Sustainable Business Models: Theoretical Reflections

Padmakshi Rana, Samuel W. Short, Steve Evans and Maria Holgado Granados

1 Introduction

Nidumolu et al. (2009) argue that sustainability is becoming increasingly essential for long-term success of companies. Those that do not rethink the business models around sustainability will limit long-term ability to create competitive advantage. Economic sustainability is a prerequisite for any viable business model, as without this there cannot be longevity for the business. While this is generally conceptualised as a requirement for growth and profitability, this need not necessarily be the case—there is a growing body of literature around the subjects of steady-state economics and not-for-profit social enterprises. Beyond economic sustainability, the need for environmental and social sustainability is increasingly recognised. Companies are attempting to address this within the framework of existing business models and exploring business model innovations.

Lüdeke-Freund (2010) defines a sustainable business model as 'a business model that creates competitive advantage through superior customer value and contributes to a sustainable development of the company and society can be interpreted as a sustainable business model'. The objective of a sustainable business model is the harmony of stakeholders' interests to ensure broader positive sustainable value creation, rather than compromises that benefit some stakeholder groups at the expense of others. As Bocken et al. (2014) assert, 'a sustainable business model aligns interests of all stakeholder groups and explicitly considers the environment and society as key stakeholders'. Sustainable business models seek to go beyond

P. Rana (✉) · S.W. Short · S. Evans
Centre for Industrial Sustainability, Institute for Manufacturing, University of Cambridge, 17 Charles Babbage Road, Cambridge CB3 0FS, United Kingdom
e-mail: padmakshi.rana@cantab.net

M.H. Granados
EPSRC Centre for Industrial Sustainability, University of Cambridge, Cambridge, United Kingdom

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generating economic value primarily for customers and shareholders, but try to create social, environmental and economic value for a broader set of stakeholders in the industrial network. As such, a sustainable business model is the holistic value logic that encompasses economic, environmental and social goals while aligning the interests of all stakeholder groups.

2 Sustainable Business Modelling—Frameworks, Concepts and Tools

The aim is to create future sustainable business models that incorporate economic, environmental and social value in equal measure as an integral part of their business model. The existing work on sustainable business model and modelling is either at a theoretical/conceptual phase or informed through minimal industrial input. There are frameworks and case narratives which emphasise on sustainable business model for value creation and strategic elements of a business model. These are useful in developing an understanding of the area but tend to be limited to setting the research scope or have an environmental emphasis rather than a holistic view of the three metrics of sustainability—environmental, social and economic. The frameworks and concepts, below, provide input towards embedding sustainability in business models through the inclusion of broader range of stakeholders and assist towards redefining value to include environmental and social in addition to economic objectives, thus help towards a business case for sustainability.

2.1 Product-Service Systems

Product-service systems (PSS) and the more generic term 'servitisation' have received extensive consideration in the academic literature. Baines et al. (2007) present a literature review based on over 60 papers. Servitisation was coined by Vandermerwe's seminal paper, referring to the incremental addition of services to a product offering, generating a steady stream of service revenue in place of new product sales (Vandermerwe and Rada 1988). PSS is a specific case of servitisation.

Tukker and Tischner (2006), in particular, focus on PSS and the 3 pillars of sustainability (environmental, social and economic). They understand 'product service' as a specific type of 'offering' or 'value proposition' and the additional word 'system' containing a combination of the value network, technological architecture and revenue model, so the term 'product-service system' describes some parts of a business model. They study a way to generate this business model considering sustainability, and they offer a practical guideline to PSS development consisting of 5 steps (Fig. 1). They apply a sustainability approach during the whole process, but specifically in steps 2 and 3, they propose some tools that can be used to integrate sustainability during the development of the PSS, for example a system SWOT

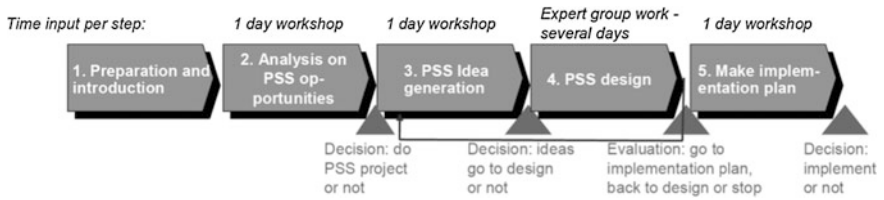

Fig. 1 Steps of the practical guideline to PSS development (Tukker and Tischner 2006)

analysis considering sustainability factors, sustainability guidelines to get inspiration for PSS idea development and a checklist for sustainability of ideas.

