

## Policy Brief

### Clusters and how to make it work: *Cluster Strategy Toolkit*

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Clusters as the magic answer to regional economic development; firms in clusters have been proven to be more innovative; cluster policy dominates EU policy; 'top-sectors' and excellence are the choice of national policy makers; clusters are 'in'. However, clusters are complex, 'messy' and there seems to be no clear logic about how clusters grow and thrive in practice. There are many theories and models but creating successful clusters remain a challenge. Everybody, policy makers, academics, urban planners, regional development agents, cluster organizations, businesses and industry, all have their own ideas and solutions about how clusters need to be developed. Some seek collaborations and networks as ideal ways to innovate, others seek answers in value chain approaches, others in research and development and often in the triple-helix collaboration model, and yet others in econometric benchmarks; consultants seem to offer a 'one size fits all' solution that cannot work. Silicon Valley's success cannot be replicated elsewhere and this lesson has become painfully clear to many policy makers. This paper elaborates on an approach that takes into account the need for closer scrutiny of local settings of clusters in developing more customized strategies.

Clusters are diverse, complex and unpredictable. They each have a history and a cultural context that determine their development. There is need for more integrated approaches that explores different facets of clusters in their development. The cluster strategy toolkit supports strategy development from a deeper understanding of principles and patterns in cluster dynamics. The cluster strategy toolkit was developed as part of a larger research project. This policy brief is an adaptation of the findings of the research and captures the ingredients of the toolkit. The case of Karlstad in the Region Värmland, Sweden has been included in this policy to illustrate how the toolkit works and what policy inputs can be gained by such an approach.

#### Part 1: CLUSTER ANALYSIS - ELEMENTS OF THE TOOLKIT

The first part of the policy brief explains the Cluster Strategy Toolkit by describing the eleven elements of the toolkit. Information gained from these eleven aspects would provide insights relevant to mapping cluster (and regional) developments. Each element of the toolkit has been explained and where possible questions have been identified that could be raised during cluster analysis initiatives.

##### a. Recognizing complexity and 'wicked problems'

Policy makers have since the global financial crisis recognized that they are increasingly faced with challenges that are complex and systemic in nature. These challenges are often multi-faceted and have different dimensions and can be found in different spaces and places in the system. These problems are often connected to other problems and they are 'wicked'. The term 'wicked problems' has been used to describe problems that are complex and unpredictable and the following features characterize them:

Problem definition: there is no agreement about the problem as multiple stakeholders with conflicting values and interests are involved and they all have their own versions

Solutions: No right or wrong answers, only better or worse solutions

- No test of success: No obvious test of a solution is available for wicked problems

- No end stop: the problems always continue and therefore is never resolved
- No repetition possible: wicked problems are unique
- 'One-shot' operation: each solution alters the problem, not solve it. Solutions create new problems.
- Multiple pathways: There are many ways to 'explain' the problem, and each explanation determines possible resolution
- No clear-cut solutions palette: unclear directions for seeking solutions with unpredictable outcomes of solutions
- Wicked problems are often symptoms of other wicked problems (systems of problems)
- No turning back

Identifying complex and urgent issues in the cluster is necessary and often the presence of wicked problems needs to be identified and understood. Information and perceptions of stakeholders on these major challenges in the cluster is necessary. There would be a greater need to seek solutions based on collective processes and judgements in order to deal with such wicked problems. It is important to realize that for the class of challenges identified as wicked problems, there are no expert answers, that each wicked problem is unique, and that high levels of uncertainty of outcomes needs to be appreciated. Cluster developments often encompass complexity that fringe on 'wickedness' as there are multiple stakeholders and views on strategy development. Mapping the views of stakeholders and their definitions of challenges and directions for the cluster is an important part of the analysis.

#### **b. Understanding current economic landscape in the region**

The economic landscape of the region and the cluster form an important part of the context of the cluster. The way businesses, industry, university and municipalities are connected to each other need to be mapped. Below are some questions that need to be part of the mapping exercise.

- How are value chains linked? Is this limited to the region, or is it connected to the 'outside' as part of global value chains?
- What horizontal and vertical linkages are present? Are sectoral structures dominant?
- Is there a dominance of large industries?
- Are there specific sectors dominating the region?
- How homogenous is the area?
- How is research and innovation linked to businesses? How are the triple-helix connected?
- What public policy support and funding incentives exist for economic development?

This part of the analysis needs to map the current landscape of the cluster and its region.

