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SUSTAINABLE CONSUMPTION: A MULTI-LEVEL PERSPECTIVE OF A SYSTEMATIC TRANSITION

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Sustainable consumption: a multi-level perspective of a systematic transition

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Abstract

This paper reviews current and future trends in sustainable consumption. Specifically, it analyses the multiple roles consumers play in the ongoing systemic transition. The paper frames the analysis within the multi-level perspective (MLP).Using the MLP, surveys, case studies and previous research on sustainable consumption can be analysed within a coherent analytical framework that illustrates the different roles consumers can play in promoting a shift towards a sustainable socio-technical regime. This study demonstrates that environmental awareness and demand for sustainable products is increasing; at the same time, however, policies and producers are not doing enough to meet consumers' demands and to help them in their consumption choices. Specifically, no concrete policy action has yet been taken to promote a rapid transition towards a circular economy paradigm. Finally, a review of several surveys and case studies indicates that environmental concerns and demand for sustainable and (healthy) products are even more urgent for consumers who reside in developing countries. Hence, sustainable and healthy products are not luxury goods demanded only by a bunch of wealthy consumers, but are in fact also primary goods for people who live in developing countries, who are particularly exposed to environmental degradation, are less empowered and feel more discouraged.

1 Transition towards production-consumption systems: a multi-level perspective

1.1 Background and rationale

The achievement of sustainable consumption and production (SCP) patterns is considered an integral part of the 2030 Agenda for Sustainable Development. It represents a stand-alone Sustainable Development Goal (SDG 12) and a central component of many of the 17 goals and 169 targets included in the Agenda.

The Agenda acknowledges the global dimension of manufactured goods supply chains: in many sectors, the final product is the sum of components produced across the globe. Hence, sustainability entails the adoption of the most efficient production systems across suppliers in different countries. To this end, technological transfer and capacity building activities have to take place at a much more frequent pace.

Another consequence of global value chains in manufacturing goods is the increased importance of consumption patterns: a change in the consumption behaviour in Sweden can, for example, affect Asian or African producers. As consumption patterns are increasingly linked to production patterns across the globe, a shift towards sustainable patterns of consumption must proceed in parallel with a shift towards sustainable production, including sustainable industrialization.

To this respect, the SDGs call on late industrializers to leapfrog the phase of unsustainable production systems and adopt sustainable practices without suffering any reduction in terms of productivity and stable job growth. Historically, there has been strong evidence of the unique contribution of the manufacturing sector to productivity catch-up in the process of development. The challenge is to obtain the same results without adopting the traditional "grow now, clean up later" industrialization policy implemented by early industrializers.

This is only likely to happen if a system transition takes place. This shift would, in particular, entail the establishment of a deeper link between the production and consumption systems.

This paper reviews the current and future trends in sustainable consumption; specifically, we analyse the multiple roles consumers play in the ongoing systemic transition. As further explained below, we will frame our analysis within the multi-level perspective (MLP). Thereby, we can analyse surveys, case studies and previous research within a coherent analytical framework and allows us to elaborate policy recommendations.

1.2 Theoretical approach: socio-technical transition within the framework of the multi-level perspective

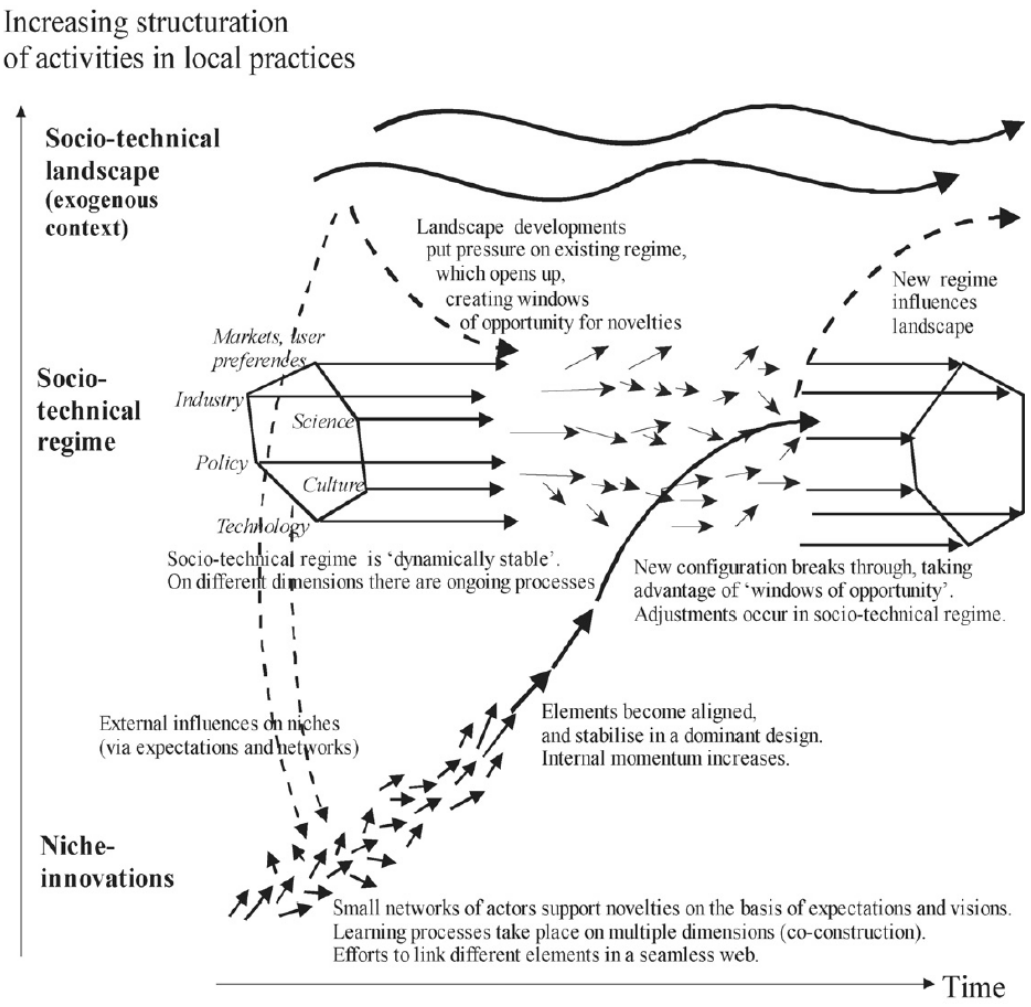
The paper frames the need for this transition within the multi-level perspective (MLP). MLP provides a relatively straightforward way to classify and simplify the analysis of complex, large-scale socio-technical systems. The MLP organizes the analysis into a socio-technical system that consists of niches, regimes and landscapes. This is a nested hierarchy of structuring processes (Geels and Schot, 2007), analogous to Giddens' (1984) concepts of reflexive agency and structure; it provides a unified framework for the analysis of socio-technical transitions.

At present, socio-technical regimes represent the mainstream approach for realizing societal functions. Change within such a regime tends to be incremental and path-dependent. Regimes also exert a structuring force on novel alternatives, which arise in niche spaces. Hence, regimes tend to produce "normal" innovation patterns, whilst "revolutionary" change originates in "niches". The implication is that the quality of incremental innovations subsequently generated within a new regime will be radically different from those under the preceding regime. Finally, both niches and regimes are situated within a broader landscape of social and physical factors, providing a macro-level structuring context. Over time, the rise of some regimes can prove quite influential upon broader landscape developments.

Within this framework, technological niches are responsible for radical innovation and regime changes. At the same time, the possibility for technological niches to take over the regime depends on both the relative strength of niches and regimes as well as on the pressure that the landscape exerts over both the regime and the niche.

Within the domain of sustainability science, sustainable niches comprise networks of real world experiments with socially and ecologically benign socio-technical practices. The actors (producers and consumers) undertaking these experiments are relatively more supportive of the social and environmental qualities of niche socio-technical practice, and more forgiving of teething troubles, owing to their different expectations of future performance compared to regime members. The norms in the niche differ in comparison with regime rules but also tend to be less established and relatively instable. Whilst 'outsiders' can be important instigators of niche developments, such as environmental activists in the early development of modern wind energy, established actors within the regime must get involved, such as large utility companies, to scale them up. Niche success ultimately rests upon broader circles of more powerful actors becoming involved in ways that mobilize widespread social legitimacy.

Figure 1 Multi-level perspective on transition



Source: Geels and Schot, 2007

The difference between innovation and transition rests on the level of analysis. Innovation studies explain how companies and R&D deliver new products, processes and services to improve human wellbeing without detriment to environmental life support systems. Moreover, innovation studies can describe how and why such "greener" practice might be accelerated at the expense of environmentally more harmful alternatives. However, they cannot capture how the social system reacts to technological innovation. Hence, there is a need to broaden the analysis: specifically, there is a need to shift the focus from simply promoting cleaner technologies towards exploring how to innovate entire systems of production and consumption.

A socio-technical transition is a set of processes that lead to a fundamental shift in socio-technical systems (e.g. Geels and Schot, 2007; Kemp, 1994). A transition involves far-reaching changes along different dimensions over considerable time-spans (even decades): technological, material, organizational, institutional, political, economic and socio-cultural. Transitions also

involve a broad range of actors. During such a period, new products, services, business models and organizations emerge, partly complementing and partly substituting existing ones. Technological and institutional structures change fundamentally, as do consumers' perceptions about what constitutes a particular service (or technology).

Hence, socio-technical transitions differ from technological innovation in that they include changes in user practices and institutional (e.g. regulatory and cultural) structures in addition to the technological dimension. Moreover, socio-technical transitions typically encompass a series of complementary non-technical innovations [1].

The COP21 final agreement set a very ambitious goal: to contain the increase in global temperatures below 2° Celsius. Nearly 60 per cent of fossil fuel proven reserves must remain unburnt (McGlade and Ekins, 2015) to secure at least a 50 per cent chance of meeting this target before 2050. Furthermore, according to IPCC estimates, we should be able to reduce our GHG emissions by 80 per cent. This need for step-jumps in absolute performance, such as an 80 per cent reduction in carbon emissions over the next generation or factor 10 improvements in resource efficiency, implies changes at the level of entire socio-technical systems. These system innovations, such as transformative innovations that overhaul food systems or waste systems, involve purposeful changes in prevailing socio-technical regimes.

This implies that we need to shift or focus from analysing how to foster environmental improvements of products and services towards how to facilitate a rapid system transition. Greener innovations may produce more eco-efficient products or services, or even enable industry clusters to develop more closed-loop processes (circular economy), but the relative improvements they deliver are insufficient if we do not understand how to promote a regime change quickly.

A rapid socio-technical transition requires not only the active involvement of consumers, but also the development of new trends of consumption as well as new integrated sustainable production-consumption systems.

[1] Innovation and transition studies have finer taxonomies for different levels of innovations as well as for different transition processes (for instance, for environmental transition, see: Suarez and Oliva, 2005). In the rest of the paper, radical innovations will be those responsible for regime change-type of transitions.

Hence, we will use this framework to analyse how sustainable consumption is emerging and evolving and how producers are responding to this challenge. In particular, we will try to position the case studies both within the different layers of the multi-level perspective as well as within the transition framework (i.e. whether regime actors are promoting incremental innovation or instead, whether niche actors are driving radical changes).

1.3 The double role of consumers in the socio-technical transition

In the next section, we analyse the dawn of a systemic transition in consumption patterns. We focus on the role of consumers in promoting sustainability, their attitude towards sustainable products and the effect this increased demand has on producers. Moreover, we will explore how policies and producers themselves are reacting to better promote and more easily market sustainable products.

In particular, we analyse the double role consumers play within the ongoing systemic transition. On the one hand, consumers feel the pressure of landscape developments (e.g. increased environmental concern; damages from increased exposure to extreme weather events) and transfer this pressure onto producers, thereby evolving into a pull factor for systemic change. In this first case, consumers act as amplifiers of the landscape pressure on the current socio-technical regime.

A small fraction of consumers do not only act as intermediaries of landscape pressure on the current socio-technical regime, but rather as actors of systemic grassroots innovation. Engaged consumers in different countries and for different sectors are developing radically new forms of consumption that challenge the current regime.

Hence, it is important to highlight that there is a difference in focusing on consumers rather than on producers, particularly when addressing sustainability matters. Ultimately, the socio-technical system produces goods and services to satisfy consumers. Consequently, consumption is shaped by an array of complex, interrelated factors such as demographics, income and prices, technology, trade, policies and infrastructure as well as social, cultural and psychological factors. Production activities across economic sectors, including extractive industries, agriculture, energy, transport and manufacturing, are directly responsible for the majority of environmental impacts caused by the economy. However, it is private and public consumption that are the fundamental causal factors and drivers of sustainable consumption (European Environment Agency, 2013).

We therefore discuss to what extent consumer preferences are driving changes and if and how institutions and policies can shape these preferences to change the demand in favour of sustainable goods and services. Moreover, we demonstrate within the MLP framework that engaged consumers are developing innovative niches that can lead to a systemic transition.

Measuring consumer preferences and attitudes is no easy task: surveys and behavioural experiments provide precious information, but they are costly and time consuming. Measuring consumption of sustainable consumption is no easy task, either. On the one hand, we now have a clear theoretical definition of what constitutes a sustainable product[2]; on the other hand, however, we do not have a clear product categorization; hence, national statistics agencies cannot easily monitor the evolution of the consumption of sustainable products.

2 Consumers and sustainability: framing current trends within MLP

The environmental landscape has been rapidly changing in the last 20 years. Globalization and climate change are exerting considerable pressure on consumers and are influencing their preferences and consumption patterns. Since the beginning of the nineties, consumers have begun actively pressuring and influencing producers and policies. Moreover, the internet and social media are providing tools for consumers to express their views and opinions even without being part of any association. As anticipated above, as consumer awareness rises, producers and policymakers face increased pressure, undermining the current socio-technical regime.

