Measuring the human element in cluster evaluation: evidencing collaborative dynamics

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Abstract

There is a general acceptance that social capital and trust are critical for effective cluster development. While this behavioural additionality forms the central rationale for cluster policies, it remains poorly captured in evaluation. This paper explores progress in evidencing the 'human element' in cluster performance.

The paper describes a long-term process of collaboration between academics, cluster policy-makers and cluster practitioners, which has brought together theory and practice to co-design new approaches to improve cluster policy evaluation. This addresses gaps in evaluation practice by exploring how the human elements that are intrinsic to effective collaborative dynamics can be better understood and evidenced. It explores how to define different aspects of the human elements that underlie collaboration, and how to evidence and track the strengthening of those elements. It has implications beyond cluster evaluation given the importance of multidisciplinary and collaborative research programmes for the engaged university.

Specifically, the paper offers a unique combination of theoretical and practical knowledge to bridge gaps in cluster evaluation practice through: (i) a definition/scoping of the human elements central to the collaborative dynamics for clusters in practice; and (ii) the development and testing of a survey tool to track progress in human element/cluster dynamics in cluster initiatives. It articulates a definition of the human elements and reports on initial testing of indicators through a pilot process that is proving useful for policy makers and cluster managers, providing information to inform the the strategy and operational activities of the collaborative initiative.

Keywords

Cluster evaluation, human element, co-design

1 Introduction

Evaluation of clusters and cluster policies is a complex field. As interest in clusters has grown, the need for effective evaluation has also risen, both to be able to show the return on investment from such initiatives and to learn how cluster dynamics can be improved. Cluster measurement and evaluation, however, has often been a source of frustration, especially among policy makers, who struggle to properly capture the impact of their investments in cluster interventions. Cluster policies usually provide an 'indirect' investment in institutional capacity and social capital that is designed to enable other, more directly outcome-oriented activities to be more effective. Following Wilson (2019: 374), "it is the desirability of cooperative dynamics... supporting the construction of the different dimensions of social capital, that provides the distinctive and unifying theoretical rationale for cluster policies". While this 'behavioural additionality' forms the central rationale for cluster policies, it remains poorly captured in evaluation.

Current evaluation approaches predominantly focus on evidencing final outcomes and impacts, using the individual firm as the unit of assessment. They therefore add up performance (often focused on economic indicators such as jobs, turnover etc.) to give a collective cluster measure, when in fact the basis of clustering is the additionality of working in a collaborative way (what can firms/organisations do to together that they cannot achieve alone).

This paper contributes to addressing gaps in evaluation practice by exploring how the human elements that are intrinsic to effective collaborative dynamics within clusters can be better understood and evidenced. It builds on a long-term and on-going process of collaboration between academics, cluster policy-makers and cluster practitioners, which has sought to bring together theory and practice to improve cluster policy evaluation (Smith et al, 2020). Through regular workshops and meetings, the issue of evidencing the benefits of cluster collaboration emerged as a key barrier holding back practice. It led to reflection, experimentation and concrete actions which have helped to answer questions such as *how to define different aspects of the human elements that underlie cluster collaboration*, and *how to evidence and track the strengthening of those elements over time*.

This paper articulates how this process has progressed from identification of the problem, through a process of conceptualisation, to design of a practical survey tool to be used by cluster policy makers. It reports on initial testing of that tool in two different contexts (Scotland and the Basque Country) to explore whether the results generated are usable for the clusters concerned and could provide the basis for a generalizable tool suitable for comparative studies across multiple clusters. The paper therefore contributes through a unique combination of theoretical and practical knowledge to bridge gaps in cluster evaluation practice by offering:

(1) A definition/scoping of the human elements central to the collaborative dynamics specific to clusters in practice; and

(2) The development and testing of a survey tool that can track progress in human element/cluster dynamics in cluster initiatives.

