Introduction: regional clusters and internationalization – complementary or contrasting fields of research?

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BACKGROUND

The spatial clustering of economic activities is a worldwide phenomenon (Kosfeld and Mitze, 2018; Nathan and Overman, 2013). As such, regional clusters and their potential economic effects are high on the research as well as the policy agenda (Fornahl et al., 2015; Jankowska and Götz, 2018). The popularity of the concept is primarily driven by the assumed benefits of the co-location of firms from similar or related industries in regional clusters, supposedly promoting, among others, productivity (e.g., Borowiecki, 2013) and the innovativeness (e.g., Baptista and Swann, 1998) of firms as well as regions.¹ In this context, localization externalities, meaning the endogenous benefits from local specialization, take centre stage.² According to Marshall (1920), there are four localization externalities: access to specialized labour, access to specialized inputs, access to knowledge spillovers, and access to greater demand by reducing the consumer search costs. Although there has been earlier scientific work (e.g., Bathelt et al., 2004) highlighting the complementary meaning of ‘global pipelines’ (interregional or even international linkages), policy-makers, driven by the assumption that these externalities work only over short geographical distances, still primarily focus on stimulating cooperation and interaction among different organizations on the local or regional level, thereby limiting their measures to the ‘local buzz’ (Dohse et al., 2018; Grashof, 2020b).

However, disproportionate regionalization developments might narrow the cognitive distance and increase the level of similarity between organizations. As a result, path dependencies and situations of technological lock-ins may arise and hamper the innovativeness of regions (Fornahl et al., 2011; Dohse et al., 2018). Or as Giuliani and Bell put it: ‘the mere reliance on localized knowledge can result in the “entropic death” of the cluster that remains locked-in to

an increasingly obsolete technological trajectory' (Giuliani and Bell, 2005, p. 48). Furthermore, the limited view of policy-makers is especially quite astonishing against the background of the steadily progressing globalization that has remarkably shaped modern societies worldwide. Regional clusters are unlikely to evade this development, thereby implying new opportunities (for example, in terms of knowledge sourcing) but also new challenges (for example, in terms of knowledge outflows) for them. Hence, regionalization and internationalization cannot be seen as isolated from each other, but rather appear to be intertwined developments (De Martino et al., 2006; Dunning, 2001; Enright, 2003; Rugman and Verbeke, 2001).

So what exactly are these new opportunities or challenges and how can they be realized or avoided? In order to prevent narrow path dependencies that result in lock-in situations, the 'local buzz' of interdependencies and interrelations between actors on the regional level require the necessity of 'global pipelines', allowing for new possibilities (Bathelt et al., 2004). Particularly, the opening of clusters in terms of geographic and/or thematic boundaries can lead to renewal effects and revitalization of clusters (Dohse et al., 2018; Morrison et al., 2013; Rosenkopf and Almeida, 2003). Internationalization can, for instance, affect knowledge flows through migration, in terms of labour mobility, and through outsourcing, in terms of shifting production facilities and building alliances (Rosenkopf and Almeida, 2003). In other words, the opening of regional clusters to the outside world is especially useful to set stimuli, which help organizations to recognize new opportunities in terms of markets and technologies, and to acquire complementarities that are not available on the regional level or in the domestic market (Uzzi, 1996). Additionally, clusters likewise appear to offer a suitable environment for firms' internationalization. Well-functioning clusters provide ties and relationships within the overall network as well as sufficient (infrastructural) resources, which constitute a necessary basis for the expansion of firms' internationalization activities (Jankowska and Götz, 2017). Moreover, from a cultural perspective, clusters can also support firms in coping with problems related to entering foreign markets. Besides the challenge of psychological distance (mode, direction, pace of expansion), clusters may help to provide knowledge and information on cultural differences between the two markets as well (Jankowska and Götz, 2017; Hosseini, 2005; Sousa and Bradley, 2006).

