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## Environmental Factors in Business Engagement in Innovation for Sustainability

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### Introduction

From the publication of the ‘Our Common Future’ by the Commission headed by Gro Harlem Brundtland (WCED 1987), to the operationalisation of the Sustainable Development Goals—SDGs, onwards—(United Nations, G. A. 2015), the quest for social, environmental and economic sustainability has been on the global agenda. Leading businesses worldwide have directed their efforts towards the development of new products, processes and business models that minimise harm to the environment, improve social welfare and sustain economic growth while creating value for the firm. Innovation has proven to be one of the most effective strategies of businesses to contribute to such sustainability goals (European Commission 2012; OECD 2010); nevertheless, introducing environmental and social

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goals in the innovation process brings in added complexity (Hansen et al. 2009) that must be overcome at different levels of the firm: organisational, strategic, operational, technological, societal. In addition, external factors sway businesses' innovation for sustainability (IfS) efforts in a certain direction (Maletič et al. 2018). These external factors are created by the social, environmental and economic trends occurring in the corporate field, such as changes in legislation or consumer preferences, as well as more disruptive events that cause a major impact on the whole system, such as a technological breakthrough or an environmental disaster.

This chapter looks at IfS and how environmental factors affect businesses in their development, showing that change is driven not only from within, but also from the outside. Because of this, companies embarking in the IfS journey must keep an inward- and outward-looking attitude (Dangelico et al. 2013), learning to manage and adapt to a changing environment in order to thrive. Therefore, we will examine the different degrees to which environmental factors influence the IfS journey, and how companies adapt and themselves contribute to systems change through their engagement in IfS.

## Background

*Innovation for sustainability*, that is, *innovation that aims to create not only economic but also environmental and social value* (Adams et al. 2016) has become a cornerstone of the business sustainable development strategy (Jay and Gerand 2015). Decoupling environmental degradation and social erosion from economic growth is now a major goal in the global agenda (UNEP 2011), and, as major actors of innovation, businesses have shown great ability to perform as levers in the transformation towards sustainability (Inigo and Albareda 2016). IfS is not solely concerned with the consecution of social and environmental goals: the importance of innovation driven by sustainability to improve competitiveness has been noted by scholars and businesses (Nidumolu et al. 2009; Pfitzer et al. 2013).

The concern about the role of businesses in sustainability and how they could act as agents of change through innovation came hand in hand with the rise of ecological economics as a discipline, and the publication of the report *Limits to Growth* by the Club of Rome (Meadows et al. 1972). This report drew on the systems thinking methodology (Forrester 1968) and previous economic research (e.g. Boulding 1966) to point at the environmental thresholds and material balance rules of the environment that the economic system was breaking in the name of growth. These models show how the economic system and its main actors, businesses, are embedded in a social system which is, in turn, embedded in the natural system.

These developments attracted the attention of management scholars, who saw innovation as a manner to improve the impact of business on the social and environmental systems without compromising economic development (Adams et al. 2016; Hansen et al. 2009). Initially, eco-innovation was the major point of interest, concentrating on how to develop products and processes that reduced environmental impacts (Fussler and James 1996). In fact, the first steps carried out by businesses in this regard were indeed so-called end-of-pipe solutions, which reduced harm to the environment without changing strategy substantially. Social innovation or those '*innovative activities and services that are motivated by the goal of meeting a social need*' also gained attention (Mulgan et al. 2007: 8), however very often in non-competitive contexts. However, IfS goes beyond environmental and social innovation by integrating economic, social and ecological concerns (Schiederig et al. 2012). It also becomes aligned with business strategy, as a tool to enhance economic, social and environmental performance of the firm (Bos-Brouwers 2010; Jay and Gerand 2015).

These strategies come as a response of companies to environmental factors to which the need to adapt. These changes may come from the demand from consumers for sustainable products, citizen response to environmental disasters or from the diminishing stock of certain raw materials to name a few. For example, the first movements in IfS were mostly concerned with products and processes, with a strong focus on

material and energy efficiency and the reduction of harmful emissions. This came as a response to environmental disasters at rather local levels, such as oil spills or the emission of pollutants in rivers.