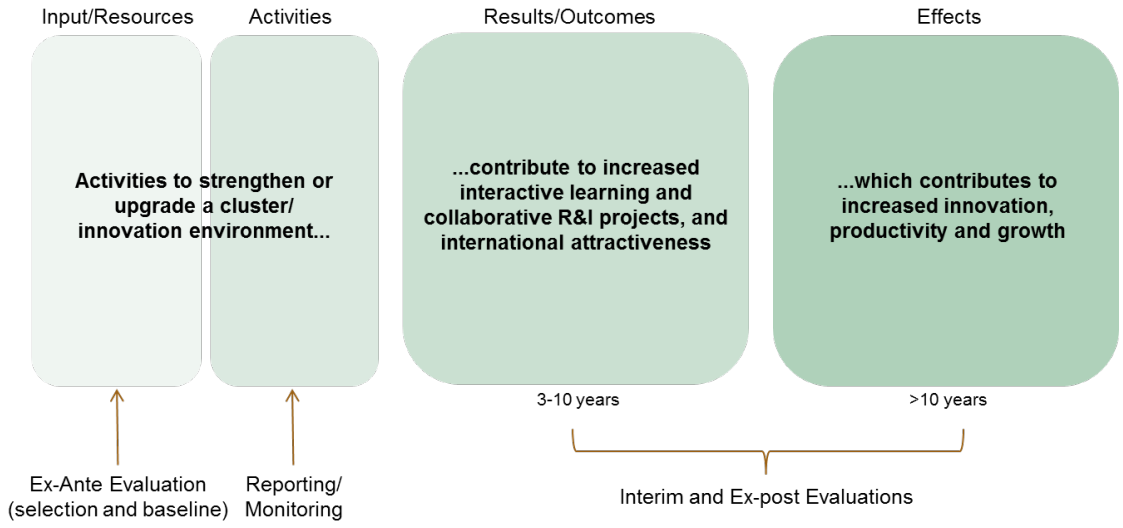
The paper articulates a review of current literature to inform thinking, before describing the approach taken to tackle the challenge, including developing tools for evaluation and testing them in different regions. The results are presented and discussed before conclusions and opportunities for further research are identified.

2 Background and review of literature

Since Michael Porter (1990, 1998) popularised the concept of clustering as a key driver of regional competitiveness, it has been adopted enthusiastically as an intervention methodology to boost territorial performance. Whereas the origins of cluster theory can be traced back to the economics of agglomeration - rooted in Marshall's (1890) pioneering work on industrial districts - the defining feature of contemporary cluster interventions is the conscious pursuit of collaborative endeavours among firms and other agents. Cluster policies, are premised on the additional competitive advantages that can be derived from fostering cooperative dynamics alongside existing localised competitive dynamics.

From almost three decades of international experience implementing cluster programmes, there is an emerging 'generally accepted effect logic' for the policy interventions on which cluster evaluation is based (TACTICS, 2012; Giuliani and Pietrobelli, 2014). The inputs and activities of the cluster programme are oriented to help strengthen or upgrade the innovation and competitiveness environment of clusters. This leads to immediate results, such as increased collaborative R&D or joint internationalisation approaches, which in turn should generate positive effects on regional competitiveness (see Fig 1).

Figure 1: Generalized effect logic of cluster policy



There has long been a widespread acceptance of the key role that social capital and trust play in regional economic development in general (Cooke et al., 2005; Malecki, 2012; Moulaert and Sekia, 2003; Putnam, 2000), and in clusters specifically (Etxabe and

Valdaliso, 2016; Huber, 2009; Malmberg and Maskell, 2002; Staber, 2007). It is social capital –i.e. the development of social interactions between actors– that underpins the effective development of cooperative dynamics within clusters, enabling bridges to be built between different actor groups in the innovation ecosystem. It provides the foundations for mobilizing engagement and linkages that lead to new knowledge, strengthened capacity and collaborative projects to deliver concrete economic advantages. Indeed, the main differentiator between cluster programmes and other innovation and business development programmes is their focus on relationship-building and internal/external behaviours, facilitating the group to do together what they could not do alone, and promoting the benefits of connections and collaborations.

This logic is in line with theories of innovation systems and evolutionary economics, whereby the 'human element' embodied in interactive learning processes is acknowledged drive increased innovation output and productivity, thus strengthening international competitiveness (Cooke and Morgan, 1998; Asheim and Parrilli, 2012). A key objective of cluster policy is to develop and leverage those human elements underscoring effective collaboration within specific industrial clusters, thereby boosting regional innovation, productivity and competitiveness outcomes.

