Performance evaluation to support European regional development – A university–industry perspective

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DOI: 10.1080/09654313.2019.1581728

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Abstract

Regional-level innovation policies and development activities, which are not only technology oriented but that also address intellectual issues, knowledge and absorptive capacity enhancement as sources of innovation and economic growth, are posing challenges regarding their management. One of the main challenges that arises with these new types of regional-level development activities relates to their evaluation because insufficient attention is paid to the design and building of the current evaluation frameworks suggested for the context of regional development. This study presents a framework to design and build a performance evaluation system to support the performance measurement of regional development activities. Utilizing operational-level development activities as an empirical example, this study aims to improve the understanding of performance evaluation in university–industry collaborations in the context of regional development. The presented framework highlights the role of the evaluation as part of the learning process in regional development activities between universities and industrial and public-sector organizations. The results of the study show that it is also possible to use the evaluation system to increase the understanding of the interplay between operational level development activities and regional development programmes.

Keywords: regional development, performance management, performance evaluation, university–industry collaboration

1. Introduction

The role, development and importance of the region as a territory of reference is rapidly changing and constantly evolving within the European Union (EU) area (Zabala-Iturriagagoitia, Jiménez-Sáez, & Castro-Martínez, 2008). During the last decades, the pursuit of a knowledge-based economy has become an important goal for economic development among European countries, and different types of knowledge-based regional development strategies have been widely adopted to achieve these goals (Laasonen & Kolehmainen, 2017). Within the context of increasing globalization and international competitiveness, the development of information and communication technologies, and the growing role of the economy and innovation, differences between regions and regional development are becoming more apparent; the future goal of marginal regions is to narrow the gap with more developed regions (Stec & Grzebyk, 2018; Zabala-Iturriagagoitia, Voigt, Gutiérrez-Gracia, & Jiménez-Sáez, 2007). Governments, funding agencies, and policymakers at the European level have high expectations of research, development and innovation infrastructures in the context of scientific and innovative policies aimed at sustaining long-term economic growth (Florio, Forte, Pancotti, Sirtori, & Vignetti 2016). As interest in innovation and development activities from the public- and private-sector and science organizations increases, the infrastructures supporting these activities are facing increased scrutiny (Lundberg & Andersen, 2012).

Collaborative relationships and partnerships in research, development and innovation activities have been identified as an important factor explaining the differences in innovation performance, not only between the individual organizations but also between regions (Fritsch, 2004; Lundberg & Andersen, 2012). As part of the regional development activities, the importance of knowledge and academic support for organizational development and innovation activities has been identified, and public resources are now being directed through different regional-level funding mechanisms towards university–industry interaction to generate innovation and economic growth.

New types of regional policies are posing challenges for the management of regional level innovation and development activities. Regional-level development and innovation activities may involve partners from private and public organizations and from research institutions, which might all have different management and organizational cultures (Pecas & Henriques, 2006; Perkmann & Walsh, 2009; Bishop, D'Este, & Neely, 2011; Rantala & Ukko, 2018). One of the main challenges for new types of regional-level development activities relates to their evaluation. Evaluation of the regional-level policies and of the innovation and development activities is not a novel issue among academics and policymakers; however, ongoing changes have left some open questions about evaluation. An important weakness of the current evaluation frameworks presented to support the evaluation and management of the regional-level innovation activities is that they pay insufficient attention to the design and building of mechanisms for these activities (Diez, 2001). The design and building of the evaluation frameworks should therefore be guided by

the participation of all actors involved in generating new regional policies, and the evaluation must become an open process of collective learning (Diez, 2001).

This study presents a framework for designing and building a performance evaluation system to support the performance evaluation of regional development. In this study, the performance evaluation reflects the measurement and evaluation of the outputs and outcomes of the development activities in university–industry collaborations. As such, the performance evaluation reflects the evaluation of the participating organizations' aims and goals compared to the original operational level development plans, and the evaluation of the outcomes compared to regional level development programmes. Utilizing operational-level development activities as an empirical example, this study aims to improve the understanding of performance measurement of university–industry collaborations in the context of regional development. The presented performance evaluation framework supports the evaluation of regional development activities at the operational level but also connects the activities of industrial organizations and universities to the 'big picture' of the regional development activities.

Even though universities are currently collaborating with other societal organizations in innovation and development activities in the context of regional development, all participating organizations have specific interests and expectations towards the collaboration (Rantala and Ukko, 2018). In some cases, the personal interests of the organizations are main motivational drivers towards the collaboration activities and the participants are not interested in the development activities at the regional level. However, from the societal viewpoint, the regional level innovation and development activities should produce and generate outcomes for other society, not only the participating organizations. The presented evaluation framework highlights the role of evaluation in the learning processes and aims to increase the understanding and interests of the participating organizations in regional development activities at the regional level. Empirical and practical evidence to support the presented framework was gathered from two European Regional Development Fund-based projects in Finland. The originality of the study lies in defining the evaluation system in a way that considers the viewpoint of universities and industrial organizations as participants of regional development and requires the organizations to collaborate with universities at an early stage in the evaluation design. The results of the study can be utilized by policymakers, corporate financiers, enterprises and academics to support, improve and evaluate regional development activities.

2. Regional development

Since the 1980s, theories and studies of regional policies and development have evolved, and the focus of regional development has moved to new arenas (Diez, 2001). Policies and development infrastructures (e.g. university–industry collaborations) have been established which highlight that innovation activities and networks of all existing institutions in the region (e.g. industrial organizations, public- and third-sector organizations, and universities) are strong elements that must integrate actions and operations undertaken by regional administration and governments (Cooke et al., 2000; Diez, 2001). These policies and mechanisms to turn the policies in practice

are not only technology oriented but also address intellectual issues, such as new knowledge and absorptive capacity, as sources of innovation and economic growth at the regional level (Bishop et al., 2011; McCann & Ortega-Argiles, 2015). According to Laasonen and Kolehmainen (2017), scholarly debate originates from different innovation models, especially from regional innovation systems, which have been major conceptual frameworks for understanding innovation-driven and knowledge-based regional development. In addition, for innovation activities and networks, which are sources for regional development, cluster policies have been extended across the world since Porter (2003) began to promote the role of clusters or related organizations and other agents in enhancing regional or territorial competitiveness (Aragon, Aranguren, Diez, Iturrioz, & Wilson, 2014). These cluster policies are aimed towards creating collaborative relationships of a systemic nature, bringing together different social, institutional and economic resources (Aragon et al., 2014).