2.2 *Conceptualising Business Models for Sustainability*

Lüdeke-Freund (2009) emphasises on value creation, eco-innovation and strategic elements of a sustainable business model—value proposition, value creating logic and value delivery configuration. Lüdeke-Freund (2009) presents a preliminary framework (Fig. 2) that can be used for identifying, understanding and supporting sustainable business model and modelling processes and steps towards systematic research on business models and their contribution towards a business case for sustainability. It builds on the Osterwalder and Pigneur's (2010) business model canvas. The framework attempts to integrate broader social and environmental considerations within the value proposition and integrate eco-innovations into the value creation process.

Stubbs and Cocklin (2008) observe that 'the sustainable business model is not absolute or prescriptive. It will continually be enhanced as we gain further understanding of how companies operationalise sustainability'. Stubbs and Cocklin's case studies of sustainability, while limited to only two cases, provide some preliminary insights into some of the attributes of sustainable businesses. They propose a framework for analysis consisting of structural and cultural attributes. Their analysis serves a useful point for further consideration of how to build sustainable business models. They make a series of propositions on the important elements of a sustainable business model (Stubbs and Cocklin 2008):

- Draws on economic, environmental and social aspects of sustainability in defining an organisation's purpose,
- Uses an integral Triple Bottom Line approach in measuring performance,
- Considers needs of all stakeholders rather than giving priority to shareholder's expectations,
- Treats nature as a stakeholder and promotes environmental stewardship,
- Sustainability leaders/champions drive the necessary cultural and structural changes to implement sustainability and
- Encompasses systems-level perspective as well as the firm-level perspective.

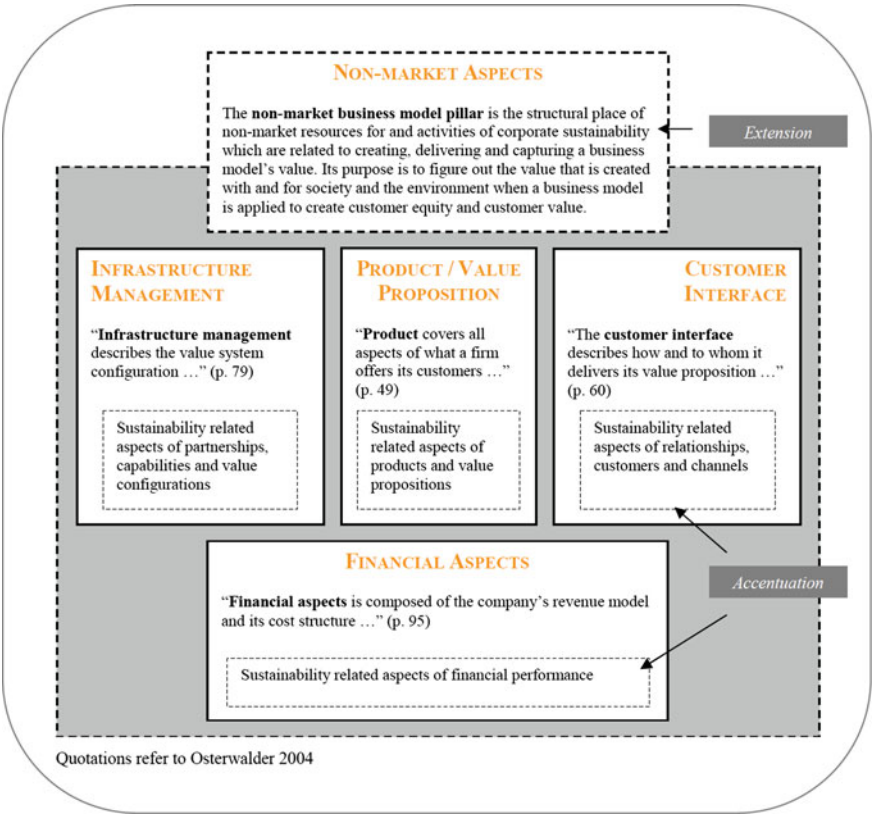

Fig. 2 Five-pillar template for business models for sustainability (Lüdeke-Freund 2009)

