

The Circular Economy: Barriers and Opportunities for SMEs

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Abstract

The 'circular economy' is gaining momentum as a concept in both academic and policy circles, while circular business models have been linked to significant economic benefits. This paper identifies key barriers and enablers to adopting circular economy business practices, using input from a literature review, discussions held in the context of the GreenEcoNet project and an analysis of two SME circular business models.

Main policy messages

- SMEs wishing to enter global value chains face different types of challenges for which they need practical, technical and legal advice and support.
- For SMEs seeking to develop an innovative product within a circular economy, access to suitable sources of finance is key.
- Using language that is directly relevant to the core business operations, such as "reduce waste" or "reduce costs" can play a significant role in convincing SMEs of the benefits of the circular economy.
- Policy-makers need to first better understand the complex challenges faced by SMEs in order to develop appropriate supportive policy frameworks.
- Policy measures to raise consumers' awareness about circular economy practices and products can encourage the adoption of circular business models.

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1. The circular economy concept

1.1 *Origins and short description of the concept*

Identifying the specific origins of the circular economy is a highly complex, if not impossible, task as the concept has its roots in several different schools of thought and theories that question the prevailing linear economic systems that assume that resources are infinite (Ellen MacArthur Foundation, 2013; Preston, 2012; Allwood, 2014). Among the first authors who are considered to have influenced the development of the circular economy concept is Kenneth Boulding (1966) who envisaged a “spaceman economy” that would operate by reproducing the initial limited stock of inputs and recycling waste outputs. This concept has since evolved substantially and today there is an increasing recognition among academics, policy-makers and the business community of the need to move towards a new economic model whereby materials and energy from discarded products are re-introduced into the economic system (Lehmann et al., 2014; Ellen MacArthur Foundation, 2012).

In the available literature the circular economy has been described as an industrial economy that relies on the “restorative capacity of natural resources” (Bastein et al., 2013) and aims to minimise – if not eliminate – waste, utilise renewable sources of energy and phase out the use of harmful substances (Ellen MacArthur Foundation, 2012). The circular economy involves a distinction and careful management of two different types of materials within a closed-loop economy:¹ materials of biological origin which can return to the biosphere as feedstock (called biological nutrients, e.g. forest products) and technical materials which cannot biodegrade and enter the biosphere (called technological nutrients, e.g. plastics and metals) (Bicket et al., 2014; Ellen MacArthur Foundation, 2013). Such an economy goes beyond the ‘end of pipe’ approaches of the linear economy (Ellen MacArthur Foundation & WRAP, 2013) and seeks transformational changes across the breadth of the value chain in order to retain both types of materials in the ‘circular economy loop’ and preserve their value for as long as possible (Bicket et al., 2014; World Economic Forum et al., 2014).

1.2 *Economic rationale and business relevance*

Fostering the uptake of the circular economy concept among businesses and in policy-making requires analysis of the potential opportunities and benefits that a circular economy

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¹ However, as indicated by Bicket et al. (2014) there are cases, such as the example of biodegradable plastics, in which this division does not easily apply.

approach could yield for businesses and economies. Analysing success stories of circular business models from a subset of EU manufacturing sectors, the Ellen MacArthur Foundation found potential for annual net material cost savings ranging from €265 to 490 billion,² which equates to up to 23% of these sectors' current total input costs. The most pronounced cost savings potential was found in the automotive sector, followed by the machinery and equipment sector, and electrical machinery (Ellen MacArthur Foundation, 2012). Beyond cost savings, closing loops and increasing the re-use of materials will reduce demand for virgin materials and thus help to mitigate both demand-driven price volatility on raw material markets (e.g. for iron ore) and supply risks (World Economic Forum et al., 2014). In addition, more circular business models were found to be associated with significant (technological and organisational) innovation and employment potential (for instance in the recycling sector), as well as with reduced liabilities and warranty costs of firms due to longer-lasting, healthier and more environmentally friendly products (Ellen MacArthur Foundation, 2013). Estimates for the UK show that a circular economy could create up to 50,000 new jobs in dismantling, recycling, organic treatment and in energy from waste facilities (ESA, 2013). For the Netherlands, Bastein et al. (2013) estimate that improving circular business models in the base metals and metal product industries, in the electronics and electrical appliances industry, and in the management of biotic waste would involve the creation of approximately 54,000 jobs.

While the capacities of larger firms facilitate the adoption of and realisation of benefits from circular business models, also small and medium-sized enterprises (SMEs) are increasingly aware of the benefits of closing loops and improving resource efficiency: saving material costs, creating competitive advantages and new markets are among the main reasons for European SMEs to take action. From the SMEs surveyed, more than two-thirds are satisfied with the return on their investments in resource efficiency improvements; more than one-third of the SMEs have experienced reductions in their production costs in the past two years (European Commission, 2013a). For instance, through implementing a certified Environmental Management System (EMS), two thirds of SMEs surveyed in a UK Defra study found their sales to increase on average by €17,238 per € million turnover³ (WYG Environment, 2011).

Business decisions to transition towards more circular approaches are therefore likely to realise both short- and long-term benefits, thus fostering business competitiveness and resilience in the long run. However, a number of barriers (see section 2) pose formidable challenges to small and larger businesses in transitioning towards a circular economy. An enabling EU policy framework (see section 3) and the exchange and dissemination of best practices (see sections 4 and 5) are therefore needed to support this transition.

2. Barriers to adopting circular economy business practices

Numerous barriers can hamper the implementation of 'circular' and 'green' economy practices by SMEs that can originate, for example, from the SME enabling environment, such as culture and policy-making, from the market chain in which the SME operates, such as

² The figures in the report, 340 to 630 billion US-\$, were converted from US-\$ to € using the annual data for 2012 provided by Eurostat, available here: <http://tinyurl.com/nejg3e8>.

³ The figure in the report, £14,961 per £ million turnover, was converted from £ to € using the annual data for 2011 provided by Eurostat, available here: <http://tinyurl.com/nejg3e8>.

behaviour of suppliers, and from lack of technical skills and finance. These barriers are further analysed below on the basis of a literature review.

