



Cluster**COOP**



**CENTRAL  
EUROPE**  
COOPERATING FOR SUCCESS.



EUROPEAN UNION  
EUROPEAN REGIONAL  
DEVELOPMENT FUND

## **WP4-PP: Common methodology for the identification of emerging industry sectors in Central Europe, Part II – qualitative analysis guidelines**

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### **2. Qualitative Analysis of Cluster Emergence and Potential**

#### **2.1 Due Diligence Methodology for Sector Emergence Research**

The examination of the county-level official statistics and Amadeus database by NACE codes suggests candidates for county or region-specific “clusters” of similar manufacturing activities. They reflect a region’s industrial history and provide rough quantitative approximations of industrial specialization. However, the macro-statistical, quantitative methods do not go inside the firm or associated groups of firms to address a region’s production and organizational capabilities or strategic opportunities. This is understandable as capabilities are not statistically measurable; but, with the right conceptual tools, they observable and internationally comparable.

Research methods that emphasize the case study, qualitative approach are inspired by what is commonly understood in the business community as due diligence. We modify this somewhat to account for the focus on innovation and sector emergence.

#### **2.2 Four Stage Process**

We can identify a four stage process: company selection, getting inside the firm, company interviews, and identification of potential partners.

**2.2.1 Selecting companies.** The first step, outlined above, is to conduct a regional manufacturing overview in order to identify entrepreneurial companies and sectors with emergence potential from publically available information. These will be subjected to systematic study.

Sector emergence candidates are created from a combination of quantitative and ‘in the news’ sources. The latter may be reports from newspapers, local development agencies, chambers of industry, industry associations, consultancies,<sup>1</sup> government planning offices, national development ministries, future need assessments by technology agencies, EU regional policy agencies, etc.

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<sup>1</sup> Consultancy reports for other countries might be suggestive, for example McKinsey&Company Athens Office, March 2012, *Greece 10 Years Ahead: Defining Greece’s New Growth Model and Strategy*. Fraunhofer Gesellschaft, n.d., *The Future Needs Research* is an examination of how Germany has identified technologies and sectors for which societal needs are expanding rapidly.

Put simply, entrepreneurial firms are organized to innovate. They seek to develop competitive advantage by developing new products, processes, technologies, and organizational practices. Entrepreneurial firms do not take the environment as given; they seek to reshape the environment in which they operate by establishing long term partnering relationships with suppliers of inputs and services, customers, technology development partners, financial and research funding agencies, and education and training institutions. They tend to pursue a business model of focus and network: they focus on core capabilities and partner for complementary capabilities. They focus in order to develop a distinctive capability often with a technological dimension. Partnering relationships are perceived as intangible assets that must be carefully nurtured.

Studies of advanced economies suggest that roughly 5% of SMEs generate 50% of economic growth. This suggests the leveraged impact that innovative firms can have. It also suggests how few companies and, by extension, groups of companies have a large growth impact. Obviously, early identification of firms with such potential leveraged impact can have a big payback.

**2.2.2 Getting inside the door.** The next phase is the difficult task of setting up visits to selected individual enterprises. Business people are always busy and this is especially the case with the senior management and interviewing these individuals is critical to success. Postal surveys or ‘cold calling’ do not work. It is important to partner with trusted contacts within the business and support agency communities to break the ice. These partners will require a written paragraph or page stating the purpose of the interview. It is important to state that the interviewer or interviewing team wants to visit the production plant but will not ask questions about profitability (business leaders must be assured that the purpose is not a Trojan horse for tax collection purposes).

**2.2.3 Company visits.** At the introduction, the interviewers must ask permission to take notes and pictures. Make it clear that anything written for purposes of the report can be reviewed by company personnel before it is made public. Often the company officials will say politely that certain things can be filmed but others cannot. The purpose of the interviews is to conduct a form of due diligence that draws out the indicators of emergence and both firm and sector growth potential. A SWOT analysis is the tried and true framework for conducting interviews and for characterizing strategy.<sup>2</sup> Most senior management will be familiar with the SWOT framework as they will have conducted similar exercises for purposes of raising funds and government R&D related support. However, interviews are generally the only way to get this critical information at least for non-public companies. The task of the interview is to get