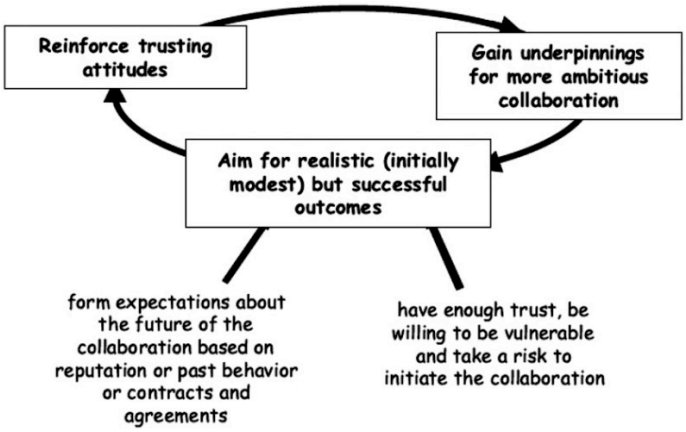
Monitoring and evaluation help understand what is happening across those stages, and to be effective must be capable of evidencing changes in the human interactions and behaviours that build social capital and underpin collaborative dynamics as well as their eventual economic (and other) impacts. Yet experience has shown that tracking this effect logic is not straightforward in practice, and that the human elements (i.e. the behaviours associated with interactive learning and collaboration) in the middle of the effect logic are extremely difficult to capture and to link to the inputs and effects on either side.

There is an emerging body of academic literature that seeks to analyse different dimensions of the relational value generated (or not) within clusters (Aragón et al., 2014a; Choi et al., 2013; Etxabe, 2018; Felzensztein *et al.*, 2018; Giuliani and Pietrobelli, 2016; Graf and Broekel, 2020; Lucena-Piquero and Vincente, 2019). However, there is typically a large gap between the methods and data used in these studies and the potential for more widespread practical application among policy-makers and cluster practitioners. For example, Giulinani et al. (2016) and Calignano and Fitjar (2017) employ social network analysis to evaluate the relationship between cluster policy and inter-organisational networks, while the specific impacts of cluster policies on knowledge networks are the focus of analysis for Calignano et al. (2018), Lucena-Piquero and Vincente (2019) and Graf and Broekel (2020). Despite the view that "the ways the networks of linkages develop are intimately related to results" (expressed in Maffioli et al. (2016: 197)), there is a lack of pragmatic tools to enable understanding of this interplay.

Previous academic work provides some insights into the importance and characteristics of human behavioural elements within clusters from which to build. Gordon & McCann (2000; 2005), for example, develop a 'social network model' of clusters with firms engaging in increasingly higher risk collaboration for mutually beneficial goals, forming

ever-changing inter-firm alliances to innovate successfully, and building trust-based linkages between cluster members. Similarly, from a systems-thinking perspective, Smith and Brown (2009) propose a five-stage conceptual model that helps explain how a cluster develops, based on changes in firm behaviours and interaction at different stages of development. The earlier work of Saxenian (1994) points clearly to the need for "repeated interaction and mutual trust" to foster collective learning and collaboration, and Cohen and Bradford (2017) articulate this as identifying "relationship currencies" only accessible due to productive collaborative partnerships. These arguments that are strongly related to the reciprocal trust building loops that Huxham and Vangen (2005) propose as reinforcing positive behaviour in a cumulative process (see Figure 1).

Figure 2: Cyclical Trust-Building Loops *Huxham and Vangen (2005)*



This resonates with recent writing, identifying success factors in collaborative endeavours within and between firms. Twombly and Schuman (2020) highlight that "collaboration is a risk sharing and resource leveraging strategic behavior … for mutual benefit. It requires an environment of trust, transparency, and respect", and this trust builds as partners engage with positive results.

The significance of what we call human elements is also reflected in arguments around the importance of using mixed methods for cluster policy evaluation (Schiemedeberg, 2010; Aranguren et al, 2014), and in emerging approaches that place more weight on relationships at the centre of clusters (Aragón et al., 2014b; Choi et al., 2013; Etxabe, 2018; Felzensztein *et al.*, 2018; Giuliani and Pietrobelli, 2016; Graf and Broekel, 2020; Lucena-Piquero and Vincente, 2019).

Influenced by this discourse and by the practical need for justifying funding, current cluster evaluation practices often do attempt to collect data on human elements alongside the more standard indicators performance related. However, the types of data collected (and from whom) vary widely, making it difficult to discuss and share learning, to benchmark across geographies, or to conduct more comprehensive analyses for a more robust understanding of the relation between these human elements and other aspects of performance. The lack of a practical, common framework – or elements of a framework–

around which to analyse more intangible components of cluster policies represents a significant barrier to policy learning and improvement.