2.1 *Environmental culture*

Although there is considerable heterogeneity among SMEs across different sectors, their responses and capacities to take up a 'green solution', are usually similar in terms of organisational and management regime. The manager is usually also the owner of the company and thus has significant power on the strategic decisions of the firm. As such, some SME managers may have a positive attitude towards green business, while others may not. This divergence of views towards 'green business' has been attributed to a number of reasons in the available literature.⁴ Naturally, the extent to which SMEs are generally willing to adopt 'green' measures, as well as their attitudes towards green policies also depends on the sector in which they operate (Bradford & Fraser, 2007).

2.2 *Financial barrier*

The cost of 'green' innovation and business models has been extensively cited in the literature as one of the major barriers to the adoption of sustainability practices by SMEs (see, for example, Vasilenko & Arbačiauskas, 2012; Lawrence et al., 2006; Trianni & Cango, 2012). The upfront costs of any type of investment and the anticipated pay-back period are particularly important for SMEs, which are generally more sensitive to additional financial costs resulting from green business activities compared to large enterprises (Oakdene Hollins, 2011; Rademaekers et al., 2011). A study has shown that in some cases SMEs lack the financial resources to establish and manage a recycling scheme (Eunomia Research & Consulting, 2011), while a survey conducted in the UK has indicated that collection and recycling of waste are less economically favourable options for SMEs that produce low volumes of waste (WRAP, 2007). Aside from the direct financial costs, there are also indirect 'hidden' costs such as the time and human resources that businesses need to devote to make environmental improvements (Revell & Blackburn, 2005; Yacob et al., 2013). In many cases, these indirect costs constitute a critical obstacle to the implementation of 'green' innovation due to SMEs' shortage of time and human capital (Iraldo et al., 2010; Oakdene Hollins, 2011; Seidel et al., 2008).

Given the significance of the financial barrier, access to finance and suitable sources of funding could be essential for SMEs seeking to improve their sustainability performance and/or introduce an innovation. Studies indicate, however, that the smaller a company is the more difficult it is to understand and assess different funding options, such as EU support programmes and government grants, mainly due to staff and management restrictions (Hoevenagel et al., 2007; Rademaekers et al., 2011; Müller & Tunçer, 2013). When it comes to bank financing, SMEs, and especially very young small businesses, face difficulties in obtaining the collateral or guarantees required by the banks, which often consider SME financing a risky business (Hyz, 2011; Müller & Tunçer, 2013).

⁴ For example, some SMEs may have low 'ecoliteracy' (Yacob & Moorthy, 2012; Seidel et al., 2008), namely little familiarity with sustainability issues or perception of sustainable development as irrelevant to their business (Hansen & Klewitz, 2012), while others do not see any reason to engage in environmental improvements (Bradford & Fraser, 2007). Additionally, in some cases SME owners are often dubious about whether the financial incentive is sufficient to pursue the "green initiative" (Revell & Blackburn, 2004), while in other cases they consider that national governments should assume responsibility for environmental matters (Revell & Rutherford, 2003).

2.3 *Lack of government support and effective legislation*

The lack of government support and encouragement (through the provision of funding opportunities, training, effective taxation policy, import duty, etc.) is widely recognised as a significant barrier in the uptake of environmental investments (Calogirou et al., 2010; Studer et al., 2006). At the same time, the lack of a strict legislative framework often influences SMEs' consideration of the necessity to integrate green solutions into their operations. This is reinforced by the fact that small firms are more influenced by regulators and local authorities regarding the improvement of their environmental performance than larger companies (Hillary, 2004). In the absence of an effective enforcement mechanism, environmental improvements are mainly driven by managers' commitment to sustainability (Rutherford et al., 2000; Biondi & Irlando, 2002; Parker et al., 2009; Calogirou et al., 2010; Seidel et al., 2008). Another obstacle is that most tools for environmental management (such as the European Eco-Management and Audit Scheme - EMAS) are produced for larger companies, without taking into account the specificities of the SME sector (Calogirou et al., 2010; Studer et al., 2006).

The first assessment of the EU Environmental Compliance Assistance Programme for SMEs (ECAP)⁵ highlights the need for a better regulation agenda in terms of the design and implementation of environmental policies (Miller et al., 2011). In the case of waste, the EU has made considerable efforts in recent years to improve the management of the various waste streams. However, despite progress on an array of waste management goals, there is considerable room for improvement in the design and implementation of EU waste legislation. In particular, a study produced for the European Commission (Mudgal et al., 2011) has indicated that there is a lack of clarity on several concepts of EU legislation such as producer responsibility,⁶ quality of separate collection and definitions of recycling, re-use and recovery. The concept of waste hierarchy⁷ could also be more explicit because member states are given the flexibility to divert from the hierarchy.

2.4 *Lack of information*

The lack of knowledge about the benefits of the circular economy has been identified as one of the barriers to the implementation of circular economy practices among SMEs. Two studies screened for this document indicate that many SMEs not only neglect the possible financial gains from improving their resource efficiency, but also consider resource efficiency practices to be costly for their business⁸ (Rademaekers et al., 2011; AMEC & Bio Intelligence

⁵ ECAP is an initiative of the European Commission aiming to facilitate SMEs comply with their environmental obligations. Available at: <http://ec.europa.eu/environment/archives/sme/index.htm>.

⁶ OECD (2001, p.18) defines extended producer responsibility (EPR) as "an environmental policy approach in which a producer's responsibility, physical and/or financial, for a product is extended to the post-consumer stage of a product's life cycle". The EPR presents an area of the EU waste legislation in which research has indicated a lack of coherence across the EU. In particular, the EPR national schemes that have been developed in response to the EU legislation vary significantly in terms of structure, definition of producer, associated costs, competent parties, etc. As a result, businesses in different member states often operate in different market environments and this in turn creates uncertainty and additional administrative burdens (Mudgal et al., 2011; Watkins et al., 2012).

⁷ This refers to the 5-step hierarchy included in the Waste Framework Directive, where waste prevention is given top priority, followed by re-use, recycling, other recovery and finally disposal.