#### **c. Understanding factors affecting development of the region – drivers of change**

The next aspect of the analysis is mapping the landscape of the region and the clusters to understand how they are changing. Mapping the drivers of change, such as shifting geo-political powers and markets, EU internal market and policy directives, national and EU laws and regulations, digitalization of commercial and industrial processes, social network developments, etc. need to be understood. Drivers of change that specifically affect local, regional and cluster developments need to be identified. Key stakeholders and experts are good sources of information on the drivers of change.

#### **d. Understanding past developments – history, geography and culture**

Identifying key elements that shaped how the region to be what it is in the current situation is important. Understanding the history, geography, demographics of the region and critical events in the past would help understand issues about future developments. The local context of the cluster needs to be mapped. Questions on critical historical and geographical factors are asked. Cultural traits and other factors for the current situation are mapped in this part of the analysis.

#### **e. Understanding how regions expect to deal with the changes and where the gaps are – changing competences for changing landscapes**

Changes in the context of clusters and regions and how they perceive and react to these changes need to be analysed; levels of alertness to external changes and its impact on the region are important. Identifying the need for new competences and gaps in current competences and knowledge in the region need to be mapped to help become 'future-proof'. Questions aimed at identifying competences, research and resources for future development need to be posed.

#### **f. Identifying the reference framework of the region/cluster – scope, identity and rules**

Definition and identity of the region and cluster are important reference frameworks that need to be verified. There may be a policy definition of a cluster but stakeholders in the cluster may have differing definitions and weightage given to the role and boundaries of the cluster. The firms in a cluster may be operating from their company perspective rather than a cluster perspective. There may be different and even conflicting expectations from the different stakeholders on the role of cluster organization, policy guidelines and interventions, etc.

Definitions and identities ascribed to a region/cluster are often unspoken and may have an impact on the development, particularly, if they are divergent. Issues need to be mapped from the different stakeholders' perceptions:

- What is important to them and what are their priorities?
- Where are the boundaries of their 'business' and that of the cluster?
- How do individual stakeholders react to local changes?
- Is their focus international?
- Who is in the cluster and how is power distributed in the cluster?
- How does policy influence cluster development?
- What is expected of policy?

#### **g. Understanding the players and how they perceive, connect and act – stakeholders**

The way stakeholders interact and communicate in the region or cluster is relevant to understanding how the cluster will develop. Types of collaborations, perceptions on competition and collaboration, factual information on the interaction patterns can help map where innovation is being sought and where potential new clusters can be found. Consolidation of businesses (merges and acquisition) and equity flows in cross-sectoral collaborations are often indicative of new cluster development (PwC, 2012). Questions on linkages and collaborations amongst cluster members and other entities in the region are important to map.

#### **h. Understanding competitive advantage of the clusters - differences that count**

Recognizing the need for diversity in clusters in terms of thinking, knowledge, organizing, the degree of openness to new ideas, etc. need to be mapped to understand where complementarity and new innovation could be generated. Distinctive advantages and differences in the region and in clusters are important opportunities for innovation and growth. Information related to core competences and distinctive advantages and to inherent differences need to be explored.

#### **i. Understanding changes the interactions are bringing to the region – collaborations and interactions**

Exploring patterns of interaction in the cluster/region by asking about how often stakeholders meet, about who is taking part in collective strategy development, and if there is an increase in the number of meetings, and whether there are changes in the quality of such meetings, for example from informal networking to more focussed themes and strategy related sessions, etc. The outcomes from the meetings could indicate the transformations that are taking place between those involved and possibly the diffusion of knowledge and ideas beyond the meetings. Interactions in collaboration projects where new knowledge and businesses often result in innovation and these needed to be mapped. Specific examples of the nature and types of interactions and collaborations would give insights into changing interaction patterns. Outputs that reflect transformations need to be mapped to see the shifts in the cluster developments.

#### **j. Understanding new patterns that are emerging – emerging ideas and structures**

Changes in how stakeholders are interacting and the way business is done, who new players in the field are, new rules dominating economic participation and measures of success, new routines being established in business and innovation, are all indicators of emergent cluster development. Understanding these emergent patterns can help understand the direction and opportunities arising in clusters and their regions.