However, from the perspective of clusters, internationalization includes more than just cluster firms entering foreign markets, but instead proves to be a highly complex task for the involved organizations (Dohse et al., 2018; Jankowska and Götz, 2017). Indeed, clusters need internal and external linkages to broaden the knowledge base within their boundaries (Bathelt et al., 2004; Bathelt, 2008). Thus, clusters must have capabilities on the one hand to organize a functioning cluster-internal knowledge exchange, and on the other

hand to build a sufficient level of a heterogeneous knowledge base, allowing for the influx and understanding as well as processing of hitherto unrelated knowledge into clusters (e.g., Giuliani, 2005).

Recently, German policy-makers have recognized this area of tension and set up a pioneering funding programme to conflate the competing developments and to underline the importance of internationalization in the context of clusters. In 2015, the German government launched a large-scale research project ‘Internationalization of Leading-edge Clusters, Future Concepts and Networks’ (see Chapter 8, ‘InterSpiN’) which has a funding capacity of more than €100 million.³ This book emerged from this context, and examines the advantages and disadvantages of place-based innovation in an internationalized economy, and its combined effects on regional clusters.

OBJECTIVES

This book addresses the role of regional clusters in the context of ongoing globalization. Not only does it contribute to advancing the debate about clusters and internationalization, but it also has a high practical value for policy-makers who are increasingly confronted with the situation of globalization challenging their established regional structures. Without having a clear understanding of the specific interplay between the localization and cooperation externalities, regional policy-makers face the danger of weakening or even losing their already existing regional knowledge networks.

The combination of theoretical and empirical (qualitative and quantitative) approaches explored in this book offers a vibrant mix that guarantees an analysis from broad and diverse perspectives. The following topics are thereby considered:

- The role of clusters in wider networks such as global value chains. First, the conceptualization of internationalization, and then the embeddedness of local linkages are examined more closely.
- The specific role of migrants for the internationalization patterns of regional clusters.
- The influence of localization in regional clusters for firm internationalization, particularly in transition economies.
- The effect of cluster internationalization on (radical) innovations. Moreover, the impact of international linkages and localized spillovers on the emergence of innovation activities are researched in more detail.
- The possibilities of policy and its importance to foster cluster internationalization.

As this book is based on theoretical as well as empirical contributions from relevant international experts, it provides valuable and elaborated insights about the internationalization process of regional clusters and its effect on regional as well as firm performance. The combination of empirical and theoretical approaches will thereby ensure that this book is an essential reading for academics from various disciplines as well as policy-makers to understand clusters in today's global economy. Consequently, it takes a pioneering role in the literature in explaining the relationship between regional clusters and internationalization.

STRUCTURE OF THE BOOK

The book comprises eight chapters in total. All chapters contribute to an improved understanding of clusters and regional networks against the background of the competing trends of localization and internationalization. Despite the popularity of both trends and the widespread use of related concepts, surprisingly little is understood regarding the combined effects on the regional level (Dohse et al., 2018). Hence, as a whole this book offers a unique composition of different perspectives on regional development in a globalized world.

In Chapter 1, Hassink examines the hitherto scarcely researched phenomenon of cluster repositioning from a global production network and strategic coupling perspective. As such, strategic coupling focuses on regional economic development by analysing the matches and mismatches between regional assets on the one hand, and the needs of the transnational corporations which steer global production networks on the other hand. The author redesigns the traditional concept of strategic coupling into a new concept, which is called strategic cluster coupling. This concept provides a research framework for analysing the relationships between cluster repositioning in global production networks and the cluster policies needed to support this repositioning process.

In Chapter 2, Cooke explores how cluster internationalization evolved through a process called co-presencing. Key areas are considered where proposed 4.0 Economy processes (in terms of the rise of artificial intelligence) are likely to cause major disruption to established business models as well as cluster models. In this context, the differentiation of machine-learning from deep-learning regions, and illustrations of three case studies (Tesla, Darkface and Deepmind) based on artificial intelligence learning applications, lead to accounts of changed aspects of spatial configurations. Fundamentally, this chapter collects answers to questions about whether cluster internationalization addresses the issues of internationalization by diagonal and lateral cluster-to-cluster interaction on a global scale.