Most recently, the focus of regional innovation policies has shifted towards putting entrepreneurship and its importance in innovation generation at the forefront of the regional development policies and activities, and has brought SMEs to the centre-stage in EU development policy thinking (Foray & Rainoldi, 2013; McCann, Ortega-Argiles, & Foray, 2015; McCann & Ortega-Argiles, 2016). This shift and policy approach towards creating and sustaining local competitiveness and economic growth and sustainability is called the Smart Specialization Policy approach (Foray, 2014). Kroll (2015) claimed that one idea behind establishing the Smart Specialization approach is to draw attention and raise a political level of support for 'general purpose technologies' (e.g. Foray, 2012). Those technologies refer to solutions that could be used to increase organizations' sustainable development activities and their absorptive capacity (e.g. McCann and Ortega-Argiles, 2014).

Related to challenges in evaluating contemporary regional development activities and policies, Stec and Grzebyk (2018) claimed that existing literature does not offer precise methods or frameworks that could be used to evaluate the progress of implementing the Europe 2020 goals. Secundo, Perez, Martinaitis and Leitner (2017) added that the call for performance evaluation, frameworks, tools and individual performance measures is driven by the European policy framework, which highlight the role of universities in the context of regional development. Even though different kinds of approaches and frameworks have been used to evaluate cluster policies (Zabala-Iturriagagoitia et al., 2008), challenges related to evaluating and measuring the impacts of such policies and infrastructures on the competitiveness of firms and territories exist (Aragon et al., 2014; Schmiedeberg, 2010; Aranguren, De la Maza, Parrilli, Vendrell, & Wilson, 2012). The importance of intangible learning effects (e.g. trust, cooperation, knowledge transfer, and absorptive capacity) also present difficulties in evaluating the effectiveness of cluster policies (Aragon et al., 2014). Therefore, Aragon et al. (2014) claimed that it is particularly important to find evaluation frameworks that are not only suitable but also contribute to the cooperative basis of the policy itself. They added that a common acceptance exists within evaluation theory and within policymaking and practitioner communities that involving the stakeholders in the evaluation process offers the potential to generate useful information and facilitate an increase in capacity and capital (Dobbs & Moore, 2002).

The regional development and new types of regional and innovation policies have highlighted the partnerships and collaboration activities between universities and private and public-sector organizations (e.g. Acosta et al., 2016). These collaborations are becoming increasingly important because, according to Muscio (2010), they create benefits for all parties involved and for the regional areas and society in general. For that reason, government initiatives and changes in the institutional framework have facilitated these collaborations (van Looy et al., 2003; Guenther & Wagner, 2008; Messeni Petruzzelli, 2011; Rasmussen, 2008; Franco & Haase, 2015; Mäkimattila, Junell, & Rantala, 2015). The vital research and knowledge that universities produce are supposed to be transformed to support the innovation and development activities of the other regional organizations. In the long run, meaningful knowledge and economic welfare are important for the development of a whole region.

Even though university–industry collaboration has been argued to have many positive impacts on participating organizations and on regions and society as a whole, the collaboration activities also face some challenges (Bruneel, D´Este, & Salter, 2010). Universities and private and public sector organizations represent different logics and they all may have different operational cultures, organizational structures and goals for operations (Tartari, Salter, & D´Este2012; Villani, Rasmussen, & Grimaldi 2017). While the academic orientation and logic of universities strives for openness and the creation of knowledge, private and public sector organizations are more directed towards secrecy and finding solutions that could create them competitive advantages (Bruneel, D´Este, & Salter, 2010; Villani, Rasmussen, & Grimaldi 2017). All participating organizations may therefore have individual expectations towards the collaboration and development activities. In addition to securing their salaries, university researchers and project managers' interests might relate to possibilities of joint publications or publications containing industrial cases, which might boost and sustain their careers. However, the interests of participating organizations, both private and public, in these collaboration activities relate, for example, to receiving some governmental funding support to their innovation and development activities. In other words, participating organizations and individual persons might have different expectations towards university–industry collaborations; they are not interested in the role of the development activities at the regional level. However, the aim of the regional level innovation and development activities and policies is to provide wellbeing and economic growth to the whole region, not only to the individual organizations. Therefore, the individual development activities, such as university–industry collaboration projects, should generate positive outcomes for the whole region, despite the participants' individual interests towards them.

Even though universities and industrial organizations are showing greater interest in the collaborations, and firms are increasingly engaging in formal partnerships with universities, frameworks to evaluate these collaborations are lacking (Perkmann, Neely, & Walsh, 2011). This lack presents challenges not only for universities and industrial and public organizations in evaluating their operational roles but also for the whole collaboration as a part of the region's development. However, despite the challenges in evaluating these collaborations, the evaluation of public policies and regional development activities has garnered increasing attention over recent years. According to Magro and Wilson (2015), this interest stems from the paucity of governmental and public funding resources of many countries which has increased the interests of

public administrations and policymakers to evaluate the impacts of their policies. Smits and Kuhlmann (2004) claimed that policymakers (and other stakeholders) learn from their interventions by evaluating the results and outcomes of their efforts; at the same time, these insights gathered by the evaluation can be turned into new development and policy concepts and interventions.

3. Performance evaluation of regional development activities

Within the context of new types of regional policies and development activities some attention has been paid to the development of new types of evaluation methods and frameworks to support the management of regional development activities. According to Aranguren, Magro, and Wilson (2017), a growing need remains for performance evaluation because the complexity of contemporary policies highlights the challenges in existing evaluation frameworks and processes. One of their main findings is that explicit demand for evaluation and the existence of surroundings where politicians, other societal stakeholder members and researchers can meet frequently are important elements if evaluation is to be transformative (Aranguren, Magro, & Wilson, 2017). In her 2001 study, Diez explored the value of the traditional, objective and quantitative models and methods of evaluation when applied to regional innovation and cluster policies. In her study, the opinion was that classical evaluation models, based on the quantitative analyses and/or value of money studies, did not adapt to the specific characteristics of this new generation of regional policies and proved to be of little use for evaluating these policies. Diez (2001) also examined regional innovation and cluster policies, their characteristics and their evaluation, and identified the following most problematic elements that must be overcome when seeking and developing new frameworks and methods to evaluate regional development activities:

- Intangible objectives, the complexity of cause–effect relationships and systemic nature;
- At a horizontal and vertical level, embeddedness, dynamic and flexible processes and the region as an active subject.