Consumers associations and engaged consumers, a fraction of the overall population, do not just act as environmental watchdogs, they also promote and test new forms of consumption. Within the MLP, we can consider associations and engaged consumers as niches that are trying to innovate the way we consume. To increase their influence and advocate their ideas and cultural innovation, they need to collaborate with (and sometimes challenge) influential actors (public institutions and manufacturing companies).

Niche actors are responsible for the increase in programmes and policies aimed at changing individual behaviours (for reviews, see Southerton et al., 2011). Many of these initiatives reflect a growing and pervasive discourse premised on the notion that in order to achieve sustainable consumption, we must target and change consumer behaviour and lifestyle choices, while simultaneously improving efficiency and productivity (Jackson, 2006). This ‘going green’ discourse is concerned with changing individuals’ attitudes to encourage the uptake of small actions, techno-efficiency measures and green products.

[2] Sustainable products are products that provide environmental, social and economic benefits while protecting public health and the environment over their entire life cycle, from raw materials extraction to final disposal.

The active role of consumers should convert into a pull effect for producers and reward not only green products but also green production processes. Informed choices can be made by either opting for products recognized for their sustainability and certified by some form of labelling, or by avoiding the purchase of products from companies with a record of poor environmental performance.

Innovative consumption patterns by niches can, of course, become the new norm in the socio-technical regime: it requires the niche to be the standard bearer for the broader market. Often, those standards even become the new rules and regulations adopted by institutions.

2.1 Environmental concerns and consumer attitudes: a cross-country comparison

In the next section, we analyse how environmental concerns (i.e. climate change, increased urban pollution and resource scarcity) are affecting consumers' attitudes and choices. Specifically, we want to understand to what extent consumers perceive the exogenous landscape pressure on the current socio-technical regime and if and to what extent they are ready to switch towards sustainable consumption. Finally, we investigate whether consumers perceive the current policies promoting sustainable consumption as being effective.

2.1.1 Eurobarometer and the Hong Kong Consumer Council

As mentioned above, if we want to know what consumers think and whether they purchase sustainable products, we have to depend on survey data. As surveys are costly, it is usually difficult to find recurrent analyses at multi-country level. On the one hand, several studies on consumer attitude towards sustainable products and sustainability do in fact exist; on the other, however, these studies are often country-specific, sector-specific and most importantly, are carried out only once (or at least not regularly). Hence, while providing useful case-specific information, such survey data do not allow for cross-country comparisons nor do they provide clear results on overall trends. Moreover, the majority of these studies are carried out by marketing companies or by sector associations. Official institutions rarely conduct this type of survey.

Two recent notable exceptions are the Eurobarometer special surveys carried out in 2013 and the "Sustainable Consumption for a Better Future Survey" conducted by the Hong Kong Consumer Council. We compare the findings of these two surveys because similar trends emerged. There are two intriguing indications that emerge from the two surveys:

- The majority of consumers is concerned about the environment and perceives that his/her consumption patterns have a negative impact on it;
- There is a considerable market for sustainable products, as respondents have stated their willingness to consider and purchase green and sustainable products.

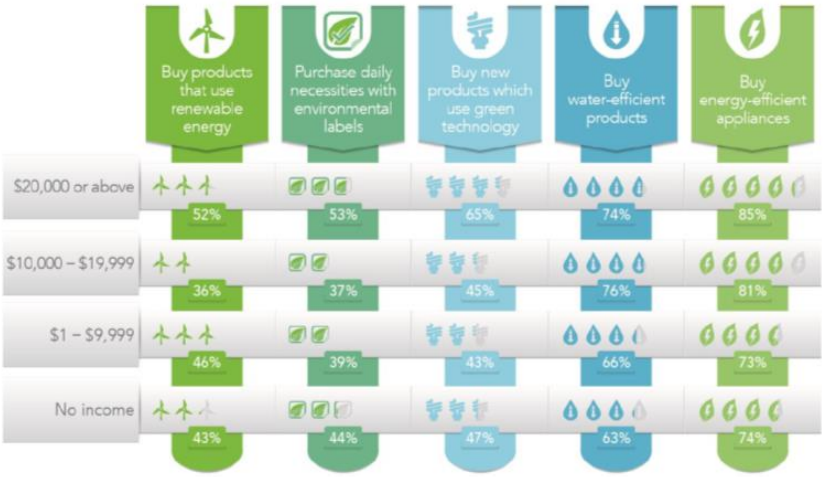
On the other hand, two drawbacks took shape:

- Consumers are sceptical about self-claims made by producers while they would trust a comprehensive environmental labelling system;
- There are mixed feelings when they consider the possibility of paying a price premium for sustainable products: some vigorously oppose this option, while others are ready to pay a considerably higher price for sustainable products.

Finally, as regards the products, consumers tend to pay more attention to environmental quality when purchasing food and durable goods, in particular, home appliances. The two main concerns about the latter are their estimated lifespan and their energy consumption. In this case, 'sustainable' implicitly means that the product will last longer and that it will consume less energy. Hence, a clear correlation with quality emerges. As for food, consumers are aware that excessive meat consumption has an impact on the environment and in the EU, 50 per cent of respondents are therefore considering the possibility of replacing nearly all of the meat they consume with vegetables. In that case, a clear correlation with safety and health factors emerges. In terms of consumer heterogeneity, it is interesting to note that consumers' attitudes are not significantly influenced by the income group or age group they belong to or their level of education.

The Hong Kong survey reveals that willingness to choose sustainable products rises with level of income; at the same time, the increase in willingness is not striking and even individuals with lower levels of income are prepared to buy sustainable products. This is particularly true for energy-efficient and water-efficient products.

Figure 2 Selected purchasing behaviour by income groups in Hong Kong



Source: Hong Kong Consumer Council, 2013

The following table shows that younger people tend to trust green labels as effective indicators of the reduced environmental impact of labelled products more than older respondents. On the other hand, however, confidence in green labels does not decrease considerably with age.

Table 1 Confidence in green labels

	Total "Confident"	Total "Not confident"	Don't know
EU27	66%	33%	1%
Age			
15-24	70%	30%	-
25-39	68%	31%	1%
40-54	65%	34%	1%
55 +	63%	35%	2%

Source: European Commission, 2013

Both surveys conclude with similar policy recommendations to promote sustainable consumption:

1) Improvement and harmonization of environmental labels;

2) Clearer indication of the availability of sustainable products in the stores.

Hence, these two surveys show that consumers generally have a positive attitude towards sustainable products and that the lack of trusted information or difficulty finding reliable information hinders the possibility of increasing the market share of sustainable products.

2.1.2 The "Greendex"

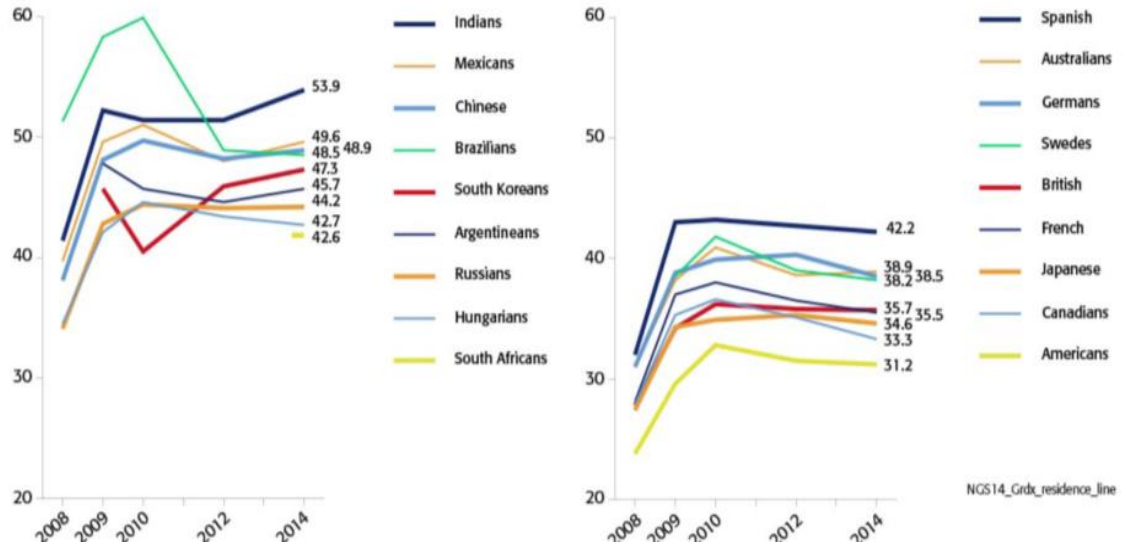
To determine whether these findings are generalizable and to test whether they change over time, we have to look at the findings of cross-country and recurrent surveys. To this end, the most notable recurrent study is the "Greendex", developed by "National Geographic". It is the most important survey on consumer attitudes and sustainable consumption patterns worldwide and allows for cross-country comparisons. Since 2008, National Geographic has been conducting an international survey biennially (involving 18 countries and 1,000 consumers per country) to measure and monitor consumer progress towards environmentally sustainable consumption. Its key objective is to provide regular quantitative measures of sustainable consumption patterns as well as measures of the evolution of consumers' green attitude. Hence, the survey monitors both actual behaviours and attitudes, asking respondents to provide information on their actual consumption behaviour as well as their view of a set of environmental and health issues. This provides the possibility to compute a household footprint based on energy use, transportation habits, food consumption and the relative penetration of green versus traditional products. Moreover, it provides the possibility to compare the gap between attitude and behaviour.

Quantitative data on actual consumption are concisely collected and weighted to return an overall score, the "Greendex". Hence, each respondent has a score based on the consumption patterns they report in the survey; a country's score is based on the average of its individual respondents. The Greendex measures consumer behaviour in four general areas: housing, transportation, food consumption and goods[3]. Because each respondent earns a score that reflects the environmental impact of his or her consumption patterns (where low scores signify greater environmental impact), poorer countries will clearly look greener unless some form of correction is introduced. The Greendex does not, however, correct its scores on any purchase

[3] http://environment.nationalgeographic.com/environment/greendex/

parity measure, and this is a major limitation. Hence, the most important insight of the survey is the evolution of sustainable consumption patterns over time for each individual country, illustrated in Figure 3.

Figure 3 The Greendex score

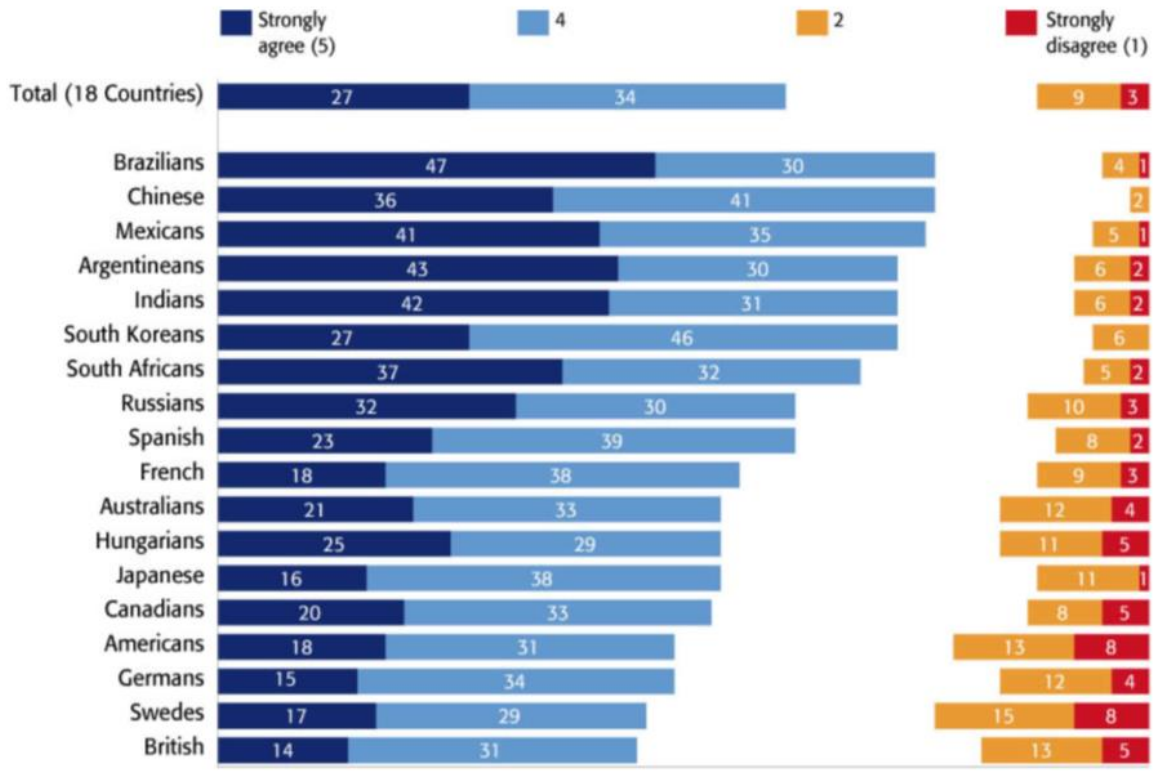


Source: National Geographic and GlobeScan, 2014

As expected, wealthier countries perform worse. Moreover—and albeit the short time frame—most of the countries do not demonstrate any considerable improvements in their sustainable consumption patterns.

In terms of attitudes and perceptions, Figure 4 returns a very interesting result.

