6 Sustainable manufacturing

Creating a regional forest-based bio-economy

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6.1 Introduction

How regions develop environmentally sustainable new growth paths represents an increasingly urgent challenge for both policy makers and academics interested in sustainable regional renewal. The concern for sustainability comes in the context of increasing perceptions of the scale of contemporary environmental degradation and is leading to growing pressures for changes to existing socio-technical systems as a way of addressing this pressing societal challenge (Geels 2011; Coenen et al. 2015). However, the emergence and diffusion of new socio-technological systems is a complex and long-term process involving significant changes to existing scientific knowledge and technologies, user practices and markets, as well as societal institutions (Geels 2004, 2011). These systemic transitions usually require a re-alignment of multiple technical and social elements in new configurations that are often contested as they can undermine powerful vested interests (Geels 2011; Boshma et al. 2017). Moreover, it is argued that transitions towards sustainable socio-technical systems require purposive action (Smith et al. 2005 in Geels 2011) in the sense that they are the result of policies that consciously address the need for environmental sustainability. Given these conditions, the dynamics of systemic transitions towards green regional economies will differ significantly from the evolutionary processes of regional renewal within existing socio-technical systems discussed in much of the evolutionary economic geography literature (Boschma 2017), which focus on the nature and diversity of local technologies and capabilities, knowledge spill-overs and entrepreneurial responses to new technological and market opportunities.

This chapter describes and analyses initial efforts to establish a new regional growth path based on the transition of Sweden's Värmland Region from a socio-technical system based on the traditional manufacture of pulp and paper towards a forest-based bio-economy. Given the complexity and multitude of factors that influence the regional transition of socio-technical systems, the study of the dynamics of change in one region can help us gain an understanding of the factors and relationships that promote or hinder systemic change. The account highlights the importance of place-specific dynamics of

transition processes such as the existence of a natural resource with the potential to become a new source of a renewable biological raw material (in this case the forest); new regional visions and policies; the role of the locality for market formation; and the role of local formal and informal institutions in the emergence and transition towards new regional socio-technical systems. The main focus of the chapter is on the role of agency and new policy initiatives strongly influenced by the need to address major societal challenges such as climate change on processes of regional diversification. The analysis adopts a multi-scalar perspective because many of the key players in Värmland's regional economy are subsidiaries of multi-national corporations (MNCs) or part of their global value chains (GVCs) and global innovation networks (GINs) and because transitions of socio-technological systemic tend to be global in nature, though with important national and regional manifestations.

The chapter is structured as follows: Section 6.2 brings together insights from the literatures on evolutionary economic geography and transitions to discuss changes in socio-economic systems with a focus on environmental sustainability. In Section 6.3 the methodology of the study is presented. Section 6.4 describes and analyses processes of transition towards a sustainable forest-based bio-economy. Section 6.5 discusses the role of agency and the multi-scalar nature of regional transitions to new socio-technical systems. Section 6.6 concludes the discussion.

6.2 Regional transitions towards sustainable socio-technical systems

Evolutionary interpretations of regional development and diversification have emphasised the importance of local knowledge given the path-dependent nature of learning and technological change (Immarino 2005; Castaldi et al. 2015) and much attention has focused on the nature and degree of technological diversity of local knowledge and capabilities which are seen to condition the type of new activities that will be able to develop (Frenken et al. 2007; Nefket et al. 2011; Boschma et al. 2017). In these accounts, novelty is analysed in relation to the existing knowledge base and capabilities of a region, and the main mechanism for local diversification are knowledge spill-overs between industrial sectors (Asheim et al. 2011), whilst the main drivers of innovation and regional renewal are profit-driven firms incentivised by new technological and market opportunities. As argued by Boschma et al. (2017), the focus of recent studies on regional renewal has been on the enabling conditions embodied in regional capabilities, with less attention having been paid to factors that constrain the development of new growth paths and the role of agency in overcoming such obstacles.