Table 1 presents the challenges, characteristics and evaluating proposals of the study of Diez (2001). The dashed line box highlights the focus of the performance evaluation framework presented in this stud

Table 1. Matching regional policies to evaluation approaches (Diez, 2001).

Characteristics	Challenges	Evaluating proposals
Innovation is a complex interactive process where continuous feedback is produced	There is no linear causal relationship between resources, activities, results, effects and regional impact	What is needed is a holistic approach and the application of naturalistic, qualitative and interrogative techniques
The objectives of the policy are the creation of knowledge, learning and capacity building	Well-defined objectives do not exist and there are numerous difficulties in quantifying effects and identifying measuring indicators	Qualitative information is the most suitable and useful tool for estimating the effects of individual and institutional learning
Systemic nature: at a vertical and horizontal level	Complex interactions are produced between the different regional subsystems and effects at different levels: companies, institutions, regional community	Case studies as a method of observation and analysis
The policies are firmly rooted in their context and embedded in their socio-economic framework	It is necessary to know and understand the cultural and political context in which the evaluation develops	Social, cultural and political elements are an integral component of the evaluation. Evaluation is a socio-political process
Innovation policies are dynamic processes where continuous interactions are produced	Evaluation must be an active-reactive-adaptive process in relation to changes in conditions (context) and the needs of stakeholders	Evaluation design must be dynamic and flexible
Policies are designed via a bottom-up approach and with the active participation of all the regional actors	Evaluation must be opened up to the different actors involved and must recognize the existence of a pluralist society	The participation of the actors involved must guide the evaluating design. Evaluation is a collective learning process

From the different viewpoints and according to other scholars related to evaluation (for example, among the researchers of performance measurement) the role of the participatory evaluation and involvement of the stakeholders and personnel of the target organizations have been recognized (e.g., Ukko, Tenhunen, & Rantanen, 2008). Participatory evaluation and involvement of the stakeholder groups start out by recognizing that designing the evaluation frameworks and methods develops within multidimensional contexts and society, and allows the frameworks to be built upon the aims, values and goals of all the participants at all phases and throughout the entire evaluation process (Diez, 2001). The approach of the participatory evaluation in the context of designing and building the evaluation frameworks and methods has not been actively used to support the evaluation of regional innovation and development activities. Diez (2001) argued that important weaknesses related to evaluation are that the new types of regional policies pay insufficient attention to designing mechanisms and structures that allow later evaluation of these policies.

The performance evaluation framework and design process presented in this study highlights the participation of the actors involved in the regional development processes between university, industry and public-sector organizations. The designing and building of the performance measurement system is seen as a collective learning process between participating organizations, which is suggested as an element for the evaluation proposals presented in Table 1. Kuhlmann (2003) stated that the use of a performance evaluation as a mediation tool, which does not hinder the different perspectives and viewpoint of organizations, but makes the different interests visible, can provide new perspectives to policy planning. Kuhlmann (2003) added that conducting performance evaluations to mediate stakeholders' viewpoints will not generate radical changes to innovation and research policies; however, the practical level implementation of radical changes can be supported by mediation underpinning the learning capabilities of the participating organizations. The involvement of the participants to the performance measurement design process also provides possibilities and surroundings for interactions between participants, which is seen a part of innovation policies and their dynamic processes. Further, the involvement of the participants in the performance measurement design process opens the evaluation for all actors and stakeholder groups.

The literature on performance measurement recognizes the trends towards inter-organizational work and regularly calls for research on performance measurements in collaborative organizations (Bitici, Garengo, Döfler, & Nudurupati, 2012). The regional development and innovation activities are a collaborative infrastructure that performance measurements can be used to support on the one hand, and ask for more empirical evidence and understanding on the other hand. Bitici et al. (2012) presented a question related to the evaluation of challenges, theoretical and practical, associated with systems of collaborative organizations, where the act of collaboration creates an additional dimension of complexity: How do we concurrently manage the performance of the collaborative organization while also managing the performance of the participating organizations as a complete system? Their review (Bitici et al., 2012) identified three principle challenges that the performance measurement research community needs to address:

- understanding performance measurement as a social system,
- understanding performance measurement as a learning system, and
- understanding performance measurement in autopoietic networks.

In summary, evaluation is becoming an important and integral part of regional development and regional policies. Because evaluation serves as an additional policy element in its design, build, implementation and development (Diez, 2001), it is important to create conditions between academics, politicians and other regional stakeholders that enable the development of mechanisms for participative, qualitative and contextual evaluation.

4. Research design and methodology

Since existing literature on the evaluation of regional policies lacks models for the design process, this study presents a framework for designing and building of a performance evaluation system to support the management of such infrastructures using university–industry collaborations as an

example of regional development activities. The conceptual framework has been developed by establishing an understanding of the key concepts (e.g. stakeholder involvement and defining the aims of regional development programmes) to define how to design a performance evaluation system that can support the management and evaluation of regional development activities at the operational level.

This paper provides insights from two Finnish case studies from European regional development activities established between university research units and private and public-sector organizations operating in the same regional area. The Finnish strategy for regional development is linked to the Europe 2020 programme, which is a long-term programme for achieving socioeconomic growth, the main objective of which is to strengthen and develop the economies of all member states (Stec & Grzebyk, 2018). In terms of the big picture, the regional development priorities in Finland are as follows: (1) growth through renewal, (2) vitality through regional networks, and (3) wellbeing through partnerships (Ministry of Economic Affairs and Employment of Finland). Southern Finland will use the structural funds to diversify its economic structure and increase the number of growing, innovative and internationalizing organizations located in the region. For example, SMEs are supported in developing their growth potential and new business, in specialization and increasing their network-like cooperation (Structuralfunds.fi, 2018). More precisely, the empirical part of the study is executed in the Päijät-Häme region, which is recognized as a regional eco-innovation cluster, having variety of educational institutions, local innovation centres and business parks in the region (Cooke, 2008; Panapanaan, Uotila & Jalkala, 2014). A main part of Finland's future competitive advantage is suggested to be high level knowledge, research and development skills (Structuralfunds.fi, 2018). As such, university–industry collaborations are under high societal expectations, also in the context of regional development. Finland thus provides an interesting context for this study.