⁸ The role of sharing information on costs and SME best practices in improving business resource efficiency has been highlighted by several studies (Lawton et al., 2013).

Service, 2013). The latter has been attributed to the diffusion of traditional concepts such as the ‘polluter pays principle’ that have contributed to businesses viewing waste as a burden (Ellen MacArthur Foundation & WRAP, 2013).

In this context, a survey conducted by the FUSION project (2014), which is co-funded by the European Commission, provides useful insights into SMEs’ understanding of the circular economy. The survey involved approximately 300 companies⁹ that are based in three different countries, namely France, Belgium and England, and which have already demonstrated an interest in sustainability issues. Interestingly, the majority of the participants had either never heard of the term ‘circular economy’ or did not understand its meaning. On the positive side, when participants were given a clear definition¹⁰ of circular economy, involving aspects such as the re-use and recovery of waste materials, the majority responded that they were making efforts to recycle and repair. Additionally, companies identified waste management as one of the sectors that could unlock new business opportunities.

2.5 Administrative burden

The transition of SMEs to green business practices usually incurs administrative burdens stemming from environmental legislation. The administrative burdens represent a key issue for European SMEs; burdens that frequently demand unaffordable financial and time resources (OECD, 2010). According to a study produced for the European Commission (Calogirou et al., 2010), although SMEs are generally aware of the environmental national legislation, they lack the specific knowledge and capacity to comply with the necessary requirements. As a result, they often rely on external consultants to meet their obligations; this in turn entails an extra cost, which might be significant for very small enterprises. Additionally, the monitoring and reporting of environmental data is often a complex process as SMEs are required to submit the same data to various authorities and in different formats.¹¹ Another factor is the deviation from ex ante cost estimates deriving from the above-mentioned procedures, which may induce uncertainty and potentially harm business competitiveness (Oosterhuis et al., 2006).

2.6 Lack of technical skills

Several studies have indicated that the lack of internal technical skills is an additional obstacle that prevents SMEs from taking advantage of green economy opportunities (see, for example, Trianni & Cango, 2012; Rademaekers et al., 2011; Iraldo et al., 2010). Many SMEs do not have the technical capacity to identify, assess and implement more advanced technical options that would enable them to reduce their environmental impacts while realising cost savings. As a consequence, they usually prioritise technologies with which they are already

⁹ The majority of businesses participating in the survey were small and medium-sized enterprises operating mainly in the manufacturing, construction and renewable energy sectors.

¹⁰ The specific question was: “If the circular economy is defined as a model whereby products are repaired, reused or upgraded instead of being thrown away and recovered, waste materials are reprocessed for remanufacture, on a scale of 1-5, how closely aligned do you think your business is to the circular economy?”.

¹¹ It has been reported that SME managers occasionally experience problems in assessing the environmental and financial benefits from implementing green solutions and often decide to seek guidance and assistance from external consultants.

familiar and depend on the suggestions of their suppliers for new technical solutions; however, in order to assess the new options they still need a certain level of technical skill and knowledge. Additionally, this might entail an excessive reliance on the opinions and recommendations of external actors (Calogirou et al., 2010; Hoevenagel et al., 2007; Rademaekers et al., 2011; Trianni & Cango, 2012).

2.7 Lack of support from the supply and demand network

Lack of suppliers' and customers' environmental awareness is widely recognised as a discouraging factor in the existing literature (Meqdadi, 2012; Wooi & Zailani, 2010). Although customers' purchasing decisions are partly influenced by sustainability criteria, their fulfilment is not usually regarded as a high priority (Wycherley, 1999). 'Green supply chain' initiatives that require the participation of external stakeholders (such as 'green purchasing') have generally been found to have a low adoption level. Added to this, due to their small size and bargaining power, small businesses have little influence on their suppliers' engagement in sustainable activities (Wooi & Zailani, 2010; Eltayeb & Zailani, 2009; Zhu, 2008). Suppliers are reportedly reluctant to foster a greener supply chain due to the potential costs that could harm their competitiveness (Wycherley, 1999).

3. EU Policy Context

The circular economy is a broad, overarching concept encompassing various materials, products, processes and actors within different stages in product and value chains. There is thus a wide range of existing policies relevant to all these different circular economy stages (Bicket et al., 2014). The concept is also present in several strategic EU policy documents such as the Resource-efficient Europe Flagship Initiative of the Europe 2020 Strategy and the 7th Environment Action Programme. Providing a thorough overview of the EU policy landscape that is relevant to this complex topic¹² is beyond the scope of this paper. Rather, this section will focus on the Circular Economy Package that was adopted with the objective of establishing a common and coherent EU circular economy policy framework. It will also address the Green Action Plan for SMEs, which was published together with the Circular Economy Package and presents the first European Commission communication that directly addresses SMEs in the green economy. This policy document includes actions in support of the adoption of circular business models by SMEs.

3.1 The Circular Economy Package

Waste management has been a central element of EU environmental policy during the past 30 years through a number of environmental action plans and a body of legislation on waste aiming to make Europe more resource efficient (European Commission, 2010). Despite the significant improvement in the performance of the EU waste management (EEA, 2013), further progress in this field has been hindered by several problems, such as the poor transposition of EU waste directives into national law (Monier et al., 2011; Jackson & Watkins, 2012). In response to the legal obligation to review the waste management targets included in EU waste legislation, in 2013 the Commission conducted a review of EU waste policy with the aim of presenting the results of this review in 2014 (European Commission, 2013b).

¹² For example, a roadmap published by the European Commission (2015) provides a list of 20 different EU policy initiatives that are related to the circular economy.

In this context, in July 2014 the Commission published a Circular Economy Package that included a new legislative proposal¹³ amending six waste-related directives¹⁴ and aiming to improve the overall coherence of EU waste legislation. The proposal included, among others, new EU recycling targets and tightened rules on incineration and landfill. The legislative proposal was accompanied by a European Commission (2014a) Communication titled on “Towards a circular economy: A zero waste programme for Europe”. The Communication outlined the Commission’s approach to modernise waste policy and targets and set up an enabling policy framework for a circular economy that would maximise the business opportunities arising from resource efficiency and circular economy.