Whilst these accounts of the dynamics of regional diversification based on new combinations of previously unconnected technologies (which diffuse through regional economies on the basis of spill-overs – see Castaldi et al. 2015; Boschma et al. 2017) can explain radical and incremental innovation

within existing socio-technical systems (Geels 2004), they do not capture the complexities, obstacles and tensions associated with systemic changes of globally dominant techno-economic and social systems. Socio-technical-systems transitions involve not only new technologies but also changes in markets and user practices, as well as institutions (e.g. environmental standards and practices) which are often contested.

It is argued that, in general, private firms have limited incentives to drive sustainability transitions because the goal is related to a collective good (sustainability) associated with numerous instances of market failure (Geels 2011). Moreover, the industries where sustainability transitions are most needed (e.g. transport and energy) tend to be dominated by large MNCs that possess complementary assets (Teece 1986, Rothaermel 2001) (such as specialised manufacturing capabilities and large-scale test trials) that give incumbents a strong position in relation to the entrepreneurial firms that tend to be the first to develop environmental innovations. Therefore, the involvement of incumbent firms that are still embedded in current socio-technical systems in processes of systems transition to a green economy usually requires significant strategic reorientation on their part (Geels 2011). From a regional development perspective, successful transitions towards sustainable local economies therefore require what Coe and Yeung (2015) refer to as a *strategic coupling* between local strategies of regional diversification and the strategic needs of MNCs and their GVCs. This process of strategic coupling has three important characteristics: (i) it is strategic in that it needs intentional and active intervention on the part of both regional authorities and the MNCs active in the region to occur; (ii) it is time-space contingent and is therefore a temporary coalition between local and non-local actors; and (iii) actors from different spatial scales interact (Coe and Yeung 2015). The ability to align regional diversification strategies with those of MNCs is not automatic or always successful (Coe et al. 2004; Dunning and Lundan 2008; Coe and Yeung 2015).

The above discussion suggest that in order to understand processes of regional transitions in line with new, environmentally sustainable, socio-technical systems, the role of agency (including, for example, the collective action by firms and the actions of policy makers) and policy needs to be incorporated into the analysis (Neffke et al. 2016; Boschma 2017; Boschma et al. 2017). The literature suggests that in the case of regional diversification based on the transformation of socio-technical transformation, new entrants such as spin-offs and to a lesser extent diversifying firms will be the key agents of change and the formation of new industries (Neffke et al. 2016; Boschma et al. 2017). However, it is accepted that regional governments can also play an important role as agents of regional transitions by lobbying for the creation of new supporting institutions at the national and global levels. Moreover, when new socio-technical systems are close to the existing knowledge base of a locality, a region can provide a supporting institutional structure for change.

Given that the development of socio-technical transitions are global in nature and scale, especially transitions related to climate change, a multi-scalar

perspective that takes into account how global and national processes impact on regional diversification is necessary.

6.3 Methodology

The case study is written following the tradition of ‘appreciative theorizing’ (Nelson and Winter 1982; Nelson 1994), a theory-building approach widely used in innovation studies and evolutionary theories of innovation and organisational change that concentrates the analysis on the role of actors, relationships and processes that lead to qualitative transformation. Data for the study was collected from 15 semi-structured interviews with representatives from six firms located in the cluster organisation Paper Province (PP) (three MNCs and three SMEs) and nine representatives from the national and regional policy-making system. Interviews took place in 2016, three years after PP won the Vinnväxt competition, and therefore focus on the initial stages of the process of regional diversification and transition.

6.4 Värmland Region’s transition towards a sustainable forest-based bio-economy

A structural transition towards a regional bio-economy involves underlying changes in a local economy so that renewable biological resources such as crops, forests, fish, animals and micro-organisms replace fossil fuels and become a major source of raw material for production. In the case of forestry, the biological resource is lignin, a wood component produced as by-product (or waste material) of pulp production, which can potentially be refined into new environmentally friendly fuels, chemicals and lightweight materials (e.g. bio-based household products, composite materials, pharmaceuticals, paper and textiles) (Formas 2012). Lignin has been described as a new ‘green gold’ because of its potential to replace fossil fuel as a source of energy as well as raw materials. However, many of the technologies related to the bio-economy are still very new to the industrial sector and society. In that sense, the bio-economy represents a new socio-technical system requiring the development of new forms of production and new firms, new markets and changes in user practices as well as new institutions.