The following chapter by Fromhold-Eisebith, Chapter 3, is based on the regional resilience approach and constructively combines it with assumptions on the role of clusters in this international context. Accordingly, in this context different issues are first explored conceptually, developing a heuristic approach that conceptualizes logical links of resilience and cluster dynamics in a global-local setting. The approach is then used to better understand and potentially predict how broader resilience dynamics in the automotive industries, triggered by economic and technology shocks, affect automotive clusters in selected parts of the world.

In their analysis of the Israeli information technology (IT) cluster and the Belgian jewellery diamond cluster, Henn and Schäfer go beyond the role of intra- or interorganizational ties within clusters, and take a new perspective by investigating the role of migrants for the internationalization (patterns) of clusters. Thus, the authors perform an in-depth analysis on the role of migrants in establishing linkages between clusters. Based on literature from economic geography as well as international business studies, the authors show that migrants can influence the internationalization process in two different ways: gradual internationalization or ‘born globals’. Moreover, they demonstrate that migrants influence the internationalization process on the firm and cluster level.

In Chapter 5, Lehmann and Roy examine how the localization in a regional cluster in a transition economy affects a firm’s internationalization. For this purpose, they apply a qualitative approach (based on 23 interviews from Southeast European clusters). The results point out that there are similarities as well as differences between the internationalization process of cluster companies in transition economies and developed economies. Regarding the particularities in transition economies, it is for instance shown that in transition economies clusters are a means to overcome local institutional problems and hence strengthen firms’ internationalization advantages.

In the following chapter, Chapter 6, van Haaren, van Oort and Maasland assess whether firm performance is higher (in terms of employment growth) in policy-induced knowledge locations versus other locations. Furthermore, they investigate whether this relationship is moderated by firm and location characteristics, and whether firms in knowledge locations are more resilient to changes in the global macroeconomic climate. In order to address these research questions, they apply quantitative analyses to the national level as well as a more comprehensive analysis for the Metropolitan region of Rotterdam–The Hague. The results indicate, for instance, that area-based incentives have a substantial impact on the employment function of firm establishments in the Netherlands, although moderating effects (for instance through firm size) are likewise identified. Moreover, by focusing on the internationalization dimension, in particular the vulnerability to macroeconomic change, they

find that firm employment is served by membership of knowledge locations in pre-crisis times, but is actually hit harder in terms of employment lay-offs during and directly after the crisis period.

In Chapter 7, Tödling and Auer direct their attention to the shift of innovation interactions from the local and regional to a global scale, and find that the region as a space for supporting innovation and competitiveness of firms is losing its importance. However, the authors suggest that firms and clusters rely on various kinds of knowledge bases and factors for their development that differ in their geographical mobility and territorial boundedness. Therefore, the authors investigate in three different industries the extent to which, as well as which kind of, driving factors for cluster development and innovation have become non-local or remain territorially bound to regions or countries. This has relevance for regional and innovation policies that try to enhance the competitiveness of clusters and regional economies.

In the last chapter, Chapter 8, Grashof and Brenner explore the relationship between radical innovations and regional clusters. More precisely, they investigate which type of relationship particularly promotes the emergence of radical innovations in firms located in clusters. By applying a quantitative approach on the firm level and combining several data sources, they find evidence for the assumed benefits of cluster external as well as cross-cluster relationships. Additionally, they further differentiate the types of relationships according to the geographic and thematic characteristics. Thereby, they determine for instance that particularly firms that have cross-cluster relationships with thematically and regionally different partners are most likely to create radical innovations. This chapter therefore highlights the need to think beyond cluster boundaries and to relate with partners from different industries and regions in order to foster the creation of radical innovations.

OUTLOOK

Based on the contributions of this edited volume, some upcoming research topics can already be identified, such as the relationship between clusters and radical innovations, the role of migrants, the influence of new technologies (such as artificial intelligence) and potential inequality problems arising from supporting the internationalization aspirations of some selected regional clusters. Apart from these topics, we want to additionally highlight some other areas which are, in our view, promising for future cluster research. Based on the contributions of this edited volume and our own research, we can identify four potential areas for future studies investigating regional clusters in the global economy, as follows.

