Global Clusters Policy: Towards the Selection of Dominant Designs?

Julie Hermans [1] Annick Castiaux [1] Marcus Dejardin [2] Stephane Lucas [3]
1 Louvain School of Management, Campus of Namur, Namur, Belgium
2 Department of Economics, CERPE - FUNDP-University of Namur, Belgium
3 Physics Department, LARN - FUNDP-University of Namur, Belgium
(E-mail : julie.hermans@fundp.ac.be, annick.castiaux@fundp.ac.be, marcus.dejardin@fundp.ac.be, stephane.lucas@fundp.ac.be)

Abstract In this paper, we consider the clustering initiative from the Walloon government (Belgium) as a framework favouring the emergence of dominant designs. We compare the "pôles de compétitivité wallons" – that we decided to translate as "global clusters" – to the clusters already studied in the literature. We show that the particularities of Walloon clusters make them a powerful instrument to enhance collateral assets [8] helping to lead the emergence of technological dominant designs. To illustrate our approach, we present the MecaTech cluster in which one of us is involved with his Nuclear Physics Lab. We finally consider the way those global clusters should evolve to favour the exploitation of the emerged dominant designs while exploring future opportunities. A good balance between exploitation and exploration as well as adequate networking and clustering instruments to support both objectives are absolutely necessary to ensure sustainability and growth of the involved actors.
Key words Pôles de compétitivité; clusters; dominant design; managing innovation; regional development

1 Introduction

The government of the Walloon Region in Belgium has recently supported the creation of "pôles de compétitivité" in the framework of a regional development plan: the "Priority actions for the future of Wallonia" also called the Marshall plan. The target is to promote the emergence of innovative clusters that should support the development of regional competitive advantage as the Walloon firm acquires specialization and learning processes facilitated by an enhanced access to local capabilities like infrastructure, skills, knowledge and institutional assistance [1]. In this context, both specialization and learning are supported by inter-firms relationships within the constituted networks as well as by interactions with the knowledge institutions, i.e. research centres and universities, and with the local public authorities. The building-up of innovative capabilities through such interactions has been studied by the Triple Helix model [2], the Mode 2 of the knowledge production system [3] and the literature on National Innovation Systems [4] [5], which has coined the Region as one of the main interesting units of analysis [6] [7]. The regional level is particularly coherent in the case of Wallonia which displays common linguistic and cultural characteristics as well as its own institutions that regulate economic behavior and social activities [1].

In this paper, we propose a complementary reading of the "pôles de compétitivité" in order to identify points of interest and bring some lights on the conditions to achieve economic redeployment. Firstly, we will describe the Marshall plan for Wallonia and its priorities focusing on its main instrument: the creation of "pôles de compétitivité" and funding of associated collaborative R&D projects. In the next section, we introduce the theoretical framework used to analyze that policy: the Dominant Design model [8] [9] which describes the technological cycle that revolves around the emergence of a dominant standard. The next section explores the nature of those clusters and their potential effects on Wallonia: we will argue that it generates endogenous technological discontinuities for local firms as they engage in collaborative behaviors, and supports the emergence of Walloon dominant designs in several global markets. That aim for global leadership and international visibility justifies our translation of "pôles de compétitivité" as "global clusters" in this paper.

2 Global Clusters of Wallonia

2.1 Context and Origin

The global clusters policy and the dynamics they are assumed to favour are at the heart of the

Marshall plan which aims to establish in Wallonia “the conditions for a shared prosperity through structural improvement and convergence towards European averages” [10] or in other words the economic redeployment of this region that has still difficulties to overcome the collapse of its steel industry and the restructuring in several other sectors. This action plan of four years (2005-2009), financed at regional level by 1 billion EUR, focuses on five priorities: the creation of global clusters ; the support of professional initiatives and activities’ creation; the supply of fiscal measures at the benefit of the firm; the strengthening of research and innovation in connection with companies and finally the development of Walloon labor’ skills and competences.