The Värmland Region of Sweden has a long history of industrial development based on the forest industry, above all pulp and paper, and deep knowledge of the process technologies underlying these two sectors. At the time that the study took place, there were some 200 companies dedicated to the pulp and paper industry in the region that covered the whole paper and pulp value chain, including companies that manage the forest, paper and pulp mills, all major national and international machine and equipment suppliers, technology and engineering management consultancy firms and other specialised service firms. The majority of the large mills and supplier firms located in the region are the local affiliates of leading global MNCs in the pulp, paper and

forest-based industries, and a number of them are also key players in the development of the new technologies used in the industry worldwide. Most of the MNCs located in the region have a long history in the area (in some cases 50–100 years) and are therefore a critical part of the knowledge and competence base of the region. At the same time, these local MNC affiliates are also embedded in the global knowledge systems of their parent firms, which in most cases are headquartered outside the region and often outside Sweden. As well as the large MNCs, the region also hosts many dynamic small and medium-sized enterprises (SMEs). Some of these are stand-alone firms which export and deliver services to international markets, while others mainly supply services and components to the local affiliates of MNCs and are therefore part of the global innovation and production networks of these global firms. The region hosts the University of Karlstad. Whilst the University has played a role in local industrial development, in general academic researchers working in the technological and business fields relevant to local industrial development are few and isolated. Links between the university and local firms do exist, but they tend to be ad hoc and mainly focused on a few PhD placements.

The region also hosts a cluster organisation – PP – established in the late 1990s when concerns about the impact of the decline of the paper and pulp industries in the region motivated the municipality of Karlstad along with other public and private regional actors to establish a cluster organisation. PP was later reorganised into a business association (though it is still mainly a publicly funded organisation) and today has more than 100 member companies. The Management Board of PP includes representatives from the large MNCs as well as SMEs, the regional government of Värmland, the municipal government of Karlstad (which is meant to represent the wider community of the region), the University of Karlstad, as well as a RISE centre (RISE is a network of Research and Technology Organisations, wholly or partly owned by the Swedish state, which perform industrial research and innovation). The regional strategy of PP has been strongly influenced by the leading MNC affiliates operating in the region which are active participants of the Management Board of PP as well as by the Värmland regional government. It is important to note that PP with the support of the Värmland regional government has been the main driving force for the strategic regional transition towards a forest-based bio-economy.

6.4.1 The creation of new regional growth paths

The initial process of transition towards a regional bio-economy can be traced back to the mid- to late 2000s, when the Värmland regional government began to push industry cluster organisations such as PP to adopt a more strategic role in regional industrial development. A number of important initiatives associated with issues of sustainability and innovation were taken by PP in the early 2000s. Examples include the establishment in 2004 of the Packaging Greenhouse, an independent test laboratory for paper and engineering products and services, which played an important part in many regional development projects,

as well as the Energy Square (launched in 2007), which aimed to develop new products and services that reduce energy consumption within the global pulp and paper industry.

However, broader attempts towards local industrial diversification were not successful during this period because the representatives of the leading paper and pulp firms in the region could not agree on a common strategy. One of the main obstacles to change at this stage was the fact that the main business of the traditional pulp and paper mills located in the region was packaging (an area of the paper and pulp industry that was not in decline) and they did not see the need for change. Other companies in the region such as machine suppliers and technology consultancy firms (many of them affiliates of large international engineering consultancy firms) were much more open to novel growth paths which opened up new business opportunities; however, their dependence on the large paper and pulp MNCs limited their capacity for change. What existed in the region at this stage was therefore a strongly embedded socio-technical system with no clear motivation for change from a business point of view. In this period, the lack of strategic coupling (or alignment) between MNCs and regional policy makers who perceived the need to create new local growth paths was a significant obstacle to structural change.