There is a marked need, therefore, to develop cluster evaluation to capture the less tangible benefits of clustering in a standard and pragmatic way, enabling a more rigorous understanding of the workings (or not) of the human elements in clusters, as well as the possibility to compare and learn across different policy approaches and geographies.

3 Research approach

These challenges, among others, inspired a group of cluster practitioners, policy makers and researchers from around the world to form a working group within the TCI network - the global practitioner network for competitiveness, clusters and innovation (Smith *et al.*, 2020). Building on existing cluster programme effect logics and many years of cluster policy implementation experience across diverse contexts, the group have progressively explored ways to collectively define, categorise and evidence the human elements that underscore cluster collaboration. This has resulted in building new evaluation approaches in the form of a survey tool that can be implemented, tested and compared across different contexts and geographies.

Defining and evidencing the human elements at work in clusters

An early step in the working group process was to articulate what was meant by 'human elements' and to collectively define its different dimensions. Initial discussions captured the ways in which these human elements were experienced within clusters, alongside ways in which researchers and policy-makers were trying to measure progress. These discussions demonstrated a clear understanding among practitioners that collaborative dynamics happen first, and that it is only subsequently that better competitive performance may be generated, creating a clear rationale to capture these early indicators to understand whether the policy is progressing in the right direction. Examples given included firstly stimulating the linkages between different cluster actors (**more** connections with different partners, business to business and research to business); secondly building greater trust between actors which leads to greater investment in collaboration and willingness to take more risks (**deeper** relationships with greater innovation potential); thirdly the positional and reputational benefits of the cluster in corralling actors around common strategies, and articulating those priorities (**leading** the collaborative effort).

Building on previous research on the dimensions and indicators of social capital (Falk and Harrison, 1998; Nahapied and Ghoshal, 1998) and the interaction between various dimensions of proximity (Boschma, 2005; Aragón *et al.*, 2014), and through successive co-design workshops involving academics, policy makers and cluster practitioners (Smith *et al.*, 2020), three practically-framed dimensions to the human elements in clusters were proposed: linkages, levels and leadership.

Linkages (structural dimensions)

- Breadth of engagement and diversity of organisational involvement
- Connections and network ties between actors: both within the cluster initiative and externally
- Interaction and knowledge sharing between different types of actors

Levels (relational dimensions)

- Trust and deeper types of collaboration
- Participating actors' perception of benefits from pursuing joint activities
- Participating actors' commitment to collective action (without guaranteed reciprocity)

Leadership (cognitive dimensions)

- Participating actors' perception of and support for a shared rationale or value proposition for collective action
- Participating actors' perception and support of a shared identity
- Capacity to orchestrate actions among different agents towards common agendas
- Evidence of a shared vision, common identity and wider reputation as well as the development of a credible voice for the collective

Once these three dimensions were articulated, the discussion turned to identifying the characteristics of collaborative dynamics that might be present and the type of indicators and/or changes that would evidence strength. These reflections were informed by a combination of academic/theoretical frames (as mentioned above), existing evaluation experience among the working group, and reflections based around the "Perfect Cluster Framework" designed to act as an aspirational model of cluster growth to help inform strategic discussions within clusters (Smith *et al.*, 2020). Iterationions in twice-yearly meetings led to consensus on the collaborative dynamics generally sought by cluster policies, and the fact that these will develop and mature over time, demonstrating different activities, behaviours and evidence. For example, internal engagement (between cluster members) may shift from simple information and knowledge sharing to strategic collaboration. There may be increased interaction and knowledge sharing between different types of actors, and this enables increased trust and deeper types of collaboration. The success of these collaborative activities over time leads to improved perception of benefits from addressing common goals and greater commitment to collective action. The kinds of indicators that would evidence these changes as the cluster dynamics improve include:

- Internal and external linkages / network ties (*structural*)
  - quantity of new linkages
  - type/proximity of partner(s)

- quality of linkages

› Engagement / trust / commitment (*relational*)

- type of engagement
- level of (company) commitment / reciprocity

› Shared vision and identity (*cognitive*)

- common vision
- collective action
- enhanced reputation
- influencing stakeholders