However, environmental factors evolve, showing a wider interconnection between business, society and the environment than the immediate response to market demands of public turmoil over a particular issue. Both practitioners and scholars came to the realisation that, on top of management practices that included such goals, for them to be effective, a connection with its wider system was needed. This was prompted by the emergence of global social and environmental problems, such as modern slavery or climate change. The need to find a new role for business in society has resulted in a wider trend on business model innovations for sustainability (Bocken et al. 2014; Lüdeke-Freund et al. 2016; Stubbs and Cocklin 2008). The aim is to connect the different aspects of sustainable value creation and capture, beyond technology development. Moreover, IfS has started to be directed towards the realisation of global objectives, such as the SDGs, or towards the engrailment of business innovation in a wider sustainability-oriented system, such as the circular economy (Geissdoerfer et al. 2017).

In this regard, the example set by Philips' journey of IfS is illustrative (Seebode et al. 2012). At the beginning, the company was mostly concerned with increasing the efficiency of their light bulbs, so that the consumption of energy would be lowered. This responded to customer demands for more efficient products. Then, the company was concerned with materials use and started to work on increasing the durability of light bulbs, so that less materials were used for the same period of lighting, due to the pressing concerns over the obsolesce of light bulbs. However, reduced energy consumption and the need to buy less bulbs over time lead to an unexpected consequence: more lighting is used, including new uses for lighting as ornament, for example (Franceschini et al. 2018). In addition, despite the increased durability of their products, there was no control of recyclable or reusable materials after use. Therefore, Philips designed a new strategy, framed under circular economy principles: selling light as a service instead of light bulbs (Philips 2018; Seebode et al. 2012). In this way, the company can ensure the

optimal efficiency of lights at location, while being able to take control of materials and work with the repair, reuse and recycle principles of the circular economy. Not only is this system beneficial from a sustainability perspective, it also avoids upfront costs for the consumer—which can be large for office space and public buildings—and ensures a steady cash flow for the company. The IfS engagement journey of Philips shows how it was not derived from internal decisions only—the external environment guided the transition as well. The following sections will look at how environmental factors and how companies manage them affect the successful engagement in IfS.

Efforts to improve the sustainability of the economic system, linked to the literature and practice in industrial ecology that had been flourishing in the previous decades (Murray et al. 2017), have led researchers and practitioners alike towards the theory of socio-technical systems transitions for sustainability, which approaches IfS from a systemic perspective, as a lever for wider change. Socio-technical transitions theory for sustainability examines how innovations developed at a niche level gradually change the pre-existing cultural, market, policy, technological and industrial regime, while, in turn, the development of such innovations is affected by such regime dynamics, as well as landscape conditions (Geels and Schot 2007). For businesses, the effect of this perspective is twofold: first, when they are part of the regime for a particular innovation, they will be pushed into a certain direction; but second, they are also able to shape the environment in which they operate by developing and diffusing innovations. The focus of analysis in this corpus of research is the change in wider socio-ecological system, although the role of businesses in these transitions has also been explored (Loorbach and Wijsman 2013).

Acknowledging the embeddedness of businesses in a wider system and their capacity to act as agents of change also means realising that the boundaries of the firm are permeable; therefore, IfS activities will also be influenced by the external environment (Keskin et al. 2013). When research has looked at environmental circumstances for IfS, it has often done so without looking directly at how it affected organisational transformation of business as actors in sustainability transitions (Bergek and Berggren 2014) or as an exploration of the actors and relationships

in innovation systems for sustainability and collaboration and network effects (Goodman et al. 2017).

## Environmental Factors: Method of Analysis

Based on the analysis of the literature on dynamic capabilities and how businesses adapt to changing environments, we examine empirically how external factors influence business engagement in IfS, looking at different degrees of environmental change (Ambrosini et al. 2009). The literature on dynamic capabilities explains how businesses develop new capabilities in response to changing environments; therefore, it is useful in illustrating the organisational developments that take place in response to varying dynamics in the socio-technical system.

The research builds on 8 cases of companies performing IfS in different sectors. Data were collected through interviews with the CEO, innovation manager and sustainability manager of 8 companies spearheading IfS in Spain, which were selected due to their successful track record in IfS, as shown in Table 4.1 (apart from the studied cases, illustrative examples of cases more familiar with a wider audience have been included). When relevant, other persons involved in the management of IfS were interviewed, resulting in a total of 30 in-depth (from 45 minutes to 3 hours long), semi-structured interviews. The main topics covered the companies' IfS journey, actions taken to successfully engage in IfS and how they managed the relationship with the external environment (network, stakeholders, industry trends and megatrends...). These were analysed in the context of degrees of environmental dynamism as identified by Ambrosini et al. (2009): stable, dynamic and discontinuous environments. These were transcribed verbatim and analysed through a three-step coding approach, building from concepts in the literature (deductive) but also finding new patterns in the data (inductive) (Gioia et al. 2012). Although the findings of this research can be generalised to other contexts (Polit and Beck 2010), it is limited by its context, meaning that there might also be alternative paths to reach the same point (Gresov and Drazin 1997).