As a methodological framework, this study builds on two longitudinal, qualitative case studies. According to Yin (2003) and Meredith (1998), case studies can be utilized to explore and understand emerging and contemporary phenomena in real-life contexts. The researchers were motivated to utilize case studies as a background for this study to gain an empirical, real-life understanding of the performance measurements of operational-level regional development activities. Voss, Tsikriktsis and Frohlich (2002) stated that case studies can be utilized to generate an in-depth understanding and to capture the context of the explored phenomenon in much more detail.

The case study method can also be considered an approach that enables researchers to apply various quantitative and qualitative methods, such as conducting interviews or using questionnaires to explore different phenomena (Gummesson, 2000). When developing the performance evaluation framework presented in this study, the researchers were able to gather empirical data from the two large longitudinal cases presented below.

Case 1

The aim of the regional development and research project in Case 1 was to develop and support the competitiveness and innovativeness of regional organizations by transferring the knowledge and know-how produced in the university setting to participating organizations. Twenty researchers participated in 13 different cases during the project which took place from 1 January 2011 through 30 June 2014. During that time, 227 organizations participated in projects in different cases and work packages. The data gathered from Case 1 is based on different workshop observations, individual and group interviews conducted during the project, feedback and surveys gathered, and the researcher's personal observations. Table 2 presents details of the most important cases and work packages for the data collection.

The data and empirical evidence from the project for this study were gathered and analysed from the viewpoint of the evaluation and measurement of the project. For example, what are the challenges related to the evaluation of such activities and how could the evaluation frameworks be designed and built to support the management of the project? The data were analysed through the cooperation of three researchers. Qualitative content analysis and quantitative analysis were conducted to analyse the data gathered from the different cases. Qualitative content analysis was performed to analyse the individual and group interviews, workshop observations, field notes, memos and drawings. Quantitative analysis was conducted to analyse the results gathered from surveys arranged in the different cases. From these analyses, the researchers made patterns related to the current challenges of performance evaluation and measurement of university–industry collaboration in the context of regional development. During the analysis phase, research triangulation and data triangulation were used to validate the findings. Data triangulation, based on data from different cases, was used to increase the understating of the explored phenomenon from different viewpoints. Research triangulation was used to increase the number of experts to analyse and interpret the findings and to avoid possible biases related to single-observer analysation.

Figure 1 presents the challenges related to performance evaluation and measurement in university–industry collaboration in the context of regional development, which is discussed in the following chapter.

Table 2. Main sources for data gathering from Case 1.

Case/Work package	Target of development	Data gathering
Establishment of regional innovation network including 30 SMEs	Innovation network was established to support long-term innovation activities of participating organizations and establish the innovativeness of the whole region Industrial organizations' contemporary performance measurement practices and challenges were explored as a part of the collaboration activities (for more information, see Rantala and Ukko, 2018).	- Interviews with participating members from industry organizations in the building phase of innovation networks - Workshop observations during 10 workshops - Feedback gathered after each workshop - Interviews with the participants during the evaluation phase of the collaboration

Development project with public dental healthcare organization	The results were gathered during the research and development project with a public dental health care organization whereby the performance measurement system for the university–public organization collaboration was collaboratively designed (for more information, see Rantala, Ukko, and Rantanen, 2018).	- Group interviews with the steering group/management team; four semi-structured interviews, which lasted 2.5 hours on average. - Workshop observations during three workshops with the mangers and personnel of the public sector organization - Survey arranged after the workshops for all participants from the public dental healthcare organization (21 persons)
Development project of city centre area	The development of a local city centre area. Because of changes in shopping and trading behaviours, the city centre area suffered from the loss of customers and people. Therefore, area entrepreneurs, property owners and event organizers worked in a participatory process with public servants to design the future of the city centre (for more information, see Konsti-Laakso and Rantala, 2018).	- Field notes from individual meetings with the management team of the process during the working phase of three workshops - Group discussions, notes, drawings, photos, videos, recorded interviews, feedback after the workshop (3 workshops, 43-65 participating organizations)

The regional development and research project in Case 2, which was conducted from 1 December 2014 to 31 May 2018, was established to continue the regional innovation and development support activities started in Case 1 between the university and other regional organizations. The structure of the development project was divided into three different work packages: the first focused on concretizing and facilitating regional development/experimental platforms, the second focused on the systematic development of new types of value networks, and the third focused on supporting and facilitating start-up and student entrepreneurships. As a part of the whole development project, a performance evaluation system was designed and built to not only support the management of the whole collaboration but also evaluate the performance of participating organizations as part of the project. By utilizing the evidence and experiences gathered during the regional development project in Case 1, members from the participating organizations and university (project manager, case managers, individual researchers) designed and built the performance evaluation system in three collaborative workshops. The empirical level evidence to support the presented framework in chapter five was gathered during these workshops and later during the whole development project. Table 3 presents the data gathered from Case 2 in more detail.

Table 3. Process of data gathering from Case 2.

