

Creating and Capturing Value through Sustainability

The Sustainable Value Analysis Tool

A new tool helps companies discover opportunities to create and capture value through sustainability across the product life cycle.

Miying Yang, Doroteya Vladimirova, and Steve Evans

bios below

Miying Yang is a research associate at the Centre for Industrial Sustainability, Institute for Manufacturing, University of Cambridge, and a lecturer in engineering management at the University of Exeter. She holds a PhD from the Department of Engineering at the University of Cambridge. Her research is focused on sustainable business model innovation and product-service systems; she is interested in transforming theories into practical tools that help industries solve real problems. She developed the Sustainable Value Analysis Tool from her PhD research to help manufacturing companies identify opportunities for new value creation and capture. miying.yang@cantab.net

Doroteya Vladimirova is a senior research associate at the Centre for Industrial Sustainability, Institute for Manufacturing, University of Cambridge, and a Fellow of the Cambridge Institute for Sustainability Leadership. She leads research on value innovation and new business models for a sustainable future. Her focus is on managing business model innovations that lead to more economically, socially, and environmentally sustainable organizations. She holds a PhD from Cranfield University. Prior to undertaking her doctorate, she worked for more than a decade in international affairs with national and foreign governments and in international business with one of the world's largest automakers. dkv21@cam.ac.uk

Steve Evans is a professor of life cycle engineering and the director of the Centre for Industrial Sustainability, Institute for Manufacturing, University of Cambridge. He led the launch of the UK's first Master's in Sustainable Design. His research seeks a deep understanding of how industries develop solutions that move toward a sustainable future. He spent 12 years in industry, experience which led to his research emphasis on improving engineering performance and provided an excellent grounding for tackling complex, real-life problems. se321@cam.ac.uk

Overview: Recent research and practice have shown that business model innovation can be one way to create and capture new value and drive production and consumption toward sustainability. However, business model tools typically do not create a space to consider how sustainability concerns may be integrated into the innovation process. To address this gap, this article describes a tool that can help companies identify new opportunities to create and capture value through sustainability by analyzing value captured and uncaptured for key stakeholders across the product life cycle. The

Sustainable Value Analysis Tool is shown to help companies recognize value uncaptured and turn it into opportunities; it facilitates sustainability-focused business model innovation by identifying value uncaptured—and hence, opportunities for innovation—associated with environmental and social sustainability in production, use, and disposal.

Keywords: Sustainable Value Analysis Tool; Sustainability; Business model innovation; Sustainability-focused innovation

In recent years, as companies have been challenged by environmental legislation and societal pressures (Elkington 1997), sustainability has become a key factor in long-term business success. As companies have been pushed to reduce the negative environmental and societal impact of their businesses, innovation for sustainability has received much attention from researchers and practitioners (Nidumolu, Prahalad, and Rangaswami 2009; Boons et al. 2013). However, although technological approaches to promote sustainability have been thoroughly investigated (Camarinha-Matos 2011), comparatively little work has been done to understand how innovation in business models can support a move toward sustainability across the product life cycle, including manufacturing, operation, and disposal.

This kind of comprehensive, system-oriented innovation is the province of business model innovation, which looks at how companies create and capture value at every stage of a product's journey to market. While business model innovation has been the subject of much discussion and research, very few tools have been developed to help companies integrate sustainability into the business model innovation process (Evans et al., in press). Existing tools for business model innovation either do not consider sustainability (for instance, Osterwalder and Pigneur's [2010] Business Model Canvas) or do not address all of the elements of the business model (for example, lifecycle assessment tools [Tukker 2000]). Thus, sustainability considerations and business model innovation are often not well integrated, with sustainability being treated as an add-on rather than as a core source of value.

Considering sustainability in the process of business model innovation can provide entirely new ways to create and capture value, beyond those offered by merely developing greener technology or cleaner production systems, by making sustainability a central element not only of the product, but of the business itself. New tools that help companies integrate sustainability concerns and opportunities in the design of new business models can uncover new approaches that yield new sources of value, making sustainability an opportunity for growth rather than a challenge to be overcome. To address this need, we developed a tool, the Sustainable Value Analysis Tool, that provides a broader way of looking at value, one that integrates sustainability from the beginning of the process, and a strategic process and conceptual framework for creating and capturing value by identifying where in the product life cycle value—environmental and social value as well as economic value—has not been captured. The result is a business model innovation process that has sustainability at its heart.