In late 2014, however, the Junker Commission announced in its 2015 work programme that the Circular Economy Package would be withdrawn and replaced by a new circular economy strategy, including a more ambitious legislative proposal by the end of 2015 (European Commission, 2014b). According to the roadmap¹⁵ published for this initiative (European Commission, 2015), the strategy will be aligned with the priorities of the new Commission and will place circular economy within the context of the Commission’s commitment towards boosting jobs and growth. It will also aim to remove barriers to the development of new markets and business models. Furthermore the roadmap stresses that the previous package (European Commission, 2015, p. 1) “had a rather exclusive focus on waste management, without appropriately exploring synergies with other policies”.

3.2 The Green Action Plan for SMEs

The Green Action Plan (GAP) for SMEs was adopted by the European Commission on 2 July 2014 – together with the Circular Economy Package – with the purpose of “enabling SMES to turn environmental challenges into business opportunities”. It follows the policy direction that was set by two other important documents: the Europe 2020 Strategy and the Small Business Act. The former sets clear targets for the EU to become a sustainable economy, while the latter states that the EU should help SMEs seize the opportunities created by the new economic paradigm that is the green economy.

The GAP is a detailed description of actions to be taken by the European Commission (2014c, p. 1) in order to “help SMEs exploit the business opportunities that the transition to a green economy offers”. The actions are grouped in five broad themes: *Greening SMEs for more competitiveness and sustainability*, *Green entrepreneurship for the companies of the future*, *Opportunities for SMEs in a greener value chain*, *Access to the market for green SMEs*, and *Governance*.

Each theme is translated into objectives (e.g. Facilitate cross-sectoral collaboration in view of promoting the circular economy), and these are subsequently broken down into concrete actions (e.g. establishment of an expert group to focus on a systemic approach to eco-innovation in the framework of Horizon 2020). The GAP was accompanied by a *List of EU actions supporting SMEs in a green economy* (European Commission, 2014d). This document

¹³ The legislative proposal is available here: <http://tinyurl.com/o6aq8sr>.

¹⁴ Specifically, it would amend Directives 2008/98/EC on waste, 94/62/EC on packaging and packaging waste, 1999/31/EC on the landfill of waste, 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment.

¹⁵ As noted on the first page of the document, this is an indicative roadmap and does not prejudice the final content of the initiative.

follows the structure of the GAP and further disaggregates actions into different steps to be taken by the Commission.

The circular economy concept underlies several sections of the GAP and is defined (European Commission, 2014c, p. 7) as an economy that

“keeps the value added in products for as long as possible and eliminates waste. Resources embedded in products are kept in productive use when the product reaches the end of its life, providing further value.”

It is most prominent in the third theme of the document: *Opportunities for SMEs in a greener value chain*. The objectives set out by the Commission under this theme reflect a recognition of the presence of barriers for small businesses wishing to adopt the circular economy concept, as well as a belief that cross-sectoral collaboration could be a success factor to achieve this goal. In the *Access to the market for green SMEs* section, the Commission commits to encouraging new standards that benefit companies that follow a circular economy principle.

4. Lessons from GreenEcoNet annual conference and thematic workshops

4.1 Annual conference

4.1.1 Concept and target audience

The GreenEcoNet annual conferences take place at the end of each project year and aim to stimulate the debate on ‘hot topics’ for SMEs emerging from the EU policy agenda. The topics are selected by the GreenEcoNet project consortium on the basis of discussions with key stakeholders, such as organisations representing European SMEs and representatives from EU institutions. One of the ‘hot topics’ selected for the First GreenEcoNet annual conference (held in Brussels on 25th June 2014) was “Circular Economy and Opportunities for SMEs”. There were around 70 participants from all major stakeholder groups involved in policy-making i.e. different Directorate-Generals (DGs) of the European Commission, member states, representatives from the European Parliament, SME associations, research organisations, businesses and NGOs.

4.1.2 Main outcomes of the first GreenEcoNet annual conference

The barriers that prevent SMEs from adopting circular economy business models featured prominently in the conference discussions. Lack of time, staff, skills, access to information and funding were among the most significant barriers identified. Another key issue highlighted was that SMEs are generally not very familiar with the term ‘circular economy’ and recognise other terms better, such as ‘resource efficiency’ and ‘green economy’. To this end, it is important to use language that SMEs consider as relevant to their business rather than obscure terminology.

The economic benefits of circular economy and resource efficiency, and the supportive policy frameworks that address both supply and demand, were considered to be among the most significant enablers. When it comes to costs, participants from SMEs stressed that small businesses often focus on the initial costs of the ‘green solution’, which are a key determinant in decisions about implementation. SMEs need therefore easy-to-understand information

about how to take the first step towards the circular/green economy. Once they understand the benefits, the transition process is simpler.

Improving awareness among SMEs of the benefits and solutions offered by circular/green economy issues and solutions could be one of the most important tasks for policy-makers. Clearly, policy-makers need to better understand the problems and issues faced by different SME sectors to then be able to adopt useful measures. Even in the case of waste, there are many different waste streams potentially available for businesses as resources that require different technologies and different framework conditions to foster SMEs' capacity to innovate.

During the event it was acknowledged that a web platform could provide a library of information for SMEs that could centralise tools, practices, methods and existing products and services. Such a platform could address the different barriers (e.g. financial) faced by SMEs by increasing awareness about the benefits of the circular economy and demonstrate to policy-makers areas where governance support is needed.

4.2 *Thematic workshops*

4.2.1 *Concept and target audience*

In 2014, the GreenEcoNet team organised two thematic workshops in Germany that discussed roles, challenges and needs of SMEs in a circular economy. Compared to the annual conference that took place in Brussels and focused on EU policy-making, the workshops mainly had a national and regional focus and mostly hosted stakeholders from Germany. Conceptually, the first workshop (held in Düren on 26th November) aimed to learn about SMEs' perceptions of, as well as challenges and potential opportunities associated with, a circular economy. It brought together 22 participants, mainly SMEs from the paper industry, which is resource and energy intensive as well as a resource efficiency-aware sector. Multipliers from Germany and a Belgian SME technology association were present. The lessons learnt from SME representatives were then fed back to multipliers, intermediaries and academia in the second workshop (held in Berlin on 28th November) to discuss tangible barriers and potential (policy) support options for SMEs in a circular economy. Representatives from mainly SME multipliers, research institutions and national authorities (19 participants) attended this workshop.