Those priorities are structured in actions with dedicated budget, the biggest one being the funding of collaborative R&D projects proposed within the global clusters. In fact, nearly thirty percent of the whole envelope is dedicated to Research and Development activities throughout actions like collaborative R&D projects, the support of academic spin-off creation or grants for doctoral research with high innovation potential (see Figure 1). Those instruments develop either regional research institutions – for instance through the creation of an Agency for Technology Stimulation (ATS) – or the innovative capabilities of the local firm or research unit by providing funds for additional research workers and research operating expenses.

“The actions” proposed by the Marshall plan do not target pure basic research, which is characterized by the quest for fundamental understanding without any particular use in mind. In fact, the activities at hand range from use-oriented basic research to pure applied research (see Figure 1) depending on the vision actually adopted by the jury which selects the project, the administration issuing the instruments and the actors who will benefit from them. Use-oriented basic research and pure applied research are both undertaken in the context of a given application but while use-oriented basic research is dedicated to fundamental understanding, pure applied research is characterized by the quest for the right design. Pure applied research may produce new knowledge and practical experience but does not consider fundamental understanding as a primary objective [11].

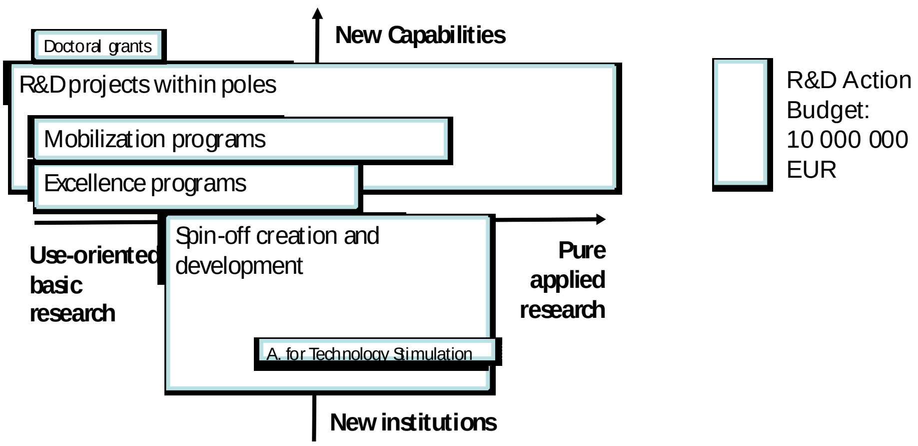

Figure 1 R&D Actions from the Marshall Plan

As a result, the Region has to sustain efficient relationships between economic and research actors in order to benefit from systemic effects and to develop competitive advantage. The creation of global clusters and the financing of the R&D projects within this newly created framework are the main response to this goal as it urges Walloon actors to pool economic, technical, scientific and human competences in networks [10] and offers a structure to materialize the potential partnerships. As an anecdote, the nickname of the Priority actions for the Walloon future – the “Marshall plan” for Wallonia – may have two origins: the common reference is the action plan for Europe after World War II, but a more subtle view from regional and spatial economists would reveal the allusion to Alfred Marshall [12], pioneer in the study of agglomeration economies and industrial districts [13].

Based on a preliminary study on the existing economic, technological and scientific bases of Wallonia [13], five economic areas were initially selected by the Walloon Government as potential global clusters: life science; agro-industry; mechanical engineering; transport and logistics and aeronautics and space industry. From those five would-be clusters, only two (life science and agro-industry) were identified by Henry Capron as having a sufficient potential to become an actual global cluster, namely [13] the combination, on a given territory, of companies, training centres and research units which :

- Engage in a partnership approach in order to create synergies around innovative joint projects;
- Experience a critical mass that allows for international visibility.

