation lab, social innovation, innovation team roles, innovation competences, self-assessment

1 | INTRODUCTION

Today's most critical challenges demand systemic ways to tackle them. Climate change, environmental degradation, health crisis, education inequalities, and employment and poverty reduction are some examples of those wicked problems characterized by their complexity, their interdependencies and their context specificity (Zivkovic 2018). Social Innovation (SI) then emerges as a research strand for not only helping to understand these societal issues but to facilitate the development of systemic strategies toward a transformative change of social practices in order to solve social problems and meeting local demands (Strasser, Kraker, and Kemp 2019).

In particular, the notion of SI Labs has recently become a subject of interest in the literature. SI labs emerge as an approach to keep up with increasing changes and accumulating challenges that society deals with and where more conventional approaches relying solely on techno-centric approaches fall short (Westley et al. 2015; Jezierski et al. 2014). Innovation labs are defined as semi-autonomous organizations dedicated to facilitate innovation processes by allowing multi-stakeholders groups to interact in open collaboration with the purpose of creating and prototyping solutions to systemic challenges while strengthening people's

innovative and technological competences (M. Lewis and Moultrie 2005; Gryszkiewicz, Lykourentzou, and Toivonen 2016; Zivkovic 2018). In this sense, SI labs act as cross-pollinators of knowledge, creating dialogue, mixing voices, allowing for new ideas to appear and to be translated into alternative solutions (Wascher, Kaletka, and Schultze 2019). The way these organizational forms perform often depends on the problem that is being addressed and the context they belong to. This means that the people, the organizations involved and even the methods applied within a SI lab are constantly changing (Wascher et al. 2018).

The changing and permeable nature of the "lab" phenomenon represents a complex working environment which often leads to conditions of uncertainty. This is something on which authors have raised concerns, suggesting that those teams in charge of leading an innovation lab should be able to deal with ambiguities, integrate multiple perspectives and facilitate the work across-disciplines (Osorio et al. 2020; McGann, Wells, and Blomkamp 2019). There is an increasing interest in how innovation labs can be used to address societal problems (McGann, Wells, and Blomkamp 2019); governments, companies, universities, and even communities are continuously turning to the implementation of their own "lab." They are becoming vectors for fostering collaborative learning, inclusive entrepreneurial thinking, systemic change and the transfer of innovation capabilities (Delgado et al. 2020; Vessal et al. 2021; Rayna and Striukova 2019; Camargo, Morel, and Lhoste 2021). However, several questions arise when considering how the teams managing these initiatives should be composed and organized (J. M. Lewis 2020; Zivkovic 2018). This aspect is of paramount importance, especially at the early-design phase to foster the future development and consolidation of such initiatives.

In fact, the assembling of innovation teams has been a matter of interest for a long time. Both practitioners and scholars from public and private sectors have addressed and shared their experiences in the nature and characteristics of innovations teams across time. This is a vision that has been in constant evolution, referring for instance to the 80's where corporate-type innovation teams, whose nature depended mainly on the emergence of those 'champions' capable of overcoming any obstacle, while additional roles were organized towards supporting them (Roberts and Fusfeld 1982; Jenssen and Jørgensen 2004). Then, as the adoption of open innovation practices became more widespread, the idea of innovation teams has progressively become more agile and adaptive, opening the door to the integration of multiple disciplines, and being the inspiration for new ways of work and collaboration (Hellström, Jacob, and Malmquist 2002; Hering and Phillips 2005; Gemünden, Salomo, and Hölzle 2007). While the perception of lonely innovators and isolated teams seems to persist today, the increasing interconnection and complexity of the problems that we face as society, the amount of information and knowledge that is continuously created, and the challenging task of making critical decisions with unforeseeable repercussions, are evidence on why today's innovation teams are called to be able to efficiently collaborate under a multitude of perspectives, disciplines and cultures (Björklund et al. 2017; Puttick, Baeck, and Colligan 2014).

This is not a minor issue since it is in people where the success of every innovation process of an organization lies (Leonard-Barton 1995). Thus, understanding the dynamics of group work and team performance has been a topic of interest for the scientific community. In this regard, previous studies have tackled this issue from several perspectives. In terms of team theory for instance, Belbin (2010) gathers in her book an extensive research that resumes her proposition of the nine key team roles at work. Originally published in 1993, Belbin explains in her work why roles in a team are in fact the sum up of multiple factors such as personal traits, knowledge, skills, experience and even situations that will determine a person's behaviour in group work or in a specific job. More specifically studies on innovation teams as the ones by (Kratzer, Leenders, and Engelen 2004; Kratzer, Leenders, and Engelen 2006; Kratzer, Leenders, and Engelen 2006) have focused on examining how factors such as team communication, conflicts or virtuality influence creativity performance. Likewise, DeCusatis (2008) pointed out how team performance varies based on generational preferences, habits and the nature of the intended innovation. Precisely, this changing nature of the innovation process across time has opened the door for not only asking which roles are required but also what are the competences needed for successful innovation teams.

That is why researches like these of (Chatenier et al. 2010) and (Podmetina et al. 2018) have proposed specific competence profiles, for open innovation teams revealing what are the main tasks they perform, the main challenges they face and the underlying competencies behind them. Chatenier et al. (2010) pointed out that competence profiles are instrumental for the creation and development of innovation teams. However, besides their comprehensive and detailed model they also suggest that a single competence profile falls short when it comes to assembling effective innovation teams, specifically at the moment of determining which competences need to be held by each team member and for which role.

Despite the existing research, the literature remains scarce when referring to what competences are key for guiding the conformation of SI lab teams and under which roles can they be organized. This is a major issue for the successful implementation of an innovation lab initiative, since beyond physical and technological resources, human facilitation is one of its fundamental pillars (Magadley and Birdi 2009). Furthermore, how these aspects are early weighed in terms of the lab setup and its context

(i.e. private, community or university) determines the type of challenges a lab team will have to face (Rayna and Striukova 2019). But more importantly, the strategies to overcome these challenges could be driven or undermined according to the competences of the lab team, reflecting also on how effectively they would be able to achieve the intended social impact (Rayna and Striukova 2021). Therefore, the main focus of this article lies on the identification of the key competences and roles that could help the conformation of teams meant to be the bearers of SI processes. Our goal is to propose a methodological approach for the early design of SI lab teams. By means of a self-assessment tool, we intend to provide practical guidance for the creation of more enduring lab teams while at the same time we continue to create awareness on the management of these organizational structures.