#### **k. Understanding where changes are coming, whether they are centrally steered, or, bottom-up initiatives – self-organizing processes**

Exploring and mapping emergent local initiatives and the role of centralized steering through policy would help understand the dynamics of self-organization and the supporting role policy may be playing in shaping current cluster developments. The space for local initiatives in policy and the need for self-organization may be important to understand in cluster developments as they are often neglected in strategy development where only leading players participate in strategy and policy developments. The policy could fill gaps to facilitate cluster interactions and collaborations, to create conducive business environments, and to facilitate knowledge and skills development. Mapping current roles and impact of policy could help understand what is needed in the next steps.

Below is an overview of the cluster strategy toolkit and the eleven aspects that have been described in the first part of the policy brief.

## CLUSTER STRATEGY TOOLKIT

- a. Complexity and 'Wicked Problems'
- b. Current economic landscape
- c. Drivers of change
- d. History, geography and culture
- e. Changing competences for changing landscapes
- f. Regional playing field: scope, identity and rules
- g. Stakeholders
- h. Differences that count
- i. Collaborations and interactions
- j. Emergent ideas and structures
- k. Self-organizing processes

In order to understand how the toolkit can be applied in cluster analysis, the case of Karlstad has been used to illustrate this in the next section.

### Part 2: CLUSTER STRATEGY TOOLKIT APPLIED TO KARLSTAD REGION

#### Introduction to Karlstad and its changing context

The county of Värmland has a population of 273, 000 people covering 17, 586 square kilometers. There are 16 municipalities and Karlstad is the biggest town with 85, 000 inhabitants. Värmland is situated in the Northern central part of Sweden bordering Norway. The region is also characterized by water (10, 512 lakes) including Lake Vänern in the south that is the largest inland lake in Western Europe. There were four clusters, The Paper Province, The Packaging Arena, Steel and Engineering and Compare (IT). The Paper Province is the oldest of these clusters and this dates back to the paper and pulp industry that was established in the 17th Century in Karlstad, Värmland region.

Stakeholders described recent changes in the context of Karlstad and Region Värmland that posed new challenges for the region. Highlights of these changes and challenges were:

- Changes in global markets in the paper and pulp industry, leading position threatened?
- Caretaker role of paper and pulp industry in the region changing - patterns of patronage in the past still lingering
- Rural-urban migration and brain drain issues
- Expanding urban hubs, Stockholm, Guttenberg and Oslo, with Karlstad in the middle - threat of absorption or redundancy
- Shortage of technical personnel due to urban pull and lack of interest in technical careers

- Sustainability agenda due to climate change and environmental pressures
- Consumer demands for 'green' products

### Analysis based on Cluster Strategy Toolkit

The following description of developments in the Karlstad region and its clusters were based on interviews with key stakeholders and experts related to The Paper Province cluster. Although the case study was limited in its scope, different aspects of cluster and regional developments were identified and have been analysed and implications for policy have been identified. The purpose of the case description was to illustrate the use and value of the Cluster Strategy Toolkit. A more extensive study could provide more details and insights into changes in cluster developments regarding its definition, interaction and directions and that of the Karlstad region.

### Recognizing complexity and 'wicked problems'

The town and the region needed to deal with challenges of changing economic conditions and perspectives. There were many stakeholders: the paper and pulp industry, businesses in general, cluster organizations, local municipality policy makers, Region Värmland policy makers, local, regional and national politicians, university and research institutes, businesses, citizens, and technology institutes.

Stakeholders had their own views, interests, perspectives, and ideas about what the core issues were, how they needed to be solved, and what priorities were needed. To illustrate,

- The national government and ministry of education focused on prominent (academic) universities and allocated funds for fundamental research and development to support innovation and to develop national competitive advantages. Industry had a more urgent need for applied research but funds for applied research were limited and had less priority in national policy.
- The local Karlstad business sector were not happy with the education system and opened their own 'technology centre' to train young people to meet the specific labour needs of their industries.
- Local city council was seeking answers by demanding more efficiency and collaborations amongst the four cluster organizations.
- The paper and pulp industry were concerned about global market changes but it was 'business as usual' according to local experts.
- National and local governments did not seem to recognize the need to 'save' the paper mills for their innovation value – a lot of spin-offs were generated from the mills according to the cluster organization.
- There were complaints about the mill from local residents even though they were dependent on the paper and pulp industry but seemed not to appreciate its value to the community and its history.
- Spin-offs from the paper and pulp industry resulted in new clusters in the past, namely, Steel and Engineering cluster, Compare, an IT and telecom cluster, and The Packaging Arena cluster. These clusters were born out of the needs of the paper mills, knowledge and opportunities created as a result of the mills' activities.