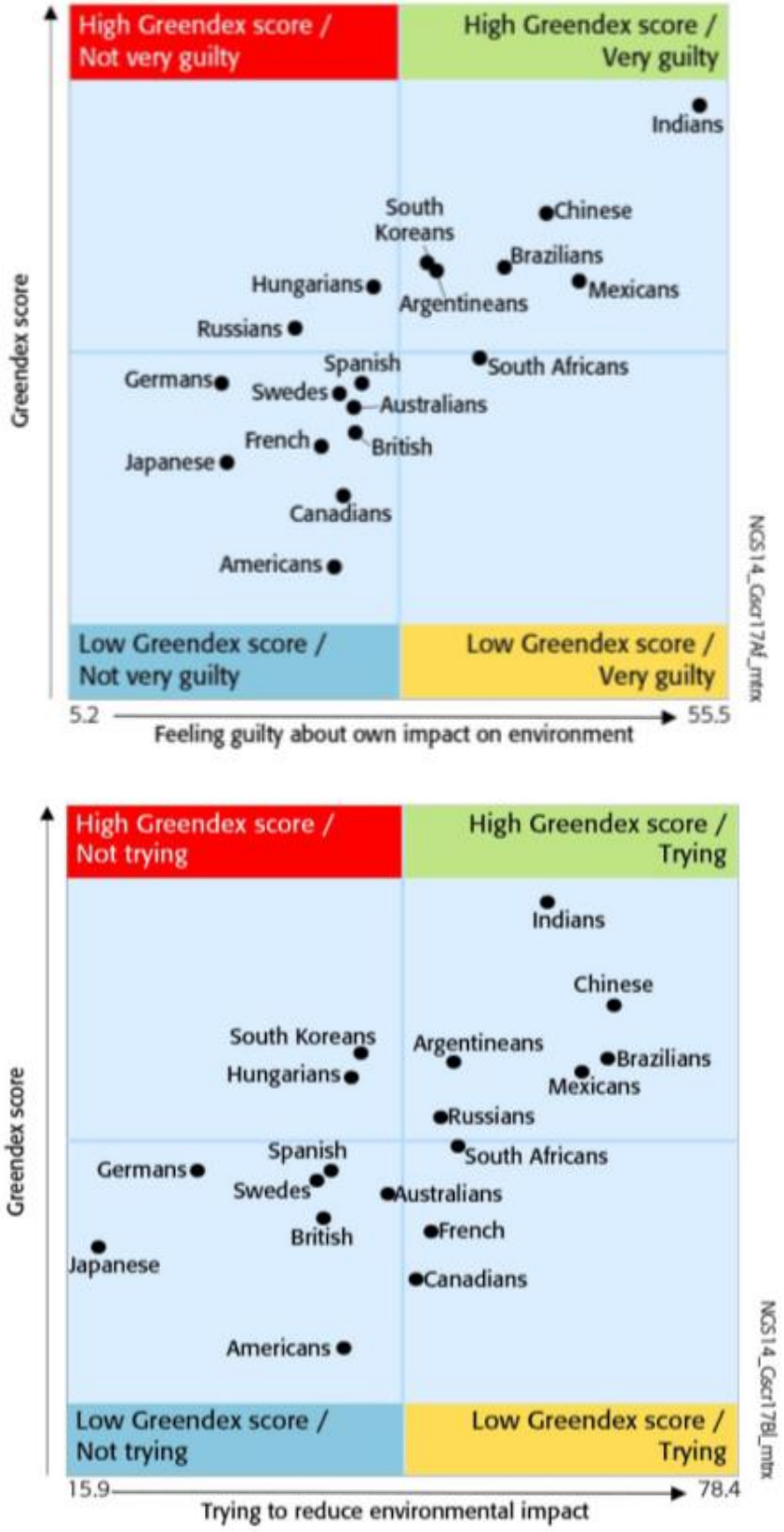
Figure 4 **Percentage of consumers concerned about the environmental impact of their consumption**



Source: National Geographic and GlobeScan, 2014

Albeit having the least impact on the environment (in terms of absolute levels of consumption), consumers in developing countries are far more concerned about the environmental impact of their consumption than consumers in developed countries. Similar results are obtained when consumers are asked whether they feel guilty about their impact on the environment. Hence, the most intriguing part of the analysis is the relationship between these composite measures of sustainable consumption from the Greendex and the environmental attitudes of respondents.

Figure 5 **Relationship between the Greendex and "Feeling guilty about my environmental impact" (left); "trying to reduce my environmental impact" (right)**

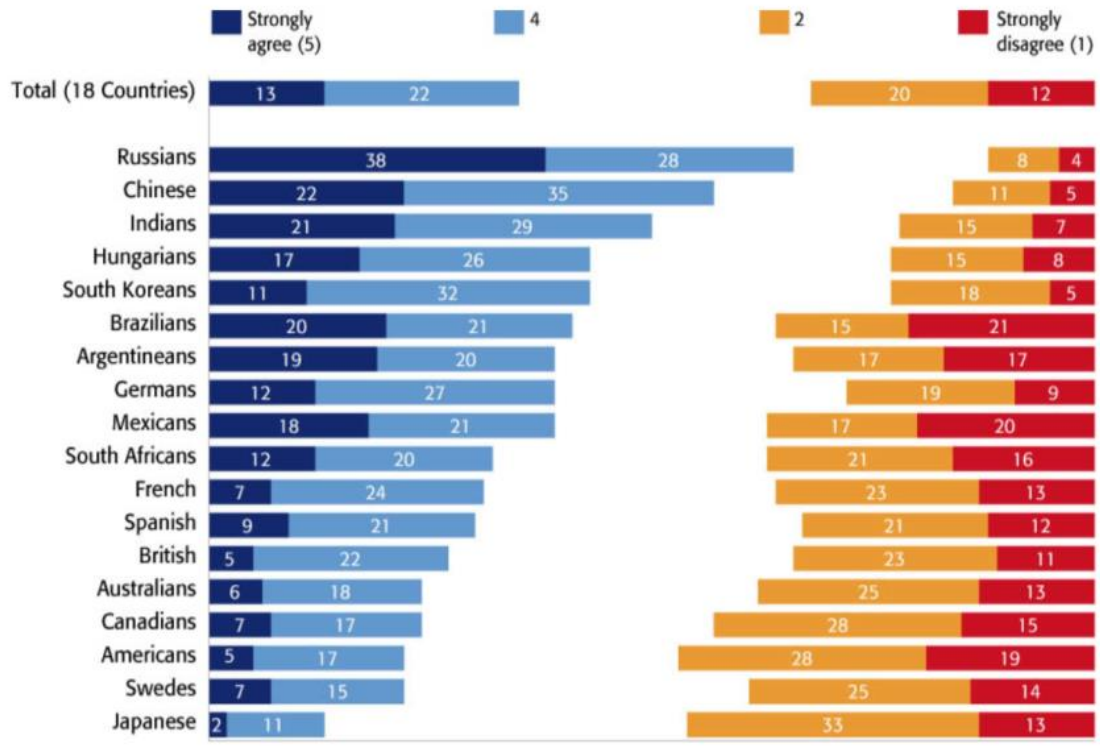


Source: National Geographic and GlobeScan, 2014

Consumers in developing countries seem to have a stronger pro-environment attitude. Consumers in wealthier countries, despite behaving less sustainably, seem to feel less guilty about their consumption pattern. Moreover, consumers in developing countries are keener to attempt to reduce the environmental impact of their consumption pattern.

It is possible to paint at least three underlying trends. The first is that irrespective of the actual degree of their environmental impact, consumers in developing countries are generally more concerned about the environment, particularly those living in urban areas. The landscape environment is actively putting pressure on consumers. There is a growing body of literature showing that consumers in developing countries are concerned about their health: they have little trust in production processes and in final products and are experiencing a deterioration of their surrounding environment. Hence, as shown in the Greendex report as well as in other surveys such as "The Product Mindset[4]", environmental and safety concerns are interwoven.

Figure 6 Consumers who feel they as individuals cannot prevent environmental degradation



Source: National Geographic and GlobeScan, 2014

[4] In 2013, 92 per cent of Chinese consumers stated that an increase in product safety was their top priority. UL, 2013, The Product Mindset, China Country Report.

The second finding from this survey is that consumers in wealthier countries are less concerned about environmental degradation. To this end, the explanation is not that they care less, but rather that they believe they can actively contribute to changing their own consumption patterns, or to put it differently, they believe that they are empowered. The statement respondents were asked to agree or disagree with was whether they think societal impact on the environment is so severe that they as individuals cannot change anything about it.

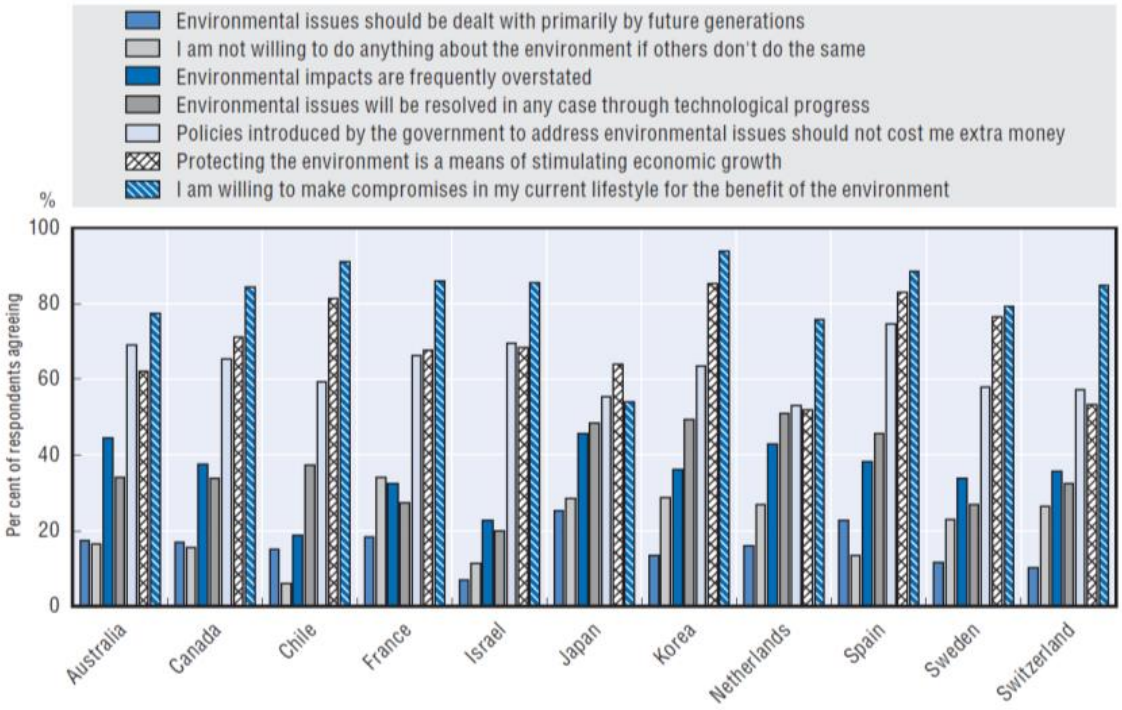
Figure 6 clearly shows that consumers in wealthier countries feel more empowered: they are quite confident that their individual actions can make a difference. Consumers in developing countries, on the other hand, are less confident on average that individual actions can have a significant positive impact on the fight against environmental degradation. This implies that niches have more fertile ground in wealthier societies, while they are more urgently needed in developing countries, where scepticism towards individual actions is rife.

2.1.3 OECD and the Nielsen Company surveys

The OECD survey "Greening Household Behavior", published in 2014, confirms the finding that consumers in developed economies are confident that they can be part of the solution to protecting the environment. Respondents participating in the survey were asked whether they agreed with seven statements addressing different aspects of the environment. These statements, presented in Figure 7, cover issues such as reciprocity (i.e. willingness to make sacrifices as long as others do the same), the role of technology in addressing environmental problems, intergenerational equity and scepticism about claims with regard to environmental issues.

The statement respondents agreed most with was: "I am willing to make compromises in my current lifestyle for the benefit of the environment". Agreement with this statement was highest in the Republic of Korea, where nearly 95 per cent of respondents expressed willingness to make such sacrifices. The statement ranking second in terms of consensus is that protecting the environment is a means to stimulate economic growth. Hence, people are generally prepared to partially change their lifestyle and believe that protecting the environment can generate economic benefits.

Figure 7 Levels of agreement with seven statements on environmental policies



Source: OECD, 2014

The third and final trend that emerges from the Greendex survey and is confirmed in the OECD's survey, is that a "values action gap" exists in developed countries, in particular. To this end, a growing body of literature shows that the majority of consumers have difficulty translating their sustainability concerns into purchases (Pedersen and Neergaard, 2006). Everyday decisions on practical environmental or ethical solutions often result in trade-offs between conflicting issues and in a "motivational and practical complexity of green consumption". Specifically, product choice involves the processing of a considerable amount of pieces of information within a short period and often with a lack of readily accessible and comprehensible explanations (Horne, 2009). That is, consumers might not buy green products because of the complex purchasing process. Hence, the intention-behaviour gap, generated by such unease about the process, implies that environmental consciousness does not automatically lead to environmentally friendly behaviour and that environmental awareness likewise does not always lead to changes in purchasing behaviour.

Within our framework, this factor denotes the current socio-technical regime's resilience that the innovative niches are up against. Niches of innovative and engaged consumers have to demonstrate how sustainable consumption can be put into practice in everyday life.