Relevant actors were then asked to submit a cluster proposal that reflected a joint development strategy and potential consortiums that would result from the interconnection of future participants. The five global clusters were finally labeled by an international jury in 2006: Biowin; Wagralim; MecaTech; Logistics in Wallonia and Skywin. The poles are now in their fourth call for projects and have launched more than 40 joint projects that include R&D collaboration as well as training opportunity.

2.2 The Clustering Paradigm

While the term "pôle de compétitivité" is quite recent and mainly francophone as it comes from the French clustering experience [14], its relatives – the economic cluster [15], industrial district [16] [17] or regional hub [18] – have been considered for the last decade as key elements for regional economic growth. Porter defined the clusters as "geographical concentrations of interconnected companies; specialized suppliers; service providers; firms in related industries and associated institutions in a particular field linked by commonalities and complementarities" [15]. Beside their geographical concentration, members are also subject to institutional [19] or cognitive [20] [21] proximity. This network configuration enables trust and common understanding eventually leading to spillovers from local universities [22] [23], the transfer of tacit knowledge [24] and the reduction of transaction costs [25], sometimes at the expense of external relationships [20]. The role of knowledge diffusion for innovation and competitive advantage [26] even gave birth to the concept of (regional) knowledge clusters [27] [20] [28].

Nowadays, the clustering approach has reached a quasi-paradigmatic status as more and more regional economic plans are shaped under its precepts. This trend in particularly vivid in Europe as confirmed during the first European Presidency Conference on Innovation and Clusters held in Stockholm in January 2008. In Wallonia, the clustering approach has led to the "global clusters" policy as well as to the creation of another instrument, the "companies' networks or clusters" as defined by the Walloon Government in its 18th January 2007 Décret. For convenience, we will refer to "regional clusters" when speaking about those "companies' networks or clusters".

Regional and global clusters are two Walloon instruments emerging from the clustering approach. Beside the network configuration, they share the same incentive to go beyond traditional industrial boundaries: they bring together organizations from various sectors like ICT specialists and hospitals for the treatment of complex medical pictures or the textile industry and pharmaceutical companies for the development of smart clothes. Nevertheless, regional and global clusters are different and their cohabitation in the institutional landscape of Wallonia is sometimes a source of confusion[1]. On the contrary of global clusters which were identified by Capron through a technocratic selection [13], regional clusters are spontaneously initiated by the industrial actors. Regional clusters focus on general business development and innovation while global clusters have specific funding tools at their disposal: the R&D joint projects which are supported by the Marshall plan. While global clusters must involved in a balanced way research actors, training centers and companies, regional clusters are much more flexible. Last but not least, even if both kinds of cluster must demonstrate a reasonable critical mass, global clusters target international visibility while regional clusters look for regional representation.

In spite of those differences, regional and global clusters are closely linked: existing regional clusters even became the real engine of the corresponding global cluster like in the case of Logistics in Wallonia. In fact, regional and global clusters interact as parts or partners: as an example, even if the ICT sector was not identified as a global cluster, its Walloon regional cluster has connections in each global cluster and actively participates in their R&D projects.

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[1] For instance, the ICT cluster of Wallonia is called "Infopole" while the official translation of "Pôles de compétitivité" is "Competitiveness clusters".

Table 1 The Clustering Approach in the "Pôles De Compétitivité"

Characteristics of global clusters and effects on learning processes	
Network configuration	Pool of local competences and interconnection of the knowledge basis
Concentration	International visibility and critical mass for economic growth
R&D partnerships	Localized interactive learning that complements informal connectivity. Spreading of the risk in the innovative phase
Transcendence	Multidisciplinary and inter-sector connectivity to go beyond traditional industrial boundaries. Meeting point for research actors from various disciplines, SMEs, large national and multinational companies and training centres

The policy of global clusters was built to favor employment, the emergence of high added-value activities and the visibility of Wallonia as a dynamic Region with research reputation of excellence. While the characteristics of this policy should support the learning processes of local organizations (see Table 1) for the time horizon of the Marshall plan, long term impact remains uncertain and many fear that the underlying dynamics will turn out to be *words writ on water*. As the mechanisms behind long term development of clusters and their impact on local capabilities are still unclear, a complementary analysis that considers the effects of the intended technological progress on the industrial structure of the targeted region is requested.