### a. Understanding current economic landscapes in the region

- The tradition of the regions was one of small municipalities where one big plant dominated and many Small and Medium-sized Enterprises arose to serve the main plant.
- Paper and Pulp Industry was dominant in the Region Värmland and having an important position in the community. There were 3 other clusters besides The Paper Province, namely Compare (IT and telecom cluster), Steel and Engineering cluster, and Packaging Arena.
- Clusters were relatively independent and had a 'comfortable position'. They had achieved success in the past and seemed to be complacent in their success according to the municipality.
- Bigger companies tended to use their own R&D facilities but were slowly changing and were collaborating more often with the local university.
- Karlstad University's Service research centre (CTF) was one of the leading research centres in service innovation globally. Regional companies were not aware of the potential value of the research centre for them.
- Municipality and Regional development agencies funded and steered cluster development.
- There was no national and governmental level policy on clusters, only at the regional level at the time of the research.

#### **b. Understanding factors affecting development of the region – drivers of change**

- Internal drivers of change
  - Businesses sought growth and innovation in products and areas adjacent to their own core business.
  - The demands of the local municipality of Karlstad for more collaboration amongst cluster organizations to improve efficiency and reduce duplication.
  - The need for SME to collaborate to vie for complex tenders and projects.
- External drivers of change
  - Pressure of the urban cities of Oslo, Gothenburg and Stockholm were expanding around Karlstad and this created an urgency for Karlstad to survive and to be independent rather than become a satellite town of one of the other cities.
  - National funding and attention were also more focussed on the bigger cities.
  - EU policy was providing funding and stimulating local regional developments and clusters. The Paper Province was named a 'world-class cluster' by the European Cluster Observatory.
  - EU policy was pushing for 'bigger, multi-sectoral, high-tech, excellent clusters' that breaks down barriers between segments and sectors.
  - Environmental regulations related to sustainable forest resources, and pollution measures for both air and water contamination
  - Competition from Brazil and other up-coming markets
  - Technology innovations had led to spin-offs that became relevant for other industries. The scope of the clusters, Compare and Steel and Engineering, became larger serving not only the paper and pulp industry.

#### **c. Understanding development of the region – history, geography and culture**

Karlstad is a Swedish, provincial town, and the region had been dominated by its paper and pulp industry for more than three centuries. Small communities in the region were usually dominated with one main industrial player. For Region Värmland, it was the paper mills. The presence of the river and the lake enabled logging and transport of timber to paper mills, and they, in turn, had sufficient water to process the wood. Transportation of finished products was also served by shipping. Water and forests were important natural resources of the area. Skilled labour and technological innovation and service from ICT, engineering and machinery companies were also



important to the growth of the industries and the region. However, the paper and pulp industry was huge, dominant, and in some ways, slow to change as it was a big investment industry (similar to many traditional industries in the world). The paper and pulp industry, and the steel and engineering clusters were heavy industry that was male-dominated. The mills tended to 'take care of the region' and citizens often responded to this by letting them dominate the region and to take care of them according to a cluster manager. Also, the communities in the region (as is in rural Sweden elsewhere) were often small and had a history of 'trust' and collaborations. Another historical and cultural value of Sweden was that of equality that affected policy and funding decisions as well as local collaboration patterns.

#### **d. Understanding how regions expect to deal with the changes and where the gaps are – changing competences for changing landscapes**

The region had grown by adapting to growing markets and offering specialized paper products through the help of technology, specialized machinery and skilled labour. The mills also consolidated over the years such that the 400 mills had been reduced to a few large mills that dominated the landscape of Karlstad region. The town and regions surrounding were dependent on the paper mills and their related industries. The wave of consolidation allowed economies of scales, efficiency and specialization.

Environmental demands by EU and national policy and in recent times by consumers meant that the industry had to meet these demands through new innovations. The industry had to change to meet market and environmental pressures to be competitive and viable. The region as a community served the industry and it grew with the industry. It was a locally driven development that had to change to meet new demands from outside. More recent developments in emerging economies had put pressure on the paper and pulp industry. Mills in Brazil, for example, were becoming competitors for the Swedish mills, also in Karlstad.