From these conclusions and using elements of the cluster dynamics model (Smith and Brown, 2009), a framework was explored that describes characteristics of leadership, regional backing, engagement and collaboration at different stages of development. This again was tested and iterated in international co-design workshops involving cluster practitioners, researchers and policy leads. The final step was to develop a survey tool that could be integrated into a firm level survey (as part of cluster evaluation activities). This explored engagement with and perceived value of these collaborative dynamics and human elements from the member's point of view, designed as a practical survey tool providing a simple, common set of questions which can be adapted according to the specific cluster policy context. It is structured in four parts: (A) Basic company/member information; (B) economic data; (C) perceived value of collaborative strength; and (D) collaborative dynamics. Many evaluation surveys incorporate parts A and B. However, parts C and D address the aim of facilitating the understanding (and measurement) of the human element in clusters and as such aim to fill the gap in evaluation approaches. These are described in brief below, together with a description of how the survey was tested within several different contexts.

Part C assesses attitudes and perceptions around shared vision and the value of collective action. This is explored through assessing agreement with statements including:

› We feel we are part of a collaborative effort and identify ourselves as part of the cluster

› We are convinced that working with others provides long-term benefits to our company

› We share a common view with other members of the challenges and strategic objectives of the cluster

Part D drills further into the extent of collaborative activities/projects engaged with over the last 18 months or have planned, with the aim to:

› Improve market intelligence and strategic focus

- Attract or develop talent
- Attract investment
- Develop knowledge/research
- Foster innovation
- Support internationalisation

This section also then explores the perceived value of such activities to the firm (low, medium, high) to assess perceptions on the return on investment in collaboration.

Testing the Framework

At this stage the survey tool was purely a theoretical construct. It was important therefore to test in real world application by integrating the survey into practical evaluations. The purpose of this pilot phase was firstly to test the practicality of the survey tool (i.e. ease of implementation and integration with wider data collection processes), and secondly to test the usefulness of any outputs (both for specific clusters and for potential shared learning between regions). This was a test of change phase, looking at the feasibility and usability of the tool and its outputs.

This pilot test was implemented in Scotland and the Basque Country, where the survey questions were integrated into ongoing evaluations. The extent of use and adaptation varied across the pilot implementing regions, reflecting the different contexts of the policies.. In both cases the use of the survey integrated with larger cluster evaluation processes, looking to capture the value and perceived benefits from cluster members of their participation in collaborative activities within the cluster. In Scotland this was also enhanced to include non-member views, both as a comparator to members, but also to evidence the wider leadership value of the cluster initiative to the wider domain. Survey participation in Scotland involved 54 companies from the food and drink cluster. In the Basque country the survey was completed by 161 members of four cluster organisations (environmental technologies, construction, foundry and habitat/contract). For both pilot areas the focus was on the firms, with other actors (research institutes, public sector partners) feeding into the wider evaluation in different ways.

4 Summary of main results

The key results from the testing of the survey are presented below, together with information on how they were aiming to use the results.