To this end, the article first elaborates on the concepts of SI lab, competence and innovation roles. Next, a role-based framework is developed by comparing seven existing conceptual frameworks drawn from the literature on innovation teams and SI. Then, the proposed framework is operationalized through a competence-based assessment tool (online questionnaire) from which a self-assessment methodology is designed. This approach is subsequently tested within the context of the Climate Labs project, an Erasmus+ initiative whose aim is to strengthen the applied research and innovation capacities of 10 Latin American Higher Education Institutions in Mexico, Brazil and Colombia via the design and implementation of Social Innovation Labs for mitigation and adaptation to Climate Change. Results from this exploratory study evidence that the chosen approach is instrumental in the characterization of teams at the early stages of the implementation of a lab project inside Higher Education Institutions, enabling them to elicit improvement strategies. Lastly, discussion and conclusions are built around the main implications of this work and suggested paths for future research.

2 | THEORETICAL BACKGROUND

2.1 | Social Innovation Labs

SI refers to the new answers provided to the increasing unsatisfied or badly-satisfied societal issues (Gregoire 2016). It is understood as the new social relations (doing, organizing, framing and knowing) between people (e.g. producers and consumers, citizens and government, refugees and native inhabitants, etc.) as well as between people and any other aspect in society (e.g. people and nature, producers and their products, etc.) (Strasser, Kraker, and Kemp 2019). SI has been described as being context specific, these new social relations often lead to novel practices that are meant to address social issues such as childcare, education, unemployment, crime prevention, ageing population or climate change (Rayna and Striukova 2019; Dias and Partidário 2019). This means that the value sought through SI is primarily intended to benefit society rather than individuals (Moulaert et al. 2014). A key difference from other innovation approaches, such as technological innovation, is that the focus is not necessarily on new technologies or material infrastructure but to contribute to solving social problems where technology is seen as a means for that purpose (Mulgan 2006; Murray, Caulier-Grice, and Mulgan 2010). In that sense, SI mainly consists of taking advantage of existing competences and expertise within the population to find more effective, efficient or sustainable ways to tackle current demanding issues (Strasser, Kraker, and Kemp 2019). This also implies that SI solutions are a product of relational changes that prioritize values rather than status, purpose rather than profit, co-ownership rather than hierarchy, and collaboration rather than competition (Strasser, Kraker, and Kemp 2019; Gregoire 2016).

Recently, the term SI lab has been used for framing the different organizational forms that agglomerate teams and methods with the intention of creating socially innovative initiatives (Jezierski et al. 2014; Westley et al. 2015; Wascher, Kaletka, and Schultze 2019). The notion of innovation labs has been present in the literature for several years now (Osorio, Dupont, Camargo, and Pena 2019), building on the more classic "lab" idea usually associated to the physical or natural sciences, to establishing itself as a "safe haven for experimentation, focused on problem solving and solution creation" (Bloom and Faulkner 2016). Among the constellation of labs, SI labs raise with the particular focus on addressing complex social problems and enabling coherent action by multiple stakeholders (Zivkovic 2018). They do so by providing the space and processes for facilitating collaboration among cross-sector stakeholders in order to develop new projects, products, tools, regulations, policies, etc. (Wascher et al. 2018).

SI labs are characterized because they foster the creation of dialogue, listening and mixing the different voices of the actors involved, and creating boundary objects (e.g. prototypes, illustrations, concepts, scenarios, and maps) for knowledge co-production processes to allow diverse actors to work together (See Nilsson, Bonnici, and EL 2015; Lake, Fernando, and Eardley 2016; Timmermans et al. 2020). Ultimately, they act as cross-pollinators of co-creation methods, approaches and perspectives between groups allowing to stimulate and channel collective creativity so that new ideas constantly emerge (Jezierski et al. 2014; Rayna and Striukova 2019). Despite how promising it is to pursue the innovation lab approach, it is important to keep

in mind that this is a response to keep up to increasing and accumulating changes that we live today and where more conventional approaches fall short (Zivkovic 2018; Vessal et al. 2021). That is to say, to embark on such an initiative implies to deal with uncertainty, ambiguity and tensions that are inherent aspects of working on such complex and changing conditions (Osorio, Dupont, Camargo, Palominos, et al. 2019; Jezierski et al. 2014). This is why organizations willing to create their own "lab" need to be aware of the challenges and opportunities that this type of initiative entails.

SI lab teams perform in permeable and changing environments where people and organizations come and go depending on the problem that is being addressed and the parties to whom it is relevant (Wascher et al. 2018). These ever-changing conditions demand for teams who value and practice flexibility and agility in order to make the most of the ecosystem. Lab teams should possess a wide range of competences that allow them to be open to transitions and comfortable with ambiguities; use multiple lenses to integrate multiple perspectives; and be able and willing to work across-disciplines so resources can be mobilized in creative ways (Jezierski et al. 2014; Puttick, Baeck, and Colligan 2014; Rayna and Striukova 2021). Still, literature seems to remain scarce when it comes to providing guidance on which competences should SI lab teams have or focus their development in order to succeed. In the next subsection, we explore this issue in order to establish a common ground for what set of competences a team for a SI lab should have.

2.2 | Competence and social innovation labs

From organizational and managerial perspectives, development of human competences is a fundamental task in the path of innovation and successful organizations (Leonard-Barton 1995). Understanding individual competences is key for enabling teams and organizations to perform and adapt in rapidly changing conditions (Sandberg 2000). In general, the concept of *competence* is understood as the capability of an individual to deliver sustainable and effective performance in a specific domain, job, role, organizational context or situation (Mulder 2014). A *competence* consists of various *competencies* that coherently cluster a set of knowledge, skills, attitudes and experience (Mulder 2014). In that sense, competence profiles are often used to represent the functional and behavioral competencies that are required to successfully meet complex demands in a particular context (Chatenier et al. 2010).