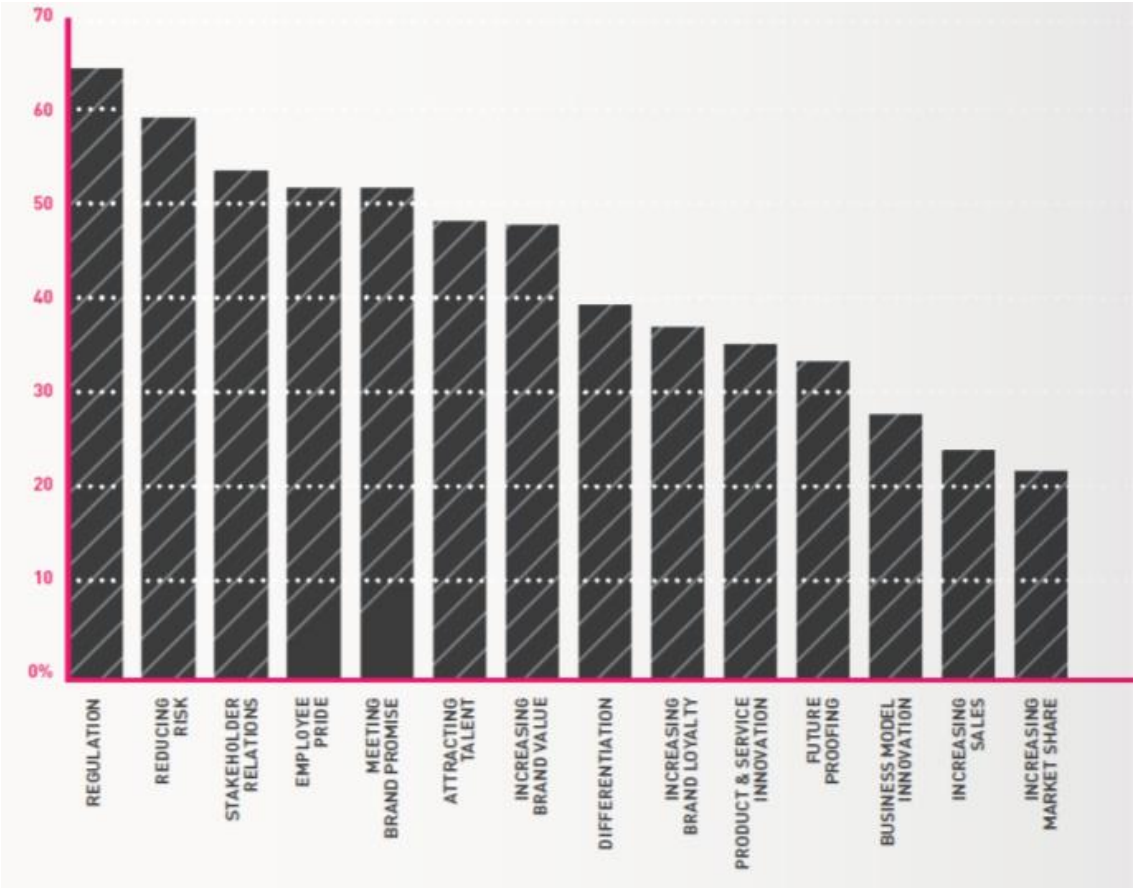
At the same time, niches of innovative suppliers have to develop and bring innovative products to the market, which are not more costly than other comparable ones. As already mentioned, not all consumers agree that the efforts to achieve sustainable consumption should be placed on their shoulders. Nonetheless, awareness of green products is continuously increasing, and recent surveys tend to demonstrate that there is now an absolute majority of consumers who are prepared to pay more for sustainable products.

For instance, in its 2015 Global Sustainability Report, the Nielsen Company (a consulting firm) asked 30,000 survey respondents in 60 countries across the globe whether they were prepared to pay a price premium for products and services produced by companies committed to making a positive social and environmental impact. Sixty-six per cent of global respondents confirmed that they are prepared to pay more for sustainable goods, up from 55 per cent in 2014 (and 50 per cent in 2013). The result is robust across regions and is irrespective of income levels. To this end, it is interesting to note that the survey carried out by the Nielsen Company returns similar results as the Greendex report cited above. Their findings reveal that it is generally more difficult to persuade consumers in developed markets to purchase or pay more for sustainable products, while consumers in Latin America, Asia, the Middle East and Africa are 23 per cent to -29 per cent more willing to pay a price premium for sustainable goods.

Consumers in developed markets, instead, place the burden of making sustainable products available on producers. As shown in Figure 8, the majority of respondents participating in the OECD survey agreed with the fact that government policies to address environmental issues should not cost households any additional money. Moreover, several surveys involving American consumers show that 70 per cent to 80 per cent would opt for sustainable products if the quality and price are comparable to that of the non-sustainable competitor's goods.

This does not imply that consumers in developed countries are not demanding sustainable products; instead, they have become accustomed to the notion that products and production processes have to be sustainable and that it is the producers' responsibility to deliver sustainable products at no additional costs. In other words, society in developed countries take system innovation in terms of production and resources for granted.

Figure 8 Main reasons for investing in sustainable products and production processes



Source: Sustainable Lifestyle Frontier Group, 2013

This assertion is demonstrated by the reputational damage producers face when environmental accidents occur. Consumers might not act but they do react, at least in the short term. In developed countries, consumers might not reward green producers, but they can punish producers in case of misconduct. A recent survey carried out by Sustainable Lifestyle Frontier Group asked major international corporations to state the main drivers for their investment in sustainable products and production processes. The second and third strongest drivers are risk reduction and stakeholder relations, both proxies of reputational aspects. Hence, this is an indirect verification that consumer values are changing: cracks in the actual regime are starting to emerge and companies have to adapt.

2.2 Consumers as sustainability drivers

The review of different surveys presented above reveals that consumer awareness is increasing as is demand for green and sustainable products. Hence, consumers are acting as amplifiers of landscape pressure with the consequence of destabilizing the current socio-technical regime even further. In the next section, we discuss cases in which consumers have effectively

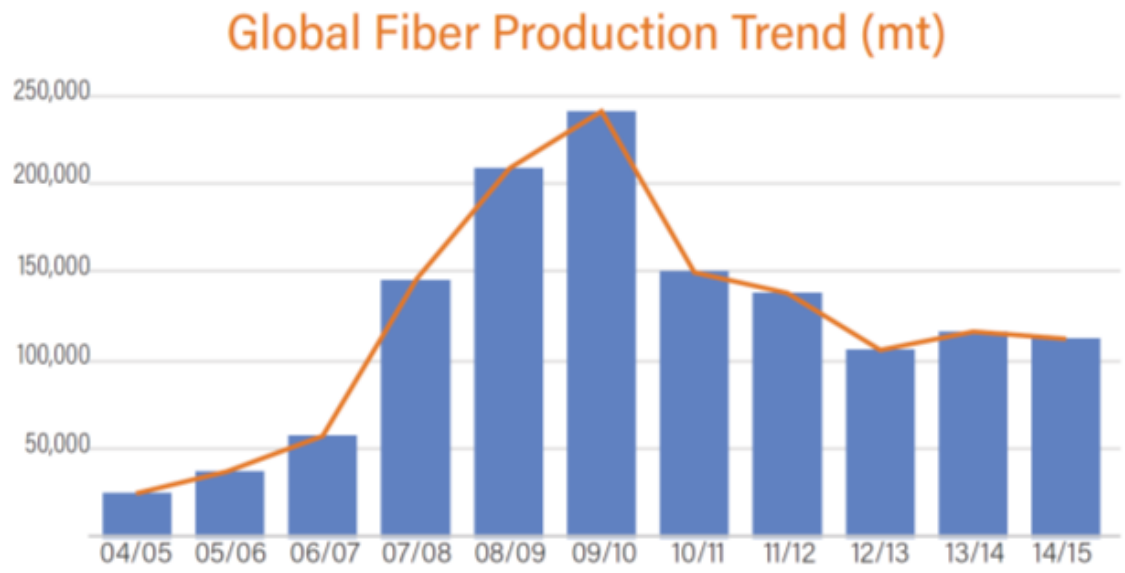
amplified the landscape pressure on the supply chain of specific products, *de facto* accelerating the introduction of technical and systemic innovations.

2.2.1 Organic cotton

Consumer awareness lies at the heart of the evolution of the organic movement (Rieple & Singh, 2010). Demand for organic products initially started in the food industry, underpinned by health-related reasons: a growing number of consumers was concerned about the health implications of pesticides and insecticides. As awareness increased, consumers began demanding organic clothing, i.e. clothing produced with organic cotton. Organic cotton is a "cotton that is farmed without the use of synthetic chemicals such as pesticides and fertilizers" (Rieple & Singh, 2010, p. 2292).

The clothing and textile industry has a major environmental footprint, polluting around 200 t of water per ton of fabric (Nagurney & Yu, 2012). The environmental impact of the production of cotton, one of the most versatile fibres used in clothing (Claudio, 2007), the disposal of textiles (Bianchi & Birtwistle, 2012), and the distribution of products across regions and countries was of particular concern (Allwood, Laursen, Russel, Malvido de Rodrighez, & Bocken, 2008). Moreover, cotton farming is responsible for about 10 per cent of all synthetic pesticides and for between 20 per cent and 25 per cent of insecticides used worldwide every year (Nagurney & Yu, 2012). Environmental protection thus seems to be the main motivation for consumers of organic cotton. To this end, studies show that the purchasing motivation for organic food products and organic cotton differ slightly. While health concerns remain the primary reason for purchasing organic food products (Krystallis, Fotopoulos, & Zotos, 2006; Quah & Tan, 2010), environmental considerations alone explain consumers' preference for organic cotton (Casadesus-Masanell, Crooke, Reinhardt & Vasishth, 2009; Gam et al., 2010). Hence, the example of organic cotton is a very effective one of consumers as drivers of the introduction of sustainable products in the market.

Figure 9 Global organic production trend

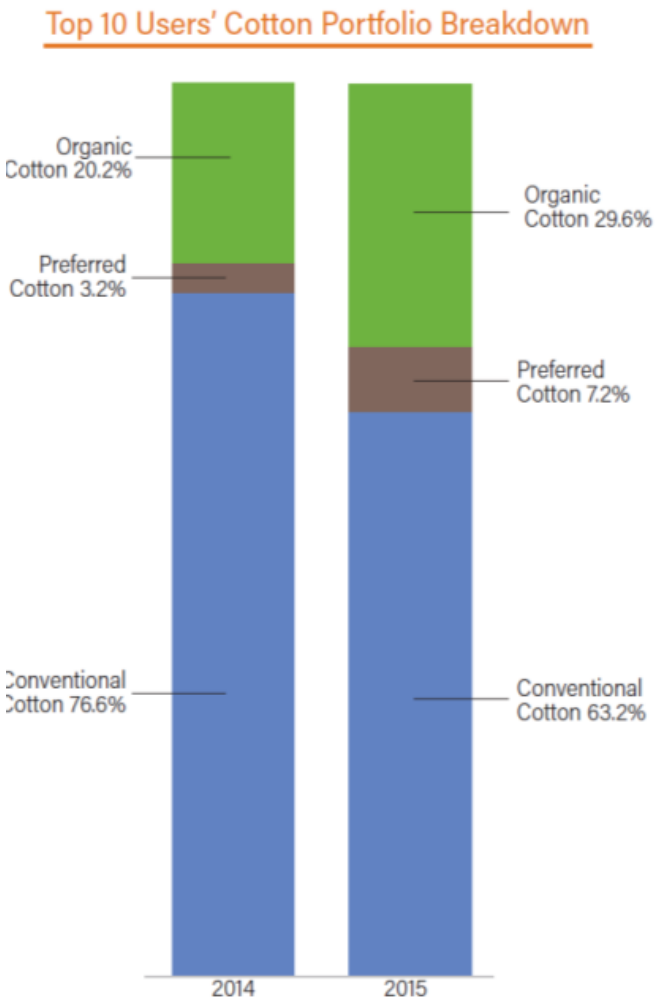


Source: Textile Exchange, 2016

The global production of organic cotton rose by nearly 4,000 per cent between 1992, when organic cotton was first mass produced, and 2010; its production fell sharply in 2011/2012 and has remained stable since. The drop in production experienced in recent years has been driven by price dynamics: lower demand for all types of cotton has reduced prices and production. Regardless, the overall market value of organic cotton is almost USD 16 billion with a 0.6 per cent market share.

Even though it is a very small share, some clothing designers and companies have launched innovative designs using organic cotton. In 2015, the top three users of organic cotton were: C&A, followed by H&M and Tchibo. Inditex, Nike, Decathlon, Carrefour and the US retailer Williams-Sonoma rank among the top 10 users. Within their portfolio, organic cotton represents close to a 30 per cent share.

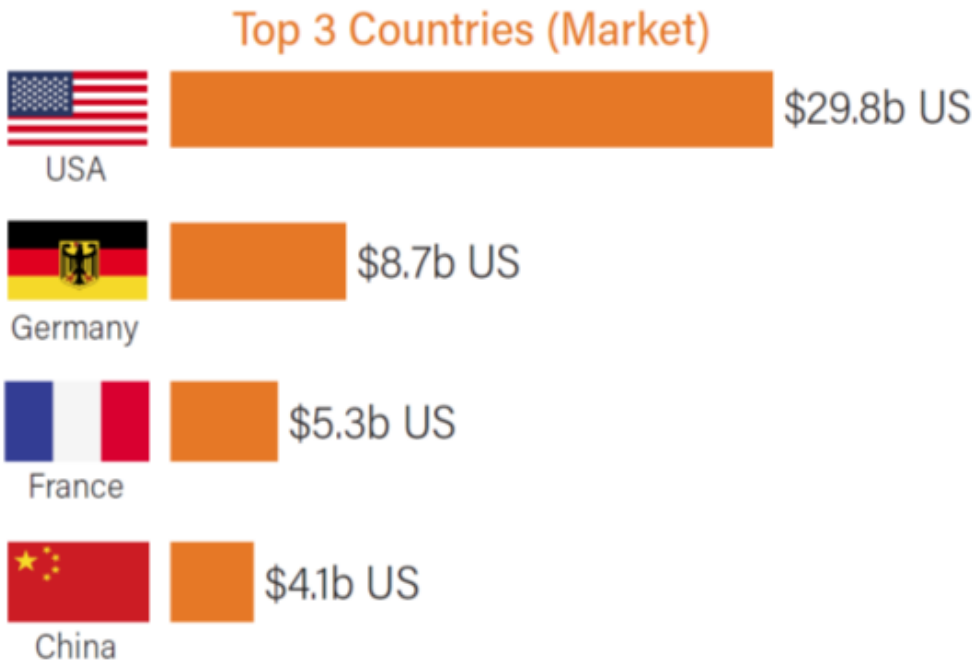
Figure 10 Breakdown of top 10 organic cotton users' portfolios breakdown



Source: Textile Exchange, 2016

According to Gam et al. (2010), price remains one of the most decisive factors determining whether consumers actually purchase organic clothing products. At present, organic clothing is sold at a premium price that can be up to 30 per cent higher than a product that is not made from organic cotton. The chart below presents the three largest markets for organic products (food and clothing combined): the above mentioned price differential provides a partial explanation for the fact that the three largest markets are found in wealthy countries.