2.3 *Business Case for Sustainability*

Recognising that economic success is essential to any firm, the business case for sustainability is thus how to profit from increasing environmental and societal contributions, rather than simply incurring increased costs. As such, the drivers of a business case for sustainability are those that directly influence economic success and are similar to those of a conventional business case (Schaltegger et al. 2011, 2012):

- Costs and cost reduction;
- Sales and profit margin, including market entry or development, and competitive strategy;
- Risk and risk reduction;
- Reputation and brand value;
- Attractiveness as employer; and
- Innovative capabilities.

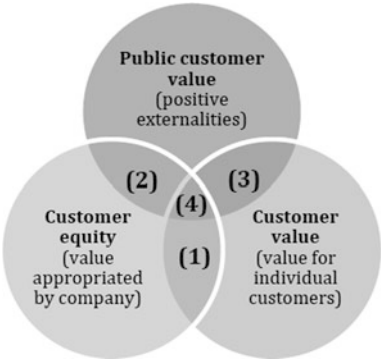

Fig. 3 Concept of extended customer value (Lüdeke-Freund 2010)

The link between voluntary sustainability activities and economic success may be different but as Schaltegger et al. (2011) suggest 'even voluntary social and environmental projects and activities can still be analysed in terms of their influence on these drivers'. A business case for sustainability provides the premise to design business models and frameworks that will integrate and foster linkages between economic, social and environmental value, with the assistance of change in corporate and business strategies.

Lüdeke-Freund (2010) in elaborating on the business case for sustainability observes that 'the central barrier to business cases with eco-innovations relates to the co-creation of private benefits for companies and customers and positive contributions to society and environment—i.e. public benefits'. Figure 3 illustrates co-creation of value through the concept of 'extended customer value or public customer value'.[1] For improving business and society relations and society's concern over corporate social responsibility, combining customer and public value is essential. Lüdeke-Freund emphasises on the following value creation areas to steer the direction of business model innovation for sustainability:

- Creating value for individual customers and the company,
- Creating value for the public and the company,
- Creating value for the public and individual customers,
- Creating value for the public, individual customers and the company.

2.4 Sustainable Business Model Archetypes

Business innovation approaches with a specific focus on sustainability are gaining increased attention. Business model element archetypes were initially defined as

[1]'To overcome the discrepancy between private and public benefits which occurs on imperfect markets, they must be co-created to generate threefold value: for the company, its customers and the public' (Lüdeke-Freund 2010).

common patterns within one element of the business model framework. The following preliminary archetypes were highlighted from literature as the ones that either align with sustainability or through innovation can guide sustainability thinking in the business model.

2.4.1 Internalising Externalities Archetypes

Goedkoop et al. (1999) initiated discussion on PSS in the sustainability literature with his proposition of the environmental benefits of PSS-based consumption. The suggested environmental benefits of PSS are as follows(Tukker and Tischner 2006):

- Decoupling of growth from material/energy throughput,
- Producer takes full life cycle responsibility encouraging environmental responsibility,
- Producer is incentivised to design for durability and upgradability and
- User has better awareness of full costs of usage and hence modifies behaviour.

Underpinning the proposed sustainability benefits of PSS is the potential to better internalise the environmental and social externalities associated with product manufacture, ownership and use. In so doing, this has the potential to initiate beneficial behavioural change in both producers and consumers towards a more sustainable society. PSS is already a well-established concept, particularly in the USA. There are many examples in the industrial B2B sector, and they appear to be emerging opportunities for growth in consumer B2C markets. One of the most well-known examples of this business model is the Xerox photocopying model, whereby the customer pays for a 'document management solution', leaving responsibility for selection and provision of the hardware, provision of toner and maintenance entirely in the hands of Xerox. Rolls Royce Aerospace, no longer sells aircraft engines, but instead offers engines on a 'power-by-the-hour' basis.