Conceptualization of Cluster Internationalization

Although this pioneering book already contributes to a first conceptualization (for example, providing a first definition of cluster internationalization; see Chapter 3), we still need to broaden our knowledge on cluster internationalization. This holds particularly true in light of the well-elaborated concept of the internationalization of single firms which has been discussed in the literature for decades (e.g., Conconi et al., 2016; Helpman et al., 2004; Melitz, 2003), while internationalization processes originating from clusters or directed towards clusters are lagging far behind in terms of the number of publications. We therefore suggest addressing the following research questions:

- What are the mechanisms of a cluster internationalization? Are they similar to those from firm internationalization? Or, how are the specific conditions in a cluster affecting internationalization activities?
- How can cluster internationalization be differentiated from the internationalization of single organizations located in a cluster?
- Which roles do specific actors – for example, universities, multinational enterprises (MNEs) and/or cluster managements – play?
- Does the composition of a cluster – for example, domination by small and medium-sized enterprises (SMEs), large firms or MNEs – influence the success of the corresponding internationalization process?

Effects of Cluster Internationalization

Furthermore, we lack knowledge about the multidimensional effects of cluster internationalization, especially from a quantitative empirical point of view. It therefore remains quite difficult to evaluate the consequences of the internationalization of regional clusters. This holds particularly true against the background of studies that emphasize the importance of potential moderating variables in understanding cluster effects (Frenken et al., 2015; Grashof, 2020a). Consequently, we propose investigating the following questions:

- In what way does the internationalization of regional clusters influence ...:
 - (a) the firms of the corresponding cluster/region? Are there differences between MNEs and non-MNEs of the corresponding cluster/region?
 - (b) the region (for example, regional network)?
- Which conditions (for example, on the firm or cluster level, as well as technological characteristics) may moderate the influence of the cluster internationalization?

Policy Measures

In our view, it is also necessary to discuss the role of policy in this context. So far, cluster policy has primarily focused on addressing market failures (for example, through the provision of an adequate infrastructure) and network failures (for example, through cooperative research and development subsidies). In the latter case, the corresponding policy measures are however normally limited to increasing the number of collaborations, instead of, for instance, connecting the right partners with each other (Grashof, 2020b; Vicente, 2014; Zenker et al., 2019). Recently, it has therefore been argued that cluster policy should follow a more active and targeted approach (Grashof, 2020b). Thus, we suggest examining the following questions:

- Under which conditions should policy support the internationalization of clusters?
- In what way can policy possibly help clusters to internationalize?
- Are new tools needed in this context?
- Or are new recipients (for example, cluster managements) of the corresponding measures needed?

Cluster Life Cycle

Lastly, the dynamic development over time should also be considered in future research dealing with cluster internationalization. In the following we want to particularly focus on the relationship between internationalization and the evolutionary development in terms of the cluster life cycle (see Figure I.1). In this regard, it appears most relevant to examine the different effects of internationalization across the phases of a cluster's life cycle (e.g., Dohse et al., 2018).

Emerging clusters are difficult to define, since in this development stage the synergies between firms and organizations mainly exist between spin-offs and their parent organization (Shohet, 1998). This implies that a spatial concentration of firms interconnected within a thematic boundary is hardly given in this phase (Menzel and Fornahl, 2010). Hence, cluster internationalization must be handled with particular sensitivity. On the one hand, internationalization efforts at such an early stage can prevent the definition of thematic as well as geographic boundaries of the cluster. Because the thematic distance among the member organizations is still large, the overwhelming technological possibilities might lead to different (technological) developments of the firms. The result can be even more expanding (technological) distances between the firms, which would lead to the disappearance of the formerly emerging cluster. On the other hand, a too-strong outward orientation may hamper the development of intra-cluster linkages, which are prerequisites for the further

Source: Menzel and Fornahl (2010, p. 218).