Figure 11 Market share of organic products



Source: Textile Exchange, 2016

2.2.2 New Zealand wine production

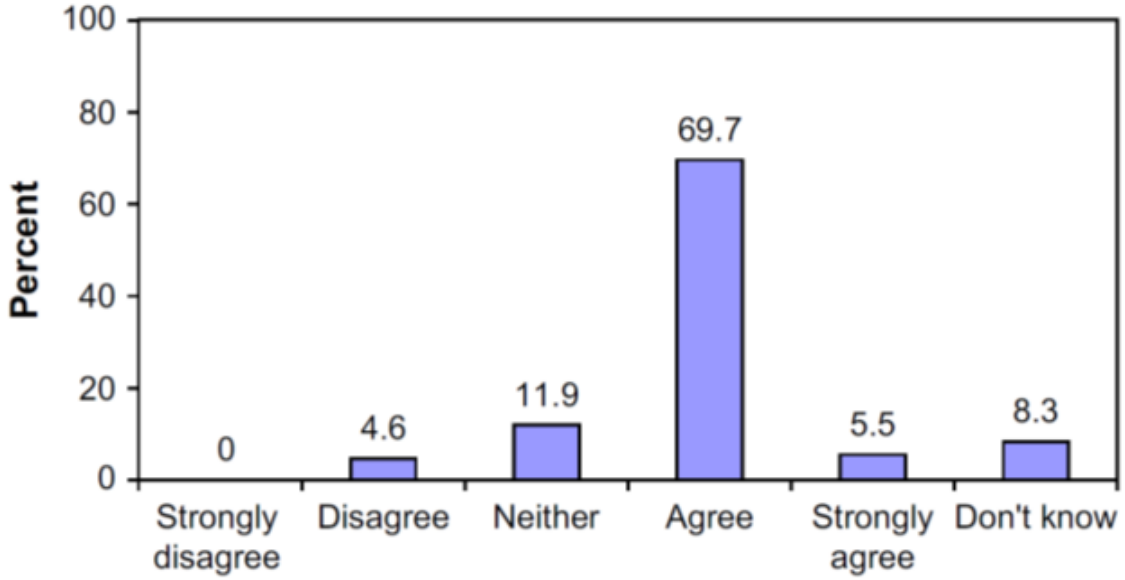
In recent years, New Zealand companies and public institutions have worked hard to promote a "clean and green" image of their economy (Lawrence et al., 2006).

Among the industries that have invested the most to implement sustainable practices as well as to promote this image is the wine industry. Wine production is a significant contributor to New Zealand's economy, with its annual wine sales of nearly USD 1.5 billion. Wine exports represent the fifth most valuable export to the European Union, the second most valuable export to the United Kingdom, and the seventh most valuable to the United States. Given growing demand and the need to improve its sustainability, wine producers adopted a new sustainability policy whereby all New Zealand grapes and wine must be produced under independently audited sustainability schemes.

Both domestic and international customers were the main drivers behind these investments in sustainability practices. A study carried out by Gabzdylova et al. (2009) shows that customers are as important as shareholders in driving sustainability investments. The study surveyed New Zealand producers in order to understand the driving forces behind their investments in sustainability practices, and unequivocally found that consumer preferences were among their top priorities.

A second study by Forbes et al. (2009) confirms these findings: in New Zealand, the effects of conventional agricultural production practices on human health and environmental wellbeing are an increasing concern for consumers. Hence, there is strong demand for wine that is produced using "green" production practices. The figure below shows that three quarters of domestic consumers prefer sustainably produced wine.

Figure 12 Consumer preference for drinking sustainably produced wines



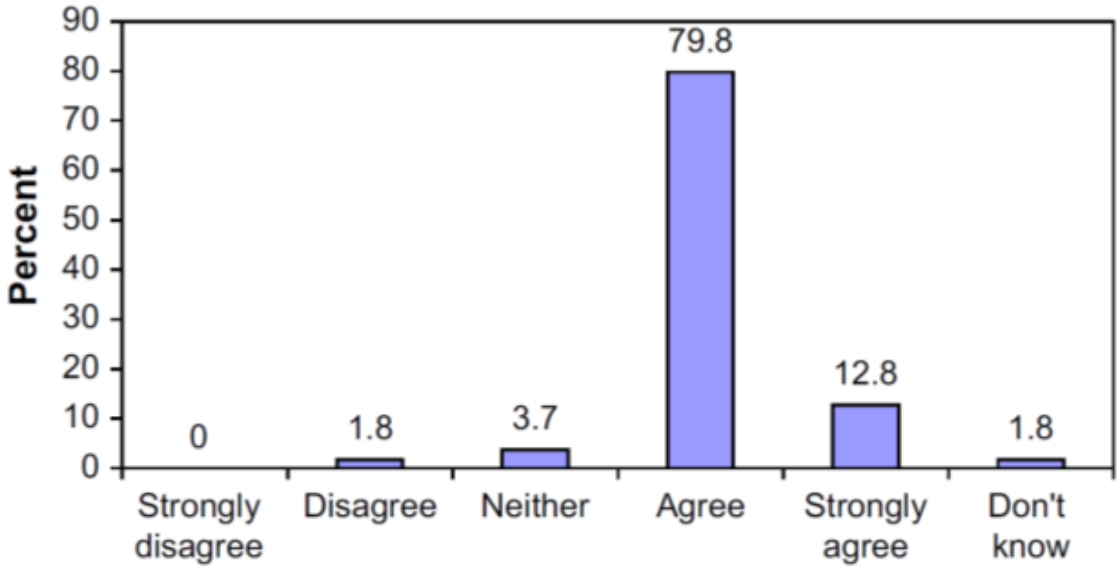
Source: Forbes et al., 2009

Moreover, domestic consumers believe that the quality of sustainable wine is equal to or even better than conventionally produced wine, and they are prepared to pay a higher price for such wine. Specifically, 80 per cent of respondents are prepared to pay a price premium of at least 5 per cent, as they expect sustainable wines to be better than conventionally produced ones. In this specific case, sustainability is considered a proxy for better quality.

Finally, an empirical analysis carried out by Marshall et al. (2010) sought to link specific environmental performances (increased energy savings; increased recycling and introduction of environmental standards) with stakeholder pressure. Their results show that the environmental performance of wine producers in New Zealand was influenced by external stakeholders and in particular, by customers. Moreover, compared with US producers, wineries in New Zealand are much more dependent on exports than winemakers in the US and that they generally perceive a much greater pressure from their customers.

This empirical evidence reinforces the findings of Forbes et al. (2009), which indicate that more than 90 per cent of domestic consumers in New Zealand demand effective labelling to identify sustainable wines.

Figure 13 Consumer demand for labels identifying sustainably produced wines



Source: Forbes et al., 2009

2.3 Consumers as niches of societal change

As mentioned above, consumers are not just amplifying the pressure on the current socio-technical system, they are also active players in promoting grassroots innovations. System-changing innovations for sustainability transitions seem to emerge in radical innovative niches. MLP assumes that niche-level actors and networks aggregate learning from local projects, disseminating best practice and encouraging innovation diffusion. Engaged consumers can become niches and be key actors in grassroots innovations. Three cases of consumer-based niches are presented below.

2.3.1 Community energy in the UK

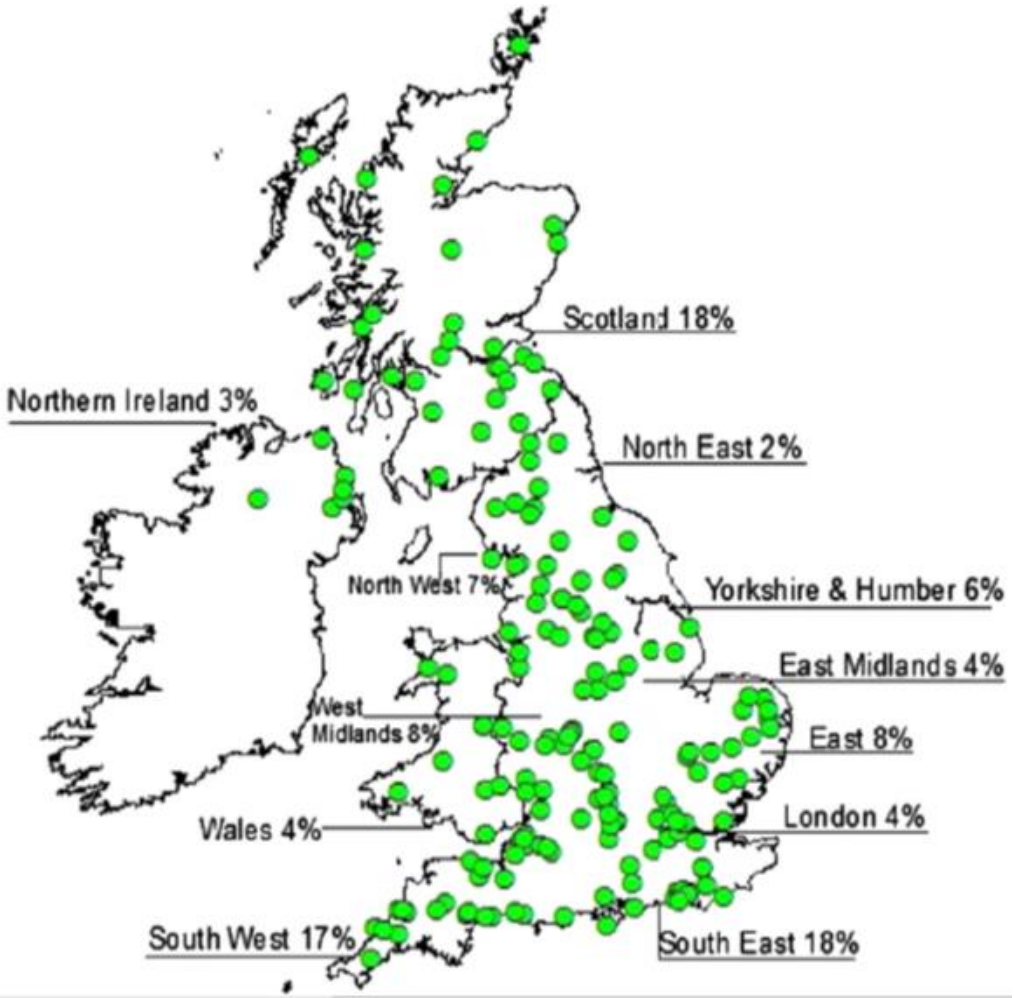
Due to the growing number of community energy projects, the UK government issued a "Community Energy Strategy Report" in 2014. These communities have been flourishing in the UK since the early 2000s. Engaged consumers seeking to create a sustainable energy system at the local level, started developing community energy projects encompassing a wide range of initiatives such as locally-owned renewable energy generation, community hall refurbishments and collective behaviour change programmes. These projects are typically launched or run by a diverse range of civil society groups, including voluntary organizations, cooperatives, informal

associations, etc., and partnerships with social enterprises, schools, businesses, faith groups, local government or utility companies.

At present, there is no single definition of community energy; the most accepted one considers community energy to refer to those projects where communities (of place or interest) exhibit a high degree of ownership and control and collectively benefit from the outcomes (both supply- and demand-side sustainable energy initiatives). The Community Energy Strategy Report identifies over 1,000 community energy projects, either in the form of renewable energy generation or in simpler demand-side initiatives, involving nearly 150,000 people.

Seyfang et al. (2013) surveyed more than 350 communities to produce a first comprehensive atlas, presented below.

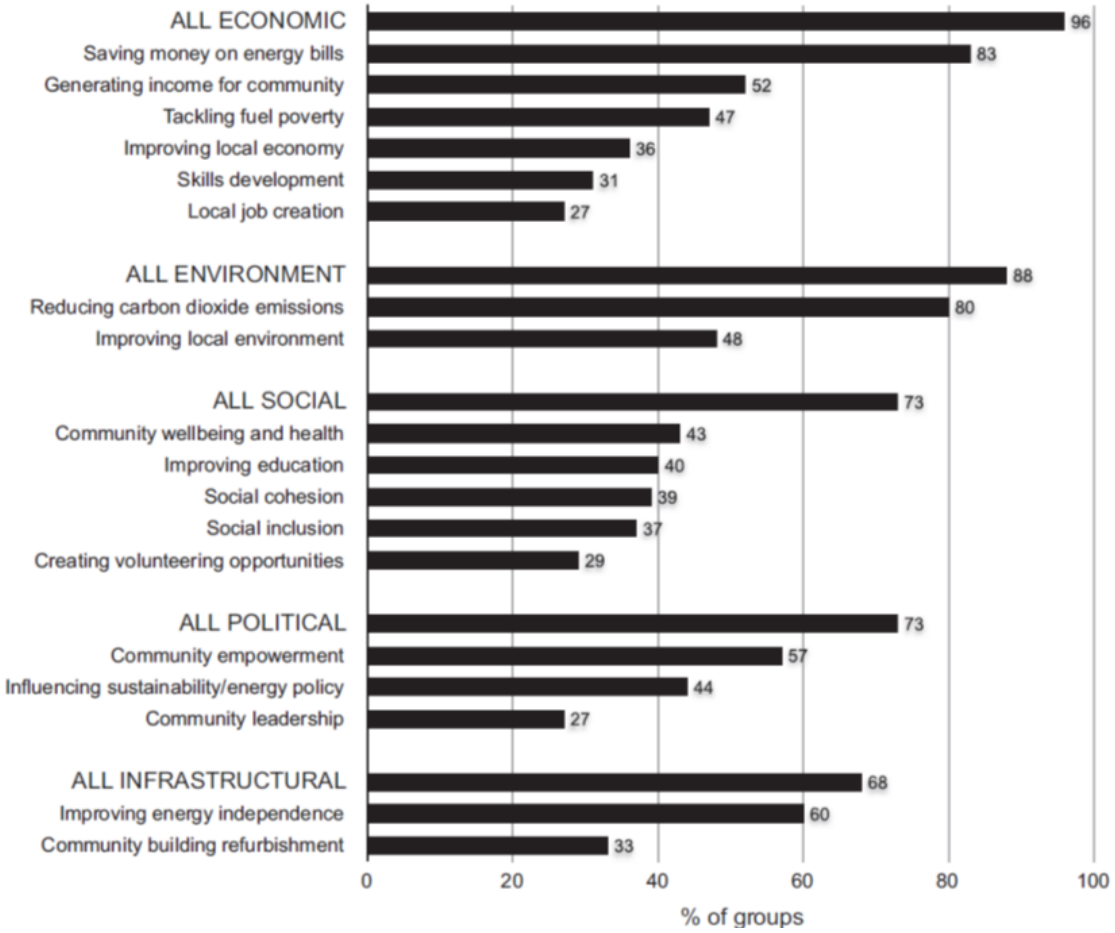
Figure 14 Map of geographical locations of UK community energy projects



Source: Seyfang et al., 2013

Seyfang et al.'s study also discovered that the origins of these groups are rooted in civil society: well over half (59 per cent) had been set up by individuals and a further third (34 per cent) by pre-existing community groups. This demonstrates that community energy groups are predominantly citizen-led and community-based from the outset. The main motivation for setting up a community energy project is saving money on energy bills. Hence, consumers gather to make investments in generation technologies as well as in energy efficient technologies in order to take control of their energy needs. At the same time, environmental, social and political considerations are almost on par with economic considerations, as shown in the figure below.