The motives for early assessment are strong. In the second part of this paper, we contribute in this way by presenting the results of our analysis of global clusters through the Dominant Design model which will help us identify potential interactions between technological and industrial dynamics [29], [8] [9] in Wallonia. The first section describes the theoretical framework while the next section takes distance from the initial Dominant Design theory and proposes an original application of this concept in the context of a regional economic development policy.

3 The Dominant Design Model

3.1 Emergence

Firstly introduced by Abernathy and Utterback [8] [30], the Dominant Design model describes the life cycle of an industry around the emergence of a dominant standard. In its early phase, uncertainties about users' preferences and/or technological means to fulfil the preferences place the competitive focus on product innovation [31]. The emergence of a dominant design is preceded by a period of transition [30] in which the market sorts out variants and identifies desired functionalities. As uncertainties decrease, a number of performance requirements to be met by the product or process become more accurate and eventually become implicit in its design [30], decreasing variety and pointing up process innovation (see Figure 2): as a result, the rate of major innovation shifts from product to process innovation. At the end of the transition phase, the market standard is set giving birth to the distinct phase [30] or era of incremental change [9].

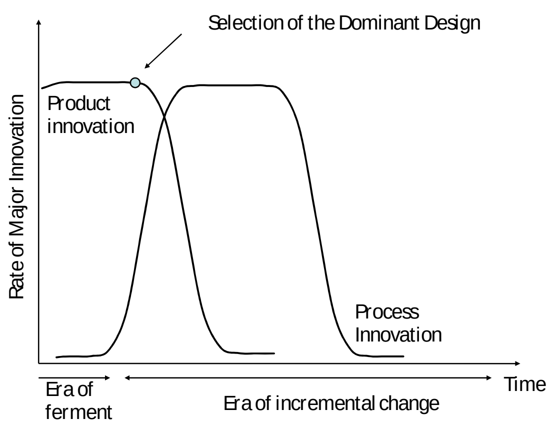

Figure 2 Evolution of Product and Process Innovations Versus Time, Adapted from [30]

As mass consumption occurs after the emergence of the dominant design [9], the firm that manages to offer the dominant design and its network of associated technologies should capture and maintain a higher market share. Economies of scale, learning by doing and economies of scope in the reuse of knowledge and skills associated to the dominant design [32] further reduce production costs. In order to take advantage of the cycle – namely produce and deliver the selected dominant design – managers should be attentive to potential emergence factors [33] like:

- Chance events (see [30]), opportunities that lead to the selection of a given design that does not necessarily display intrinsic superiority.
- Technological constraints: technologies with intrinsic superiority [30] or network externalities [32]; competence enhancing/destroying characteristic of the technological change [9].
- Market constraints: homogeneity of the demand [34]; critical mass [35]; existence of entry barrier and switching costs.
- Regulation and government intervention: definition of standards [30]; institutional context [9].
- Strategic use of firm-level collateral assets [30]: market linkages; access to lead users' network; strategic alliance; first mover advantage; integration and engineering skills; brand image; delivering channels; etc.

The selection of the dominant design impacts the competitive behavior of the industry as well as the innovative activities of its actors from product innovation to process innovation. First of all, the competitive focus shifts from higher performance to lower costs [9] and from variety and product innovation [31] to imitative reaction [29] and product differentiation [27] via minor reconfiguration [9] or in other words via peripheral elaboration. This era witnesses the departure of the actors that were not able to make the leap and favors "firms – large or small – that are able to achieve greater skills in process innovation and integration and with more highly developed internal technical and engineering skills" [29]. As a consequence, innovation activities will target peripheral components, elaborating around the core component that has emerged as the dominant design. As the cycle evolves toward maturity, a stronger focus is put on process development and standardization [27], the major share of innovation being introduced by established firms rather than by new entrants [31].