Figure I.1 The cluster life cycle (CLC)

evolution of the cluster (e.g., Brenner and Mühlig, 2013; Jankowska and Götz, 2018). Under these circumstances, SMEs are likely to fall by the wayside, since they cannot profit sufficiently from local synergies such as knowledge spillovers. Nevertheless, it is reasonable to assume that this charged relationship is dependent on the concrete industry context. While some industries may follow a rather sequential internationalization process represented by the chain model (Johanson and Vahlne, 1977), in other industries the internationalization pattern of ‘born globals’ (e.g., Cavusgil and Knight, 2015) is more likely to happen. Examples are information and communication technology (ICT) (e.g., Cannone and Ughetto, 2014) as well as pharmaceutical industries (e.g., Gassmann and Keupp, 2007). In these cases, it appears to be of similar importance for emerging clusters to establish internal knowledge networks and to simultaneously build linkages to international knowledge hubs. Due to the underlying high pace of technology evolution in these industries (e.g., Suarez and Lanzolla, 2005, 2007), it is reasonable that internationalization has a particularly crucial role for cluster survival, since it offers the possibility to keep up with the latest technological trends.

Growing clusters instead can take full advantage of the internationalization efforts. The extension of their boundaries is accompanied by the influx of new technological possibilities that increases the heterogeneity of the knowledge base. Thus, a certain level of internationalization might be necessary for clusters to sustain and enter a new growth phase. It might especially be useful

to deploy the expertise of expatriates in this context. This allows the thematic boundaries to move incrementally, which opens the established networks and grants access for new companies to enter the cluster. Nevertheless, this is not a guarantee to prevent the danger of narrow path dependencies resulting in lock-ins. A too-similar knowledge base and decreasing diversity within clusters therefore can still lead to declining innovativeness and diminishing of their renewal activities. In other words, mature clusters face the risk of losing the ability to adapt to changing environments. Thus, long-term growth is only possible if heterogeneity within the cluster can be maintained (Menzel and Fornahl, 2010).

Mature or even declining clusters are characterized by increasing homogeneity of knowledge bases among the member organizations. They lose the ability to adjust themselves to changing environments and sustain their diversity (Menzel and Fornahl, 2010). Hence, at this stage, internationalization must go beyond mere exchange of expatriates, and has to be more fundamental or radical. Institutionalized linkages between clusters from different countries, such as the Health Axis Europe,⁴ appear to be a promising approach in this context. The aim of internationalization efforts at this stage of the cluster life cycle (CLC) should be to move the cluster to earlier development stages of the life cycle to enable new growth phases. This means that a mere renewal, such as in the previous development stage, is not enough: the cluster has to transform itself towards new technological possibilities. The internationalization of the cluster can thereby help in the way that it fosters the redefinition of the cluster's boundaries, which however also requires that former synergies and complementarities must be established differently (Menzel and Fornahl, 2010). If the transformation is successful, this opens up the possibility for more radical innovations within the cluster and might cause the development of new trajectories in a changed environment.

However, two groups of actors must be distinguished: namely, the cluster managements as superordinate organizations on the one hand, and the different single organizations and firms within a cluster on the other hand. Therefore, it might be difficult to match a cluster with a particular development stage if it is in transition. It is also difficult to differentiate between the internationalization efforts of all organizations within clusters, which complicates the generalization of cluster activities and their development as a whole, since different member organizations follow individual goals. More research efforts are therefore needed to understand the consequences of firm as well as cluster internationalization across the cluster life cycle.

Nevertheless, all in all it becomes clear that we have to rethink clusters, in that they are not isolated from the ongoing globalization processes. Researchers and policy-makers alike are therefore required to expand their cluster understanding towards an international dimension, so that in the end

clusters can reach beyond their regional limitations and benefit as components of an international knowledge cluster.

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NOTES

1. For a good overview of the regional and firm-specific effects, please see Fornahl et al. (2018).
2. In line with Grashof and Fornahl (2020) as well as Lazzaretto et al. (2014), it is argued that urbanization externalities (economic benefits of diversified regional industry structures) do not belong to the core of the common cluster understanding.
3. For more information, please visit <https://interspin.de/en/start/>.
4. The Health Axis Europe (HAE) is a strategic alliance between four biomedical clusters from Leuven (Belgium), Heidelberg (Germany), Maastricht (Netherlands) and Copenhagen (Denmark). For more information about the HAE, please visit <https://www.health-axis.eu/>.

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