The arguments in favour of industrial diversification began to gain increasing support in the paper and pulp industry, both inside and outside the region, from 2012 to 2013 as it became increasingly clear that the traditional business models adopted by the major firms in the industry might not be commercially sustainable over the longer term. This change in the perception of business conditions was the result of both a fall in the global consumption of paper as well as an increasing awareness of the industry's negative environmental impact at a time when sustainable environmental development was becoming a policy priority both within Sweden and at the EU level (e.g. the Lund Declaration of 2009 and the European Climate Change Programme 2000–2004). Interviews with firms and policy makers in the region indicate that this change in business conditions was critical for the creation of a more receptive environment amongst all regional stakeholders for arguments in favour of structural and transformative change. Therefore, what we see is the beginning of a questioning by global industry leaders as well as regional bodies of the sustainability of the dominant socio-technical system in the paper and pulp industry.

Yet, within the region, the challenges associated with the development of a common strategy for industrial renewal and socio-technical transitions were significant. One of the main difficulties confronting PP and its Management Board was that given the importance of MNC affiliates in the local economy (both through their direct investment as well as their influence over suppliers through their control of regional value chains), it was critical to include these firms in any strategy of regional transformation. However, strategic decisions that define the activities of MNC affiliates are usually taken at headquarter level and are driven by considerations which are far removed from the needs of regional development. Therefore, though local management might support

regional strategic initiatives which are positive for the locality as well and their affiliates, these proposals for change might not necessarily be supported by headquarters which have different priorities and perceptions of the needs of the whole MNC. Moreover, though local suppliers and service providers might welcome the idea of change, such support may weaken if local collaborative buyer–supplier relationships are disrupted.

What we saw in the Värmland Region at that time is that although important elements of the infrastructure, capabilities and networks that would have enabled the transition towards an environmentally sustainable socio-technical system did exist in the area, the lack of a common regional strategy that could have unified and mobilised local firms or given directionality to the investment of local firms was not present. In the case of this particular region, the deadlock was broken when the leadership of PP in collaboration with the Värmland regional government were able to formulate and articulate a strategy of regional transition towards sustainable development that won the support of global senior managers of MNCs and their regional affiliates as well as other regional firms and stakeholders. Critical to this process was the notion of a *forest-based bio-economy*, a strategy for growth and structural diversification that the mills located in the area could support and sell to headquarters.

6.4.2 A vision and strategy for transition towards a sustainable bio-economy

Critical to Värmland region's success in mobilising regional actors around a common strategy of regional as well as socio-technical transformation was the ability of the leadership of PP to formulate and articulate a regional strategy for growth based on the notion of a *forest-based bio-economy* involving the creation of new regional value chains based on the forestry sector and the use of lignin, a waste material already created by existing paper and pulp mills. As a member of the Management Board of PP noted:

[T]hree and a half years ago [i.e. 2013], nobody here talked of a bio-economy. Nobody talked about cooperating and different value-chains from the forest, no one ... so I think, when I look back, it was about selling a good story about the future. (Interview with a member of the Management Board of PP)

A critical element that galvanised the region into the formulation of a new strategy of regional transition that incorporated the need for sustainability and that later resulted in the notion of a *forest-based bio-economy* was the decision by PP to participate in Vinnova's (Sweden's national agency for innovation systems) Vinnväxt competition. Vinnväxt (Regional Growth through Dynamic Innovation Systems) is a national territorial-based programme which aims to promote sustainable regional growth by developing innovative local environments in specific fields. As part of its mission, Vinnväxt programmes aim

to incentivise transformational change towards innovation-driven sustainable growth through the long-term funding of regional initiatives (usually a region receives funding for ten years). The competition for Vinnvåxt funding requires regions to formulate a long-term strategy for regional renewal based on innovation and new collaborations (Vinnova 2016) and it explicitly asks regions to work towards ensuring that a proportion of the local economy is based on renewable technologies and practices (interview with Management Board Member of the Paper Province Vinnvåxt Initiative):

The clue was that they asked ‘Where will you be in 15 years’ time?’ and they said ‘There has to be a good proportion of renewable’. That was really the important thing. This led us to ask what is renewable? (Interview with a member of the Management Board of PP)