In the context of open innovation for instance, (Chatenier et al. 2010) proposed in their work a competence profile for open innovation teams based on 20 semi-structured interviews and 2 focus groups with professionals that had participated in open innovation projects in the agribusiness sector. Based on their empirical findings, they built a profile composed of 4 main competence categories and 34 key competencies to accomplish three main tasks of an open innovation team: (1) managing the inter-organizational collaboration process, (2) managing the overall innovation process and (3) creating new knowledge collaboratively. They consider that a team having competence in self-management, interpersonal management, project management and content management should be better prepared to deal with the challenges behind those main tasks.

In a similar way, Podmetina et al. (2015) proposed an open innovation specialist profile based on a large-scale survey with 528 European companies. By inquiring on the required and desired competencies that an employee should have for implementing open innovation, they build a profile composed of six categories of competencies: collaboration skills, interdisciplinary skills, methodic skills, explorative skills, transformational skills and exploitative skills. This work will subsequently lead to the proposition of a competence model for open innovation in which direct links between competencies, key activities and roles are made at the organizational level (Podmetina et al. 2018). This holistic understanding of what constitutes a person's essentials elements for performing in a determined task or role is instrumental for assembling teams and training professionals (Mulder 2014). Furthermore, a competence profile can also be used as an assessment tool of ongoing teams in order to spark reflecting processes (Sandberg 2000). This ultimately allows managers for identifying whether there is room for improvement and deciding what kind of actions are worth pursuing in order to enhance a team's performance, especially in the complex and uncertain circumstances such as the ones of facilitating innovation processes (Chatenier et al. 2010). Nevertheless, although the studies conducted by (Chatenier et al. 2010) and (Podmetina et al. 2018) are presented as specific but not unique to the open innovation context, little has been studied in terms of SI and SI labs.

While the existing literature on SI labs constantly highlights the importance of the lab team and the selection of the staff, most of today's experiences and insights rely on generic statements such as the need of people with mixed profiles and backgrounds to reflect the social reality, with both traditional skills such as project management and communications and innovation skills to get things done, or with networking skills to gather participants and build connections (Puttick, Baeck, and Colligan 2014; Kieboom, Exel, and Sigaloff 2015; Jezierski et al. 2014). Acknowledging the importance of this issue, Wascher et al. (2018) gathered from the literature a set of 14 competences which they proposed as key for a SI lab team (see Table 1). They consider that the

combination of all of these competences should help the team to successfully manage and facilitate cross-sector collaborations. Furthermore, these teams tend to be relatively small, usually composed by a lab manager, administrative staff and members dedicated to the lab-process facilitation (Wascher et al. 2018). Yet, there is no evidence that suggests what are the required roles for a SI lab and further, which competences are needed to effectively perform those roles.

TABLE 1 SI Lab list of competences retrieved from [@Wascher2018]

Competence	Description
Project management	Competence in planning and implementing innovative projects; meeting legal requirements as well as financial expertise, contracts and agreements on the use of space
Moderation	Competence for integrating emerging ideas and orient projects
Mediation	Competence for helping project parties understand and focus on the important issues needed to reach a conflict resolution
Networking	Competence for building connections and relationships with local organizations
Participation	Competence in fostering mechanisms for the involvement of the parties in the project's decision-making processes
Communication	Competence for empathy, change of perspective and use of media in a clear, positive, conversational fashion
Self-organization	Competence for ambiguity and frustration tolerance, confidence and self-esteem
Intercultural	Competence in ensuring inclusivity throughout the project
Evaluation	Competence in the design of mechanisms for monitoring strategies and results
Research methods and interdisciplinary work	Competence for working under interdisciplinary environments using diverse research methods such as critical thinking, data analytics, social research, anthropology, etc.
Design methods and creative thinking	Competence in applying design methods such as design thinking, theory of change planning, etc.
Information and telecommunication techniques	Competence in technological techniques that provide support to the project development
Entrepreneurial thinking	Competence in project incubation processes and ventures
Systems thinking	Competence in addressing challenges in a holistic way and being able to examine the links and interactions between all the constituent elements

2.3 | Innovation Teams & Roles

The idea of thinking on what are the roles or behaviors that are required to facilitate the innovation process within an organization is not new at all. One can refer to the notion of "champion" back in the 60's where the success of the innovation process was attributed to the one single person who was willing to fail for a doubtful idea but capable of reaching success (Roberts and Fusfeld 1982; Jenssen and Jørgensen 2004). Nevertheless, the aim of reflecting on innovation roles is no longer to create heroes that prevail against all odds. Instead, it consists of building strong teams aware of their strengths and weaknesses so that they can find ways to overcome the barriers in the path of realizing the intended innovation process (Gemünden, Salomo, and Hölzle 2007). Indeed, innovation does not originate and sustain itself, but rather through the people who make it happen through teams that push their imagination, resilience and perseverance (Kelley and Littman 2005).

It is in this sense that literature on innovation teams and roles has evolved, as innovation processes have become more open, collaborative and social, so it has been the case for the roles needed to facilitate these processes. By diving into the literature of innovation teams we intend to illustrate the diversity of roles that members of an innovation team can have which subsequently could be of inspiration for the set up of a lab team. Under this context, seven models of innovation roles have been found in the literature (Figure 1) which will be now discussed.

One of the earliest innovation role models that can be found is the one proposed by (Roberts and Fusfeld 1982). Their proposition is composed of five roles needed to fulfil the critical functions for a technology-based innovation process. These are the *idea generator*, the *entrepreneur* or *champion*, the *project leader*, the *gatekeeper* and the *coach*. The intention was to highlight those key functions that were not always explicit in formal job structures. They also acknowledge that depending on the size of the team or the organization, some roles need to be fulfilled by more than one person, while some individuals can perform more than one role, and that ultimately, the roles someone can fulfil will change over a person's career. But beyond considering a role as purely functional, it is even more important to ask how a person is going to behave within a team. Under the premise that people's useful behaviors can be grouped into a set of related clusters, (Belbin 2010) condensed in her book (originally published in 1993) the nine team roles which make an effective contribution to team performance: *plant, resource investigator, coordinator, shaper, monitor evaluator, teamworker, implementer, completer finisher and specialist*. Even though the Belbin team roles are not exclusively for an innovation team, they represent an important part of team theory that should be considered.