**Table 4.1** Main features of the sample companies

| Industry               | Number of employees | Turnover <sup>a</sup> | SOI strategy   |
|------------------------|---------------------|-----------------------|--|
| Chemical               | 25                  | 3.7                   | Holistic approach to SOI, developing products based on green chemistry and biotechnology, but also converting to a product-service system business model                   |
| Climate consultancy    | 35                  | 2                     | Sustainability lies at the core of their activities. Provides advice on climate issues to businesses and policy-makers   |
| Wind energy            | 6.431               | 2.846                 | It used to be a metallurgical company, which then streamlined to the development of wind turbines, mostly eco-designed   |
| IT consultancy         | 3.000               | 247.7                 | This innovation-driven company has set up its own research institute to be able to experiment with socio-ecological projects that can then be translated to the whole firm |
| Technology development | 39.000              | 2.940                 | It has a unit dedicated to sustainable products and services, while catering to societal demands lies at the core of its business model                                    |
| Elevation systems      | 4.333               | 578                   | SOI is the element of differentiation of this firm in a highly competitive industry, and commitment to sustainability is widespread across all the firm operations         |
| Fashion                | 70                  | 20                    | Sustainability is a core value for the founder, which has impregnated the whole firm and is considered part of the firm's identity   |
| Electric networks      | 1.500               | 320                   | Achieving higher levels of energy efficiency while eco-designing the distribution units is the core of its product strategy  |

<sup>a</sup>Turnover is measured in million euros. All data are provided for year 2014

## Environmental Factors in Business Engagement in Innovation for Sustainability

The findings in the sample companies suggest that companies adapt to a different external environment that has a profound effect on both how the organisation develops IfS. The studied companies seem to be affected by different environmental factors at three different levels as it is conceptualised in Fig. 4.1. The degree of change in their environments can be: stable, dynamic and discontinuous environments. These levels may change for a firm or industry in a non-consecutive manner for instance, a company in a stable environment may jump-start to a discontinuous environment after a reputational disaster or the emergence of a radically new technology, while returning to a stable environment once adjustments have been made. Therefore, there is not a longitudinal relationship between these degrees of dynamism, they do not come after each other, but instead, they are determined

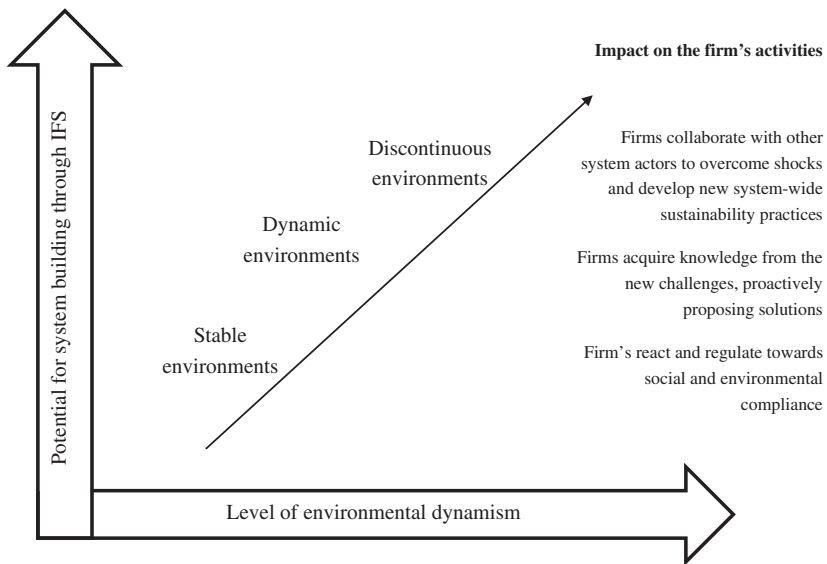


Fig. 4.1 Levels of environmental dynamism and impact on firms' IfS engagement



by external events. Three factors seem to be influential in shaping the organisational transformation for IfS: laws and regulations, socio-environmental challenges and discontinuous economic and technological change.