The process of application for Vinnova’s Vinnvåxt competition opened up an intensive period of collective search and learning amongst firms and regional institutional stakeholders represented on the Management Board of PP to identify a long-term regional sustainable growth strategy. Interestingly, as they prepared their application for the Vinnvåxt competition, the Board of PP, including the representatives of the mills and their suppliers, were not clear what could be renewable in the local economy, and numerous workshops, discussions and regional SWOT (strengths, weaknesses, opportunities and threats) analysis were organised around this issue. In the early stages, firms could identify their strengths and the threats they faced, but little clarity existed with respect to future possibilities. Terms such as ‘sustainability’ and ‘bio-economy’ were used, but little clarity existed about what they meant.

In their process of search to clarify their strategy, PP came across the notion of a ‘forest-based bio-economy’, a concept which opened up a scenario of regional renewal that did not challenge the core business or power of existing paper and pulp MNCs. In a forest-based bio-economy, the production of paper and pulp would remain an important part of the regional economy, but the waste produced by traditional paper and pulp manufacturers – above all lignin and heat – would become the raw material for the emergence of new regional value chains. In this scenario, the existing paper and pulp mills could become important players in the creation of new local value chains because of their deep knowledge and capabilities of the process technologies that underpin the innovation in forest-based production. The new strategic idea was therefore to become a large-scale ‘regional demonstrator of a forest-based bio-economy’ where forest-based industries value chains can be verified, tested and supported. Interviews with local firms and representatives from PP also highlighted that the idea that local firms could contribute to the solution to climate change was an important element of the regional debate, which resulted in the notion of a regional transition towards a forest-based bio-economy gaining widespread support (interviews with representatives of firms and institutions members of the Management Board of PP).

6.4.3 New technological initiatives in the area

In 2013, PP was announced as the winner of Vinnväxt, opening a period of record investment (SEK 130 million over ten years)¹ in the forest industry of Värmland. Winning the competition has incentivised new investments in innovation and industrial renewal, as well as new types of collaborations and networks. At the time of interview, there were 10–15 major innovation projects supported by PP to develop technological and business processes associated with the forest-based bio-economy (this does not include the new investments by the paper mills and machinery and equipment suppliers, which are held under conditions of tight secrecy).

Examples of projects supported by PP include the following.

The LignoCity test-bed

Test-beds are physical or virtual environments in which companies, academia and other organisations can collaborate in the development, testing and introduction of new products, services, processes or organisational solutions. In the case of the LignoCity test-bed, the aim is to develop sustainable processes and products based on the use of lignin as a raw material (at the moment, the lignin value chains are still undeveloped), an area where the region has a strong competitive advantage as lignin is a by-product of pulp mills. The LignoCity test-bed is based on a unique Swedish technology that separates lignin from pulp mills, but can also be used to develop alternative technologies. The project involved opening RISE's demonstration plant to companies interested in evaluating and validating new refining concepts using lignin so that they can develop and scale up the technology to new climate-friendly fuels, chemicals and materials. The project is run by RISE and aims to shorten the time from idea to commercialisation. It is also expected to contribute to the establishment of new companies in Värmland. At the time that this study took place, approximately 20 companies were involved in the project. The project is also part of the region's Smart Specialisation Strategy (<http://www.innventia.com/en/About-us/News1/LignoCity-a-new-centre-for-new-green-technologies>).

Becoming a regional large-scale demonstrator

Interviews also show that there is a strong belief in PP that the creation of new value chains based on a forest-based bio-economy is not enough and that the success of this regional transformation requires that the region, including the regional government and municipalities, become large-scale

‘demonstrators’ and users of the bio-economy. The role of public actors in creating demand for bio-economy products, thereby contributing to the creation of a regional market, is seen as a critical element of the regional transition towards a bio-economy. A number of examples were given where public actors could become important users, for example, local hospitals using sheets made from cellulose and a regional and municipal transport system powered by biofuels. This follows already existing examples of municipally owned energy companies that use the waste product from local paper mills (e.g. hot water) as a source of energy.