Business Model Innovation for Sustainability

In the literature, the concept of the business model is closely linked to the concept of value (Amit and Zott 2012); the business model explains how a company creates, delivers and captures value (Richardson 2008). Thus, business model innovation is the process of identifying new ways to create, deliver and capture value (Casadesus-Masanell and Zhu 2013). Several tools have been developed to help companies improve value creation and capture—in other words, to build more effective business models. Value Network Analysis maps the tangible and intangible value exchanges within internal networks (between individuals and groups within a firm) and external networks (between organizations); developed by consultants, the method has achieved practical results (Allee 2011). Osterwalder and Pigneur's (2010) Business Model Canvas, specifically intended to help companies design business models, has become the dominant tool and won wide acceptance in industry. This tool breaks the business model down into nine elements—value proposition, customer segments, channels, customer relationships, revenue streams, key resources, activities, partnerships and cost structure—and provides a framework for understanding the relationships among these elements. A more recent entrant, the Value Mapping Tool (Bocken et al. 2013; Evans, Rana, and Short 2014), also focuses on relationships, analyzing value exchanges from the perspective of multiple stakeholders to identify value creation opportunities.

Den Ouden's (2012) Value Framework, which approaches business model design by developing value propositions for all stakeholders, is alone among the major tools in explicitly considering larger impacts; the framework aims to create shared value concepts for four levels of value—user, organization, ecosystem, and society—and considers value from four perspectives: the economy, psychology, sociology, and ecology. However, the framework remains largely conceptual and is difficult to apply in industry. None of the other major tools specifically includes sustainability considerations in the construction of the business model or the mapping of value relationships. The Business Model Canvas, for example, focuses on economic value, and the Value Network Analysis, while it may include larger networks beyond the organization, is not specifically intended to be used in the context of sustainability. The Value Mapping Tool includes sustainability issues by considering the environment and society as key stakeholders, but it still does not offer an adequate approach to address the concept of value related to sustainability.

Focusing business model innovation on sustainability requires a framework for understanding how sustainability may generate opportunities for value creation. It requires innovation not only on technologies, but across the entire system, including design, processes, and operating procedures (Szekely and Strebel 2013; Micheli et al. 2012). This holistic, systems view can be based on four key concepts (Zott, Amit, and Massa 2011; Magretta 2002; Porter and Kramer 2011; Yang et al. 2014):

- Lifecycle thinking,
- Multiple stakeholders,
- Value uncaptured, and
- Economic, social, and environmental value.

Lifecycle thinking. Lifecycle thinking is about considering the economic, environmental, and social impacts of a product across its entire life cycle—not just in manufacturing or disposal, but from materials sourcing through manufacturing and use to its ultimate disposal or recycling. As described by Jun, Kiritsis, and Xirouchakis (2007), a product's life cycle begins when the product is designed and manufactured (beginning of life; BOL), extends through its life in use (middle of life; MOL) and to its recycling, reuse, remanufacture, and disposal (end of life; EOL). Companies usually focus on capturing value in the stages they are responsible for—design, manufacture, distribution, and perhaps maintenance—but value opportunities may exist in any stage of the product life cycle. For example, many manufacturers expend great energy creating value from sustainability in design and production, but miss opportunities to create and capture value while products are in use or even at the end of the life cycle, when they are recycled or discarded. Lifecycle thinking can help companies to discover sustainability-focused value opportunities across the entire product life cycle, and perhaps identify new ways to both maximize value and minimize environmental and social impacts.

Multiple stakeholders. The manufacture, marketing, and recycling of any product involves multiple stakeholders at various levels, from company shareholders to employees, customers, end users, and communities (Freeman 2007). Building business models focused on sustainability requires companies to link resources and outcomes across all of these multiple stakeholders (Argandoña 2011), as sustainability efforts must contribute to the creation of shareholder value at the same time as they satisfy customer needs and make positive contributions to the environment and society (Stubbs and Cocklin 2008; Hart and Milstein 2003). Engaging with multiple stakeholders can help managers identify the key players at each stage of the product life cycle, understand the value exchanges between stakeholders, and keep all stakeholder interests aligned.

Value uncaptured. The concepts of value captured and value uncaptured offers a way to think about where and how value is captured in the business model and where additional value might be created and captured. Recognizing value captured and value uncaptured and identifying the opportunities represented by value uncaptured is an effective approach to sustainability-focused business model innovation (Yang et al. 2017). Value captured is the benefit delivered to the company and its stakeholders; it includes not only monetary value, but also the wider value provided to the environment and society. In terms of sustainability, improved energy efficiency, zero emissions, and clean production are all elements of value captured for the environment. Value uncaptured is potential value that is not captured in the current business model. Some value uncaptured is visible, for example, in waste streams in production and in reusable components of broken products that are discarded. Some is invisible, for example, workforce overcapacity or underutilization of available expertise and knowledge. Value uncaptured may come in any of four forms—value surplus, value absence, value missed, and value destroyed (Yang 2015; Yang et al. 2017) (Table 1). Value uncaptured has some similarity with the Lean concept of waste, for instance the seven wastes of lean production (Bicheno and Holweg 2008), but value uncaptured is broader than Lean's wastes, both in the kinds of value it considers and in its coverage of the entire product life cycle, beyond production.