2.4.2 Network-Based Archetypes

This includes examples such as fair trade, resource stewardship, demand-side management and localisation. Fair trade and similar types of supplier accreditation programmes that drive more ethical or sustainable business practices at the grass roots level in developing nations have been in operation for almost two decades. These supply chain-focused initiatives aim at delivering environmental and social sustainability benefits funded through a differentiated product offering that delivers intangible value for consumers. Other similar certification initiatives focusing primarily on natural resources protection have been established. The most prominent include the Forest Stewardship Council (FSC) and the Marine Stewardship Council (MSC). These two initiatives aim to ensure that resources taken from nature are fully replenished through careful management of the extraction rate and regeneration programmes.

Demand-side management aims to address sustainability from the perspective of sustainable consumption. The business model emerged in the household energy sector, whereby utility providers are incentivized through government/taxpayer subsidies to assist consumers in reducing their energy consumption. Localisation is the focus on creating industry and jobs in domestic markets, perhaps closer to resource inputs, usually closer to end customers, perhaps offering a more customised local product/service offering, and with a closer connection to local communities. Localisation's primary contribution to sustainability is in the creation and sustaining of jobs and hence social sustainability, although may also offer environmental benefits.

An example of a framework that is based on whole systems thinking and recognises the need for understanding interactions, relationships and impacts between stakeholders and actors in the system and network is the Natural Step approach. The Natural Step approach is a 'five-level framework—systems, success, strategic, actions and tools' with tools such as the four system conditions (sustainability principles based on physical resource use and availability and 'people's capacity to meet basic human needs'), funnel ('metaphor to visualise social, economic and environmental pressures on a growing society') backcasting and life cycle assessment (Waldron et al. 2008).

2.4.3 Society-Based Archetypes

A complimentary literature stream is that of social enterprises. A social enterprise is defined as in between not-for-profit organisations and profit-maximising businesses. It has to cover its costs and repay capital, but is more social value than profit driven. This form of business has the ability to survive as a commercial entity, while also acting as a force for good. Yunus et al. (2010) propose the following transition from a traditional business model for considering a social business model and highlight the components of both model types (Fig. 4).

Thompson and MacMillan (2010) emphasise the challenges in managing trade-offs between competing objectives of social wealth creation and profit

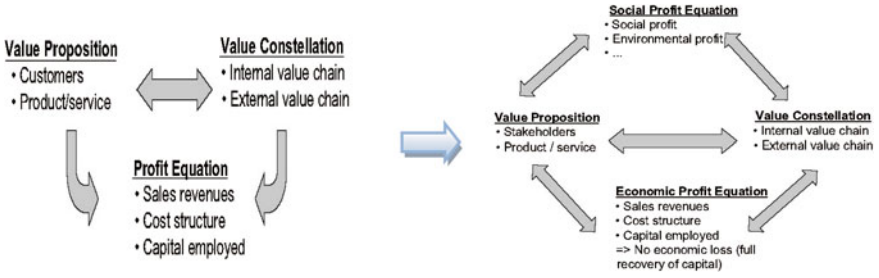

Fig. 4 Traditional business model to a social business model (Yunus et al. 2010)

generation. Grassl (2012) states that business models for social enterprises must fulfil the following conditions as a minimum:

- Drive by a social mission (i.e. abstain from distributing profit to shareholders),
- Generate positive externalities (spill overs) for society,
- Recognise the centrality of the entrepreneurial function and
- Achieve competitiveness on markets through effective planning and management.

2.4.4 Life Cycle-Based Archetypes

This category focuses on product and process redesign towards improving resource efficiency and reducing waste and pollution. It covers a range of concepts, often broadly referred to in the literature as eco-innovations. The two most prominent ones are industrial symbiosis demonstrating process innovation and cradle to cradle demonstrating a product focus. Other examples include biomimicry which is the science and art of emulating Nature's best biological ideas to solve human problems (Benyus 1997). These concepts are not mutually exclusive though, and progressive firms might combine such concepts within one business model.