3.2 From Industrial Life Cycle to Technology Cycle

According to [30], the dominant design is the basic architecture of product or process that emerges as the accepted market standard, a creative synthesis of innovations introduced in earlier variants [35]. It accounts for over fifty per cent of new product sales or new process installation and maintains a fifty per cent market share for at least four years [9]. In order to overcome inconsistencies linked to the observation of this construct, Murmann and colleagues [35] [32] introduced multiple levels of analysis – system, subsystems and components – and defined the Dominant Design as a stable core component that can be a stable interface.

Borrowing the concept of dominance relationship from genetics, they consider the dominant design as a highly pleiotropic component, in other words a component that determines a high number of traits of the whole system with a lower probability of mutation success [32]. This core component is either tightly connected to other subsystems or represents a strategic bottleneck [36] [35]. From this perspective, a product is seen as "composed of a nested hierarchy of subsystems and linking mechanisms" [35] and the empirical referent of the cycle is not automatically the product itself: a dominant design can be assigned at the system level or a subsystem level (see Figure 3). Its emergence follow an evolutionary process: mutation of a stable core component that initiates an era of ferment, variety as numerous variants compete to attract a significant market share, selection of a dominant design triggered by the interplay between technical and market choices [30] as well as political, social and organizational forces [9], retention as the dominant design impels subsequent innovations (see Figure 4).

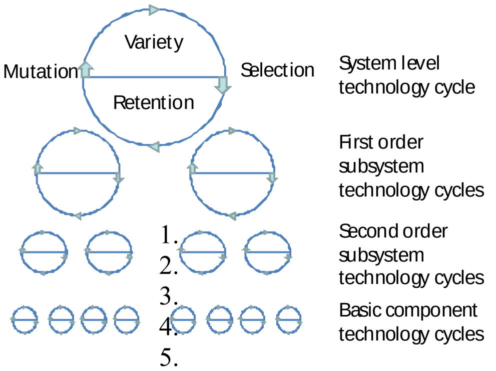

Figure 3 Nested Hierarchy of Technology Cycles, Adapted from [32]

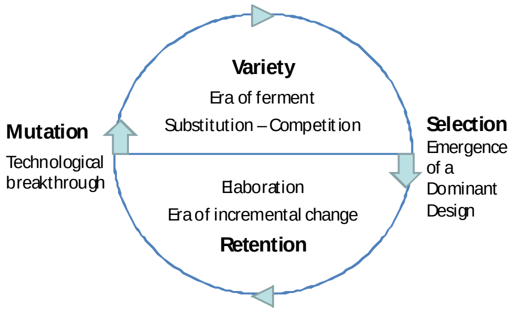

Figure 4 Dominant Design Model, Adapted from [33]

Those authors build on the work of [9] who preferred the notion of technology cycle to the "industry life cycle". Indeed, they proposed a second central milestone: the technological breakthrough, an innovation that advances an industry's price vs. performance frontier by changing the product or process design and developing a decisive new competitive advantage that strikes at the very foundation of the existing technical order [9]. This discontinuity results in a substantial change in the technological base of the product, the set of technical competences that is needed to design and produce it [37]. The cycle at hand is no longer a distinct industry but a given technological trajectory that may have ramifications in various markets and industries.

4 Dominant Designs and Economic Development Policies

4.1 Toward Walloon Dominant Designs

Strategic choices and economic policies can influence the emergence of a dominant design, for instance by building fructuous alliances that may sustain the competitive position of a product or by creating infrastructure that favors the development of a specific set of technologies. In this section, we argue that global clusters support the selection of Walloon dominant designs in several global markets through enhanced collateral assets. To illustrate our approach, we present the MecaTech cluster as well as one associated R&D project in which one of us is involved with his Nuclear Physics Lab. All names of projects and firms are disguised to ensure confidentiality.