More recently, Hering and Phillips (2005) presented eight innovation roles making emphasis on those that are required for a generic innovation process. They detailed the features of what can be expected of these roles rather than just titles or job descriptions. According to them, *connector, librarian, framer, judge, prototyper, monitor* and _storyteller _are the roles that should be sought to set-up an innovation team. Organization's commitment and a belief system are also considered critical for them in order to have the time and the resources for innovation teams to deal with the uncertainty involved in any innovation process. Alternatively, Kelley and Littman (2005) published their book *Ten Faces of Innovation* based on their experiences at IDEO. They condensed ten persona descriptions as a way to inspire the roles that members of an organization should play to foster creativity and innovation. They consider that each role or persona helps to bring on the table specific values, tools, skills and thus, it is important to assure their presence in any innovation team. These ten roles are grouped in *learners* (anthropologist, experimenter and cross-pollinator), *organizers* (hurdler, collaborator and director) and *builders* (experience architect, set designer, caregiver and storyteller).

Based on 104 interviews with representatives of German enterprises and 42 cases from questionnaires, Gemünden, Salomo, and Hölzle (2007) proposed a model to assess whether the influence of certain innovation roles increase the success of new product development under increasingly more open innovation contexts. They pointed out that not only innovation and technological experts are present (*expert promoter* and *process promoter*), but strong leadership (*project leader*) as well as good external relationships (*technology and market relationships promoters*). Moreover, they emphasized the importance of having institutional support in the form of *power promoters*. In more recent years, (Goduscheit 2014) builds on the work initiated by (Gemünden, Salomo, and Hölzle 2007). In this case, he seeks to further develop the concept of innovation promoters. This notion is established on the basis that innovation teams are meant to overcome the barriers and difficulties to successful innovations. His interest was to explore the inter-organizational dimension among the innovation roles proposed by (Gemünden, Salomo, and Hölzle 2007) by analyzing how they interact/perform with multiple organizations. As a result, he further develops the innovation promoters model by moving from the original six roles to a proposition of nine roles: *seniority, top-level representative, technological expert, methodology expert, intra-organizational process, inter-organizational process, project process, technology relationship and* market relationship.

Finally, we refer to the very interesting work conducted by (Nyström et al. 2014). They also build on the work realized by (Gemünden, Salomo, and Hölzle 2007) on analyzing the roles for an open innovation context but they center their research on the influence these roles can have on innovation networks. For this, they studied 26 living labs leading to a final proposition of 17 roles that network actors can adopt or create during an innovation project. The new roles identified are mostly related to the users and the facilitators (*e.g., co-creator, orchestrator, contributor*), which correspond to living lab approaches that encourage multi-stakeholder involvement. They also state the importance of innovation roles to combine multiple perspectives due to the increasing complexity of innovation projects. This is something that relates to the more systemic and transdisciplinary approach that is required on SI projects.

Throughout this literature review it is possible to observe that despite the diversity of perspectives, processes or names, authors agree that unbalanced teams and frequent changes can disturb how an innovation team performs. This is a challenge that definitely should be considered in the conformation of an innovation lab. However, none of the role models establishes a direct

link between the proposed roles and the adequate competences that should allow a person to fulfil it. Nor any of the identified studies is developed under the SI context. These elements are taking into account the proposition of this article in the next section.

3 | METHODOLOGY

Throughout the theoretical background presented before, the principles behind the notion of SI labs have been explored, along with the dynamics that lab teams are deemed to deal in such kind of context. Several questions have been raised in terms on which roles would allow a SI lab team to be better prepared to accomplish their mission. And further, what set of competences would be necessary for these teams to thrive in such conditions. Accordingly, seven innovation role models have been retrieved from the literature on innovation teams as well as a set of 14 competences considered as key for SI lab teams. However, since research on how managerial teams of innovation labs perform, and more specifically those within the SI context remains unexplored, through this study we intend to establish a connection between theory from competences for innovation and innovation teams in order to hypothesize on the essentials elements that should be considered in the process of assembling a SI lab team. To this end, a four-stage process was designed for conducting this research as shown in Figure 2.

Firstly, based on the literature review an adapted role model is proposed. Since none of the previous role models for innovation teams were rooted in SI nor innovation labs, we aim to take into consideration the 14 identified competences to make a model proposition adapted to the conditions of this research. Following this, the proposed model is operationally defined as an assessment tool (online questionnaire) that would ultimately be applied under a self-assessment approach. Given the practical motivation behind this exploratory study, is to support 10 latin-american university teams to set up the lab team for their own SI lab within the frame of the Erasmus+ Climate Labs project, we opted to pursue a self-assessment approach with a two-fold purpose. Firstly, to use the proposed approach to spark reflecting processes that would allow the university teams to increase awareness of their current status toward the expected roles. And secondly, to have a comprehensive role characterization at the early stage of the project encompassing all the lab teams according to their own perception of the degree of mastery of such competences.

Due to the transcontinental nature of the Climate Labs project, the application of the self-assessment approach was conducted virtually by means of the online questionnaire and an online workshop. The proposed approach was designed so each lab team member (including professors, researchers, students, and administrative staff) could participate and be part of the process. A total of 65 answers were received along with the workshop results for each team. Results and insights are then analyzed and discussed so conclusions can be made in order to provide guidelines for the future of the Climate Labs project but also to the further development of this study.

4 | PROPOSITION OF A COMPETENCE-BASED ROLE MODEL FOR SI LAB TEAMS

Despite several insights from empirical studies and different statements of which functions or behaviours are possible to find in an innovation team, the propositions and explanations fall short when it comes to the specificity of innovation lab teams. We therefore believe that it is reasonable to think that by establishing a clearer connection between competences for SI labs and innovation team theory a model can be proposed. First, drawing from the 14 competences proposed by (Wascher et al. 2018), a categorization was made thinking on which main functions could be proposed. Based on the literature and according to knowledge and experience of the authors, four categories of competences were identified as illustrated in Table 2. This was done in terms of those competences that contribute the most to one of the following functions: (1) innovation process orchestration, (2) materialize systemic solutions, (3) spark connections and new ideas, and those that contribute to (4) organizing and measuring results.