## Stable Environments: Regulation and Policy

Stable environments are characterised by a continuous but incremental and relatively predictable pace of change. An example of such stable environment is found in highly regulated industries, such as the utilities sector, as illustrated by the interviews with Electric. In this highly regulated, high upfront investment sector, despite gradual regulatory change, it is rare to encounter shocks due to changing preferences or emergence of new competitors. Regulatory changes occur in due time; therefore, the environmental change is not radical, and companies have more time to fine-tune their routines and processes in response to changes. In the case of IfS, the legal and regulatory framework is often a driver for the focal company to develop new products or services or to create demand for existing innovations (Esty and Charnovitz 2012; Horbach et al. 2012). Although in other fields regulation seems to hinder innovation, in the case of IfS tightening environmental and social regulations—such as those requiring certain levels of greenhouse gas emissions—nurture the development of innovations resulting in compliant socio-ecological outcomes while the economic bottom-line is protected. Policy goals, such as the UN SDGs or commitment to sustainability programs like the circular economy (McDowall et al. 2017), also spur demand for innovations for sustainability. As an example, Nestlé has aligned its innovation strategy with the 42 SDGs in their field of business, with a twofold objective: (1) fulfilling the demand for such innovations raised by the SDGs, and (2) contributing to human nutrition and health, rural development, environmental sustainability and human rights (Nestlé 2017). Therefore, the existence of a regulatory framework that makes social and environmental requirements from firms stricter creates a stable but evolving environment to which companies gradually adapt. As a consequence, it is important for businesses to

keep track of the upcoming advances in regulation and policy. Staying ahead of regulation through IfS saves costs of adaption and helps to tap into new markets.

Despite this, it must also be noted that regulation may also hinder the introduction of IfS, either because of absence of regulation and the application of the precautionary principle in case of radical novelties, or due to the lock-in of regulatory institutions to previous systems. An example of the latter applies to many innovations in the field of the circular economy, since the heavily regulated waste management arena often does not contemplate reuse or refurbishing for disposed of materials (Technopolis 2016). In this case, companies must adapt to such environment differently: rather than adapting towards compliance, companies act as advocates of a technology push, breaking through the existent socio-technical regime with technologies paired to viable sustainable business models.

## **Dynamic Environments: Rising Socio-environmental Challenges**

In dynamic environments, companies respond to socio-environmental challenges posed by their business context through adapting IfS to these demands. Dynamic environments are characterised by the need to modify company strategies to adapt to changes in the environment beyond incremental adjustments, for instance, because of the entrance in the market of a new competitor or because of new customer demands. As explained by a representative of Elevation, their market is being completely reshaped by sustainability concerns of buyers, who need to comply with CO<sub>2</sub> emissions standards and compete for sustainable building certifications and awards. Companies with a strong commitment to sustainability will seek a holistic viewpoint from which to integrate the greatest number of issues possible. As compared to laws and regulations, which affect all companies in a sector in a given territorial limit, tackling socio-environmental challenges might be a choice of the company (because of commitment to sustainability, market opportunities or both) or a requirement of the community within which it operates. Hence, the

benchmarking possibilities are reduced; path-dependencies and deliberate processes come into place in developing the necessary capabilities to adapt to these environments. However, the chances for distinguishing the company and rely on the firm's strengths also increase; therefore, although the complexity of the required changes increases, the opportunity to develop a competitive advantage based on differentiation also grows.

Tackling particular socio-environmental issues that are not spelled out in laws or policies requires a particular sustainability expertise, since the innovation required is far beyond compliance. As illustrated by representatives of Fashion, this is the case of their industry, in which regulations cover minimum standards of safety and well-being of workers and health and safety issues in clothing. The studied fashion company goes well beyond this, regularly engaging with its providers to ensure the well-being of their workers and working towards the inclusion of sustainable fibres in their designs. They have also established a slow fashion business model, guaranteeing the durability of their products and minimising the production, transport, storage and disposal activities that result in environmental harm. In these cases, companies need to adapt by acquiring this new knowledge not only about techniques, but also about sustainability direction, that will not be provided by existing standards or regulations. They can do so by integrating new sustainability knowledge into the company, by staying in touch with the needs of their stakeholders and developing absorptive capacity (Ben Arfi et al. 2018). Another option is to engage in partnerships or multi-stakeholder platforms, in which one of the partners provides expertise on the issue and how it may be tackled (Nidumolu et al. 2014; Phillips et al. 2017).