4.2.2 *Main outcomes of the 1st workshop on roles and challenges of SMEs in a circular economy*

After presentations on consultancy support options for SMEs to improve resource efficiency and on practical experiences with resource efficiency improvements and closing loops at plant level, the Düren workshop participants discussed i) challenges and needs for the paper industry, ii) scope for transnational exchange between SMEs, and iii) the potential of a web platform for SMEs on best practice exchange of circular economy experience.

i) The paper industry: Challenges and needs

Participants stressed the need for regional networks of advisors and consultancies to raise awareness and knowledge of competent advisors in the region.

Participants also noted a gap between the orientation and focus of much research and the needs of industry. There is both the need and opportunity for new action that fosters research-industry linkages (including transnational initiatives).

When making changes to improve resource efficiency, the quality and safety of production must be maintained and integrated into improvement processes as well. Change needs courage to think outside the box and to try to overcome organisational blindness. One key point for long-term change is the involvement of employees: without their involvement and participation, technical innovation cannot be implemented. This needs closer exchange and collaboration between technological and financial departments of a firm in order to consider the payback time needs of innovation investments. The goal should be an improvement of internal communication, e.g. a tandem system of the technical and marketing departments.

ii) Scope for transnational exchange between SMEs

As regards the possibilities of increasing networking in the 'Three Country Region' (the Netherlands, Belgium and Germany), language barriers must be considered and it is important to address thematically attractive and business-relevant themes. In addition, finding regional network partners is essential. These partners should have good connections to enterprises (in particular SMEs) from their respective regions. Furthermore, it is important to monitor which events, meetings and activities take place in the border region and, if applicable, are already well established. Here, based on the interests and motivation of SMEs exchange events can be offered by relevant regional or transnational multipliers, such as business associations, efficiency agencies or business development agencies, e.g. on cross-cutting themes or relevant specific issues.

iii) Potential of a web platform for SMEs on best practice exchange

The working group found that SMEs are generally interested in using a web platform and willing to invest time to use of the platform, as long as the platform:

- a) is easy to find or becomes well known;
- b) is well structured and user friendly;
- c) offers relevant, accessible (language) and current information;
- d) functions properly from a technical perspective.

Ideally, the platform should be perceived in the first searches as a quick and relevant source of help. That way it will continue to be used as an important source of information and networking. At the beginning, the platform should be completely free of cost and offer information that can be accessed for free. Relevant information should be made available through research from the institutions managing the platform. In this context, different actors, in particular SMEs and sector associations, but also municipal institutions and political decision-makers, should be involved in the development and starting phase of the platform.

In the long term two distinct entry points should be developed: 1) a free interface with access to basic functions, information and networking possibilities; 2) a charged access portal with access to industry-specific information and networks and/or to a match-making market place. The payment of access fees would finance the management, moderation and maintenance of this special interface. It should be decided whether and to what extent a quality and seriousness check should be made for information submitted by users.

In order to have a functioning platform, it is essential that users provide information on their enterprise, their products and their innovations in addition to asking honest questions – without jeopardising trade secrets that give them a competitive advantage. It is only through publishing relevant information that an open effective exchange and innovating network among enterprises from a certain industry (who are therefore potential rivals) can be created. For this, we need platform users who feel free to communicate openly.

Another important aspect is the focus of the platform. Here, highlighting the financial advantages of resource and energy efficiency and mentioning the potential for competitiveness improvements in a circular economy appears to be promising.

4.2.3 Main outcomes of the 2nd workshop on barriers, needs and support options for SMEs in a circular economy

Through various input presentations and group work i) the role of online and offline networking for SMEs, as well as ii) barriers, needs and support options were discussed during the Berlin workshop.

i) Role of online and offline networking for SMEs

Many SMEs will be reticent about sharing their knowledge as it gives them a competitive advantage. The information could also be commercially sensitive, but this varies from one SME to another. In some sectors, people are more willing and able to share than in others. Some SMEs that have ‘greened’ their operations might want to share their case study in order to use it as a marketing instrument. Nonetheless, some efforts will be necessary to convince SMEs to share their case studies. Reluctance to share might also be tied to limited time resources and the need to build a trusting relationship before sharing information.

A preference for personal contact appears to be well accepted in the small business landscape. SMEs prefer personal contact with their sector organisations and multipliers. They are usually more familiar with offline networking based on trust. In addition, SMEs are not likely to look for an online platform on their own. SMEs do not have time to look for the most relevant site on the internet. SMEs would rather go to multipliers, and these could direct them to the online platform if they can be convinced of its usefulness.

SMEs often lack familiarity with circular economy business opportunities, and many small businesses do not see ‘being green’ as a priority. This does not mean that they are against greening their business, but rather that their main focus is on their core business operation. Greening their operations becomes interesting when it supports their core business. It is therefore crucial to use the language of cost effectiveness when convincing SMEs to join the circular economy. Some SMEs simply do not know that circular business models are available and could be beneficial. Furthermore, SMEs often simply respond to what is demanded by bigger companies in the value chain (for example, a car manufacturer that decides to only purchase parts if they were produced in a ‘green’ way). SMEs can be key drivers of macroeconomic development towards a circular economy, but due to barriers and knowledge gaps, the micro-level optimisation behaviour of SMEs often stands in the way of greener businesses. Moreover, current macroeconomic settings, e.g. deflation, net savings and low investments, may also hinder SMEs in their use of circular business models.

ii) Barriers, needs and support options for SMEs in a circular economy

One key barrier was found to be a lack of technical and managerial knowledge, skills and information, including on the usability of new business models. This limits the options for SMEs to adjust to a circular economy as new or adopted ways of doing business may not be known or staff may not be able to (easily) pursue new activities. In addition, a lack of long-term scenarios in the top management's mind-set – which may result from a lack of time, lack of awareness of the relevance of a circular economy or aversion to change – may also hinder the implementation of a circular business model, including insufficient retirement planning for succession among business executives.