Regional cooperation for industrial symbiosis within PP

In 2017, PP started a project on industrial symbiosis together with Linköping University, RISE and ten other regional partners. Industrial symbiosis means that residue from one industry becomes the raw material of another. Examples include waste energy from paper mills that can be used by other industries or municipal facilities, but also shared services and logistics solutions. In the project, PP and its partners have to map the different industrial residual streams in the region in order to find circular solutions with multiple beneficiaries.

6.5 The role of agency and the multi-scalar nature of the process of regional transitions to new socio-technical system

As discussed above, a critical factor in Värmland Region’s ability to start a process of transition towards a regional forest-based bio-economy was the role of PP. Our interviews indicate that PP was able to develop and articulate a vision of the *forest-based bio-economy* capable of aligning the interests of different regional stakeholders, including the local affiliates of the large MNCs. Moreover, it consistently argued for this idea in the context of significant doubts and initial opposition from a number of powerful MNC affiliates operating in the region. Interviews with local R&D managers indicate that at the time that regional discussions were taking place, the concept of a regional strategy of development based on a bio-economy was very novel. As the R&D manager of one of the large paper mills interviewed explained:

We were very early to actually put the bio-economy on the agenda – in the Board [Management Board of PP] and in the meetings, to really have that as a strategy. I think we were four or five years earlier than everybody

else. We were very early adopters of this as a strategy, this is the thing ... This would not have happened without Paper Province. (R&D manager, paper mill)

PP also played an important enabling role in the creation of new regional, national and international business and innovation networks that are developing the new forest-based technologies. Moreover, PP and its Management Board has also been a crucial forum for collective learning at the regional level. In collaboration with the Värmland regional government as part of the EU Smart Specialisation Strategy, PP has undertaken a detailed analysis of existing locally based industrial activities and capabilities, knowledge and technology institutions, and infrastructure and the changes required to bring about the transition towards a bio-economy. However, the formulation of the strategy of transitions towards a bio-economy was very strongly influenced by the notion that new strategies for regional development also needed to address societal challenges, in this case climate change (interviews with PP and the Värmland regional government). In this process PP also evolved from being predominantly an industry association representing the interests of firms in the region and creating opportunities for networking to an organisation able to give strategic leadership for a transition of socio-technical system in the region. Our interviews suggest that in this example of regional diversification which involved a process of transition to a new socio-technical system, normal business interactions and market mechanisms would not have resulted in a unified strategic vision. The role of policy-making institutions with a deep understanding of the strategic needs as well as the assets and competencies of the regions was central to the development and implementation of the strategy of regional transitions.

The multi-scalar nature of the transition has also been critical in this process of transition. Though very much focused on the development needs of the region and based on a deep understanding of local assets (the forest), knowledge and capabilities, as well as networks, the process of regional transition has been incentivised, informed and financed by a number of national and international factors. These influences were perceived at different levels, including: the initial incentive to develop a strategy for regional development; the formulation of a regional strategy that also needed to address societal goals; and the need to establish a strategic coupling between the needs of the region and those of the MNC affiliates operating in the area.

6.5.1 The role of regional government and EU policy on clusters and smart specialisation

The Värmland regional government is a member of the Management Board of PP and played a central role in the formulation and development of PP's strategy for regional transition towards a forest-based bio-economy. The contribution of the Värmland regional government has been influenced by its close

collaboration with the EU on the formulation of regional strategies for cluster development and smart specialisation. In early to mid-2000s, the regional government set out to challenge the clusters in the region to take on a more strategic role by asking them what kind of local renewal they foresaw for their cluster. In the case of PP, this led to the formulation of the Vinnväxt proposal, which formulated the notion of the forest-based bio-economy.