Figure 15 Objectives of UK community energy groups



Source: Seyfang et al, 2013

In the survey, community representatives were given the option to indicate all of the objectives the project aimed to achieve. It is worth noting that more than 70 per cent of the communities have both political and social motivations.

In order to be considered effective niches capable of fostering system-changing innovations, the MLP suggests that innovative niches should develop networks among themselves and develop a learning process for other niches to facilitate replication of the project. To this end, a study by Seyfang et al. (2014) argues that community energy groups can be considered niches, albeit at an emerging phase. Despite the sector's impressive growth, there is no coordination among the projects: they tend to learn from each other rather than from dedicated networking organizations, and while intermediary organizations are beginning to glean transferrable lessons from different projects, they cannot meet all of the local groups' support needs. Their study concludes that the nascent niche is neither robust nor influential; hence, it has not yet reached the necessary capacity to affect policy priorities.

2.3.2 Italian ethical purchasing groups

Engaged consumers are leading the changes in consumption patterns and people's attitudes. This niche of engaged individuals aspires to change consumption patterns by demanding and actively pushing producers to bring green and sustainable products to the market. These consumers are not just prepared to pay a price premium for these products, but often already have and are promoting a new set of values regarding consumption and consumer ethics.

One good example of the role that engaged consumers can play is are the ethical purchasing groups (EPG). EPG consists of a number of individuals who have joined forces to carry out strategies aimed at co-buying products that are environmentally and ethically sound. Individuals participating in EPGs are not just willing to get better deals and purchase sustainable products; they also have a different attitude towards consumption: ethical values matter more than any economic motivation. In Italy, EPGs (known as Gruppi di Acquisto Solidale - GAS) have emerged and consolidated (Graziano and Forno, 2012).

They were created as (generally) local networks run by citizen-consumers who share solidarity criteria in everyday purchase consumption decisions and activities. These criteria mainly relate to respect for the environment and for small-scale local producers, involving shared purchases, lower prices and solidarity principles.

In an official document, the Italian GAS movement highlighted the fundamental features of the initiative, which embed the real power participants of the groups hold: "*The act of shopping is not [...] a private act involving only the consumer, her/his taste, her/his needs, her/his wallet. It can have a strong and clear social, economic and political value. Gaining awareness of this power may allow us to influence the way firms' source, distribute and produce.*" (ReteGAS, 1999, p. 1).

Indeed, at local level, GAS have become more than just purchasing groups and have created new forms of political participation. These movements go beyond conventional forms of political consumerism by adopting innovating organizational and political participation tools.

Following an in-depth analysis, Graziano and Forno (2012) qualify GAS as (local) pressure movements, organized informally in a solidarity and trustful network, politicizing critical consumerism and exercising pressure on local decision makers, especially with respect to environmental and social justice issues. They operate as both new agents of socioeconomic and political socialization and conduits of local political participation.

Great interest has arisen around GAS, whose activities originate from individual political reactions to actual environmental and social challenges. GAS, in fact, have strong mobilization and socialization power among concerned consumers. Members become active consumer-citizens through a progressive process of effective involvement in the group.

Brunori et al. (2011) summarize GAS's strategy into distinctive principles:

- reflexive consumption, pursuing social justice, environmental sustainability and a different meaning of quality;
- solidarity within the group and with producers aimed at improving employment and working conditions;
- socialization, i.e. satisfying the need to share ideas and decisions;
- developing synergies, i.e. using social links to generate economies into food production and distribution.

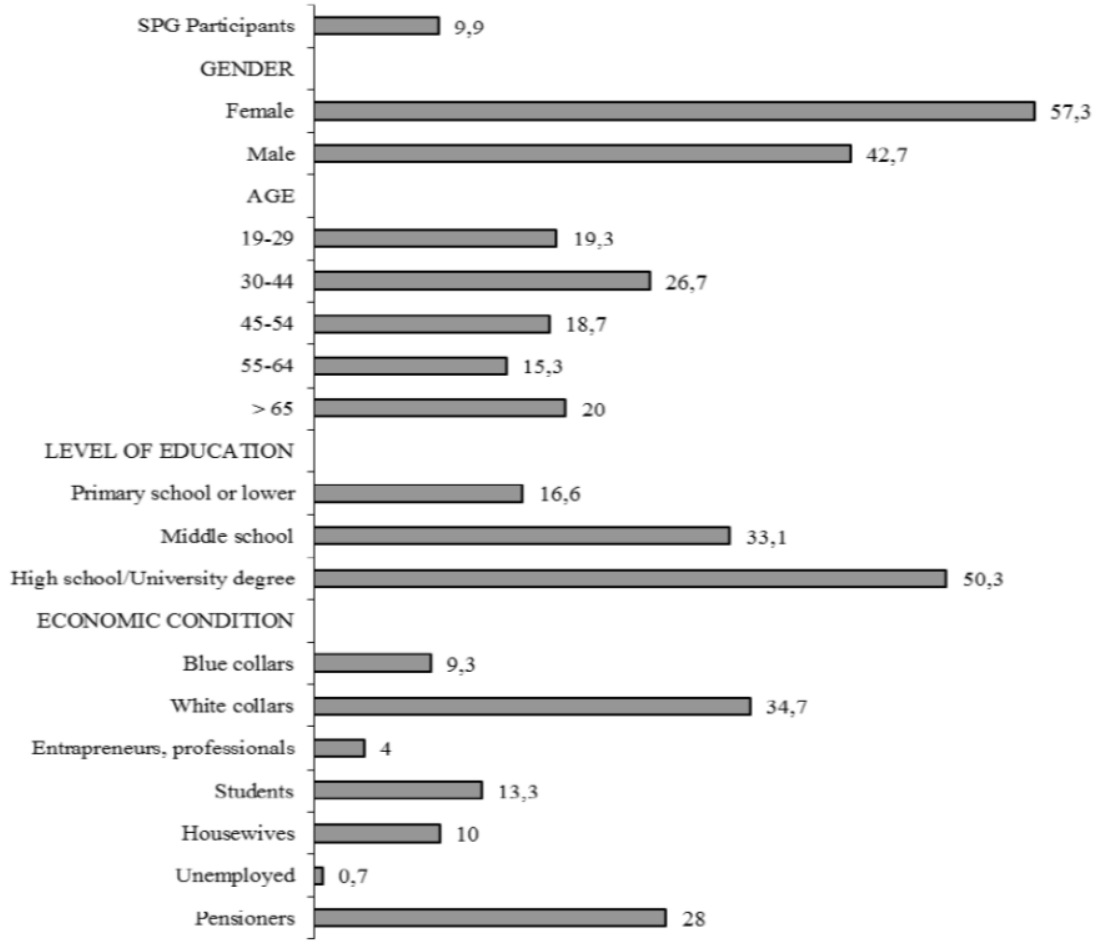
GAS normally maintain their local and informal organizational structure. Few of them have formalized their organization into a proper association and even in these cases, formal membership is not required. The main recruitment occurs through word of mouth among family, friends and neighbours. There are roughly more than 900 registered GAS in Italy today involving approximately 200,000 people – some estimate that the number of GAS could be twice as high, taking into account all non-registered ones. Rough estimates provided by the

coordination of registered GAS show that these groups spend more than EUR 100 million for all types of products, from food to clothing. These figures have grown considerably in recent decades and can be considered the lower bound, given that the majority of GAS are informal and do not provide data. Still, they are considered a niche: even with more optimistic estimates (i.e. a doubling of the estimated value of annual purchases), the weight of GAS on Italian households' final consumption of food, clothing and furniture is slightly above 0.1 per cent.

Graziano and Forno (2012) carried out a study based on a regional survey conducted in Lombardy in 2009, which has the highest diffusion of registered GAS. The results are in line with another survey carried out by GAS.P!, the largest GAS in Tuscany (Brunori et al., 2011).

Participants are generally aged between 30 and 50, with a medium-high level of education (high school or university degree) and consist of more women than men. The lower share of entrepreneurs and professionals suggests that GAS tend to attract more people with a high cultural capital rather than—or not necessarily—those with a high economic capital.

Figure 16 Socio-economic profile of SPG participants in Lombardy



Source: Graziano and Forno, 2012

Participants look for social and environmentally friendly products, meaning sustainable, local, seasonal and organic (in the case of food). They reject price as the best indicator for quality (high prices) or convenience (low prices). Instead, they have developed the concept of "fair price", that is, a price that enables the creation of trust and social bonds among small-scale producers and consumers. On the one hand, a fair price allows small-scale producers to survive and continue to produce goods that are environmentally and socially sustainable; on the other hand, a fair price means that consumers pay the lowest possible price which allows small-scale producers to provide sustainable products.

Well-functioning GAS create the context in which citizens join to satisfy their consumer-related needs in an ethical way. In marketing theory, consumers' needs are labelled as functional, hedonic, aesthetic, symbolic, ethical, social and linking. Ultimately, GAS members aim at modifying not just the way consumers satisfy these needs, but also the relative weight of each need within consumers' utility functions. For instance, Brunori et al. (2011) have qualitatively compared the relative importance of each consumer-related need for both GAS members and conventional consumers. The comparison is presented in Table 2.

Table 2 contrasts conventional consumers and GAS members. Freedom of choice and variety are less important for GAS consumers as they tend to associate these characteristics with negative environmental effects (in the food industry, for instance, variety often means having the possibility to purchase non-seasonal products).

GAS members purchase not only food and clothing, they have expanded their shared purchasing experiences to include furniture and other durable goods. As their shared purchasing experience increases, they generate positive externalities and spillover effects: members overtake the so-called transaction costs related to the selection of "real" sustainable products and provide real-life examples of how consumers can change their lifestyle while keeping or even increasing their welfare. As consumption dilemmas are resolved, the intention-action gap narrows and members feel more confident in actively demanding sustainable products and production processes.

Table 2 Changes in the socio-technical system of citizen-consumers

	Conventional	Box scheme of a GAS
Functional		
Convenience (time, skills, certainty of results)	High	Low
Health (content of nutrients)	Low	High
Freedom of choice	High	Low
Education	Low	High
Hedonic		
Variety	High (off-season and high distance products)	Low (reduced choice to seasonal products)
	Low (biodiversity)	High (formerly unknown products, local varieties)
Taste	Low (no freshness, no seasonality)	High (fresh, seasonal)
	High (artificial vs natural flavour)	
Aesthetic	High	Low (according to conventional criteria)
Symbolic	Food as social distinction	High in the appropriate social context
	Food as identity service	
Ethical	Low	High
Linkages	Low	High - participating in solidarity purchasing groups as a way to feel as part of a community

Source: Brunori et al., 2011

2.3.3 Community-supported agriculture in China

Consumers in China and other emerging Asian countries are increasingly facing environment-related challenges (Ely and Scoones, 2009; Altenburg et al., 2008; Lema and Lema, 2012; Schmitz, 2013). Similarly to what has ensued in developed economies and in line with MLP assumptions, niches of engaged consumers are emerging. These niches are fostering grassroots innovation aimed at challenging current food consumption practices (Ely et al., 2016). The most notable niches are civil society-based movements, which can be compared to the case of the aforementioned Italian GAS.

Since the mid-2000s, Chinese authorities have promoted an extremely positive vision of genetically modified crops. This has mainly occurred through state-run media – typically, a good indicator of the prevailing political line of thought. Some studies (Du and Rachul, 2012; Liu and Cong, 2014) report the substantial absence of negative articles on transgenic organisms in Chinese newspaper, which instead publish a considerable number of enthusiastic commentaries regarding the environmental benefits of GM crops.

The Chinese Ministry of Science and Technology (MOST) strongly supported the development of biotechnologies and technological advancements in transgenic food science, even designating it as a relevant part of China's Medium-Long Term Plan for Science and Technology (2006-2020). This strategy was drafted to align R&D investments and incentives in strategic emerging industries (such as the food industry) with government-sponsored efforts to address environmental imperatives.

However, a first public debate arose in 2014, when China's Ministry of Agriculture (MOA), in charge of the administration of trials, commercialization and import of GM crops, neither commercialized nor renewed the biosafety certificates for phytase maize. Although the certificates were granted a few months later, this episode stimulated a lively public debate.

Environmental NGOs, parts of China's scientific community and a few industry insiders started questioning the validity of the certificates and demanded more information. This debate gained wider attention from the general public, shifting the perception on GM maize: scepticism arose and some engaged consumers began demanding local and organic maize. Specifically, consumers began requesting farmers and retailers to provide more information and traceability of crops and GM sources in general, feeling that there was a growing lack of transparency in the regulatory process and in decisions on biotechnological practices. The increasing distrust and corresponding increase in demand for non-GM food started spreading among Chinese

consumers. A number of international surveys confirmed the uncertainty the population across China felt.