A good example of how companies are adapting to new landscapes is the challenge posed by the rise of non-communicable diseases derived mostly from diet, such as obesity and diabetes type II. This is a relatively new issue—at least at its current scale—to which several industries need to adapt. Food companies like Unilever (2017) are now focusing on prevention, by reducing the sugar levels of their products. However, this does not come without challenges, as tastiness and consumer preferences need to be taken into consideration. Therefore, a strong R&D effort is carried out by the firm, in close collaboration with

customers and nutrition experts. Multi-stakeholder partnerships such as the Roundtable for Sustainable Palm Oil, despite its shortcomings, have also reshaped the industry attitude towards the sourcing and use of palm oil.

## **Discontinuous Environments: Discontinuous Economic and Technological Change**

Finally, in some cases and different contexts, companies face discontinuous environments that push firms to develop innovations for sustainability not to be left behind, adapting to major changes and finding a way to sustain the economic, social and environmental contribution of the business through new markets and business models. This discontinuity may be social, environmental, economic or technological, but in any of the cases, it represents radical, sudden changes that companies to which companies must adapt. Discontinuous change may be local or global and affect all businesses, a certain industry or even a single company. For instance, the video-on-demand technologies, paired with the ubiquity of high-speed Internet connection, have profoundly changed the nature of the media industry. The Deepwater Horizon disaster caused a profound impact on BP, which had to adapt its strategies, but also triggers other developments, since policies on offshore drilling were modified in the aftermath of the environmental debacle. In any case, cultivating organisational resilience and slack is necessary to adapt to these changes, whether steadier (such as video-on-demand) or sudden (such as Deepwater Horizon). In order to be resilient, companies must acknowledge their engraftment in wider systems, building organisational strategies and a vision in relation to its surrounding environment. Only in such a way, it will be able to absorb shocks affecting the system and integrate change in the same way that the system does. In addition, sudden changes in the environment often trigger IfS; for instance, in the case of earthquakes, floods and droughts, they often result in increased risk-mitigating innovations (Miao and Popp 2014). But, beyond technological innovation, adapting to discontinuous change may require developing new organisational configurations

and structures, learning new processes and transforming the company strategy and vision. In some cases, these processes are of considerable relevance owing to their transformative role in sustainable development, thus reconfiguring a firm's purpose and goals (van Kleef and Roome 2007).

For instance, in the face of natural disasters provoked by climate change and considering the reliance of the company on smallholders' production of cereal, the Kellogg Company has started working with them to build climate resilience (Rowling 2017). Kellogg is going beyond its role as buyer by constructing a collaborative business model in which it engages climate start-ups, producers and governments to develop a climate resilient value chain. Furthermore, the social awareness of the human rights violations in many textile companies' supply chain raised by the Rana Plaza disaster also activated new forms or organisational innovation. Beyond revisiting their own supply chains, textile companies have partnered with NGOs and unions to tackle the issue together (Reinecke and Donaghey 2015). These examples show how, in order to be adaptive and thrive in highly discontinuous environments, firms need to develop resilience by getting to know the other actors and dynamics in the system in which they develop their activities. These companies actively participate in the co-building of such system (Adams et al. 2016), rather than let themselves be swayed by external dynamics, collaborating with other stakeholders and establishing clear sustainability goals not only for the company itself, but for the whole system in which they operate.

## Conclusion

In this chapter, we have explored how business organisations are related to the economic, social and natural environments in which they are embedded, and how changes in such environments affects their IfS activities. There are three major degrees of change. In stable environments, whereby change is mostly guided by regulations and policies, the firm must react to such changes; moreover, these may serve as a steer and anchor for the company to direct its IfS. Therefore, vigilance

systems that ensure that the company anticipates these changes are essential. However, at so-called dynamic environments, companies adopt a more proactive role, for which they need to identify the socio-environmental challenges in their surrounding environment and acquire the necessary knowledge to tackle them through innovation, very often in partnership with stakeholders. Finally, in the case of discontinuous change, those businesses that realise their engrailment in a wider environment and work to grant resilience for the wider system will thrive in their IfS activities.

In a nutshell, this chapter shows that, apart from working on internal capabilities, businesses must also look outside and adapt to the main challenges in their environments to thrive and become more competitive through IfS activities. This calls for further research on outward-looking management of IfS, and how the relationship between businesses and their external environment can help to sustain economic, social and natural resilience.

This also has important implications for businesses. The research shows that, to successfully engage in IfS, companies must keep looking outside of the firm for new knowledge, new collaboration opportunities and building networks that will help them to acknowledge the dynamics of the system in which they operate. As environments become more discontinuous, successful companies become proactive agents of change for sustainability, maximising the impact not only for the firm, but also for their environment.

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