6.5.2 Vinnova and Swedish national innovation strategy that addresses societal challenges

As discussed above, a critical point in the development of the region was the application for long-term funding from Vinnova's Vinnväxt programme. Vinnväxt's mission is to promote sustainable regional growth and to catalyse a broader transformational change in society towards innovation-driven sustainable growth. The competition demands the formulation of a strategy for regional renewal based on innovation and new collaborations as part of the proposal (Vinnova 2014) as well as a long-term strategic change that addresses issues related to the societal challenges such as climate change and environmental sustainability (interviews with representatives of the Paper Province Vinnväxt Initiative). In its formulation of the forest-based bio-economy, PP was largely influenced by the EU's strategy for a bio-economy and smart specialisation. The notion of addressing climate change has now been integrated into the region's Smart Specialisation Strategy for the region (interviews with representatives of the Paper Province Vinnvaxt Initiative).

6.5.3 The necessity for strategic coupling between the needs of the regions and the MNC affiliates operating in the region

As discussed above, the region hosts a number of MNC affiliates which are deeply embedded in the local economy and are critical to the competences of the region. These firms are also tightly integrated into the knowledge and innovation networks of their parent companies. This double-embeddedness enables these firms to play a significant role in the upgrading of the innovative and manufacturing capabilities of the locality as they can become conduits for the entry of state-of-the-art knowledge into the region. Local affiliates of MNCs can play a significant role in regional renewal when the strategic shifts in the region match the strategic needs of the MNC as a whole. The key point is that the strategic decisions of MNCs are not taken locally, nor are they driven by the needs for regional development; rather, they are driven by the need to meet the interests of global shareholders. When there is strategic convergence between regional development and the needs of MNCs, these firms can bring the significant resources in terms of finance, knowledge and capabilities needed to bring about regional strategic shifts. However, when no strategic match is possible, local MNC affiliates can paralyse regional renewal (as seen in

PP before 2012) or even undermine it by destroying local competences if they withdraw from the area.

The case of PP shows that aligning the interests and strategies of the various MNCs operating in the area and achieving a strategic match between them and the needs for regional renewal can be extremely complex and is often contingent on major drivers for societal change outside the control of the region (in this case major changes in societal values with respect to environmental sustainability and/or radical changes in technology which threaten the existing business models of MNCs).

6.6 Conclusion

This chapter has discussed the initial experiences of regional transition from the traditional manufacture of paper and pulp towards a sustainable forest-based bio-economy. This transformational change represents both a change in the socio-spatial composition of a regional economy as well as a change of socio-technical systems. These major transformations, though still in their initial stages, have been made possible because of the region's deep knowledge of forest-based process technologies and the ability of PP as a cluster organisation to formulate a vision and strategy of regional transformation that unified the main local stakeholders. Directly addressing climate change as a major societal challenge is a central element of the regional diversification strategy, galvanising regional, national and EU support for the new growth path.

The study highlights the role of regional policy-making bodies with a deep understanding of the strategic needs as well as the assets and competencies of their regions as critical agents of regional renewal. This is associated with their ability to formulate new strategies of regional transformative change and mobilise regional stakeholders in processes of learning, searching and implementation. In our study, the ability of regional bodies to play this role was strongly influenced by their interactions with national and EU bodies, which informed, supported and funded their efforts to promote regional transitions.

In the case of a region where MNC affiliates play such a strong role in the local economy, transformational change of socio-technical system required the strategic coupling between the new regional growth paths and the long-term objectives of the global MNCs in the area. In this particular case, a strategic coupling was possible because the sustainability of the existing socio-technical system was beginning to be questioned not only at a regional level but also at a global level, and because the new strategies for regional transformation did not challenge the core business or power of existing MNCs. On the contrary, the notion of the forest-based bio-economy can open up a wide range of new business opportunities for existing firms. However, the experience of the region also shows that when no strategic coupling is achieved, MNCs can block efforts towards both regional diversification when these involve changes in socio-technical systems.

Note

- 1 The total project budget for PP is SEK 130 million over ten years. Half of the funding comes from Vinnova and half from regional co-funders, such as Värmland Region, Karlstad University, the Värmland municipalities, the County Administrative Board, the County Council, the Forest Board and the PP member companies. See <https://www.kau.se/en/research/collaboration-researchers/research-collaboration/vinnvaxt-paper-province-20>.

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