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<sup>2</sup> A note of caution: Too often SWOT degenerates into an indiscriminating list of unrelated and often contradictory factors that fail to align with the original, underlying purpose of the SWOT technique. Consequently, it is important to go back to the meaning of SWOT and to stress that its core assumption is that the internal positive and negative attributes of a business organization (or, in our case, a company with a sector emergence potential) can be distinguished from factors that characterise its external environment. The internal analysis serves to pinpoint the strengths and weaknesses. The external analysis serves to identify strategic opportunities and threats. Implicit in the SWOT framework is that the business organization (or region) has at least some ability to influence its internal performance, but has little or no power over the nature and behaviour of its external environment.

the information required to fill out the 4 dimensions as only in rare cases will a company provide a formal SWOT analysis conducted internally. But a successful interview is one in which the company directors offer their thinking on each of the elements; it is up to the interviewer to carefully record them in writing or remember them if not.

The starting point of the interview is the company history. Always read the company's website carefully as this shows respect as well as gets to the point more quickly. As the history of the company is told think about how to define the company's fundamental 'concept' or basis for its competitive advantage and how it has evolved and discuss this. This will emerge in the process of discussing the company's strengths, competitive threats, and the market opportunities.

As the SWOT analysis takes shape, the company's strategy will emerge. Strategy is not the starting point because it must be anchored in the SWOT framework including an objective assessment of the company's weaknesses. For example, a firm may say its strategy is to be a technology leader but will not have established partnerships with technology-development companies or public or private engineering labs. Or, a company may state its goal is to be innovative but lacks product development capability and the requisite engineering skills.

As noted above, entrepreneurial firms tend to be guided, although not formally, by a business model of focus and network. The focus is important because innovation is very costly in resources. In fact, an innovative company can require financial funding for a range of activities. In the case of high tech these activities will include basic research, proof of concept, early-stage technology development, product development, production, and marketing. Banks rarely fund innovation; they fund fixed capital in the form of machines and, in some cases, working capital but only for existing products.

Innovation is risky and tends to be funded from one of the following sources:

- profit margins of existing products (and divisions in the case of large domestic and foreign companies),
- governmental sources including government funded engineering and technology development agencies,
- corporate venturing in the form of cash rich companies seeking to take an equity position in a start-up,
- business partners such as customers and/or suppliers with a shared interest in the innovation idea,
- family and friends, including credit cards.

In seeking funding for innovative activities, the company will have been subjected to due diligence investigations by any one or more of the potential funding sources. For example, they may have applied to the European Investment Bank for financial resources.

#### 2.2.4 Factory Visit and Global Best Practice Criteria

The emerging cluster development potential is limited by the production capabilities of a region's enterprises. Production capabilities determine the performance standards that can be achieved. Sector emergence and growth depends upon the development of a critical mass of firms with the production capabilities to achieve the performance standards to compete in international markets.

This is a high standard. The great advantage of 'mittelstand' regions is a deep and broad knowledge base in skills and capabilities accumulated and advanced over many decades; this knowledge base is taken for granted by the enterprises, most of which are SMEs that leverage them to develop new products, processes, and technologies. At the same time, following industrializing regions have certain advantages. For example, the production and organizational principles required to achieve world class performance standards are knowable if not practiced. Turning the principles into production and organizational capabilities is not straightforward. It demands acute awareness and subtle adjustment to local circumstances. Bridging the gap distinguishes entrepreneurial firms with the potential to create and grow new sectors from companies in general.

A visit to the factory floor will provide the evidence of where the company is on the journey toward turning general principles into operational capabilities in the sphere of production. The principles are commonly referred to in terms such as lean manufacturing, world class manufacturing, just-in-time (JIT) or the Toyota Production System, total quality management (TQM). These frameworks all offer benchmark tools by which the company's directors can develop change programs. The particular change program is not critical; what is critical is that a company has such an assessment of progress system and the awareness and involvement of the entire workforce in its implementation.

How can you tell if there is a gap between the 'talk' and the 'walk'? By find out, for example, what metrics does the company use to measure performance? A good answer is 'inventory turns' or the ratio of annual sales to the stock of inventory because it is a measure that points directly to specific improvement activities that are required to meet world class competition and which are understandable to workers who must be on board to implement them. Does the company have visual indicators of quality? Does the company have an improvement philosophy of designing quality into the process or inspecting it in? Does the company benchmark industry technical specifications such as size tolerances of parts in metal working or proportion of sanders to labor force in furniture making? Are the shop-floor workers multi-skilled? Specifically, do they operate more than one machine, do they do set-ups for product changeovers and maintenance as well as operate machines, and are they involved in and even responsible for process improvement exercises? If not at the present time, does the company have a skill upgrading program with an educational institution to address the needs? Does the workforce pay structure account for worker self-improvement efforts?