This shift in consumer attitude affected both the private sector, which started taking the public's perception more seriously—along with technical, economic and regulatory requisites and conditions—as well as the government. Alongside its support policies for GM food, the MOA introduced specific policies for the promotion of organic food as well, in order to meet the increasing demand. Urban consumers and organic food farmers have in the meantime developed informal mechanisms to facilitate market access to organic food in many Chinese cities. Niche actors are emerging, with a growing number of engaged consumers who are changing their approach and attitudes towards food consumption while addressing a set of issues they all deem relevant for the future of food (Spaargaren et al., 2012). Consumer practices and agency, along with a changing political landscape, are prepared to reshape the food industry's traditional top-down system (Ely et al., 2016).

Among these niches are the New Rural Reconstruction Movement (NRRM), which emerged as a political force in the early 2000s to popularize alternative ideas of rural development; the Farmers Seed Network, an alliance of researchers and agriculture-focused NGOs that encouraged genetic diversity in maize crops, stimulating the promotion of organic food; and the "Community Supported Agriculture" (CSA). CSA, in particular, seems to reproduce the Italian experience of GAS, promoting direct sales of organic food to urban citizens, evoking shared concerns about food safety, and progressively expanding environmentally-friendly attitudes. CSA addresses the aforementioned crisis of trust among consumers and has paved the way for applying pressure on traditional framings through new types of bottom-up initiatives.

2.4 Consumers and regime shift: some remarks

Some preliminary conclusions can be drawn. First, consumers are perceiving the landscape pressure: their environmental concerns are being confirmed, irrespective of where they live; their demand for sustainable and healthy products is increasing, particularly in developing countries. This specific point shows that sustainable consumption is not an attitude of wealthy consumers, but rather an urgent need throughout different societies.

Secondly, consumers feel that the current regime is not effective in promoting sustainable practices: on the one hand, they are prepared to purchase sustainable products; on the other, they are not fully satisfied with the information they receive. Moreover, there is no clear consensus on who should pay for increased product sustainability.

Thirdly, landscape pressure is effective in turning consumers into drivers of socio-technical change. Consumers can indeed amplify the existing pressure on producers.

Finally, there are encouraging experiences regarding active consumer groups who are creating innovative niches. These niches generate grassroots innovations that not only aim to modify consumption patterns, but also consumers' tastes and values.

One of the key elements of consumer engagement is for them to become more involved in production processes, either because they demand more information and more transparency, because they become directly involved or because they create ties with producers.

Ultimately, it seems that the systemic transition implies the development of an integrated production-consumption system, as is discussed in the next section.

3 Making all consumption sustainable: policies and practices to bridge consumers and producers

Landscape pressure, consumer awareness and active niches are challenging the current regime. They are not alone, since other stakeholders are experimenting and designing possible solutions for innovative production-consumption systems.

For instance, sustainability is a top priority for many producers globally. Besides environmental regulations, producers consider sustainable production as a way to increase resource efficiency and to reduce waste. Moreover, sustainable production can lead to technological and market leadership. On the other hand, policymakers are introducing laws and regulations aimed at promoting sustainable practices as well as helping consumers choose sustainable products.

All of the actions carried out by consumers, producers and policymakers are initial steps towards a more radical transformation of the production-consumption system, ultimately leading towards a circular economy paradigm, which represents a fundamental transition towards a fully sustainable production-consumption system.

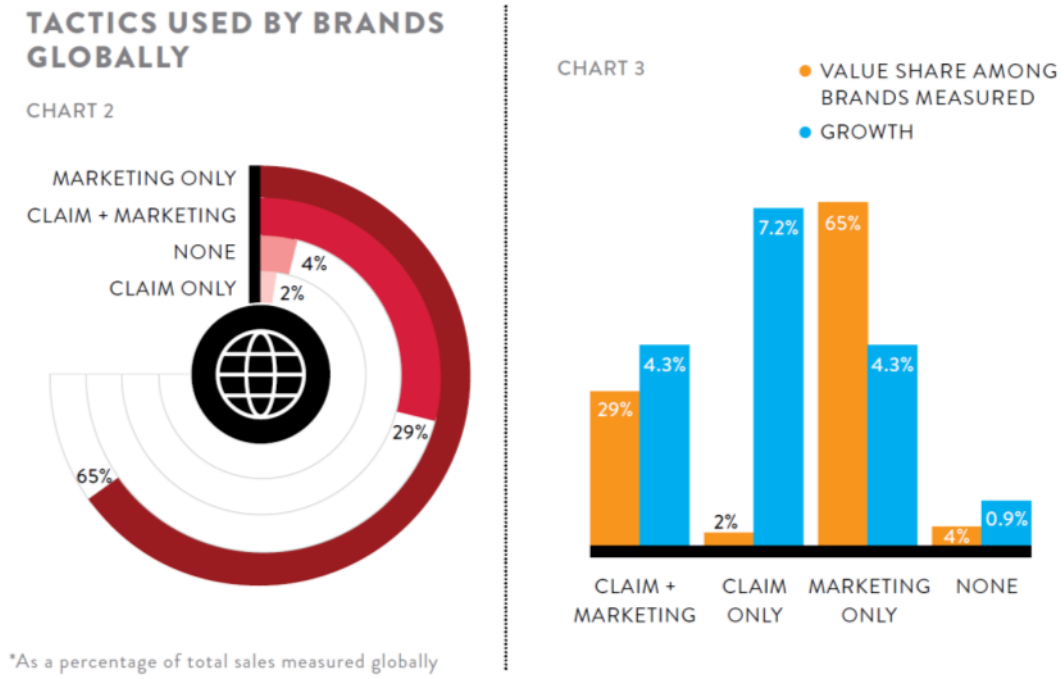
In the next section, we first analyse how marketing practices and policy measures are already bridging consumers and producers; we then discuss how the circular economy will change consumption patterns.

3.1 Promoting sustainable products: labels and marketing

In order to profit from sustainability, producers have to promote their sustainable production processes and their sustainable products. A subset of producers is targeting engaged consumers and considers green products and processes as a way to distinguish themselves from competitors. As discussed before, most companies today, even though they do not specifically target engaged consumers, are increasingly investing and expanding their corporate social responsibility strategies to avoid problems and reputational damage. Hence, managers are increasingly focusing their strategies towards stakeholders at large and not just shareholders.

There are different ways to communicate sustainability to consumers. Not all brands offer products that have specific sustainable claims or labels. The abovementioned Nielsen Company report shows that social and environmental impact marketing initiatives are the predominant strategy being used to reach consumers. Specific claims or labels on products are only used by 29 per cent of the companies that were surveyed. In 2014, 65 per cent of total sales measured globally were of brands that used a marketing-only tactic.

Figure 17 Marketing of sustainability initiatives



Source: The Nielsen Company, 2015

While the figure above illustrates that a claim-only tactic correlates with the highest growth in sales (7.2 per cent), brands using this tactic account for only 2 per cent of global sales. This makes a claim-only approach relatively uncommon across all regions and categories. It is more likely to be used by smaller brands that have fewer resources to mount marketing campaigns. Overall, traditional marketing is a driver of sales growth for brands that communicate sustainability. On-pack communication is helpful, but requires marketing to reinforce the messaging and ensure that the message reaches the relevant consumers. However, the Nielsen Company report shows that labels are important to millennials. In 2014, 51 per cent of millennials reported checking the product packaging for sustainability claims before making a purchase[5]. Yet only 31 per cent of total sales measured were from brands that provide such information (either alone or supplemented with marketing). This indicates an opportunity to increase brand recognition among this key demographic at the point of purchase.

3.1.1 The EU Ecolabel case

As discussed above, eco-labels are an emerging tool aimed at guiding consumers in their purchasing choices. Today, more than 450 eco-labels are available worldwide across nearly 200 countries and covering about 25 industries. Specific international standards defining how environmental labels should be designed exist[6].

Environmental labels are defined as policies and initiatives that aim to provide information to external users about one or more aspects of the product or service's environmental performance. They have been used for over 40 years, but the last 15 years have witnessed a proliferation of labels of varying scope, size, nature and effectiveness, along with a tremendous increase in advertisements containing environmental claims, as companies have become more eager to appeal to the growing number of environmentally conscious consumers (Gruère, 2015, Testa et al., 2015). Today's market is characterized by the co-existence of a huge variety of ecolabels, claims, declarations and other modes of transmitting information about the environmental characteristics of products.

[5] Doing Well By Doing Good Sustainability Report 2014, The Nielsen Company.

[6] The series of ISO 14020 standards defines three types of environmental labels. Type I (ISO 14024) is the standard for ecolabels, defined as multi-criteria, whole life cycle approach-based, third-party voluntary labelling schemes that distinguish some of the best-performing products according to predetermined environmental criteria and apply to diverse product categories. Type II labels (ISO 14021) are self-declared claims, privately made, that describe a product based on one or more characteristics following general guiding principles. Specifically, they have to be verifiable and provide accurate and non-misleading information. Type III (ISO 14025) focuses on environmental declarations, providing quantitative indicators of environmental performance based on life cycle assessments. These declarations are generally intended for business-to-business communication but can be used by consumers, provided they are third-party audited.

Taking into consideration the European level, in particular, the most important is the EU Ecolabel. The EU Ecolabel Regulation (No. 66/2010) lays down the rules for the establishment and application of the voluntary Ecolabel scheme. It can be applied to goods and services supplied for distribution, consumption or use on the EU market. The EU Ecolabel directive stipulates criteria that are determined on a scientific basis and consider the entire life cycle of products.

The EU Ecolabel scheme in general and the criteria for different products and services specifically, align closely with the challenges and priorities for sustainable growth in Europe. It supplements numerous policy instruments to help achieve SCP outcomes, including the Ecodesign Directive, the Energy Labelling Directive, EMAS and Green Public Procurement.

Among the most relevant characteristics, Ecolabel includes the following:

- Criteria for specific product groups are aimed at identifying the best environmentally performing products on the market, typically the top 10 per cent to 20 per cent;
- Criteria currently exist for 36 product groups and services.

These factors imply that the EU Ecolabel scheme by design is aimed at a relatively small share of the overall market for products and services.

EU Ecolabel is now widely diffused; hence, it could provide a proxy for products with high environmental performance that help encourage the development of new and more sustainable products. The last EU Ecolabel Working Plan (2015) highlighted the ultimate relevance of available data on the EU Ecolabel. Despite some limitations[7], certain general trends can be observed based on the information from the EU Ecolabel website, together with information from the EU Ecolabel Helpdesk for 2013 and 2014.

[7] Comparable data prior to 2013 are not available due to differences in the counting methodologies used by the competent bodies and the lack of license holder registrations on ECAT.

Table 3 **EU Ecolabel performance against key parameters**

Year	Number of Companies	Number of Licences	Number of Products	Number of people who have seen/heard of or bought Ecolabel products
2001	83	95		
2002		128		
2003		166		
2004		224		
2005	250	279		
2006		386		11%
2007		514		
2008		754		
2009		1 015		37%
2010		1 064		
2011	887	1 357	18 935	
2012	>1 000	1 671	17 176	
2013		2 086	37 215	
2014		1 910	43 157	

Source: Evans et al., 2015

Table 4 License and product numbers by product group for 2014 (up to September)

Product Group	2014 Licences	2014 Products
Soaps and shampoos	79	1 010
All-purpose cleaners	248	2 424
Bed mattresses	3	83
Campsites	128	129
Copy and graphic paper	47	3 672
Detergents for dishwasher	26	152
Footwear	10	195
Growing media	11	70
Hand dishwashing detergents	112	499
Hard coverings	18	14 435
Heat pumps	4	496
Indoor paints and varnishes	165	6 810
I&I automatic dishwasher detergents	16	86
I&I laundry detergents	5	61
Laundry detergents	35	243
Light sources	0	0
Lubricants	63	282
Newsprint	15	42
Outdoor paints	37	548
Portable computers	0	0
Printed paper	62	259
Sanitary tapware	1	8
Soil improvers	11	61
Televisions	9	2 589
Textiles	72	2 919
Tissue paper	126	5 409
Tourist accommodation	604	638
Wooden floor coverings	1	1
Wooden furniture	2	39
Total	**1 910**	**43 160**

One parameter not included in the above data is market penetration. At present, market shares and turnover are not monitored by official statistics. Hence, it is not possible to understand the full potential of the EU Ecolabel. However, a positive trend in the uptake of the EU Ecolabel has been recorded. Moreover, recent guidelines on the counting and reporting of license and product numbers should ensure that, in the near future, comparable data will be collected.

3.2 The next step: the circular economy and the new role of consumers

Ideally, the circular economy paradigm represents the new socio-technical regime that will replace the current take-make-waste linear industrial system. On the one hand, a circular economy consists of minimizing resources, materials, waste and scraps; on the other, it aims to maximize reuse, recovery and recycling opportunities. The circular economy will be "regenerative by design" and "restorative by intention", meaning, respectively, that biological materials will be designed to reenter the biosphere, while technical materials will be designed to circulate with minimal loss of quality.

Hence, the circular economy is a new socio-technical regime spreading across industries, value chains and countries, which should create a closed-loop system, resulting in a net positive and restorative impact measurable at the scale of an economy, and creating shared value with environmental, economic and social benefits. This paradigm, therefore, involves a fundamental rethinking of products, materials and systems of commerce. It requires participation, collaboration and shared understanding throughout the value chain.