Mechanical engineering is the "the science of movement, equilibria, forces and the energies that they mobilize to provide customers with functional systems or machines" (http://www.poleMecaTech.be). It was identified by Henri Capron as one of the economic areas in which Walloon firms could develop synergies and competitive advantage through innovative partnerships [13], pointing to promising eras of ferment in which the lagging region could compete. Indeed, even with moderate scores in Capron's study, MecaTech includes well-established members such as SMNC and GMNC, surface producers and global leaders. Both companies already had a Walloon R&D center and were benefiting from a solid network of sub-contractors and research partners in Wallonia. They decided to mobilize their social capital [38] in one substantial joint project, COAT.

SMNC and GMNC brought together a consortium of twenty-three partners towards the strategic goal of developing smart surfaces for a better management of the environment, focusing mainly on steel and glass surfaces following their core business. This orientation is in line with one of the five strategic foci defined by MecaTech in its submission project. The specific set of technologies that was chosen by the consortium builds on vacuum surface treatment, an innovation that disrupted the industry ten years ago and that gradually replaces traditional technologies in mass markets as well as niches [38]. COAT is composed of several axis that focus on dedicated properties like "Axe 1" which is related to a coating having some photocatalytic effects. This specific area was initially identified by two partners, SMNC and an academic laboratory, who had already assessed the feasibility of the underlying technological choice and took opportunity of the Marshall Plan to enlarge the project to additional partners with complementary competences. Finally, "Axe 1" gathers two large companies, one SME, one research centre and three Universities. While the chosen technology is not new to the world, it gives partners the opportunity to develop competences based on their existing expertise while being channelled by the needs of the two main industrial actors. Deliverables include new products and processes, a technological platform that should support further development as well as tangible research assets.

Like the majority of R&D projects funded within global clusters, COAT is expected to deliver short- to middle-term outcomes and subsequent economic activities, bringing to global markets products and services served by the developed competences. The international dimension of the crystallizers as well as the presence of hidden champions [39] in the consortium should back this purpose. By building on the technology of vacuum surface treatment, developing a large set of sustaining processes [38], COAT's partners implicitly define a concept that should become the dominant design on the targeted markets if the project turns out to be a success.

4.2 Competence Building

Through COAT, the technological change that affects local firms is not the mutation at the dawn of the cycle, as the disruptive technology happened ten years ago, but rather the discontinuity they face at the firm-level as they engage in global clusters and subsequently focus on a consensual technological choice. This perspective differs from the current literature on dominant design that considers technological changes at the macro-level, where discontinuities are exogenous to the firm [40]. At macro-level, the mutation implies a significant change in the industrial technological base: in addition of creating a need for new capabilities, the breakthrough will have an enhancing or threatening impact on the existing competences of the whole industry [9]. On the contrary, technological challenges that the Walloon firms face are endogenously created within the global cluster. The eco-system formed by the participants is subject to endogenous technological changes as firms select a common technological strategy.

This micro-level discontinuity will affect the specific know-how and skills of the firms by identifying gaps but also by enhancing or threatening existing capabilities. In fact, the enhancing/destroying characteristic of the technological change will be rooted in the particular history of the participant: the innovation can be competence enhancing to one organization but competence destroying to another organization [41]. Or both: as a partner in COAT, the Laboratory of Analyses by Nuclear Reactions (LARN – University of Namur) engages in the development of competences needed by its industrial partners and linked to the development of smart surfaces through plasma surface treatment. At the same time, other competences like Wet-Chemistry surface treatment are made obsolete as alternative research areas are neglected and machines replaced in order to fit the strategic technological choice.