Phase of the performance evaluation system building	Aim of the phase	Data gathering
First phase (first workshop)	In the first phase of the performance measurement design process, development perspectives and development targets were defined to each work package and each organization: • What are the objects, processes, structures, etc. that the project seeks to influence and which, if successfully reached, will lead to the desired results for work packages and the whole project? • The perspectives and measures through which the goals of the project are achieved.	- Workshop observations (around 15 participants) - Feedback gathered after the workshop
Second phase (second workshop)	In the second phase of the performance measurement design process, the methods used to evaluate the selected perspectives and development targets were defined for each perspective: • How can the selected perspectives and development targets be evaluated and measured? - Indicators - Surveys - Quantitative and qualitative assessment - Ex: Number of events, number of participating companies, increased turnover, increased co-operation, increased learning, increased occupational wellbeing	- Workshop observations (around 15 participants) - Feedback gathered after the workshop
Third phase (third workshop)	The third phase of the performance measurement design process defined the collector of data, the information to collect, to whom the information is reported and who will benefit from it for each evaluated item: • Who collects the information? - Named person - How is the information reported? • Where and when is the information collected?	- Workshop observations (around 10 participants) - Feedback gathered after the workshop

Qualitative content analysis was conducted to analyse the data gathered from three workshops. Workshop observations and feedback gathered after each workshop from university members and participating organizations were used in the analyses which focused on the design and building of

the performance measurement system in the explored context. From these analyses, the researchers explored how the involvement of the members of participating organizations in the performance measurement affected their understanding and interest in the development project at different levels (i.e. individual, organizational and regional). As in Case 1, research triangulation and data triangulation were used to validate the findings. Data triangulation, based on data from three workshops, was used to improve the understating of the explored phenomenon from different viewpoints, and research triangulation was used to increase the number of experts to analyse and interpret the findings and to avoid possible biases related to single-observer analysation.

5. Performance evaluation framework to support regional development at the operational level

The evaluation of regional development and innovation activities should form the basis not only for the support but also for the evaluation purposes of the individual organizations and their roles in regional development. As presented earlier in this study, when universities and industrial, public and third-sector organizations participate in regional development activities, they each have specific goals and wishes related to those activities. The organizations typically pursue regional development activities for different projects and working packages (Figure 1). Even though this kind operationalization of regional development programmes is attractive to the organizations because it allows them to execute activities related to their interests, it creates barriers to their understanding of regional development at the 'big picture' level. The empirical evidence gathered from three cases during Case 1 (presented in Table 2) reveals that university members and participating organizations were both predominantly unaware of the connections between the different funding streams and regional development programmes (see Challenge 1 in Figure 1). The results gathered from Case 1 also reveal that university members operating in these regional development activities seemed to be more aware of the aims and goals of the different funding streams, while other participating organizations seemed less aware (see Challenge 2). Finally, the empirical results from Case 1 reveal that organizations participating with universities in these regional development activities were also unaware of the actions pursued in other work packages.

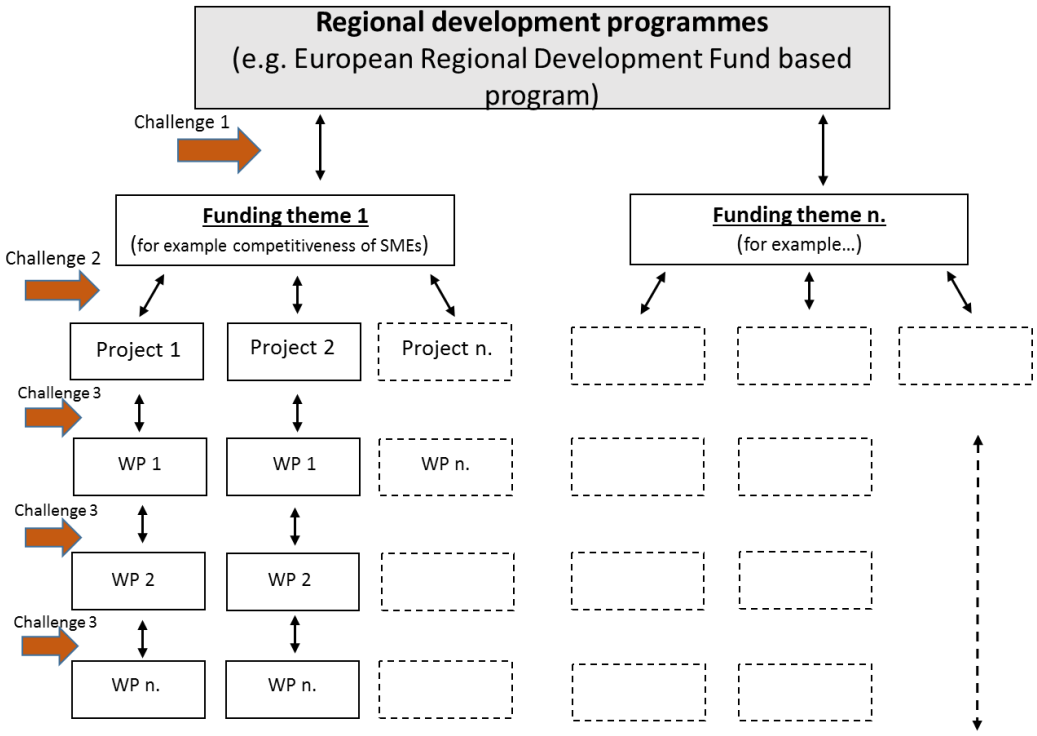

Figure 1. Challenges related to evaluation of the regional development programmes.

The presented framework and process model for designing and building performance evaluation systems for regional development activities between university and public and private sector organizations involves participants from the universities and other participating organizations. In addition to the empirical evidence gathered during the two case studies, the presented framework is developed based on previous literature regarding performance measurements, university–industry partnerships and evaluations of regional policies and development (Albats, Fiegenbaum, & Cunninghmam, 2017; Bishop et al., 2011; Bitici et al., 2012; Diez, 2001; Pecas & Henriques, 2006; Perkmann et al., 2011; Perkmann & Walsh, 2009; Ukko et al., 2008; Zabala-Iturriagagoitia et al., 2008).

5.1. Defining the aims and roles of the regional development project

At the big picture level, and in general, regional policies are divided into smaller pieces, i.e. regional development programmes that are executing the policies in practice. Regional development projects are usually funded from different sources or funding calls through which the regional development programmes are executed. Universities and industrial and public-sector organizations usually participate in regional development activities through these development and innovation projects. Each of these projects has its own goals and aims that are linked to the funding

stream. In addition, each of these funding streams have their own goals that are linked to the aims and goals of the regional development programmes with the aim of executing regional policy.