Some of the points raised by the interviewees related to the changes and the ability to change are highlighted below. Mills had a high technical knowledge component and a lot of innovation were generated by the mills although often in very specialized, narrow areas and were not 'spilling over' to the outside nor were these expertise used to create new businesses. Old industries, including the paper and pulp industry, suffer from inertia, which meant that they do not want to change, they keep existing rules, use current business models as a result of being traditionally self-sufficient and self-contained. The paper and pulp industry was the whole value chain.

- The self-contained culture was not helping them to think differently nor to use their knowledge and competences beyond their own borders.
- The demand to be clean and green required new competences and these needed to be developed and they needed to come from outside.
- New businesses and business models needed to come from the borders and through cross-sector collaborations. Examples mentioned were bio-medicine and waste deemed as a resource and with potential value.
- By joining other sectors to search for new products and industry, they could broaden existing knowledge to create new industry and businesses
- Creative people were needed, as the region was strong in engineering and a new cluster related to packaging offered opportunities to broaden existing competences.

The industry and the region needed to get new innovation, business models and new competences and these needed to be sought at or across borders, or, from outside the industry.



#### **e. Identifying the reference frameworks of the region/cluster – scope, identity and rules**

##### **The Paper Province**

The cluster in Karlstad was an established cluster of more than 13 years. There cluster organization served 90 organizations that were its members. The municipality of Karlstad funded this and other clusters. The recent developments in Karlstad involved funding rules aimed to increase efficiency of all clusters by reducing duplication of administrative and other aspects of cluster management by enforced collaborations. The cluster organizations needed to collaborate closely and their scope of activities would be influenced through these changes in funding structures. Cluster members were also demanding more value for their money, and were expecting more accountability from the cluster organization. New demands were being made of the cluster organizations.

Next level collaboration was demanded of the cluster organizations by the municipality but there were no precedence of this. The demand was more inter-cluster collaborations and sharing of resources, and efficiency through collective promotion. The municipality talked of 'deeper' collaborations but there were no clear insights about what this meant.

The role of cluster organizations, their degree of autonomy and performance in a more demand-driven context could change their scope, role and identity. The degree of collective and co-design possibility space and efforts would determine the new reference framework for cluster organizations and clusters.

The clusters were being pushed to expand their scope to a higher level of collaboration at the cluster level by local and regional government agencies but also due to EU policies supporting competitive cluster development through programmes that support cluster excellence initiatives, internationalization and inter-cluster collaborations, and professionalization of clusters. There was a shift in demands of clusters to extend their activities and scope to include intra-cluster and inter-cluster initiatives and collaborations.

#### **f. Understanding the players and how they perceive, connect and act – stakeholders**

##### **The Paper Province**

Stakeholders in the Paper Province were the businesses in the cluster, the cluster organization, the local municipality, the university, the regional government,

New stakeholders were spin-off companies from the main business, for example in biomedicines from forests.

Different stakeholders had different interests: the big industry players focussed on keeping the mills running and being competitive and were focussed on international developments from competitors and needed global scale for their operations. The competitiveness drive resulted in highly specialized engineering and machinery innovations, knowledge and spin-offs. A separate engineering and machinery cluster was the result. The automation of the paper mills had also resulted in a highly innovative ICT service industry that was the second spin-off organized in a cluster. The Mills had to comply with environmental regulations when the lake was polluted and this created innovations and spin-offs that have added to the quality of life of the region and strengthened the traditional ties between the industry and the community.

The paper and pulp industry have had the role of 'care taker' for the local communities as their lives and livelihood were woven with the mills. The mills and the communities seem to live this role even though a lot was changing, and there was concerns about the local communities being too 'complacent' and not taking ownership of their own future.

The trust level in this region, the clusters and the community was high as reflected in the relations of 'care taker', interdependent and spin-off economic activities. This trust comes from the close community and culture of the region. All stakeholders recognized this.

The dependence and dominance of the paper and pulp industry extended to business communities, and clusters that emerged from the original paper and pulp industry. However, emerging developments of Small and Medium-sized Enterprises and the newer clusters looking beyond their own regions increasingly.

Triple-helix stakeholders (policy, business and research) were essential to cluster developments and were present in the cluster and collaborations strengthened linkages and interactions in the clusters.

#### **g. Understanding competitive advantage of the clusters - differences that count**

The existence of new and old clusters in the region offered opportunities for new collaborations. The city municipality intended to use funding rules to demand more cross-cluster collaborations and to move such collaborations to the next level.

The cluster also had top-level research done at the local university. There were limited collaborations between the university and local companies and between the university and the cluster organizations at that time.