On the professional technical side we apply an engineering taxonomy. Do the firm's operations and practices reflect product engineering, process engineering, systems engineering protocols and educational background at least among some staff? Each of these

disciplines involves skills and production practices that underlie and determine the company's performance standards and strategic possibilities. A company that lacks product engineering skills along with a multi-skilled labor force cannot, for example, pursue a strategy of new product development or routinely reorganize production to rapidly and efficiently absorb and integrate new technologies.

Viewing the company in terms of the organization of the production process focuses attention on the fundamental principles of interchangeability, flow, multi-product flow, and system integration. I hasten to add that this is not the only method but it illustrates the importance of a system by which a company can evaluate itself critically. The production capability spectrum (see Table 2) provides criteria for benchmarking an individual company's position and for identifying the challenges to move to a higher level of production capabilities. The criteria are not meant to be precise. They are meant to assist in clarifying where a specific manufacturing company fits within the global division of production activities. What is important is a clear awareness by a company's leaders of where a company fits within the global system and the importance of how the company is working on a daily basis to advance up such a benchmarking system.

**2.2.5 Identification of potential partners.** The companies that can be characterized as entrepreneurial firms and the people who run them and work in them offer the greatest potential for sector and cluster emergence. By definition they embody a business model of focus and network and a group of such companies foster an open-system of vertically specialized enterprises.

However, relational assets are not limited to inter-firm relations. The literature on regional innovation systems and 'innovative milieu' such as the German mittelstand business system focus attention on the links between firms and extra-firm institutions and intangible infrastructures. In the case of high-tech clusters the three-way, subtle-coordination of firms, research-intensive universities, and government are critical to the creation of a science and technology infrastructures and the emergence of new sectors (Best 2009). The technical institutes and vocational education programs that are embedded in the regional economies of Germany and the Scandinavian economies are further examples. In these cases, the extra-firm infrastructures foster diversity of industrial activity, greater experimentation and the creation of new firms.<sup>3</sup> The idea of 'emerging' industry sectors suggests an agency that drives processes of change to which an 'entrepreneurial' state can respond. Here, too, qualitative research is required to characterize critical assets and relationships that make adaptive clusters work.

The boundaries of the open-system business model do not respect national boundaries once barriers to trade have been removed. Consequently, the emergence and growth of new sector

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<sup>3</sup> In isolation, firms cannot survive in modern, high wage economies, and tend to outsource and eventually migrate activities to low wage but increasingly skilled Asian countries. Of course we do not expect to find such advanced cluster evolution in the central Europe regions given their historic legacy. But it is useful to think in terms of identifying the characteristics of globally competitive clusters. We will find many examples of 'incipient' cluster dynamics.

will likely have spillover effects with respect to specialized firms that have complementary capabilities. The existence of such vertically specialized firms in nearby regions with complementary skills and capabilities will create commercial opportunities for both regional clusters. To the extent that clusters in both regions are open-system business models, it would suggest that new inter-cluster associations can be formed that recombine the distinctive skills and capabilities that have accumulated over time in the different regions.

The latter is the organizational and structural foundation for self-organization sector transition capabilities at both the regional and inter-regional levels. This involves the diffusion of innovation capabilities of individual firms into co-evolving groups of firms. This signals the potential for an ongoing, self-organize process of sector emergence.

## **Appendix I. Two Case studies Forenel and Mittelstand Industrial System.**

Two examples of the characteristics and inter-relatedness of entrepreneurial firms and cluster dynamic processes are presented next. The first are the characteristics of an adaptive cluster using a Finnish case; the second are the multi-level, inter-organizational characteristics of the mittelstand industrial system. These represent the strategic challenge that emerging clusters faced in the peripheral regions of Europe. They also can serve as metaphorical laboratories for identifying indicators of sector and cluster emergence.