Industrial symbiosis can be conceived as a value network concept, engaging traditionally separate industries in a relationship such that waste streams or by-products of one industry become feedstock for a second industry. Ideally firms would be co-located within industrial parks or zones to minimise transportation costs and loses. The theory is that this optimises material flows and reduces overall waste and pollution. Prerequisites are a systems-based view, mutual collaboration between firms and ideally geographical proximity. As a concept, it builds on what is known in Nature as mutualism, and the end result of the collaboration should of course be greater than if the entities operated independently. The application of industrial symbiosis is relatively infrequent, probably because it presents numerous business and policy challenges that inhibit widespread adoption. Symbiosis and development of planned eco-industrial parks have received renewed interest in the literature as environmental concerns have grown (Chertow 2000). Kalundborg in Denmark is a well-known example of industrial symbiosis. Taxonomy of 5 types of industrial symbiosis includes (Chertow 2000):

- Through waste exchanges—simple recycling, scrap dealers, etc.,
- Within an organisation or firm or facility,
- Among collocated firms in an eco-industrial park,
- Among local firms not collocated and
- Among firms organised across a broader region (virtually).

Cradle to cradle (McDonough and Braungart 2002) is used to describe a life cycle-based approach to product, process and system design, viewing the product as made up of organic and technical nutrients and seeking to create closed-loop

material systems that recycle the materials, avoiding waste and avoiding toxins and pollutants. It is focused on material and eco-efficiency improvements. It can be seen as a potential business model, or least a core element of a business model as it can represent radical innovation in the value proposition and value creation activities of the company.

To further develop business modelling for sustainability, an approach (Short et al. 2012) using business model element archetypes was proposed to assist in business model innovation for sustainability. The above archetypes provided input to the initial categorisation of the approach. The archetypes (Table 1) attempt to capture the core mechanisms seen in practice and in the literature for delivering sustainability and offer a practical framework to facilitate innovation. The approach is grounded in real-world experience for sustainability, so it is anticipated that such an approach might reduce some of the uncertainty and risk currently associated with business model innovation for sustainability. This might also encourage broader experimentation and adoption of sustainability solutions.

Table 1 Sustainable business model element archetypes (Short et al. 2012)

Sustainable business model element archetype	Examples from literature and practice review
1. Maximise material and energy efficiency	
Do more with less resources, generating less waste, emissions and pollution	Biomimicry, dematerialisation (products and packaging), green chemistry, increased product functionality (to reduce number of products required), lean manufacturing, low-carbon solutions, slow manufacturing
2. Create value from 'waste'	
Turn waste streams, emissions and discarded products into feedstocks for other products and processes, and make best use of underutilised capacity	Circular economy, closed-loop production, cradle to cradle, extended producer responsibility, industrial symbiosis, recycling, remanufacturing, reuse, sharing assets (collaborative consumption), take-back management, use excess capacity
3. Deliver functionality, rather than ownership	
Provide services that satisfy users' needs without having to own physical products	Product-orientated PSS—maintenance and extended warranty, use-orientated PSS—rental, lease, shared, result-orientated PSS—pay per use, PFI (private finance initiative)/DBFO (design, build, finance, operate), CMS (chemical management services)
4. Encourage sufficiency	
Solutions that actively seek to reduce consumption and production	Consumer/user education (educational models—communication and awareness), demand management (including cap and trade), frugal business, premium branding (limited availability), product longevity, responsible product distribution/promotion, slow fashion

(continued)

Table 1 (continued)