Industry and businesses in the area needed technically skilled personal that were aligned to their needs. Schools were not producing students with these skills. Business needs pushed joint collaboration to set-up a technical education centre where expertise from businesses was brought into the classroom. Young students participated in the training programme because of the job prospects after the training. Schools were benefitting by getting new machinery and technology and improved education programmes.

Consumer demands for more sustainable and ecological sound products offered a new spin-off in forestry-based research and expertise to create a new business base, eco and bio based health products. Paper mills had traditionally generated innovation in processes and products that had value outside the paper and pulp industry. This potential is one of the main pleas for maintaining the remaining mills.

#### **h. Understanding changes that interactions are bringing to the region – collaborations and interactions**

The high level of trust existing in the region and the collective history of the different clusters coming from The Paper Province reflected close proximity and interactions. The need to collaborate to compete in complex project bids was mentioned as indicators of the flexible collaboration patterns and interactions in the region. Application of innovation spin-off from the paper and pulp industry to other sectors by the other supporting clusters was changing the scope and identity of these clusters. Seeking new business opportunities resulted in the creation of bio-medicines as a cross-sectoral initiative. There were also other initiatives emerging that intended to preserve the forests through more sustainable practices and this needed collaborations beyond the paper and pulp industry and the existing clusters.

#### **i. Understanding the new patterns that are emerging – emerging ideas and structures**

Karlstad's clusters are pushed to work together to create 'excellence' through collaborations by EU cluster policy and that of the local municipality. No one knew what this would entail but the willingness to explore new collaborations seemed to be present. Regional and local policy and the Swedish Innovation agency were constantly offering incentives and directions for further collaborations. A new programme to create new areas of excellence emerged after mapping local research competences and local business expertise. The regional agency, Swedish innovation agency and the local municipality were involved in seeking opportunities to create new future economic growth. The result was the creation of a long-term commitment to support 10 new professorships in new knowledge and innovation developments based on the competences mapping of the region. Policy interventions and support push to new developments seemed to be a new pattern in this region.

#### **j. Understanding where the changes are coming from centrally steered or are they bottom-up initiatives – self-organizing processes**

Karlstad's funding rules of the city municipality was an example of policy driven change in cluster development. The changing demands of firms for more 'value for money' from the cluster organization and the green consumer demands were examples of bottom-up developments that pushed cluster organizations to re-think their roles. The cluster organizations needed to step up to challenges posed by businesses, local, regional and EU policies and ambitions.

### **Conclusions**

The paper and pulp industry's history and economic developments that had dominated the region would continue to impact future developments of the region. Strong local linkages, interactions and collaboration patterns were part of the social and economic landscapes. Although there were shifts in the way Karlstad and the region were developing, in order to deal with the changes in its context and the new challenges, Karlstad may need to re-consider its strategy for its future. Below are some conclusions and recommendations to this end.

#### **1. New paradigms for the region**

Karlstad's need to shift policy away from salvaging the paper and pulp industry as the main economic activity towards supporting more diverse regional development was acknowledged, but there were

feedback loops and processes in the current situation that could hinder broader regional development focus:

- a) Lock-in effect of existing economic, technological and social processes and infrastructures – e.g. vested interests and complacency of dominant industry and dependence role of citizens and policy
- b) Lack of coherence and lack of consolidation of knowledge and market development efforts needed to be addressed – e.g. fragmentation of clusters and businesses trapped in own networks and value chains, fragmentation of university R&D and that of business and industry,
- c) Lack of alignment in local, regional, national and European developments – e.g. diverse interests and focus of local, regional and national levels of policy contributing to dispersed efforts, duplication and inefficiency,
- d) Silo thinking – e.g. cluster organizations served own members rather than focussed on larger regional development, universities focused on patents and publications instead of needs of industry & businesses, businesses focused on own innovation and profits instead of collaborative projects, etc.

## **2. New economic principles**

Karlstad's shift from a industrial to cluster landscape had been successful in many ways but the dominance of the paper and pulp industry on the region meant that the sectoral approach had its impact in how the region was developing. A more explicit focus on new economic principles as organizing strategy could help break the lock-in effect of the paper and pulp industry's dominance.