The empirical evidence from Case 1 (presented in Table 2) and Case 2 (presented in Table 3) reveals that both university members and participating organizations face challenges (Challenge 1) in understanding how the aims and goals of the funding sources are linked to the regional development programme. The results gathered in Case 1 suggest that the university members seem to be aware of the aims and goals of the different funding streams that fund their projects, but the participants from the industry and public sector organizations miss the connections between operational-level activities, themes and aims, and their funding themes. Therefore, the first phase of the performance evaluation system design process should define and clarify, together with the participating organizations, how the regional development activities at the operational level connect to the funding source and to the regional development programme. Defining the links between these infrastructures increases the participants' understanding of the development activities, thus overcoming Challenge 1.

To outline a project's connection to other funding themes and regional development programmes, the aims, wishes, roles and responsibilities of the participating organizations should be carefully defined during the first phase of the process. All participating organizations have specific expectations towards the project that should be defined in this phase to make sure that they align with the aims and goals of the entire project. The empirical evidence gathered in Case 1 indicated that the participating industrial and public-sector organizations were unfamiliar with the goals and aims of the funding themes and the development project's connections to the funding theme (Challenge 2). This evidence also suggested that the university researchers are more aware of the aims and goals of the funding stream; thus, defining this connection increases the understanding and learning of the participating industrial and public-sector organizations.

In this phase, the aims and goals of the industrial and public-sector organizations, as well as university members participating in individual work packages, should be precisely defined and clarified. The empirical evidence gathered from Case 1 (first and second cases in Table 2) shows that even though industrial and public-sector organizations are participating with universities in these regional-level research and development projects, they are pursuing these activities as individual work packages or tasks. For that reason, they seem to be aware of the aims and goals of the work package in which they are participating, but they are unaware of the operations, aims and tasks that are pursued in other work packages. For that reason, clarifying and presenting the aims and goals of the other work packages can increase the regional-level understanding of participating organizations and support, thus overcoming Challenge 3.

5.2. Construction of the measurement system

After defining and clarifying the aims and roles of the participants and the aims of the entire project, the next step involves determining the purpose and construction of the evaluation system. The performance evaluation system in university–industry regional development collaborations can be used for several different purposes, which include steering the actions of the development

project, evaluating the ongoing processes, making the results visible and supporting learning among participants.

As presented above, regional development and innovation projects are often divided into individual work packages or tasks. In university–industry collaborations, these projects are usually managed by the universities (participating organizations are not interested in handling bureaucracy) and the industrial and public-sector organizations are the participants. During the first phase of constructing the measurement system, critical success factors and measures for each work package should be defined and should reflect the aims and goals of the university members and participating organizations. As each organization has its specific interest towards the regional development activities, these interests should be noted and evaluated. After each organization has defined and clarified their motivations for participating and determined measures for evaluating such activities, the success factors and selected measures should be introduced to other participants to increase understanding of the other work packages and other participants' goals and actions. This supports cross-learning between participating organizations and helps to overcome challenges in understanding the operations pursued in regional development projects (Challenge 3, Figure 1).

After designing the measures for each work package and for the whole development project, the defined and selected measures should be connected to the aims and goals, as well as to the measures of the funding streams and regional development programmes. Even though individual projects and work packages may (and should) have their own goals and measures, the development operations and measurement activities pursued in these projects should accord with the aims and goals and with the measurement of the regional-level funding and development programmes. In other words, the achievement of the operational level aims and goals should also fulfil the achievement of the regional level aims and goals. When regional level policies and development activities are executed in individual research and development projects, the achievement of the projects goals should also lead to a situation in which the regional level aims and goals are achieved, meaning that the operational-level measures and measurement activities should accord with the 'upper-level' aims, goals and evaluation.

After a suitable number of measures have been selected for the evaluation system, the next phase of the construction involves defining the data gathering and the person or team responsible for the measurement. For each measure, there should be meaningful tools or channels to gather data and information, and there should be someone interested in the gathered information. All participants should together define how the data are gathered for the selected measures and who is responsible for gathering the data. The empirical results gathered from Case 1 (presented in Table 2) revealed that the operational-level performance evaluation of the regional development projects between university and public and private sector organizations are mainly pursued by university members (usually by the university project manager). These gathered results are usually reported to other participants in steering group meetings that often include participants from other organizations. However, to support the learning and understanding of regional-level development activities, the performance evaluation activities should involve more than only one or two people, and should thus include members from all participating organizations (university, industrial and public organizations, and financier delegates).

5.3. Implementing and updating the measurement system

After constructing the performance evaluation system, the next phase of the process is the implementation. The system can support the management and learning purposes of the regional development project only if it is in active use. Implementation can be defined as a phase in which the constructed systems and frameworks are transferred into practice. Some refining of the constructed evaluation system can also be done during the implementation phase. As the forms of regional development evolve naturally during the projects, this may lead the performance evaluation system to diverge from its original purpose. It is therefore necessary to update the evaluation system during the project. Selected measures should be regularly revised, and measures that have turned out to be insignificant should be removed.

Figure 2 summarizes the process for designing and building a performance evaluation framework to support the regional development between universities and other regional organizations.

As a summary of the empirical evidence gathered from the performance measurement challenges in Case 1 (i.e. the university–industry innovation networks, the performance measurement design in university–public organization collaboration, and the evaluation of community engagement in urban development) and from the performance measurement system design process in Case 2, the university members and participating organizations have difficulties understanding not only the connections between individual operational level research and development activities but also their connection to development at the regional level. The empirical evidence gathered in Case 2, however, shows that the involvement of the members by all participating organizations in the performance evaluation design and building improves the participants' understanding of the interplay between the development project and the regional level development goals. The results gathered from the three different workshops, where the performance measurement system was collaboratively designed and built, also shows that an increased understanding of the aims and goals of the development activities at the regional level increases the participants motivation towards developing and achieving the projects' goals at the regional level. As such, the empirical results gathered from the two cases indicate that involving participants in the design and building of performance measurement and evaluation systems in university–industry collaboration in the context of regional development, increases participants' understanding of the connections between the following context specified challenges:

1. Challenges in understanding the connection between different funding streams and regional development programmes;
2. Challenges in understanding the connection between operational-level development projects and funding streams;
3. Challenges in understanding the connection between individual, operational-level work packages.

The increased understanding of the interplay between individual development activities and regional level development, in turn, increases the participants' motivation and interest in the regional level development.