4.3 Points of Interest

Within global clusters, R&D collaborative projects allow the consortiums to combine specialized knowledge, to improve their innovative capabilities through localized learning and to share the costs and risk of the innovative phase (see Table 1). From the perspective of the dominant design model, the R&D project materializes the technological plan decided within the cluster and provides members of the consortium the opportunity to develop the required competences that will lead the emergence of technological dominant designs. Multinational corporations combine their own collateral assets – delivering channels, integration skills, brand image, existing processes – with organizations with exclusive expertise or skills. As a matter of fact, multinational corporations located in the Walloon Region have emerged as crystallizers in numerous R&D projects while smaller firms – SMEs, hidden champions, start-ups – found a framework to develop their activities. Within a given project, this strategy may trigger the competitive advantage of the whole consortium through the externalities generated by the nested technologies: interconnected – large and smaller – actors are associated to the profit turned by the dominant design.

At the cluster level, the network configuration may further support the competitiveness of the participants. As expressed by Teece [42], "backward, forward, horizontal, lateral relationships and linkage within, among, between firms and other organizations such as universities (…) have a significant impact on the productivity and profitability of R&D". In fact, the enhanced access to the knowledge base of Wallonia allows for a better analysis of what has to be developed and produced and of the underlying technical and organizational constraints. More particularly, horizontal links between competitors [20] should allow comparing alternative concepts and learning from failed variants. Finally, as "the most threatening challenges are often those that come from outside the traditional definition of the industry and its products" [30], the transcendent approach of the global clusters offers a stronger support to regional firms.

The dominant design model completes the literature on knowledge clusters to explain how learning and the pool of local competences lead to competitiveness. The clustering approach deployed in global clusters is coherent with this theory, at least until the emergence of the dominant design. At this point, the dominant design model provides some insights about potential long term impact on Wallonia.

Taking the Dominant Design model for granted, global clusters would involve the emergence of Walloon dominant designs and the passage from an innovative phase characterized by a high number of actors and different alternative concepts to the transition phase characterized by the predominance of peripheral innovation and the departure of firms that were not able to make the leap. Predicted outcomes are the slowing down of the market dynamic in the sectors of interest with fewer competitors, lower marginal prices and a convergence from alternative concepts to a standard product. “As a few firms come to dominate the industry due to superior product technology and productivity” [43] both experimentation and progress would be expected to slow, reducing the incentives to develop technological partnerships.

As a consequence, the interest of the global clusters may drastically decrease. Indeed, [27] predicts a lower importance of proximity and access to pool of skilled labors past the innovative phase. In particular, multinational corporations that were attracted in the knowledge cluster due to shortages of labor for exploitative R&D in their home base [28] may reconsider their spatial location after the emergence of the dominant design. Coupled with the discrete nature of the Marshall plan (2005-2009) and the risk of its financial streams dry, this observation is particularly worrisome. In their study of the link between the propensity for innovative activity to cluster and the industry life cycle, Audretsch and Feldman [44] identified a “tension between the propensity for innovative activity to cluster in order to exploit the value of such knowledge spillovers, but at the same time to seek out new economic space because, new ideas need new space, at least during the mature and declining stages of the life cycle”.

Two observations follow. First of all, global clusters should evolve to favour the exploitation of the emerged dominant designs. As global clusters tend to escort the interconnected firms toward a transition phase with fewer actors and with emphasis on process innovation, it should back the exploitation of the projects’ outcomes. As a result, COAT’s partners should pay a particular attention to their technological platform which aims to ensure the continued existence of COAT’s results. At the cluster level, synergies with other participants interested in that focus area should be explored. Second, global clusters should favour the exploitation of the emerged dominant designs while exploring future opportunities. This finding points out to the risk of lock-in phenomena, the potential freezing of a given cluster path [45] that the industrial actors of Wallonia face as the links and competences developed in the framework of global clusters become rigid, suffering from “congestion effects” that replaced the positive agglomeration effects in the early and growth stages of an industry life cycle [44]. The following dilemma occurs: how to ensure the flexibility needed to break the path while knowledge transfer and competence building within R&D projects require strong ties between actors?