TABLE 2 Categorization of SI lab team competences

Competence	Orchestrate Innovation Process	Materialize Systemic Solutions	Spark Connections & Ideas	Organize and measure results
Project management				X

Competence	Orchestrate Innovation Process	Materialize Systemic Solutions	Spark Connections & Ideas	Organize and measure results
Moderation	X			
Mediation	X			
Networking			X	
Participation	X			
Communication			X	
Self-organization				X
Intercultural	X			
Evaluation				X
Research methods and interdisciplinary work		X		
Design methods and creative thinking		X		
Information and telecommunication techniques		X		
Entrepreneurial thinking			X	
Systems thinking		X		

Then, in order to obtain a better sense of how these competences can be better defined in terms of an innovation team and its roles, we compared the four categories of competences with the innovation roles found in the literature. At this point, we looked for similarities between the roles and behaviors that have been historically recognized among innovation teams with the competences for SI labs. We found that all four categories are present in the seven innovation team role models (see Table 3). It is worth remembering that our focus is this study lies on the composition of the lab teams. This means that during this comparison our attention remained on those roles at the core of the management of the innovation lab. This is why a fifth category emerges as "external roles" since they refer to users or external parties that surround the lab network of stakeholders. We do not intend to diminish the importance of these roles but on the contrary, we would like to remark that indeed those external roles should definitely be considered in depth in further stages of the research. However, considering the relative small size that innovation lab teams usually have, especially in early stages, we believe that these four categories constitute a comprehensive and pragmatic basis for this study.

Based on the previous work, a competence-based role model for SI labs is proposed (see Figure 3). This model is intended to establish a minimal base of competences and roles that a SI lab team should bear in mind during the implementation of their project. A general description for each of the proposed roles is outlined below.

4.0.1 | Facilitator – The ones who set the tempo and orchestrate people's collaboration

This is probably the role that most distinguishes an innovation lab team. The Facilitators are those who set the methodological tempo of the projects within the lab. They just know what strategy, tool or dynamic to use when divergence, convergence or a "simple" retrospective is needed. They get people involved and seek collaboration in every activity. When intentions and interests collide, facilitators keep everyone focused on the greater purpose. No collaboration is possible under discrimination and exclusion, so intercultural and transdisciplinarity inclusiveness is a prime directive for them. What could be expected from facilitators in a SI lab team:

- Design strategies, methods, and tools for orienting the innovation process through each project (Belbin 2010; Hering and Phillips 2005; Kelley and Littman 2005; Gemünden, Salomo, and Hölzle 2007; Goduscheit 2014).

- Provide guidance and mentoring to stimulate professional and personal development of project teams and participants (**Robert1982?**; Kelley and Littman 2005).
- Get people involved and encourage collaboration in every lab activity (**Kelley?**; Gemünden, Salomo, and Hölzle 2007; Nyström et al. 2014; Goduscheit 2014).
- Act as peacekeepers when conflict emerges, maintaining focus on project objectives and common goals (Belbin 2010; Hering and Phillips 2005; Nyström et al. 2014).
- Ensure intercultural inclusiveness in all the lab projects or activities [Kelley and Littman (2005); Nystrom2014; Wascher2018].

4.0.2 | Maker – The ones who make things happen

Whomever comes with an idea usually needs support to make it real. Makers gather a diverse set of skills that are instrumental to understand every need and prototype any solution. They do not hesitate in mixing disciplines or going to the field in order to understand the problem. They shine at combining ideas and driving innovative concepts. Makers are driven by experimentation, iterating through prototypes crafted on available technologies. Acknowledging the complexity of each problem in a systemic manner is part of the way they see the world. What could be expected from makers in a SI lab team:

- Understand needs and problems through the combination of multiple research methods and settings [Kelley and Littman (2005); Nystrom2014; Wascher et al. (2018)].
- Capture ideas, data, and any form of knowledge, restructure them and propose novel concept solutions (Roberts and Fusfeld 1982; Belbin 2010; Hering and Phillips 2005).
- Help to build physical (and digital) representations of solutions on an iterative basis (Belbin 2010; Hering and Phillips 2005; Kelley and Littman 2005; Gemünden, Salomo, and Hölzle 2007; Nyström et al. 2014; Goduscheit 2014).
- Propose alternatives to address the complexity of every problem and the systemic impact of each solution (Nyström et al. 2014; Wascher et al. 2018). 3. Visionary – The ones who push and connect

Refers to the kind of person who always finds an opportunity where no one else sees it. These very same people also create networks easily. They have an inherent talent to communicate their ideas while also keeping themselves empathetic and sensitive to others. Their particular entrepreneurial mindset keeps them moving forward looking to achieve their vision of the future and beliefs. What could be expected from visionaries in a SI lab team:

- Provide a constant flow of ideas and project opportunities for the lab (Roberts and Fusfeld 1982; Hering and Phillips 2005; Nyström et al. 2014).
- Build connections with communities and stakeholders for establishing strong links between the lab, their stakeholders, and the territory (Belbin 2010; Hering and Phillips 2005; Kelley and Littman 2005; Gemünden, Salomo, and Hölzle 2007; Nyström et al. 2014; Goduscheit 2014).
- Create an emotional connection with the people around the lab by communicating compelling stories from each project, event, success, or failure (Hering and Phillips 2005; Kelley and Littman 2005; Nyström et al. 2014; Goduscheit 2014).
- Go out and find the opportunities for the lab whether they are new alliances, funding options or showcase scenarios (Belbin 2010; Gemünden, Salomo, and Hölzle 2007; Goduscheit 2014; Wascher et al. 2018).