### **2.1 Adaptive Cluster Characteristics: Forenel**

An adaptive cluster example is the evolution of the forestry and wood processing industry of Finland. Given its extensive forests, Finland has a remarkably small wood furniture industry. Besides wood working, Finland specialized in wood-related sectors including paper, board, and pulp products. What distinguishes Finland is the role that wood processing played in the emergence of a globally successful 'forenel' cluster, is an abbreviation of FOrestry, ENgineering, and Electronics (Kuusisto 2005).<sup>4</sup> The 'forenel cluster' includes a broad group of related sub-sectors with differentiated but associated skills and capabilities in forestry, wood construction, chemicals, machinery and equipment, automation and information technology, logistics, energy, research and education, consulting and risk management services, printing, and packaging.<sup>5</sup> The new product applications along the way were driven by entrepreneurial firms leveraging legacy skills and capabilities to take advantage of technological changes and seize market opportunities. In the process new sub-sectors emerged and grew and in turn fostered new rounds of self-organizing cluster dynamic processes.

What do we learn from examples of adaptive clusters such as Forenel?

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<sup>4</sup> Kuusisto, Jari (2005)(ed.), 'Knowledge-intensive Service Activities in the Finnish Forest and Related Engineering and Electronics Industries (Forenel) Cluster'. The KISA (knowledge-intensive service activities) Project of the OECD Group on Technology and Innovation Policy (TIP) and Committee on Science and Technology Policy (CSTP). Coauthors included Hernesniemi, H., Lindström, M., Juntunen, A., and Hyvönen, J..

<sup>5</sup> Direct forest industry—wood and wood products; pulp, paper and paper products—employs approximately 70,000 people in Finland, and accounts for 5% of Finland's GDP. When the other actors are added up (forestry, engineering, chemical engineering, transportation, business services, printing) it is estimated that the cluster employs up to 170,000 people in Finland. Overall the share of Finnish forest products of the world's exports in the printing and writing papers is around 25%, in forest tractors 25%, paper machinery 30%, and pulp machines 40%. Amazingly, 60% of total capacity of the Finnish paper industry is now located outside Finland. It is argued that the Finnish forest industry is more anchored to the knowledge base of the cluster than to Finnish ownership as such. Besides the companies involved, research institutes and universities located in Finland contribute to this knowledge base (Kuusisto 2005).

## 2.2 Characteristics of adaptive clusters

- a) Firms do not compete alone in the global marketplace but as members of associated groups of firms.
- b) The basis for competition is more accurately described in terms of competing networks or clusters of firms rather than rivalries amongst individual firms (Jane Fountain P. 98 in Branscomb)
- c) Long term growth is a function of adaptive clusters. This means groups of associated companies, old and new, with the collective capability to develop new products and processes in response to changes in technologies and market opportunities.
- d) The extraordinary 'fusion' or convergence of forest products, wood engineering and electronics that underlie the development of the large, highly productive 'forenel' cluster suggests that how we conceptualize the boundaries of a 'cluster' is important for understanding industrial development and identifying growth opportunities even in the case of raw material and traditional industries.
- e) Firms compete in the global marketplace by leveraging the legacy skills, capabilities, knowledge bases, and the infrastructures of the regions in which they are embedded.
- f) Innovative firms make more than products: they advance the skills, capabilities and knowledge base of the region in which they conduct business. Moreover, the process by which innovative firms develop specific capabilities in pursuit of new market opportunities itself creates opportunities for other firms. In fact, even the failure to pursue emergent market opportunities by one firm may give rise to the establishment of a new firm or the repositioning of an established firm.
- g) Adaptability is conceptually different at the enterprise and cluster levels. For a firm, adaptability means new product development and technology management capabilities. For a cluster, adaptability translates into sectoral transitions and, in time, the emergence of new sub-sectors or even clusters. This is an evolutionary process in which companies emerge to fill in niches in a growing cluster and in which new specialist companies extend the process of differentiation of capabilities and the range of products in the cluster.
- h) The inter-firm processes by which skills, capabilities and knowledge are recombined and deepened within a region can trigger the emergence of new sub-sector growth opportunities. In this way, a region's production base can be enhanced by transition from declining to growing sectors.
- i) Successful new sectors and clusters often grow out of established ones; they form where a foundation of locational advantages exists (Porter 1998: 89).
- j) As a cluster expands, a self-reinforcing cycle promotes its growth. It will, writes Porter, gain influence with government and public and private institutions and encompass related sectors.<sup>6</sup>
- k) The financial resources for emerging manufacturing or technology-led companies are considerable. A new entrant's breakeven point can be years before the revenues from sales

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<sup>6</sup> Porter estimates it takes a decade or more to develop depth and real competitive advantage (1998: 85)

cover the costs for engineering a new product concept and even more years to cover the capital costs of prototyping, piloting, building the production facilities, and marketing the product. For companies developing new technologies the costs of basic research, proof of concept, and early stage development all precede product development. Not surprisingly, without government funding or co-funding of basic research, proof of concept and early stage development very few new technology companies would be founded. And without external, usually bank, finance for meeting the cash flow requirements for fixed and work capital during the growth phase, few companies would survive. Moreover, the resource requirements for an emerging and growing cluster are many multiples of the requirements for a single firm. (See Figure 2. Sequential model of development and funding).