Furthermore, the organisational structure and culture of an SME may limit the exchange of information between different departments, e.g. between accounting, marketing and engineering. Thus, relevant opportunities may go untapped or the SMEs response mechanisms may be too slow to exploit opportunities. Furthermore, lacking access to funding and high up-front investments costs vs. long-term pay-back times puts a brake on SMEs' ability to 'greenovate'.

Against this background, providing financial support to existing SMEs and to start-ups on EU, national, regional and local levels, ranked prominently among the needs identified. This should go hand in hand with supporting the internationalisation of SMEs, meaning that policy support could facilitate and incentivise cross-border exchange and relations between SMEs or sectors. Therefore, policy-makers are needed who i) understand the problems and challenges faced by SMEs, ii) are able and iii) willing to influence policy support towards providing solutions sought by SMEs. In addition, it also needs a clear and understandable (for SME management and employee) communication on the regional level so that SMEs know what the challenges could be and where to turn to solve these problems. This should include facilitating and encouraging SMEs to set up regional or local networks of SME CEOs and working groups to develop joint problem articulation, understanding and resolution. While the above aspects seem to be within the reach of policy-makers, it was also highlighted that SMEs need customers to be willing to pay more for green(er) services and products. This could be facilitated by policy support (e.g. tax rebates for buying certain green services and products), but it also requires wider societal support.

5. Lessons from GreenEcoNet case studies

5.1 Concept and goal of case studies

As part of the GreenEcoNet EU-funded project, the project consortium¹⁶ has developed a green economy web platform (<http://www.greeneconet.eu/>) for SMEs. Business case studies are one of the platform's most significant features¹⁷ and aim to demonstrate that the new green economy paradigm represents a significant economic opportunity for innovative small business owners. These case studies have been collected by the GreenEcoNet partners through desk-based research and stakeholder networks.

¹⁶ The GreenEcoNet consortium consists of the University of York - Stockholm Environment Institute, the Centre for European Policy Studies (CEPS), the University of Piraeus Research Center (UPRC), the Ecologic Institute, JIN Climate and Sustainability and the Green Economy Coalition.

¹⁷ At the time of writing the platform features 52 case studies.

GreenEcoNet case studies are published online for several reasons. Firstly, these ‘best in class’ businesses may inspire the rest of the small business community by describing their success stories in a compelling way and by including information on their facilitating factors. Secondly, it would be useful for policy-makers to take note of obstacles that these SMEs had to face and determine whether these could be removed or reduced. Finally, these stories can be a good starting point to create fruitful exchange between SMEs, academia, business networks and the wider business community interested in the green economy.

Sections 5.2 and 5.3, below present two SME business case studies that are featured on the GreenEcoNet web platform. The two SMEs come from two different EU member states and have implemented business models with circular economy principles. As with all case studies featured in the platform, prior to online publication these two cases were reviewed by two different research members of the GreenEcoNet consortium so as to ensure their relevance and content quality. Following their selection for this paper, a telephone interview was also conducted with representatives of both SMEs in order to fill in information gaps, clarify issues and further assess quality of content.

5.2 *Up-shirt: The t-shirt with a small environmental footprint*

5.2.1 *Summary of business/circular model*

Aus Design¹⁸ is an Estonian sustainable fashion label created by Reet Aus, a Tallinn-based designer with a PhD in sustainable fashion design. Having written her thesis¹⁹ on the use of upcycling in fashion design, her work on a documentary film about the environmental impacts of fast fashion led her to Bangladesh, where she witnessed the huge amount of wasted fabric resulting from the mass production of garments. Beximco,²⁰ a Bangladeshi factory, allowed Reet Aus to conduct research on their premises and eventually agreed to partner with her and her team on a groundbreaking project: the development of an upcycling method tailored to mass production. Years of research and development resulted in the creation of the Upmade® method.

The idea was to mass-produce garments using factory leftovers. This prevents tons of leftover fabric from ending in a landfill in addition to reducing the demand for new cotton fibres. Cotton crops not only require large amounts of water,²¹ they are also traditionally sprayed with a staggering amount of pesticides. On the one hand, the textile industry generates a huge quantity of leftover fabric, but on the other hand the industry continues to damage the environment to produce new cotton fibres. Upcycling leftover fabric is a logical answer to an illogical process.

This new method was used to create a simple piece of garment: a t-shirt, aptly renamed ‘Up-shirt’. While the Up-shirt received the most attention, Reet Aus has collections featuring other garments (dresses, trousers, etc.) using the same method.

¹⁸ As explained in section 5.1, the information about this circular business model is based on the case study presented on the GreenEcoNet platform (<http://greeneconet.eu/shirt-t-shirt-tiny-environmental-footprint>). An interview was also conducted with Reet Aus, who is the owner of the SME, on 05.05.2015.

¹⁹ The thesis is available here: <http://issuu.com/runnel/docs/reet-aus>.

²⁰ More information on Beximco can be found here: <http://www.beximco.com/textile.php>.

²¹ For example, WWF estimates that it can take more than 20,000 litres of water to produce 1kg of cotton, see more details here: <http://tinyurl.com/b4tvqht>.

Aus Design has recently developed a certification process based on the Upmade® method, in collaboration with the Stockholm Environment Institute Tallinn Centre. Manufacturers may now have their contribution to the circular economy recognised by going through the certification process (6-10 weeks) and being granted an UpMade® certified Upcycling Production System Certificate.²²

5.2.2 *Main barriers and enablers*

Barriers

The main obstacles to the progress of this innovative idea are financial in nature, as is often the case with SMEs. During the interview, Reet Aus stated that it was difficult to find funding to pursue her idea; she managed with personal funding and help from friends.

In addition, a difficult part of applying the circular business concept was that in the case of the textile industry, the production process is spread across the globe and across disciplines. The team had to bridge academic research and industrial development, western consumption and eastern production, first-world demand and third-world supply. Because of the geographical disconnect, Europeans generally fail to recognise the full impact of their fashion purchases.