Sustainable business model element archetype	Examples from literature and practice review
5. Adopt a stewardship role	
Proactively engaging with all stakeholders to ensure their long-term health and well-being	Biodiversity protection, consumer care—promote consumer health and well-being, choice-editing by retailers, ethical trade (fair trade), radical transparency, resource stewardship
6. Repurpose the business for society/environment	
Focusing the business on delivering social and environmental benefits, rather than economic profit maximisation	Base of pyramid solutions, biodiversity regeneration, entrepreneur/business support models, hybrid businesses, not-for-profit, social enterprise (for profit), social regeneration initiatives
7. Integrate business with other stakeholders	
Integrating business into local communities through inclusive collaborative approaches to business	Alternative ownership structures—collectives, partnerships, cooperatives, employee ownership, home-based working, localisation
8. Develop scale-up solutions	
Delivering sustainable solutions at a large scale to maximise benefits for society and the environment	Crowd-sourcing, collaborative approaches (sourcing, production, stakeholders), licensing, franchising, open-innovation
9. Radical innovation	
(Introduce system change through introduction of radical new technologies to facilitate a greener economy)	Lobbying/collaborating to change underlying principles of doing business. Step-change technology solutions—including renewable energy solutions, radical changes in product functionality

The archetypes were tested and refined in workshops and through further review of the literature and practice examples to identify business model innovations for sustainability. The title was changed from sustainable business model element archetypes to sustainable business model archetypes to reflect overall business model-level innovation and associate each archetype with the business model elements—value proposition, creation, delivery and capture. In-depth description on the individual categorisation of the final sustainable business model archetypes can be found in the Bocken et al. 2014 paper on *A literature and practice review to identify Sustainable Business Model Archetypes* in the Journal of Cleaner Production. The archetypes are included in the toolset explained in Chap. "Toolset for Sustainable Business Modelling" to help manufacturing companies innovate and develop sustainable business models.

Tools such as value network analysis (Allee 2011), value tree analysis, scenario analysis and system map and shared value innovation and creation tools such as blue ocean strategy (Kim and Mauborgne 2005) and value framework (Den Ouden 2012) contributed towards design and development of tools for sustainability.

3 Discussion

The frameworks, concepts and tools explained (see Sect. 4 in Chap. "Business Models and Business Modelling: State of Art" and Sect. 2 above) have contributed significantly towards business modelling for sustainable manufacturing networks that focus on generating network perspective to develop and transform the sustainable value proposition. Each of them provides guidance and insights on the design and elements of a process and tools/methods. In particular, three processes given their proximity to embedding sustainability in a business modelling and academic and industrial popularity were considered.

The Tukker and Tischner (2006) process (see Sect. 2 above) on designing and developing PSS solutions with a focus on eco-efficiency and competitiveness presents three phases—'analysing, creating and defining new ideas and realising the detailed concept' together with the 'innovation scan' process (Tukker and Van Halen 2003) on added value creation through PSS, provide insight on phases and steps for business modelling. They consider a combination of idea generation, planning, mapping and eco-design tools some of which are created specifically to fulfil sustainability requirements such as modified System SWOT (strengths, weaknesses and opportunities and threats) analysis—integrating sustainability into the SWOT analysis. Other tools such as the system map—an approach to visualise business ideas focusing on PSS, scenario writing, life cycle assessment and stakeholder motivation matrix—are based on systems and life cycle perspective. Teece's (2010) work on the business modelling steps (segment the market, create a value proposition for each segment, design and implement mechanism to capture value from each segment—Sect. 4 in Chap. "Business Models and Business Modelling: State of Art") explored for business model design is helpful in providing the foundation and input into the design process of business models and focuses on the need to integrate the wider business environment (Teece 2010). The Osterwalder and Pigneur (2010) process and toolset provide a comprehensive design process (mobilise—setting the stage, understand—immersion, design—inquiry and implement (execution) and manage), which is grounded in academic literature, includes a set of proven tools and methods such as the visually compelling business model canvas and manual, SWOT and scenario planning, proven with practitioners, and uses practical examples.

However, the Tukker and Tischner (2006) process particularly focuses on PSS and is limited in providing a more general approach to sustainable business modelling. PSS is only one aspect of sustainability, and it cannot be effective in isolation and hence needs to be combined more comprehensively with other sustainability initiatives. Moreover, not only must the solution (PSS) for stakeholders be sustainable but also the way it is sourced, produced, used and recycled. The different methods to realise sustainability will be illustrated with the help of the prospective development framework in Chap. "Methods and tools for Sustainable development of products and services" a part of which builds on the PSS approach and some of its tools. Teece and Osterwalder and Pigneur processes are primarily focused on delivering economic value with a particular focus on two stakeholders—customers

and shareholders. Moreover, the focus of Teece's business model design work is primarily on 'how to deliver what the customer wants in a cost-effective and timely fashion' (Teece 2010). The author further highlights limited research in the business model design area. The Osterwalder and Pigneur process does not necessarily include a specific focus on sustainability. The emphasis is exclusively on the value proposition for the customer with limited consideration of broader network perspectives on business model design, and examples provided in the guide are limited and do not illustrate sustainability concepts. They suggest sustainability might be considered by undertaking the business model innovation process three times—optimising for each sustainability dimension—and then combining the outcomes.