Table 1. Four forms of uncaptured value

	Definition	Examples
Value Surplus	Something exists that is not required.	Wasted heat Overproduction Repeated work
Value Absence	Something required does not exist.	Temporary lack of labor Warehouse space
Value Missed	Something exists that is not exploited.	Underutilization of by-products Inefficient use of human resources
Value Destroyed	Something exists that undermines value.	Health and safety problems Bad working conditions Pollution

Economic, social, and environmental value. Value is commonly understood as monetary value; however, sustainability requires a more comprehensive view of value that includes social and environmental benefits (Evans, Rana, and Short 2014). This is what we mean by sustainable value. Sustainable value includes economic value, social value, and environmental value, and all of the considerations particular to each of those domains (Figure 1). To effectively integrate sustainability into their business models, companies must consider benefits to the environment and to society as valuable—that is, they must integrate sustainable value into the other sources of value they consider.

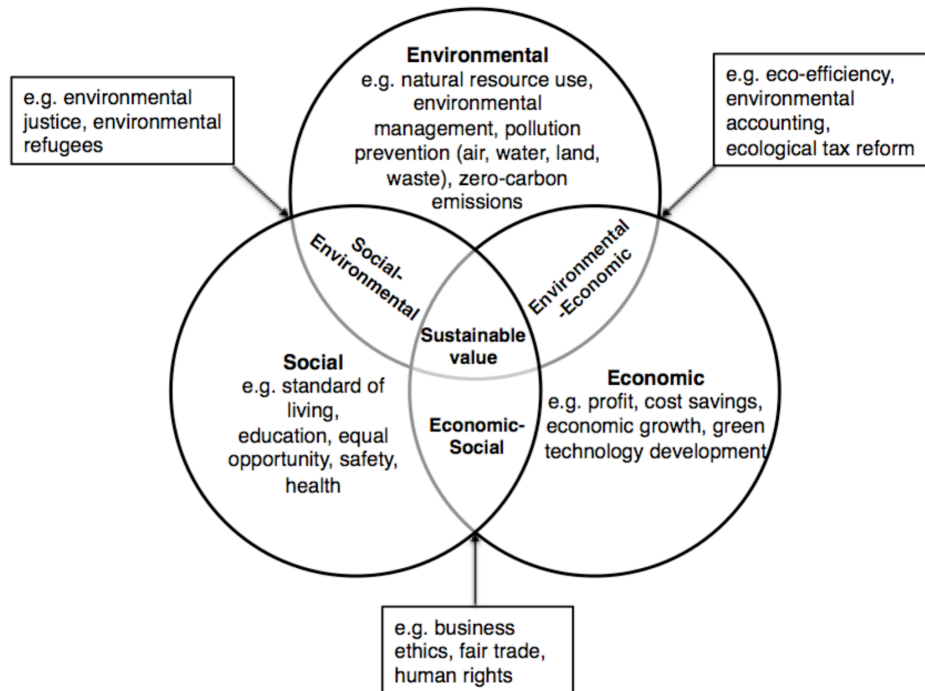


Figure 1. The elements of sustainable value

These four concepts—lifecycle thinking (where to look for value opportunities), multiple stakeholders (who to identify opportunities for), value uncaptured (how to identify value opportunities), and economic, social, and environmental value (what value consists of)—can be synthesized to provide a conceptual framework for value analysis focused on sustainability (Figure 2). By analyzing value captured and value uncaptured for all stakeholders across the product life cycle, companies can identify opportunities to create sustainable value that yield economic benefit and contribute to the environment and society. One novelty of this model is the possibility it suggests of a kind of reverse application, using negative forms of value to identify negative aspects of the current business model that might trigger the discovery of new value opportunities.