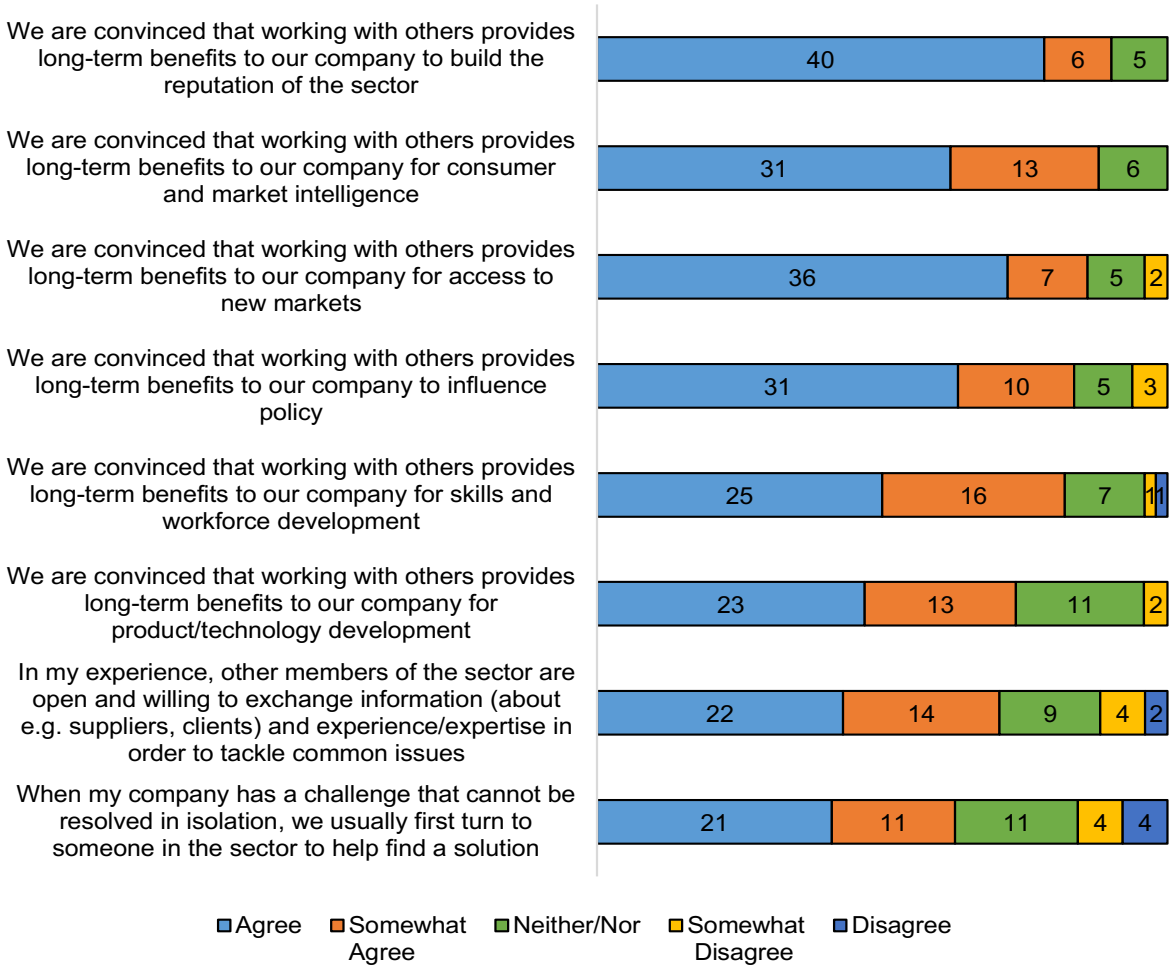
Scotland

In Scotland the tool was tested with Scotland Food and Drink (SF&D) - a key sector for Scotland, with high employment and significant contribution to exports. SF&D is the overarching industry body for the sector, which brings together business, government

agencies, research and trade bodies in a public-private partnership. It is a membership body, but also receives government funding to support its role in building collaboration, establishing a coherent strategy and acting in a leadership role for the whole sector. In 2016/17 an evaluation of SF&D was undertaken to look specifically at its collaboration and leadership role. The survey tool questions were integrated into a wider firm-level survey. The questions used focused on the perceived value of collaborative strength (indicating companies' perception of shared vision and the value of that collective action), and on collaborative dynamics (indicating the type of engagement within the cluster initiative and the value they perceived of engaging in collaborative activities). The survey was carried out among both members (39%) and non-members (61%).