4.4 Discussion

At the light of the previous section, the main stake of the Marshall plan is to constitute organizational dynamic capabilities not only to shape the dominant designs to the advantage of the firm [35] but to recognize upcoming opportunities, understand their effects on existing competences and mobilize adequate actions. Yet, the only instrument from the Marshall plan that explicitly deals with the rise of future global clusters is the “excellence programs” (see Figure 1) that support for five years selected academic teams working on a common research streams. If this is the only way toward new technological path, this choice may be questionable: as Varga figured out [23], “strengthening universities in order to advance local economies can be a good option for a relatively well developed metropolitan area but not necessarily for a lagging high technology region”.

Nevertheless, a closer look at global clusters allows distinguishing between two types of R&D projects: exploitative R&D projects that are concerned with the implementation of an industrial application within three years and prospective projects that build a converged vision on a given theme for actors with complementary skills [10]. Both kinds of projects target the development of organizational capabilities and competitiveness but exploitative projects focus on contemporary cycles while prospective projects have regards with future paths, allowing the identification of promising economic activities. Coupled with the network strategy that constitutes “an important source of new insights, competencies, and relationships for the firm as it attempts to make sense of the changes affecting its industry” [46], those projects significantly add to the firm capacity to identify and/or create discontinuous innovations. In this context, the role of “regional clusters” as defined by the18th January 2007 Décret is appreciated from a new perspective: while global clusters may suffer from congestion effects [44], Walloon clusters appear to provide a more spontaneous and flexible framework for new development.

5 Conclusions

In this paper, we have presented the instrument recently developed by the Walloon Region of Belgium to support economic growth through innovation and technology development. The so-called “Plan Marshall” has called for the creation of global clusters around privileged sectors of potential interest for the region. We have described those global clusters and distinguished them from regional clusters. As a matter of fact, global clusters are dedicated to a project which partners agree to collaborate on. This project orientation helps partners to focus on a common objective (a product or a technology): a future winner which they believe in and want to obtain the leadership for. They expect common realization and success, i.e. a dominant design [8], and are supported in this ambition by their network structure, generally crystallised around a large company already dominating the industry.

The two main points of interest presented in this paper are the risk of decreased appeal of the global clusters past the innovative phase and the lock-in phenomenon that may impede long term development of the region. In order to make sure that the Marshall plan will continue its positive impact on Walloon firms after the emergence of the dominant designs, it is crucial that organizations have developed dynamic capabilities to deal with further cycles. A good balance between exploitation and exploration as well as adequate networking and clustering instruments to support both objectives are absolutely necessary to ensure sustainability and growth of the involved actors. Within global clusters, explorative R&D projects help identifying promising economic areas but may be subject to the same congestion effects as activities are constrained by the strategy defined within its global cluster. In this case, regional clusters emerged as more flexible and spontaneous.

Further research involves the assessment of global clusters by tracking key performance parameters over time. Beyond such macro assessment, Walloon policy makers may also benefit from micro field studies focusing on the actual building of organizational competences: in depth studies of the innovation process at stake may contribute to our understanding of localized interactive learning, knowledge appropriation by the parent organization and the role of distinct actors in the process. Besides, it may bring some light to the process behind technological choices within poles and subsequent impacts on the participants. Finally, universities and other research actors being involved in the global clusters’ strategy, their roles in the different phases of the technological cycle are still unclear. For instance, [26] pointed to a higher need for users-firms linkage rather than Science and Technology networks in the case of incremental innovation while [47] found that knowledge spillovers from local universities provided the most benefit to firms pursuing imitative and incremental innovation. As University is usually associated to technological breakthrough rather than incremental phases, further studies should be useful to understand the role of university as a knowledge supplier in global clusters and as an active participant to regional economic development.

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