### 2.3 The Mittelstand Industrial System

The question is: Why are there so many globally-competitive, mid-sized entrepreneurial firms in Germany, Austria, Switzerland, Denmark, and Sweden? The concept of Mittelstand points to a model of business and industrial organization long ignored but critical to understanding the different industrial economic systems in which firms operate in the Mittelstand regions from those pervasive elsewhere in Europe.

The Mittelstand is more than a collection of entrepreneurial firms; it is best understood as a multi-level industrial system that *produces entrepreneurial firms* and that fosters the emergence and growth of new manufacturing-related sub-sectors. It operates at four levels: populations of firms, inter-firm relations, extra-firm institutions, and strategic industrial policy.

Entrepreneurial firms are as companies with the strategic and organizational capabilities to develop new products and processes in anticipation of, and in response to, new market opportunities and technological change. Entrepreneurial firms in Mittelstand regions can leverage a range of extra-firm resources to facilitate a transition to a focus and network, open-system business model. The diversity of specialist companies is itself an open-system in which individual company's focus on a core capability and partner for complementary capabilities (Richardson 1972). The entry barriers are reduced as a new entrant can focus on a single, core capability and plug into open-system networks for complementary capabilities. In other words, a small or mid-size firm can pursue a strategy of flexible specialization because of the large number of available partners to jointly coordinate not only production but the development of new products. These are extra-firm, collective organizational capabilities that enhance participant firms' new product and technology management capabilities.

An example is the capital goods infrastructure. Nearly one-third of the German Mittelstand companies are in machine equipment and half are in machine equipment, electrical engineering, and industrial products.<sup>7</sup>

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<sup>7</sup> In a study of world leading mid-sized German firms three features were identified. First, the average age of the successful companies was 70 years. Second, over 70% were found to exist in small cities or rural communities. Third, over 70% are family owned even though many such firms combine family ownership with professional management. Prof. Dr. Bernd Venhor, "The power of uncommon common sense management principles - The secret recipe of German Mittelstand companies - Lessons for large and small companies", presented at the 2nd Global Drucker Forum Vienna 2010 November 18 and 19, 2010.

This capital goods sector performs as a system level resource or infrastructure that can be leveraged by individual firms to develop new products and processes. Inter-firm connections of this type add to the openness of a region's business system; they are a functional equivalent to bureaucratic coordination within multi-divisional enterprises. But most importantly, open-system business models lower the barriers to the transition of mid-sized firms to entrepreneurial firms.

Technology research and human resource agencies constitute a second form of infrastructural or system-level resources that enhance entrepreneurial firms. The Mittelstand industrial system contains a dense network of research and skill development institutions closely aligned with sub-regionally distinctive technological capabilities.

Finally, industrial policy in the Mittelstand region is largely conducted indirectly to firms through infrastructural agencies. The German government, for example, has invested heavily in R&D for renewable energy technologies via the intermediary of nationally integrated research institutes. The challenge is to develop system-based innovation policies that link basic research, development research and applied research with the NPD and production capabilities of firms. This is a multi-level process for which only the government has the funding and the legitimacy to establish the goals and establish the dialogue required to coordinate the range of activities.

These extra-firm or system-level resources are in short supply in the emerging market regions. For the Mittelstand regions they are organizational infrastructures that function as innovation platforms. A measure of the superior innovation performance of the Mittelstand regions can be seen in the Eurostat map of patent application data by NUTS 3 regions.<sup>8</sup>

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<sup>8</sup> See Map 4: Patent applications to the EPO, by NUTS 3 regions, 2006 (per million inhabitants) - Source: Eurostat ([pat\\_ep\\_rtot](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Science_and_technology_at_regional_level)) "Science and technology at regional level" - Statistics Explained (2012/3/1) <[http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Science\\_and\\_technology\\_at\\_regional\\_level](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Science_and_technology_at_regional_level)>  
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