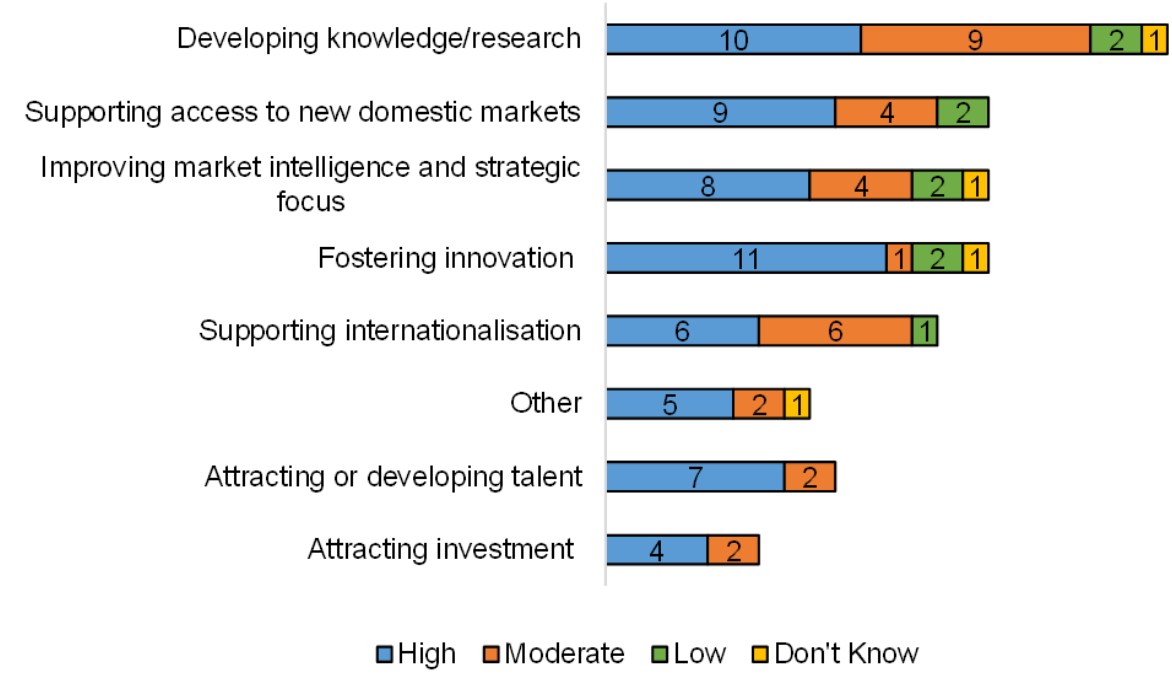
With regards to perceived value of collaborative strength (part C), the responses were generally positive, with members reporting even more positive responses than non-members. The most frequent types of collaborative activities reported (part D) were collaborative knowledge and research, accessing new markets, fostering innovation and supporting internationalisation. Almost three-quarters of companies had taken part in collaborative activity over the preceding18 months.

Figure 3: Cluster firm level survey responses SF&D *(EKOS 2017)*



The survey then explored the value perceived by the companies from that collaboration (part D). Almost all the collaborations undertaken by companies (87%) were valued as high or moderate in terms of their perceived return. Overall, the results suggested that companies engaged with SF&D value collaboration and perceive a high return on investment from that collaboration.

Figure 4: Cluster firm level survey responses SF&D – perceived value *(EKOS 2017)*



In addition, over two-thirds of companies reported that SF&D's industry leadership role was beneficial in establishing a common strategy, and that this had a positive impact on the industry. Firms highlighted the positive impact on overall reputation, and also SF&D's focus on building collaboration as a key area of importance and a success. The survey tool helped to identify the level of collaborative activity and types of relationship. It also showed the value and importance placed on collaboration by the firms.

Basque Country

Policy makers in the Basque Country in Spain integrated the survey tool into a new firm-level survey for members of cluster organisations supported by the Basque Government's cluster programme. Designed to capture the 'voice of the users', the survey included a section to measure attitudes to cooperation within the cluster organisations and incorporated several of the same questions from the tool that had been applied in the Scottish study. The survey was initially piloted among four cluster associations, with the intention that it would be later extended to all cluster organisations. The environmental technologies, construction, foundry and habitat/contract cluster organisations volunteered for the pilot study. They then embarked on a process of engagement with policy makers from the Basque Government's Business Development Agency (SPRI) and university

researchers around the precise design of the survey and the best way of implementing it, adapted to the needs of each organisation.

Mirroring the Scottish study, it was clear from the results of this pilot that cluster members highly value the role the cluster associations play in promoting networking and interaction among cluster members (part D). Over 80% of respondents either agreed or strongly agreed with the statement that 'within my firm there is a high degree of satisfaction with the collaborative activities of the cluster organisation'. Almost 80% also agreed or strongly agreed with statements that 'there is a common vision within the cluster organisation around its strategic objectives' and that 'our firm feels part of a collaborative initiative and we identify ourselves with the cluster organisation' (Part C). In two questions directly comparable with the Scottish case there were interesting parallels in the results. While just under 80% agreed or strongly disagreed with the statement that 'other members of the cluster organisation are open to collaborate in the search for solutions to common challenges', a significantl but lower proportion (below 70%) agreed or strongly agreed with the statement that 'when we have a problem that we can't solve along in our firm, we contact the cluster organisation and/or its members to look for a solution'. Thus, in both cases we can observe that recognition of the openness of others to collaboration is not completely matched by a willingness to approach others to solve specific problems.