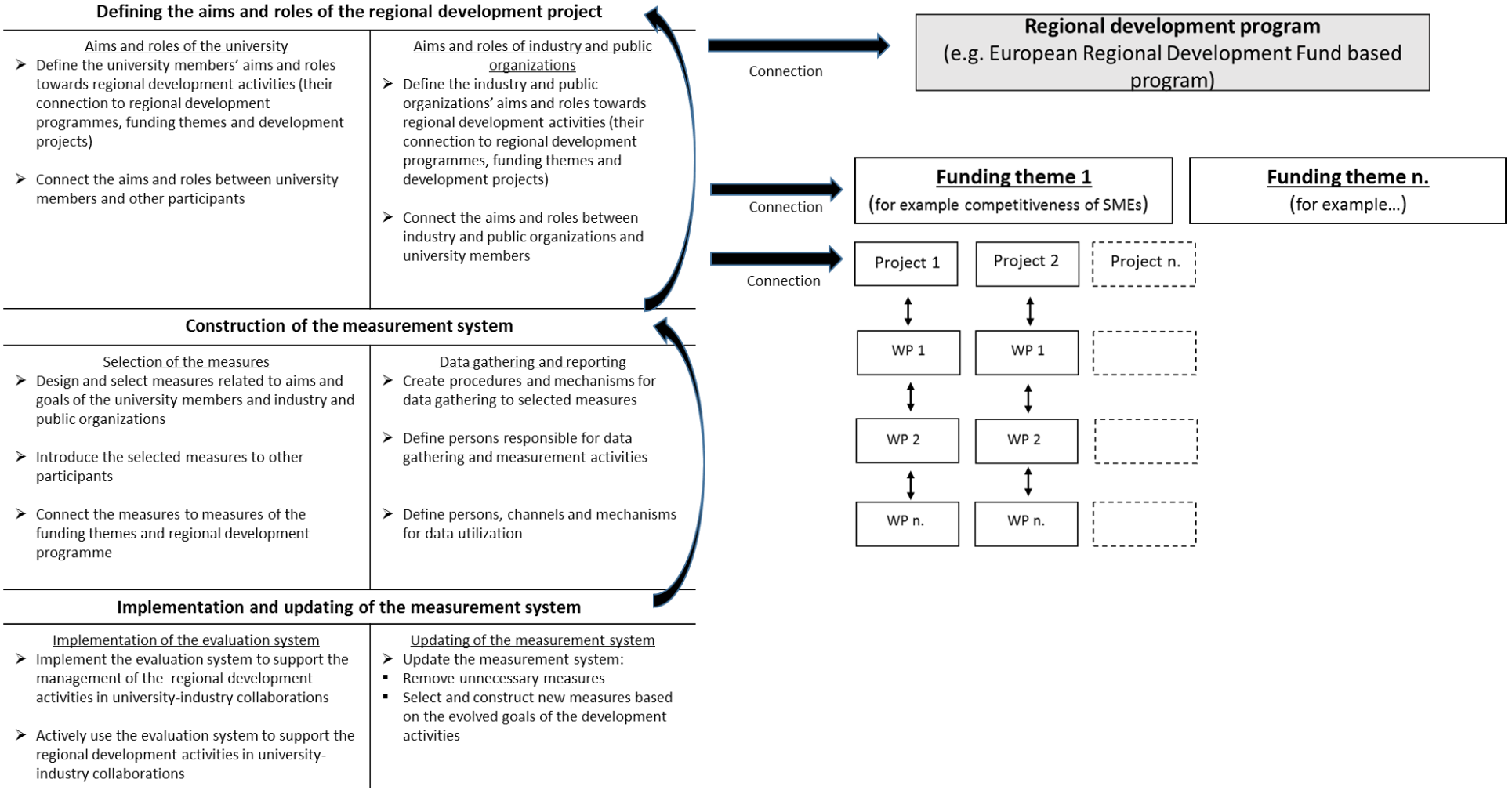

Figure 2. Performance evaluation framework to support regional development activities

6. Discussion

This study presents a framework for the design and building of a performance evaluation system to support regional development. The phenomenon was explored through operational-level regional development activities pursued between a university and private- and public-sector organizations. The results of this study reveal that even though different approaches have been suggested to evaluate regional development (e.g. Zabala-Iturriagagoitia et al., 2008; Schmiedeberg, 2010; Aranguren et al., 2012; Aragon et al., 2014), a lack of understanding remains among the university members and the private- and public-sector organizations about the connection between operational-level development activities and regional-level policies. It seems that both participating sides are more interested in their own aims and goals and in the collaboration between the participants than in the development at the regional level. As such, it seems that, currently, universities and public organizations are pursuing development activities at the operational level, and the vital research and knowledge produced by universities are transformed to support the innovation and development activities of the participating organizations. For that reason, the organizations' activities are evaluated mainly at the operational level. However, because meaningful knowledge and economic welfare are important aspects for the development of the whole region in the long run, the operational-level development activities should support and execute the aims and goals of regional-level development programmes and policies (Smits & Kuhlmann, 2004), and the university and industry participants' interests should meet the development goals at the regional level. The results of this study indicate that by connecting the operational-level research and development activities to regional level development programmes and policies, and by increasing the understanding of the interplay and links between them, the performance evaluation framework presented herein increases participants' motivation and interest in the development at the regional level. As such, the design, building and use of the performance measurement system increases the dialogue between participants and provides surroundings in which the stakeholders have possibilities to meet frequently, interact verbally and form an understanding of the development activities, which have been suggested (Aranguren, Magro, & Wilson (2017) as important elements for the evaluation to be transformative. Thus, the presented framework also supports the findings of Kuhlmann (1998) and Diez (2001), which showed that the common learning process makes it possible to create an environment in which the evaluation process can be used to build trust among participating organizations and other stakeholder groups.

The empirical results of this study, and the presented performance evaluation framework, support Diez's (2001) idea that new regional policies must be jointly designed by all regional stakeholders and should be extended to the evaluation process. The results of the study are also in line with Kuhlmann (2003), who presented that the evaluation processes in the context of regional development can be used as a mediation tool that does not hinder the different perspectives and viewpoints of participating organizations, but rather deliberately makes different goals and viewpoints visible, thus providing new perspectives to policy planning. Even though the empirical results of the study show that universities and private and public-sector organizations are mainly interested in operational-level regional development, rather than development of the policy's 'big picture', the suggested performance evaluation framework connects the operational-level activities

to upper-level development tasks and goals. Thus, the suggested performance evaluation framework can be considered as an option to Aragon's (2014) findings which suggested that it is particularly important to find evaluation frameworks that are not only suitable but also contribute to the cooperative basis of the policy itself.