Furthermore, finding the right employees was also challenging. Few people have the interest and qualifications required to become involved in such a project.

Enablers

Fortunately, the Estonian start-up received much support from Bangladesh, in contrast to the absence of funding from its home country. Reet Aus underlined that the authorities in Bangladesh were extremely receptive to her project and very helpful, investing money for the idea to become a reality. Waste is a serious problem in Bangladesh and its environmental impacts are palpable. Consequently, the textile upcycling idea was positively received and the Up-Shirt team seen as problem solvers.

Reet Aus also highlighted that an advantage of small businesses is their flexibility. While SMEs do not benefit from the funds of large companies, they are also not subject to their 'old ways', which might be particularly hard to change. Small business owners have the opportunity to build a brand from scratch without compromising on their values. In short, it is much easier to create a green SME than to make an already existing company greener.

Finally, an online crowd-funding campaign supported the Up-Shirt project, raising £12,158 (€16,731), which also raised awareness about the project and the UpMade® method.

5.2.3 *Policy lessons learned*

One main lesson from the Up-Shirt experience is that product development requires significant temporal and financial resources, both of which are usually limited for small business owners/founders. Policies aiming to finance product development could allow innovative entrepreneurs to design environmentally-friendly products or processes without having to compromise on the profitability of a product once they are ready to commercialise

²² More information on the certification process: <http://www.upmade.org/get-certified>.

it. If governments invested some money in product development, it would allow SMEs working towards a circular economy to accelerate their progress from R&D to profitability.

Reet Aus commented that she noticed a greater focus on SMEs in the past two years. For instance, AusDesign was nominated for the European Business Award for the Environment 2014-2015. Hopefully, this increased focus will turn into concrete policy measures and financial assistance that will help SMEs seize the opportunities presented by the new circular economy paradigm.

5.3 *Fairphone: Designing a fairer smartphone*

5.3.1 *Summary of business/circular model*

Fairphone²³ started in 2010 as a campaign idea to raise awareness about conflict minerals that are used for the production of consumer electronics. Three years later and following field research in Congo, the Fairphone founders concluded that in order to make a substantial impact they would need to be part of the process of producing consumer electronics. In this context, they decided to establish Fairphone²⁴ as a social enterprise²⁵ that would produce smartphones and would maximise the social impact in all stages of the value chain, from sourcing and production to design and recycling.

Responsible sourcing of minerals is the first priority of the company which focuses on using 'conflict-free'²⁶ minerals²⁷ in the production of smartphones. Additionally, Fairphone makes efforts to gradually integrate environmental and social considerations (working conditions for miners i.e. local wages, child labour etc.) in its decisions about the source of minerals and aspires to further work on this area in the future. The working conditions and environmental performance are also two important factors that affect the decision of Fairphone when selecting partners in China for the manufacturing of smartphones.

In the design process, the company seeks to maximise the lifespan of smartphones. By designing a phone that is easy to repair and by offering support, spare parts and repair tutorials to its customers, the social enterprise aims to encourage them to replace their phones only when they have reached the end of their usable span. Fairphone also explores ways to improve design for longevity, re-use and material recovery. In this context, it has

²³ As explained in section 5.1, the information about this circular business model is based on the case study presented on the GreenEcoNet platform (<http://www.greeneconet.eu/fairphone-designing-fairer-smartphone>). An interview was also conducted with Daria Koreniushkina, who is responsible for public engagement in Fairphone, on 15.04.2015.

²⁴ The enterprise is based in Amsterdam, the Netherlands.

²⁵ A social enterprise has been broadly described by the European Commission (2011, p. 2) as "an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involve employees, consumers and stakeholders affected by its commercial activities".

²⁶ 'Conflict-free' products have been defined by the US Securities and Exchange Commission as "the products that do not contain minerals that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo or an adjoining country", more info here: <http://www.sec.gov/rules/final/2012/34-67716.pdf>.

²⁷ This refers to tin, tantalum, tungsten and gold.

conducted a life-cycle assessment to better understand the environmental impacts of its product across the whole supply chain and identify eco-design tools that could be used to improve its sustainability performance.

The enterprise has furthermore established a recycling programme²⁸ to make it as easy as possible for its consumers to return their old devices for re-use or recycle. Finally, it provides funds to collect scrap phones in Ghana that would end up in landfills and bring them to Europe for recycling. Through this process and through e-waste awareness campaigns, Fairphone aspires to motivate the industry to gradually establish safe recycling facilities.

5.3.2 *Main barriers and enablers*

Barriers

Developing an 'ethical' smartphone containing minerals that originate from mines that are 'conflict-free' and also entail a low environmental impact and good working conditions is a significant challenge for Fairphone. Each smartphone includes around 30 different minerals whose traceability across the whole supply chain is often difficult. Also, the legal framework²⁹ in some countries of origin of smartphone components adds an additional layer of complexity to identifying the origin of minerals.

The financial barrier presents another important obstacle for Fairphone. The collection of sufficient financial resources for the development of the first edition of the smartphone was by no means an easy task since the development of a smartphone requires a significant initial investment. Such an investment is not easily available for start-ups such as Fairphone. Additionally, producing smartphones that would have as long a lifespan as possible according to the company's vision could pose financial challenges. For example, after selling out the first edition of Fairphone smartphone and while being in the development phase of the second edition, the company decided, despite demand, not to produce another batch of the first edition lacking the latest software and 4G technology. This decision was taken to avoid supplying customers with a device whose features would shorten its usable lifespan. This resulted in a gap of revenues from phone sales that obliged the social enterprise to take a loan to support its operations.

Enablers

The company considers social awareness as the most important enabler to developing and implementing its business model. The social enterprise publicly reveals the steps³⁰ of the process of preparing a Fairphone smartphone such as mining conditions, cost breakdown and list of suppliers and informs consumers about the complexity of this process. By being completely transparent about its operations and engaging consumers through discussions and workshops on all issues related to smartphone production, the enterprise aims to make them feel part of the process and develop a close relationship with them.