5 Discussion and reflections from the results

The results generated in Scotland helped SF&D identify areas where firms most valued the collaborative activity supported by the cluster. In addition, the wider role in leading the sector, building a common strategy and enhancing reputation as well as acting as the voice of industry were all highlighted as valuable contributions from the collaborative effort from the cluster. SF&D were at the time developing a new strategy to take them to 2030. These findings, especially on the value placed on collaboration, were extremely useful evidence, ensuring that collaboration remained a fundamental and central dimension of that new strategy.

In the Basque Country the intelligence generated by the pilot was seen as valuable by both policy makers and managers of the four cluster organisations. The two groups reflected jointly on the results and used them for discussions around the annual planning of activities. There were also further reflections on potential improvements to the survey, and a slightly adjusted survey was subsequently launched among the members of all the cluster associations supported by the policy.

Firm-level surveys in cluster evaluations, can become overly lengthy and onerous, and evaluators must be selective in including the right questions. The addition of questions on cluster dynamics and attitudes to cooperation can therefore be a challenge in evaluation design. However, as argued above, these human elements are central to the very rationale for cluster policies and understanding their role and value for cluster members should be an important part of cluster evaluation. One of the reasons to establish a common tool was

to allow shared learning and comparison. In Scotland and the Basque Country the tool has been used in a similar way. Initial comparisons have initiated a learning process with the potential for benchmarking of results, with reference points not only within region but also internationally.

The "pragmatic" implementation limited the types of questions included (removing an initial question on number and type of connections), and this did limit data gathered. However it did make the tool more practicable and therefore likely to elicit a greater number of responses. A further step of understanding cluster dynamics (i.e. the development of human elements) over time needs repeated use of the survey questions, and this is only now being tested.

6. Conclusions and future research

This research explores a key challenge of effective cluster evaluation, namely *how to define different aspects of the human elements that underlie cluster collaboration*, and *how to evidence and track the strengthening of those elements over time*. The key contribution has been to establish an internationally anchored practical understanding and definition of the human elements (including structural, relational and cognitive dimensions) at work within clusters, as well as a tested approach for evidencing the status (and development over time) of the three dimensions. The research helped articulate such a definition and identify indicators that might help track change in these dimensions. Through pilot case studies, we were able to explore how a practical survey tool could be integrated into existing (particularly firm level) evaluation efforts to evidence the value and development of the human elements in clusters, as well as whether this generated valuable information. As such this "test of change" stage was investigating both the usability and the usefulness of such an approach.

In summary:-

- the results from the cases show that the common scoping of the human element (aspects) resonate in different geographies, and that the survey is a useful "common tool" to collect structured information/evidence of development of collaborative dynamics
- the results highlight that this helps collaborative initiatives to understand how participants/members value different services/activities and use that information to adapt/develop the strategy and operational activities of the collaborative initiative
- the results confirm that, although difficult, it is possible to evidence different aspects of the human element, and that such evidence is useful to motivate collaborative efforts, to learn from others, and (primarily) to continually develop the strategic direction/activities of the collaborative initiative.

This was a limited pilot at an early feasibility stage. However, the survey tool has proved effective in generating useful data and in giving valuable feedback to clusters on their role in stimulating linkages, levels and leadership across the human element of cluster dynamics.

As an attempt to capture the human element of cluster in evaluation this has been an interesting and promising first step in terms of a test of change (i.e. is it workable and does it generate usable results). Testing in other contexts is underway and repetitions in the same contexts, opening the way to more nuanced comparative analysis. Previously the lack of consistent approaches to evidencing the human element made these types of longitudinal and/or internationally comparative studies impossible.

One challenge not yet addressed is showing causality between human element factors and economic performance, but the first stage is in showing the value placed on the cluster initiative and on the various types of collaborative endeavours it facilitates. The initial outputs from the survey have produced useful results for cluster organisations and cluster policy-makers, helping to evidence the value of collaboration and the role that cluster organisations can take in leading strategy and representing the sector. By better understanding the role of the human element in building social capital and collaborative capability, clusters and policy makers can support improved approaches to positively reinforce this beneficial behaviour, and successfully enhance competitiveness for the domain. The use of the survey in practice has raised further questions that need to be explored before a generalizable tool can be proposed. Further testing of the improved survey tool, and more research into these broader questions now need to be taken forward.

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