In the specific context of sustainable business modelling, Lüdeke-Freund's (2009, 2010) work integrates broader social and environmental considerations within the value proposition and incorporates eco-innovations into the value creation process. It can be used for identifying, understanding and supporting sustainable business model and modelling process and contribution towards a business case for sustainability. The author further introduces the non-market aspects pillar and the idea of creating public value. Stubbs and Cocklin (2008) emphasise structural and cultural attributes in describing the BM. Schaltegger et al. (2012) work on business case for sustainability provides the premise to design business models and frameworks that will integrate and foster linkages between economic, social and environmental value, with the assistance of change in corporate and business strategies. Romero and Molina (2011) introduce multi-value, multi-stakeholder perspectives. However, these frameworks focus on environmental value, with limited or no consideration for social aspects and limited grounding in practice. Nonetheless, they highlight key elements such as stakeholders and value creation, which potentially assist in the development of a sustainable business model.

The processes, frameworks and tools proposed by these leading authors all have merit and provide sound basis for sustainable business modelling. Nonetheless, an enhanced and simplified process and set of tools that better integrates the business model concept with sustainability focused on delivering sustainable value is considered necessary.

4 Conclusions

The interconnected nature of the world with multiple stakeholder networks and interrelationships between different industries through product use and disposal phase requires a long-term vision and holistic solution for redesigning business models to co-create multi-stakeholder and sustainable value. As Krantz (2010) proposes, 'companies will need even bigger changes, including new business models, greater trust and greater stakeholder engagement' based on a 'long-term vision' for pursuing sustainability. Although environmental and social approaches have been developed and implemented by companies it is often through compliance

with regulations or incremental environmental and social initiatives (eco-efficiency, eco-innovation and add-on corporate social responsibility activities in the community). While important, these approaches have not generally embedded sustainability into the core of a business and become part of a supplement to a business, or simply a coincidence. This change requires a significant shift in the way businesses are conceived and operated. Business model innovation that embeds sustainability in the proposition, creation, delivery and capture of value through a multi-stakeholder view is necessary. The following key gaps were considered in the development of the sustainable business modelling process and tools:

- Business model innovation and design for sustainability are generally ad hoc, incremental, relying on radical visionary leadership, and rarely seem to follow a prescribed process. As such, they are often experimental which potentially introduces risk and slows the rate of general adoption;
- Developing a business case for sustainability is important;
- Need for network centric business model design to ensure consideration of network-wide perspective rather than a firm-centric view;
- There is limited view on the set of stakeholders, their goals and value and the interaction/link between stakeholders in the value network; and
- Existing business model thinking and design limited to economic value, customers, shareholders and investors.
- There is a lack of process and tools that can be used by companies to evaluate novel business models. More particularly, tools and methods explore other forms of value and for analysing exchanges and relationships, while looking systematically for opportunities for broader forms of value creation through the extended industrial network. For example, searching for partner companies/organisations outside traditional value chain of the company in order to deliver sustainability is as follows:
  - Rethinking the business purpose—sustainability into the core of the business operations,
  - Taking a longer term perspective on value rather than short-term gain and
  - Broader range of stakeholders including environment and society is required.
- Companies may not be fully aware of the full range of value outcomes of their business operations:
  - Value for a network of stakeholders—aligning conflicts/frictions, various forms of value.

Chapters "Business Models and Business Modelling: State of Art" and "Sustainable Business Models: Theoretical Reflections" are supplemented by five case studies, which are presented in the following chapter. They provided industrial input towards understanding business modelling, particularly from a sustainability perspective.

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