Early roots of the "circular economy" concept can be identified in the theorization of "cradle2cradle" approach[8] of the late seventies. This also called "closed-loop" concept pursued four main objectives: product-life extension, long-life goods, reconditioning activities and waste prevention. It represents a forerunner since it insists on the importance of selling services rather than products, today referred to as "performance economy" as well as "product service systems" (see below, Chapter 3.2.1). Initial models of the circular economy as a new concept can be found in different schools of thought, launched by ecological economist Kenneth Boulding's framework (1966), according to which Earth is a closed economic system. In this system, a circular connection characterizes the relationship between the environment and the economy, and no exchange of matters occurs outside this relationship, since everything is input into everything else. Later, environmental economists Pearce and Turner (1989), based on

[8] See: "The Potential for Substituting Manpower for Energy", research contract no 76/l3-V/343/78-EN, Programme of Research and Actions on the Development of the Labour Market, DGV, Commission of the European Communities, Brussels. By W.R. Stahel and G. Reday, Battelle Geneva. 1977. Final Report 30 July 1977, study n° 76/13. 113p

Boulding's theory, framed an extended model of an economy-environment relationship, embedding the thermodynamics law (Ghisellini et al., 2015), referred to as the natural environment's assimilative waste capacity, disposal of non-recyclable resources and non-renewable or exhaustible resources (Heshmati, 2015).

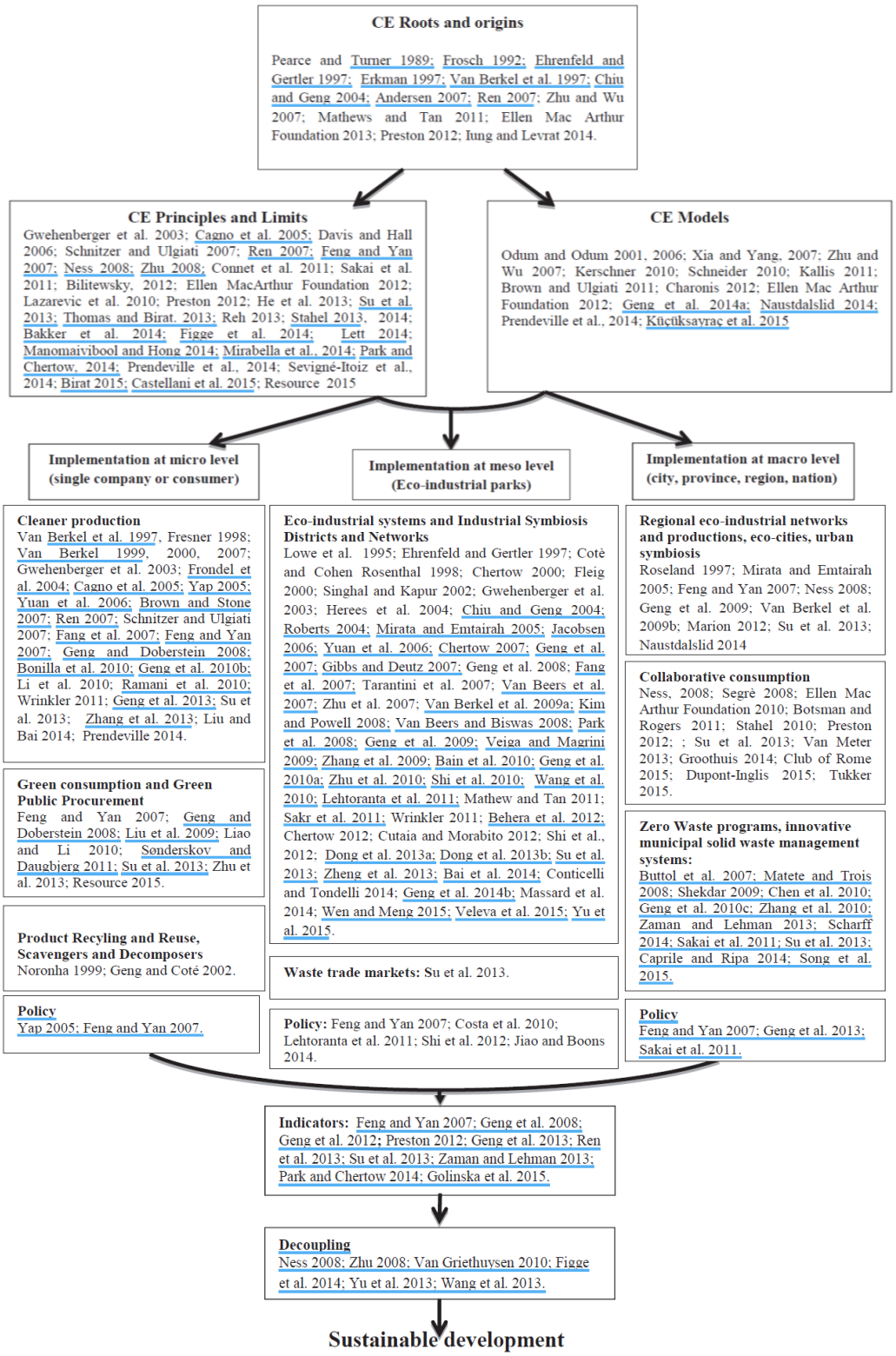
As pointed out in Figure 18, a number of approaches, models and methodologies related to classifiable specific subjects and categories have converged into the circular economy model as is the case in the present research.

In the early 2000s, governments and public institutions started adopting legislation and action plans to promote the circular economy. For instance, the European Commission passed its first Circular Economy Package with the 2014 Communication COM (398) "Towards a circular economy: A zero waste programme for Europe", and lately the new Circular Economy Package "Closing the loop - An EU action plan for the Circular Economy" (2015)[9].

In 2002, Japan introduced its Basic Law for Establishing a Recycling-Based Society, becoming the first Asian country to actively foster circular economy models. China adopted its Circular Economy Promotion Law 2009; however, the word "circular" in the title is essentially synonymous with "sustainable" (World Bank, 2017). Indeed, this seems to slightly deviate from actual practices and enforcement (Ghisellini et al., 2015). Still, it is worth mentioning that the Chinese government is the only government in the world to have introduced quantitative indicators aimed at measuring and addressing circular economy at both the macro-level and industrial park level (Geng et al., 2012).

[9] This action plan consists of a Communication COM(2015) 614; 4 Proposal for Directives amending: Directive 2008/98/EC – waste, Directive 1994/62/EC - packaging and packaging waste, Directive 1999/31/EC - landfill of waste, Directive 2000/53/EC - end-of-life vehicles; Directive 2006/66/EC - batteries and accumulators and waste batteries and accumulators; Directive 2012/19/EU - waste electrical and electronic equipment.

Figure 18 **Classification of reviewed studies according to the different subjects and categories converging into the circular economy**



Source: Ghisellini et al., 2015

From a product perspective, the circular economy paradigm aims to develop goods that are easier to repair, recycle, disassemble and remanufacture, effectively feeding the circularity of processes and extending materials or products' life and value (McKenzie-Mohr, 2011).

Consequently, consumers will change the way they consume. This does not only have to do with material use, but with attitudes and values as well. As it emerges from ongoing experiences, the circular economy paradigm entails a closer relationship among consumers and producers and a higher degree of knowledge of specific products. Through different modalities and applications of circular economy principles, consumers become active counterparts of producers in the co-creation of re-defined new production-consumption systems.

The circular economy model comprises the active role of consumers. Thus, it represents the final achievement of the integrated and sustainable production-consumption system, involving the entire value chain and fostering value construction that is shared among producers and consumers. Moreover, it entails a switch towards a more "service-based" type of consumption.

3.2.1 Product services system (PSS)

Within a PSS, consumers do not own a manufactured good, but use it under specific agreements without owning it. Products' performances lie at the core of the agreement. In practice, companies offer a physical good that can provide consumers with the service they need within a predefined level of performance. Hence, PPS is an integrated bundle of tangible products and intangible services that aims to meet customer needs, create customer utility and generate shared value (Tukker, 2015; Boehm and Thomas, 2013).

Literature shows an increasing number of experiments and case studies, although PSS still account for marginal market shares due to a series of barriers (Tukker, 2015; Reim et al., 2015). For producers, the main barriers to PSS diffusion are higher responsibilities and higher risks. For instance, products can be returned earlier and less care towards products might be taken by their users, decreasing value both for the company and for the next user. For consumers, instead, PSS can be perceived as having lower value in terms of convenience and comfort; moreover, consumers give an intrinsic value to ownership, and the mere fact that they do not own an object generates a psychological trade-off. On the one hand, the consumer is relieved from the burden of ownership; on the other, he or she is deprived of the intrinsic pleasure of owning an object.

Finally, in terms of environmental impacts—at least theoretically—PSS is consistent with the circular economy model. In terms of how the product is designed and produced, PSS should imply better product management throughout its life cycle: by retaining ownership, producers

have incentives to improve design, durability and the reuse of materials; moreover, as they have more information on actual product use, they can optimize future production according to the actual consumers' needs. On the other hand, in terms of quantity of goods produced, as consumers do not buy a physical good but rather a desired function or performance that satisfies a specific related need (e.g. transportation service bought instead of a new private means of transport), PSS should result in an overall reduction of goods produced and a higher utilization rate of those that are produced.

In practice, PSS can take different forms and can be categorized into three business models (Tukker, 2015; Reim et al, 2015):

- Product-oriented (PO) model. Selling a product remains the fundamental aspect of the model; however, producers provide a bundle of services to improve customer experience. Practical examples refer to products sold along with a take-back agreement (household appliances, printers …).

- Use-oriented (UO) model. In this case, consumers use products by renting or leasing them. Hence, property remains in the producer's hands and it has the responsibility of guaranteeing agreed levels of performance. Typical contractual agreements within the UO model are (Lacy and Rutqvist, 2015):

    - Pay for use: consumer buy output rather than the product and pay based on use metrics such as miles driven, hours used, pages printed or data transferred.

    - Leasing: customers buy contractual rights to use a product over a longer period, typically with rights to exclusive and individual access.

    - Rental: customers buy contractual rights to use a product for a short period, typically less than 30 days. A rental setup is generally more flexible than a lease agreement and customers might not have guaranteed unlimited access.

- Result-oriented (RO) model. This category envisages a performance agreement upon which customers buy a pre-defined service and quality level. The producer commits to guaranteeing a specific result or outcome rather than a specific product or service – no specific product is necessarily involved, since the customer pays exclusively for the agreed upon result, for which the provider is fully responsible.

In terms of environmental performance, a recent review of the literature on PSS (Tukker, 2015) shows that the results are controversial. In particular, product-oriented PSS do not seem to provide a radical boost in terms of resource efficiency or a circular economy; this is because companies keep sales maximization as their target. On the other hand, the potential for use-oriented and result-oriented PSS is higher; in particular, result-oriented PSS offers the greatest prospect of radical resource efficiency.

Next, we discuss a business case on PSS.

3.2.2 Michelin solutions

Michelin solutions (www.michelin-solutions.com) represents one of the first PSS business cases, since the company allows its customers to lease tires instead of buying them, achieving a win-win solution. On the one hand, consumers effectively pay per miles driven and are relieved from all maintenance duties. Michelin, on the other hand, increases customer loyalty while obtaining more information and data, which in turn become useful for better product development. Moreover, the company is responsible for the end-of-life and it is easier for them to recycle and re-use exhausted tires.

Within the leasing service, the company offers tire upgrades, maintenance and replacement, aimed at optimizing the tires' performance, following a tracking made possible by retaining ownership. At tire end-of-service, Michelin collects "discarded" tires. It retreads them to extend their technical utility and exploit lasting value. According to the company, the retreading practice requires half of the raw materials needed for new tires, but still delivering up to 90 per cent performance. Michelin claims that about 44 per cent of all replacement tires are retreaded and that these tires have a 7 per cent to 9 per cent higher rolling resistance than new equivalents. According to Gutowski et al. (2011), there are 68 per cent energy savings, considering materials production and manufacturing phases of the life cycle only, whereas no relevant environmental benefits are observed in the use phase due to several exogenous factors related, among others, to consumer utilization of the tire. To tackle this, Michelin examines every fleet for abrasion and driving behaviour and identifies potential improvements. It introduced this scheme fifteen years ago, which has allowed the company to build a sophisticated risk management scheme and create a remarkable statistical database.

4 Conclusions: policy and social implications

Climate change calls for immediate action to drive out our current production-consumption system based on a take-make-waste linear industrial approach towards a new socio-technical regime based on circularity and a positive impact on the environment. This landscape pressure is paving the way for all types of technical and social innovations, and innovative niches are blossoming and spreading in many countries and in many sectors. Within these niches of societal change, we have seen that consumers are playing an important role in promoting sustainable consumption and a completely new approach towards the environment. Environmental awareness is not limited to engaged consumers: all surveys that we have discussed show that the majority of people are concerned about environmental degradation and declare preparedness to contribute to a greener systemic transition.

At the same time, we have seen that the majority of consumers continue to be sceptical about environmental claims on products, and that engaged consumers and their sustainable consumption trajectories weigh too little on the global economy. Hence, policymakers and international institutions have to step in and translate these aspirations into policies and, more generally, into action.

We urgently need more information. Sustainable consumption and system transition require enhanced monitoring and specific statistics: national and international institutions must work together on this issue. At present, there is no comprehensive statistical monitoring of sustainable products and, therefore, it is difficult to understand market dynamics and actual consumption patterns. At this point, case studies are insufficient to provide any policy insights.

In terms of policies, there is a need to shift the focus from merely technological innovation to socio-technical transition. Sustainable production and consumption have to be supported by a more holistic approach, particularly, coupling technical changes with cultural changes, so that it becomes socially and psychologically easier for people to adopt new technologies and to modify their consumption habits.

Finally, national and international institutions should prioritize consumers in developing countries. Their environmental concerns and their demand for sustainable and (healthy) products is real and is even more urgent than that coming from consumers who live in developed economies. Moreover, people living in developing countries feel particularly exposed to environmental degradation and feel less empowered and discouraged. Hence, it would be a mistake to consider the demand for sustainable products and a sustainable lifestyle similarly to that for luxury goods coming from wealthy consumers. In developing countries, where

sustainability is intertwoven with health and safety issues, lies the future success of our societal transition towards an innovative and sustainable new socio-technical regime.

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