²⁸ More info is available here: <http://www.fairphone.com/recycling>.

²⁹ For example, according to the company, in China, which is a major producer of components that contain gold, all gold needs to go through the Shanghai Gold Exchange. After this stage it is very difficult to trace the origins of gold (Fairphone, 2015).

³⁰ The company does not yet have visibility regarding all steps of the complex chain involving hundreds of actors but aims to gradually achieve this through a step-by-step process.

By raising awareness about its product and informing consumers about the process of producing consumer electronics, Fairphone managed to receive 10,000 pre-orders for its first smartphone during a one-month crowdfunding campaign, which enabled the company to then produce the phone on a larger scale and eventually sell around 60,000 devices.

5.3.3 Policy lessons learned

One circular economy policy lesson arises from the Fairphone business model, which encourages users to maximise the lifespan of their phones by offering an easy-to-repair phone and generally by improving consumers' awareness about the reparability of its product. It should be kept in mind that the EU has established through regulation³¹ energy efficiency labelling requirements for energy-related products³² that aim to help consumers make more informed decisions. In a similar vein, policies could encourage smartphone manufacturers to include labels that would inform consumers about the reparability and durability of phones and how they can easily repair them. This could also motivate manufacturers to design quality products that last longer.

On the financial side, the example of Fairphone illustrates that social enterprises face similar challenges to other SMEs that aspire to design an innovative product requiring significant financial resources. The financial challenge is often reinforced by high-risk decisions based on environmental and social considerations, such as the Fairphone's decision not to produce additional first edition phones featuring software with a possible short lifespan, despite the high demand. In addition to providing simple and fast access to information about the available sources for funding to SMEs, the EU should continue its efforts³³ to design dedicated instruments that consider the specific characteristics of social enterprises. National governments could also play a role on this by designing publicly funded schemes targeted for social enterprises.

Regarding the issue of the traceability of minerals,³⁴ a key message from the Fairphone experience is again the importance of consumer awareness since the enterprise managed to gain significant support from consumers by informing them about the issue. Any policy measures to improve social awareness about conflict minerals in consumer electronics and enhance transparency across the whole supply chain could also motivate other companies to address this issue in their business models.

6. Conclusions

This paper has identified barriers and enablers to implementing SME circular economy business models, using input from a literature review, a series of events organised by the

³¹ Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products.

³² Examples include washing machines, refrigerators and cooking appliances.

³³ The Social Business Initiative (SBI) adopted by the Commission (2011, p. 6) recognised that "the funding system for social enterprises is underdeveloped in relation to that used by other businesses". The SBI included a series of actions to improve access to funding and mobilise EU funds for social enterprises.

³⁴ The European Commission proposed a draft regulation on conflict minerals in March 2014: http://trade.ec.europa.eu/doclib/docs/2014/march/tradoc_152227.pdf.

GreenEcoNet team and an analysis of two SME circular models featured in the GreenEcoNet platform.

Finance has frequently been highlighted as a barrier in the analysis carried out in this report. The upfront costs of ‘green’ investments emerged in the literature review as a significant barrier, while this financial obstacle was also brought up by both SMEs whose business models were presented in this paper. We can therefore assume that for SMEs seeking to develop an innovative product within a circular economy, access to suitable sources of finance is key. Interestingly, both SMEs successfully used crowdfunding campaigns to acquire funds, which also helped them increase awareness about their product. This indicates that the European Commission should continue exploring ways³⁵ to help SMEs take advantage of this newly emerging form of financing.

Lack of knowledge about the benefits of the circular economy concept is another key issue identified in the literature review, and has been widely discussed during GreenEcoNet events. Some SMEs appear not to be familiar with the circular economy concept or to face difficulties in understanding its benefits. Furthermore, SMEs do not often give priority to sustainability issues since they are more concerned with the day-to-day running of their businesses and the multiple challenges this presents. Using language that is directly relevant to core business operations, such as “reduce waste” or “reduce costs” can therefore help to convince SMEs of the benefits of the circular economy. Once they understand the benefits, the transition process can be simpler.

Both the SMEs studied for this paper are integrated into global value chains and face different challenges, namely difficulties in understanding production processes in other parts of the world and difficulties in dealing with the complex legal frameworks in countries outside the EU. SMEs wishing to enter global value chains therefore need practical, technical and legal advice and support. During the GreenEcoNet events, for example, it was often stressed by various stakeholders that policy-makers need to first better understand the problems and challenges faced by these SMEs in order to develop appropriate supportive policy frameworks. The establishment of collaboration and partnerships between SMEs can help them develop a common understanding of the challenges related to internationalisation. This could be facilitated by an online platform, such as GreenEcoNet, which would showcase the success stories of SMEs with international experience, intensify the exchange of experience between SMEs and facilitate the creation of partnerships.

Finally, raising consumer awareness about the product and the circular process has been an important factor in the business success of the two SMEs featured in this paper. This strengthens the case for policy action and information-based instruments (e.g. product labels) to raise consumer awareness about circular economy business practices and products. This could also motivate other SMEs to consider implementing similar business models.

³⁵ In March 2014, the European Commission issued a Communication on “Unleashing the potential of Crowdfunding in the European Union” to improve understanding about this financing model as well as prepare the ground for possible future policy actions. Additionally, in 2015, the Commission published a guide for small businesses that explains what crowdfunding is and how to use it. Both documents are available here: <http://tinyurl.com/q6j5teu>.

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About GreenEcoNet

GreenEcoNet is a project financed by the 7th EU Framework Programme for Research, which brings businesses and academia together on an EU-wide platform to support small and medium enterprises (SMEs) in the transition to a green economy. This platform (<http://www.greeneconet.eu/>) allows SMEs in Europe to connect to each other and to share their experiences, innovations and best practices. It thus aims to assist SMEs in optimally reaping the business opportunities of a green economy. Partners in GreenEcoNet are: the University of York - Stockholm Environment Institute, the Centre for European Policy Studies (CEPS), the University of Piraeus Research Center (UPRC), the Ecologic Institute, JIN Climate and Sustainability and the Green Economy Coalition.

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