4.0.3 | Manager – The ones who keep everything on track

Innovation lab initiatives can often be seen as fuzzy and accessory. Managers are meant to organize, give sense, and value everything that happens in a lab. Used to dealing with uncertain conditions, lab managers are exceptionally adept at handling innovation projects. They keep track of everything, detecting patterns of what works and what does not. Their ability to watch metrics and results allows them to build bridges with managerial counterparts from other institutions to defend the role of the lab in their ecosystem. Lab managers are capable of decision-making, which is key in the highly complex contexts where the lab normally operates. What could be expected from managers in a SI lab team:

- Handle technical, financial, and legal issues of the lab and its projects (Gemünden, Salomo, and Hölzle 2007; Nyström et al. 2014; Goduscheit 2014).
- Contribute to project planning keeping the balance between visionary solutions and achievable goals (Roberts and Fusfeld 1982; Belbin 2010; Kelley and Littman 2005; Nyström et al. 2014).

- Implement monitoring and assessment mechanisms to track the lab's evolution and communicate results [Roberts and Fusfeld (1982); Belbin (2010); Hering2005].
- Have a strong belief in themselves which helps them make decisions for the sustainability of the lab and its ecosystem (Belbin 2010; Gemünden, Salomo, and Hölzle 2007; Wascher et al. 2018).

4.0.4 | Design of the instrument: A self-assessment approach

The next step was to operationalize the proposed role model. Rather than relying entirely on a rationalistic approach where functional roles are predefined and team members are expected to fit into those assumptions, we seek to provide a reflection tool for lab teams to raise awareness as they design and implement their SI lab (Sandberg 2000). In this sense, a self-assessment approach is then instrumental to understand the degree in which a person considers him/herself competent in a determined task or situation while at the same time reflecting processes are sparked (Sandberg 2000; Allen and Velden 2005). An important advantage of following a self-assessment approach lies in the fact that individuals have access to information about themselves that might otherwise be more difficult to access (Allen and Velden 2005). However, it is also important to be aware that at the same time this reliance on self-knowledge often leads to problems in reliability and validity results (**Ward2000?**).

For this reason, the operationalization of our theoretical model included firstly, the definition of short descriptions for each competence (see Appendix A) which constitute the base for an online questionnaire as the first step of the self-assessment. Accordingly, the online questionnaire has 23 questions directly related to the model criteria plus 6 general questions for profiling purposes and one open question at the end for collecting feedback for a total of 30. Furthermore, based on this structure, the questionnaire was also made available in the three languages, namely Spanish, Portuguese and English. In terms of the self-assessment levels, a numeric scale from 0 to 5 with anchoring phrases was applied (see Table 4). Being 1 the level where respondents understand what the competence is but they do not practice it, and 5, where they believe they have mastered the competence and are capable of developing new ways of applying it (Dreyfus and Dreyfus 1986). The 0 level was introduced for those who are not aware or do not understand what the competence is about, allowing to reduce unintentional measurement errors (Allen and Velden 2005). In order to deal with ambiguity or lack of clarity, a test was done with several members of the consortium prior to applying the study with the latin-american teams. Adjustments were then made based on the feedback and test results. The english version of the final questionnaire can be accessed at https://forms.gle/iZ1Lwyt1KUqrerb57.

Secondly, a retrospective workshop was designed as a post self-assessment intervention in order to ask participants to reflect as a team on the results of the questionnaire. One of the main hypotheses considers that a competence profile resulting from the self-assessment enables a discussion among lab team members concerning: a) the strengths and weaknesses they may have as a team; b) the potential role(s) that each member could play in the lab; c) the aspects to develop and possible strategies for doing so. In this way, lab teams will be stimulated to reflect on their present conception of their lab and what needs to be strengthened (Sandberg 2000).

5 | APPLYING THE SELF-ASSESSMENT APPROACH

5.1 | Sample and data collection

As previously mentioned, this study is conducted as part of the Climate Labs project, an Erasmus+ initiative whose aim is to strengthen the applied research and innovation capacities of a group of latinamerican universities via the implementation of SI labs for mitigation and adaptation to Climate Change. One of the project main goals is to build multidisciplinary teams within universities that will lead the design of their Climate Lab. Therefore the self-assessment was conceived as a starting point in this project. The methodology was applied with 10 latinamerican universities from Colombia (5), Mexico (2) and Brazil (3) with the process lasting between the months of April and August 2020.

Firstly, members of each team were asked to self-assess their SI lab competences individually by means of the online questionnaire during April and May. Later in June, a webinar was held with all teams in order to share the preliminary results and introduce the retrospective activity as the second part of the methodology. Each university team was handed a customized report composed mainly by their competence profile according to our four generic role propositions: Visionary, Maker, Facilitator and Manager. The intention was to trigger a reflecting process so strengths and improvement points could be identified and discussed among the team. Based on the results, they were also asked to state to which of the proposed roles they identified the most and the least. And finally, they were also requested to ideate on potential strategies for filling their gaps as a lab team.

A total of 65 participants completed both the questionnaire and the workshop. Lab Team size oscillates between 4 and 13 members. Among respondents there are faculty members, administration staff, researchers and students. The latters being only represented by three undergraduate students and one doctoral student. This was mainly because of difficulties imposed by the global health situation due to COVID-19, with repercussions on the respective academic calendars of the universities. Nevertheless, the sample is still representative of the people that will lead the lab implementation which guarantees that insights from this analysis will offer a real picture of the early state of a SI lab team. Table 5 summarizes the team composition per university.

5.2 | Instrument internal consistency

It is of interest to have a measure of the instrument's consistency. Then, we chose to calculate Cronbach's alpha coefficient values since they have been widely used for construct validation purposes (Taber 2018). Due to the multidimensional nature of the questionnaire, alpha coefficient was calculated for the groups of items associated with each role. Alpha for maker and manager are lower, 0.773 and 0.787 respectively, but still over 0.7 which is suggestive for consistency. Also alpha for visionary has an acceptable coefficient of 0.824 whereas for facilitator is higher with 0.906. Far from reaching any conclusion in terms of reliability, results only indicate an acceptable level of interrelatedness (or equivalence) among the grouped competences for each role, something we consider positive at this exploratory stage and the subsequent steps of this research.