Finally, as performance evaluation is becoming an increasingly important and integral part of regional policies and development, and it will form a part of the policy as one more element in the design, build, implementation and development process (Diez, 2001), operational-level feedback gathered from performance evaluation activities could be more effectively used for planning long-term development programmes. The results of this study accords with Kuhlmann (2003), who presented that mediating stakeholders' perspectives by conducting evaluations will not bring revolutionary changes in research and innovation policies, but the practical implementation of radical changes can be greatly supported by mediation underpinning the learning capabilities of the participating organizations. The evaluation of operational targets and goals could be seen as upper-level design mechanisms, as presented in Figure 3.

As this study focused on the performance measurement activities at the operational level, and the results indicate that the involvement of the participants in the performance measurement processes increases their interests and motivation towards development at the regional level, further studies could develop and provide more insights regarding the surroundings in which financier delegates and decision makers have involvement in these evaluation processes. It is not only operational level developers that can learn from the evaluation activities; policymakers can also learn from their interventions by evaluating the results and outcomes of their efforts. At the same time, the insights gathered by the evaluation can be turned into new development and policy concepts and interventions (Smits & Kuhlmann 2004).

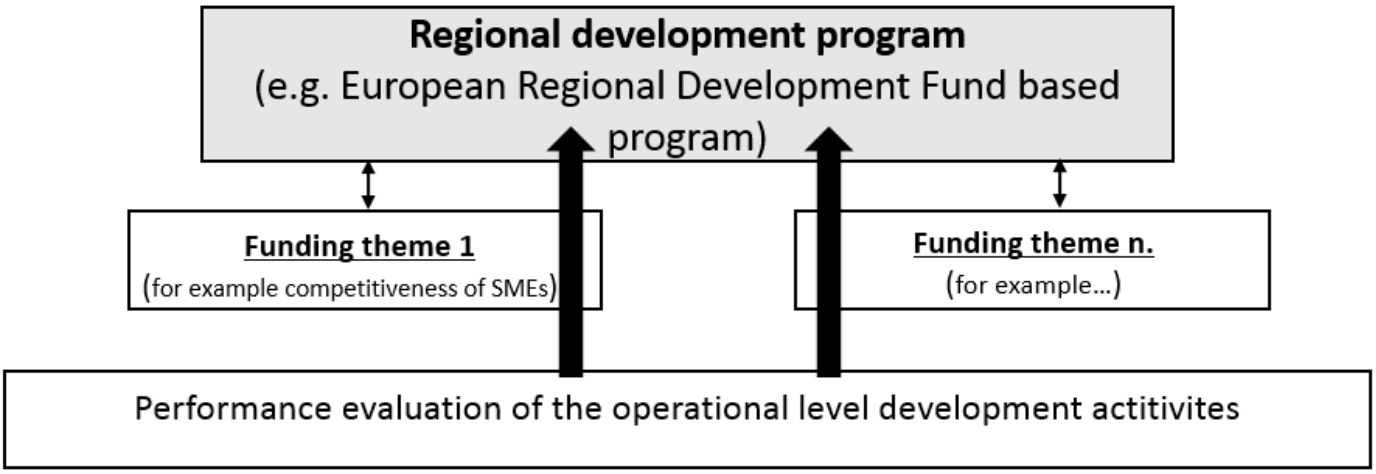

Figure 3. Connection between operational level evaluation and regional level development

7. Conclusions

The evaluation of new types of regional policies and regional-level development activities pose challenges for such infrastructures. Although existing literature highlights the need for new evaluation methods to support the management of such collaborative actions, procedures for the design of evaluation frameworks in such contexts are lacking. This study presents a framework for the design of a performance evaluation system for regional development projects using university–industry collaboration as an example. The presented framework highlights involving the organizations participating in regional development activities in the evaluation activities. The involvement of the organizations in the design and construction of the performance evaluation systems can increase the understanding related to the performance evaluation of regional development, making it possible to use the evaluation system to support the learning and understanding of the participating organizations.

Instead of focusing on feasibility or introducing individual measures, the presented framework aims to connect the operational level development activities to larger regional level development programmes. As such, the process model can be utilized as a framework by the participating stakeholder groups in designing and building a performance measurement system, or as a complementary tool to traditional quantitative evaluation techniques that external evaluators are utilizing.

The results of the study show that university–industry collaborations are pursuing regional development programmes and policies mainly at the operational level. For that reason, the performance evaluation activities of the participating organizations relate mainly to operational-level development activities. However, involving the participating organizations, both university and industrial, in the performance measurement process could help to overcome the participants' understanding of the connections between the following three challenges, which are characteristics in university-industry collaboration:

1. Challenges in understanding the connection between different funding streams and regional development programmes;
2. Challenges in understanding the connection between operational-level development projects and funding streams;
3. Challenges in understanding the connection between individual, operational-level work packages.

Overcoming these challenges and increasing the participants' understanding of the development at the regional level increased their interests and motivation to achieve the development goals at the regional level. As such, the performance measurement process in university–industry collaboration in the context of regional development can generate surroundings in which operational level participants are more deeply involved in regional level development.

As this study focused mainly on involving the participants of university–industry collaboration in the performance measurement process, and improving the understanding of the links and interplay between the operational level development programmes and regional level development, future

research should explore what actual effects can be achieved by increasing the participants' understanding. Further, as this study focused on a performance measurement design process between university and industry organizations, future research should determine how financier delegates and decision makers and/or politicians could be involved in these operational level performance measurement processes, in which cases this might be reasonable, and what might be the positive and negative sides of the involvement. Finally, even though universities usually act as facilitators or brokers in the collaboration activities between universities and other societal organizations, the results of the study indicate that they are motivated by their own interests and are not particularly aware of the development at the regional level. Thus, further research should examine how operational-level feedback gathered from performance evaluation activities could be used more effectively for planning long-term development programmes, and investigate how universities should develop their policies and incentives to promote regional development.

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