- a) Innovation as a driver of economic growth through new technology, products and services as reflected in the newly established professors.
- b) Thinking in value chains beyond the paper and pulp industry. Creating new value chains (see next point).
- c) Interdisciplinary and inter-sectoral collaborations and thinking. Examples were the bio-medicine and sustainable forestry initiatives.
- d) Network and inter-cluster collaboration with more emphasis on triple-helix linkages. New collaborations between clusters were initiated, but these could extend to beyond the region and country as purported by the EU's cluster policy.
- e) Local-global strategies for the region, as opposed to individual businesses and clusters.

Karlstad had embraced new economic structures but could enhance such efforts to realize the proposed diversified regional base. A different way of thinking about the region's future economic opportunities through its definition of its scope, borders and identity could offer new directions when guided by new economic principles that seek to unify fragmentation and mass where needed, and to break homogeneity where diversity is lacking.

## **3. New attitudes**

Karlstad needed to cast off its dependence on the paper and pulp industries and its provincial town status to avoid being subsumed by the metropolitan spread of the three main cities surrounding it. The Karlstad region needed to join forces to create new value chains and collaborations to rise to its challenge of re-defining itself to overcome redundancy and economic malaise should the paper and pulp industry fail in a global competitive market. The presence of business that served the paper and

pulp industry needed to take ownership of their future and to seek collective solutions through collaborations.

- a) Networks and collaborations as essential for new business
- b) Regional scope needs to be replaced by local-global scopes
- c) Ownership of the region by all stakeholders instead of reliance on the dominant industry

#### **4. Different roles and behaviours**

Ownership and creation of new business and economic growth by the region's stakeholders meant that new and different roles and behaviours were needed. The need to collaborate more than in the past and the need for policy to take leadership and provide incentives in different ways needed to be established.

- a) Facilitating and orchestrating role of policy that included raising awareness, offering incentives and creating new opportunities for new and different types of collaborations amongst stakeholders.
- b) Collaboration instead of competition needs to be the main business mode instead of incidentally as in the past for complex projects. The realization that collaboration to create mass, to share risks and to create different and new opportunities to launch into new markets globally needs to be shared.
- c) Test beds, pilots and new initiatives that would allow for collaborative learning and (open) innovation needed to be facilitated and become mainstream to accelerate new value adding and value chains. The creation of ecosystems of innovation that builds on latent trust in the region would enhance innovation capacities.

The Karlstad region has been described and the analysis offered insights into the interaction and patterns of developments in the cluster and region. The insights reflected underlying processes and systemic aspects of its developments. These, in turn, reflected the need for changes in the underlying structure and processes in the region.

### **PART 3: IMPLICATIONS AND APPLICATION OF CLUSTER STRATEGY TOOLKIT**

#### **The value of the Cluster Strategy Toolkit**

##### **1. Description of real complexity**

The analysis does not only describe the wood and pulp industry or only the regional development, but it includes the historical perspective, the forces at work from within and without the system, the roles of stakeholders, the (missing) competencies in the cluster, the opportunities that arise from thinking about inside and outside of clusters, visions, goals, plans, actions, collaborations, etc.

##### **2. Sense-making**

The systems alignment mapping, that includes mapping processes and patterns such as influence of history on current developments, dynamics between stakeholders, the way the container is used (enlarging or contracting the container could lead to different connections and strategies), the role of government and other stakeholders, etc. offer deeper insights of the system interactions and developments.

### 3. Capturing cluster development

The analysis captures how clusters develop, how perceptions evolve and influence emerging interactions and collaborations within and outside the cluster, how new stakeholders are engaged, how new strategies are developed, how new competencies and networks are created and how these lead to new actions and performance that in turn, influences thinking about the future (strategies).

### 4. Successful ecosystems

The cluster as an ecosystem is implicit in the model that makes explicit the successful and less successful developments in the system and thereby offering opportunities for learning about ingredients in successful collaborations, stakeholder involvements and the impact of such interactions, about competences and infrastructures contributing to new successes, and about distinguishing fertile and less fertile ecosystems. The case study offered insights into Karlstad as an ecosystem that encompassed The Paper Province as a cluster within a larger regional system that included other clusters, local and regional policy agencies, competences, knowledge developments, new opportunities and spin offs from within and outside the cluster, etc. Potential growth opportunities in Karlstad need to be further investigated by exploring the system's patterns of development in more detail.

### 5. New insights leading to new research agenda

The model has been applied to a limited number of clusters to uncover cluster developments and emergent patterns. Further investigation and application to new cluster studies would support refinement and use of the model to map and create growth strategies for context-specific developments.

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