5.3 | Competence self-assessment results

Figure 4 presents the self-assessment results for the whole sample (black line). Three additional profiles are shown (green, blue and orange dotted lines) which correspond to the three cases of lab teams that will be analyzed further in this section. Here, the radar is used to visualize the median-based profiles as a way to provide a measure of the central tendency among the sample (or specific team). The median is shown for each one of the 23 questions to help the teams to infer where strengths or weaknesses might be. From a general perspective, there are some points worth describing. The overall sample of participants declared to have a high level of competence being able to guide others (level 4) in moderation, research methods, networking and self-organization. This could be expected since there is a significant presence of professors and directors among the respondents which could have already more training and experience than team members in other positions. However, one result worth highlighting is the low level of competence in ICT and entrepreneurial thinking, suggesting the existence of common gaps that could pose challenges for the future development of a SI lab.

5.4 | Retrospective results: A cross-case analysis

Based on the self-assessment results lab teams were invited to reflect on their competence profile while the role model was introduced along with the workshop steps. Due to space limitations, results from the second part are described through three cases, namely, Labs H, I and J. These cases were chosen because as a result of the self-assessment, they stated that they lacked or had a low representation of specific roles among their team members. This allows us to frame the analysis in terms of what kind of conceptions the methodology elicits when specific roles are missing. A cross-case analysis is then conducted to discuss noteworthy observations and common elements in how lab teams interpreted results, self-positioned and what kind of actions or improvement points were identified. Table 6 presents a summary of the retrospective results for the three chosen cases. Our attention turned into analyzing and understanding how participants related to our role model and which self-declared roles emerged for each case. We were also interested in exploring how consistent (or not) are the competence profile results with the self-declared roles along with the identified improvement actions. For instance, do teams missing a specific role propose corresponding actions to fill that gap? Besides engaging or involving new people to the team, what other kind of reflections or improvement strategies the methodology elicits? With these questions in mind, the remaining of this section discusses some of the main insights.

The first part of the activity consisted in declaring to which role each participant related the most according to the role model and their competence profile. Some participants declared to be identified with multiple roles whereas others with a single one. Among the selected cases for this analysis, each one of them has a relative low representation for a certain role. For instance, Lab I do not have any self-declared maker. Lab J has only two visionaries and Lab H has only one facilitator and one maker. It is interesting to see whether strengths or weaknesses correspond or not to their team profile. This is important since having no

specific person identified or related to an specific role does not necessarily mean that they are not competent as a team in that regard.

In terms of strengths, the exercise seems to elicit both direct links from their team profile where high levels of competence are identified but also enable them to share information regarding additional key points that characterize them as a team. For example, aspects such as how long have they been working as a team, the degree of institutionalization of SI and entrepreneurship at the university and their strong links with the state government and local actors were highlighted by Lab I as their main strengths. Perhaps one remarkable characteristic is the fact that, as they stated, "all our students have a mandatory federal duty to dedicate 480 hours for social community service, where we can count on their talent and work." This is something that could prove useful for the lab once it is operating. The team of Lab J acknowledges themselves as "a Maker Team with great research capacity" as clearly the majority of them self-identified as makers which also corresponds to high levels of competence in research and design according to their global profile (see Figure 4). They also emphasize the "good positioning" of several of their members in terms of management and decision-making at their university. Remarkably, despite their team profile evidencing a high level of competence for facilitation (see Figure 4), only one member of Lab H self-identified as facilitator, but still, among their strengths they consider themselves "inclusive and respectful in moderating differences." They also outline as strong points systemic thinking, project management, pedagogical methods, networking and communications as well as their knowledge in environmental disciplines and sustainable development.

As already perceived in the global profile, competence in ICT is a common weakness that also appears in the retrospective for all three cases. In addition, Lab H and J identify entrepreneurial thinking as limited or with low experience whereas Lab I and also H raised concerns on the slow and complicated administrative processes at the university. More in particular, according to their competence profile, team members of Lab H acknowledge a lack of experience in designing and prototyping in innovation projects, and further, in building solutions to real problems in multi stakeholder contexts. Similarly, for the Lab I team, this is their first experience with a lab that combines SI and climate change. They consider this a weakness as SI practices are not yet commonly included in the academic work of other faculties. In addition they state the lack of an emergency culture regarding climate action could be a barrier when it comes to bringing changes or actions in their institution at an operational level. Lastly, the team of Lab J expressed the need of consolidating their visionary capabilities along with systemic thinking and evaluation methodologies. They also pointed out time management and the limited number of people available as weaknesses since team members are also engaged in several additional projects at the same time.

Moving forward in the retrospective, teams were then asked to synthesize what competences they need to develop toward the design and implementation of their SI lab. Besides reaching some direct conclusions in terms of specific missing competences such as ICT or entrepreneurial thinking, the activity also enabled them to elicit some less evident conclusions. For instance, team members of Lab I stated that they are missing maker roles with strengths in ICT, creative thinking and systems thinking, as well as they need to develop a participation culture. However, they also expressed as one of their conclusions "we already have the strengths of the other roles but we must keep increasing our knowledge and expand onto other roles." They also agreed that having a vision or a bigger picture of the scope of their SI lab is a key step they need to develop before moving forward. On top of that, they recognize it is important to also develop adapted project management competence which recognizes and urges the nature of a SI project. This goes in line also with members of Lab J who concluded that despite having a high representation of the manager role, they still need a project manager due to their time management issues. Teams also identified competences or roles to develop according to their thematic focus. Lab J team estimates the need to develop knowledge in Green Economy strategies while Lab H highlights the importance for developing competence in living lab and SI for climate change.

The final step in the retrospective was oriented toward the identification of strategies and actions to improve or overcome the elicited weaknesses or barriers. All three cases raised the importance of involving students in this process where research group seedbeds, social service or internships are identified as possible mechanisms to this end. A second common strategy is to develop missing or weak competences through training and learning communities. Team members seem to recognize the experimental and learning nature of their SI lab project thus potentially allowing for the consolidation of both individual and team competences. More particularly, Lab H and J outlined collaboration with other universities and actors in their ecosystem as a source for fostering knowledge exchange and advice. Whereas Lab I emphasized the importance of creating an identity around the lab so members and non members could feel included and invited to be part of it.

6 | DISCUSSION

The purpose of this study is to propose a methodological approach for guiding the creation of SI lab teams. Since (social) innovation labs are still an emergent field in the academic literature, this article contributes to the literature by connecting the theory of innovation teams with the competences for the management of SI processes. In this way, a competence-based role model was proposed focusing on four main roles to be taken into account as a starting point for SI lab initiative. Although the literature recognizes the multiplicity of roles in innovation teams and networks, in this study we chose to focus strictly on the management point of view in the early stages of an innovation lab. Prior studies have highlighted that facilitating collaborative processes across disciplines, dealing with ambiguities, integrating multiple perspectives, and building and sustaining a shared intent in multi-stakeholder projects are some of the major challenges that innovation lab teams confront today. Therefore, by focusing on the facilitation, making, visionary and managerial facets of lab management, innovation lab teams can find in this paper a deeper understanding of the roles and behaviors that could effectively assist in the implementation of the intended innovation processes.

Following an interpretative approach, the model was operationalized. As a result, the proposed methodology consists of a self-assessment tool coupled with a retrospective workshop. To the extent that the roles required for an innovation lab have not yet been defined in the literature, the proposed model was considered as the basis on which teams can not only position themselves at the individual level in terms of their competences and their relation to the proposed roles, but also at the team level in order to identify and propose improvement actions. Despite their relative small size, volatiness and sometimes informal conditions, past experiences have shown that innovation lab initiatives need to develop a human resource strategy since it becomes fundamental when it comes to bringing the people with the right mindset to deal with social challenges (Osorio et al. 2020; Timeus and Gascó 2018). Ultimately, this work calls for lab teams to not only focus their efforts on the projects and the different parties they interact with but also to develop a "reflectum practicum" dynamic for sparking team development and cohesion (Sandberg 2000). In this sense, our methodological approach in application should be seen not only as a tool for competence development but also for closing the intent-gap within a team (Gratton 1994; **Mantere2006?**), something key for SI lab initiatives to thrive (Rayna and Striukova 2019; Osorio, Dupont, Camargo, Palominos, et al. 2019).

On top of that, it is important to bear in mind the idiosyncratic nature of innovation labs which is why our approach can be also used by researchers and practitioners to elicit conceptions in which lab teams project the competences required for their lab according to their own experience and context. SI labs continue to proliferate around the world, but particularly the university context seems to find in this type of initiative a means to stimulate deep transformations and enhance its role as an agent of change in stressful times (Camargo, Morel, and Lhoste 2021; Petersen and Kruss 2021). This is precisely the case of the Climate Lab project and the cases that were analyzed in this study. In application, the self-assessment helps to have a "picture" of the lab teams where specific strengths and weaknesses of this type of teams are revealed, but which are also associated with the intrinsic conditions of the universities to which they belong. In this way, this tool contributes to mapping aspects where to focus attention to ensure the future development of a university-hosted innovation lab, but also to identify and prioritize the areas where it can generate greater value. Similarly, the recognition and socialization of competence gaps seems to evoke the identification of opportunities for collaboration with other labs and institutions. This could eventually lead to inter-collaboration between innovation labs by complementary capabilities and/or services (Memon et al. 2018).

Notwithstanding the implications of the self-assessment approach in SI labs research and practice, this exploratory work comes with several limitations that should be addressed in future research. Although the competence-based role model proposed in this paper considers a broad spectrum of the literature on roles and competences for innovation, there is still plenty of room to investigate what are the underlying competencies for each role and each competence, in terms of knowledge, skills, aptitudes and experience (Chatenier et al. 2010). Further theoretical and empirical research could explore the dynamics involved in the management of socially innovative processes and how they differ from open innovation teams, for example (Podmetina et al. 2018). In addition, any self-assessment approach suffers from subjectivity. Therefore, the results of the questionnaire should not be seen as absolute statements, but on the contrary, they should be interpreted by providing the appropriate space for collective reflection at the lab team level. The use of a competence profile should motivate the development of human talent, a process that is composed of chained events rather than one single intervention at the start of an innovation lab project (Sandberg 2000).

Lastly, our choice of only four roles may be perceived as excluding due to the multiplicity of behavioral and functional roles recognized in the field of innovation. However, this work does not seek to overlook the importance of previous studies, but on the contrary to open new research paths to deepen the analysis from the management perspective of an innovation lab and the talent in charge of fulfilling its mission. In practical terms, this work offers a starting point for nascent lab teams with limited

resources, which is often the case for SI labs, particularly in contexts such as Latin America (Osorio et al. 2020). Future research efforts should be focused on the evolution of role profiles over time and which competences prevail in projects addressing social challenges (Rayna and Striukova 2021) (i.e. what does it mean to be a facilitator, maker, visionary or manager for climate change adaptation and mitigation?). Further empirical studies could also assess which aspects of the proposed model are most influential in the performance of an innovation lab (Caccamo 2020).

7 | CONCLUSION

This article explores the competences and team roles that could guide the conformation of a SI lab team. Consequently, it develops a competence-based role model composed of an existing set of 14 competences for SI gathered from the literature, which are then organized under 4 generic roles for an innovation lab team. The methodology, composed by an online self-assessment questionnaire plus a retrospective activity, provides an interpretative approach for SI lab teams to position themselves in terms of their competence profile and the proposed roles while improvement strategies are identified. In application with 10 lab teams from latinamerican universities, the methodology proves instrumental for eliciting a team's strengths and weaknesses but also key actions that could guide team conformation. Results not only contribute to build knowledge from the team and management point of view on the (emergent) SI lab literature but also share detailed conceptions and experiences from nascent lab teams in the latinamerican context.

The study does not come without limitations. The self-assessment approach is often criticized due to the subjectivity of their results, something that could be problematic looking for reliability and results validation. However, the purpose of this work does not rely on producing generalizable results on which roles a SI lab should have and its underlying competences, but rather to provide a methodological approach to support the assembling of such heterogeneous teams. Finally, further research efforts remain in exploring in greater depth how team roles perform and interact in an innovation lab so functional and behavioral roles can be better understood. Furthermore, adding a processual perspective to this study could provide insights on changes in roles along with an innovation lab's evolution.

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