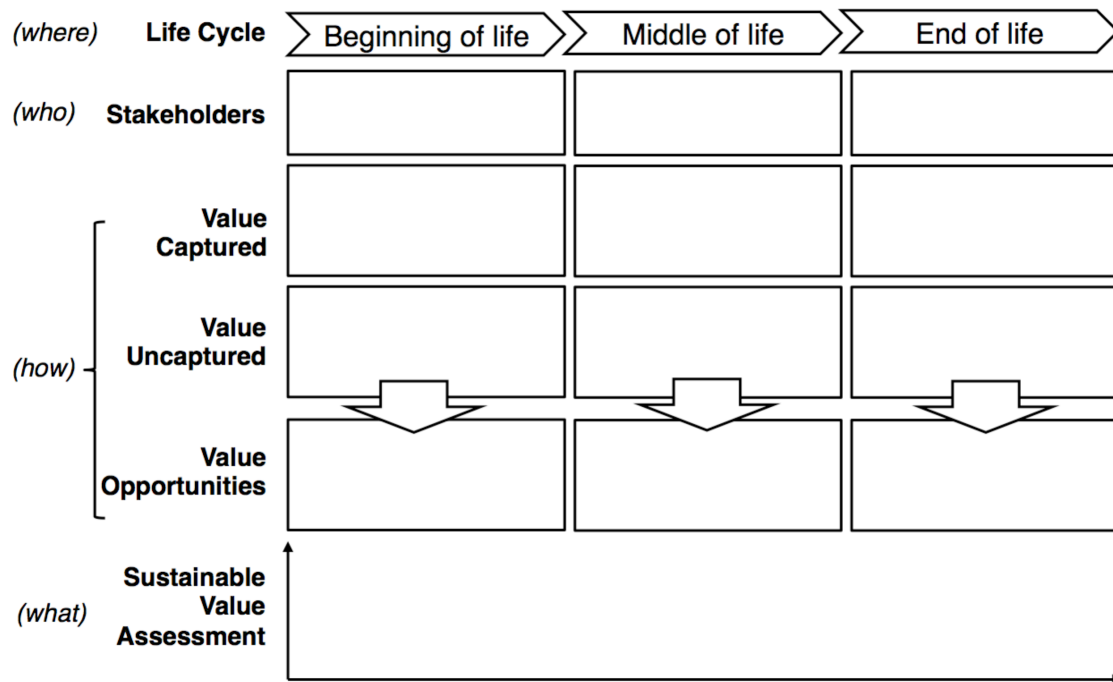


Figure 2. Conceptual framework for sustainable value analysis

Developing the Sustainable Value Analysis Tool

Beginning from this conceptual framework, we worked to develop a tool to help guide businesses through a process of sustainability-focused business model innovation. We began by reimagining the conceptual framework as a step-by-step process; for example, the concept of lifecycle thinking is captured in Step 2, “Describe the lifecycle stages of the unit of analysis.” We then designed an initial version of the tool, consisting of a poster and a set of cards, to visualize the processes guide implementation.

To further develop the tool, we used this initial version in a series of facilitated workshops with academics and practitioners. The first workshops were quite small, including just three to six participants in a single group; we then moved to larger-scale workshops that included three to seven groups of five to six participants each. In developing the tool and in the early workshops, we used an imaginary case as the unit of

analysis. During the workshops, we introduced the tool and its use and described the imaginary case; participants followed the step-by-step process to identify opportunities to create value from the case. In the later, larger workshops, where we used the tool with industrial partners, we used a specific problem from the partner as the unit of analysis. The workshops varied in length from short, one-hour sessions to long sessions of three to four hours. The length and complexity of a workshop ultimately will depend on the size and complexity of the business and of the unit of analysis.

At the end of each workshop, we sent out feedback forms and also asked participants for oral feedback regarding the ease of use and helpfulness of the tool; we also asked participants to identify any specific elements of the tool they felt needed improvement. Each workshop was recorded and researchers also took notes during the workshops. We transcribed and analyzed the workshops and the participant feedback, which revealed additional needs of participants in terms of using the tool. We then evolved the tool based on these identified needs. For example, most of the feedback on the initial version of the tool was that the participants needed more practical examples to help them understand the four forms of value uncaptured; we have embedded those examples into later versions of the tool.

Several rounds of workshops and redesign resulted in the current version of the Sustainable Value Analysis Tool (Figure 3).¹ The tool provides a step-by-step approach to identify value captured and value uncaptured for all stakeholders across the product life cycle and a scheme to search systematically for value uncaptured that may represent value opportunities. The tool, which is designed to be used in a facilitated workshop of one to four hours with five to six participants per group (although there may be multiple groups in a single workshop) attended by stakeholders from across the product life cycle, is implemented in eight steps (Table 2). The outcomes of each step are captured on sticky notes that are placed in the appropriate place on a poster-sized version of the tool. The process results in a list of feasible opportunities for creating sustainable value, evaluated in terms of both economic feasibility and environmental and social sustainability.

Sustainable Value Analysis Tool

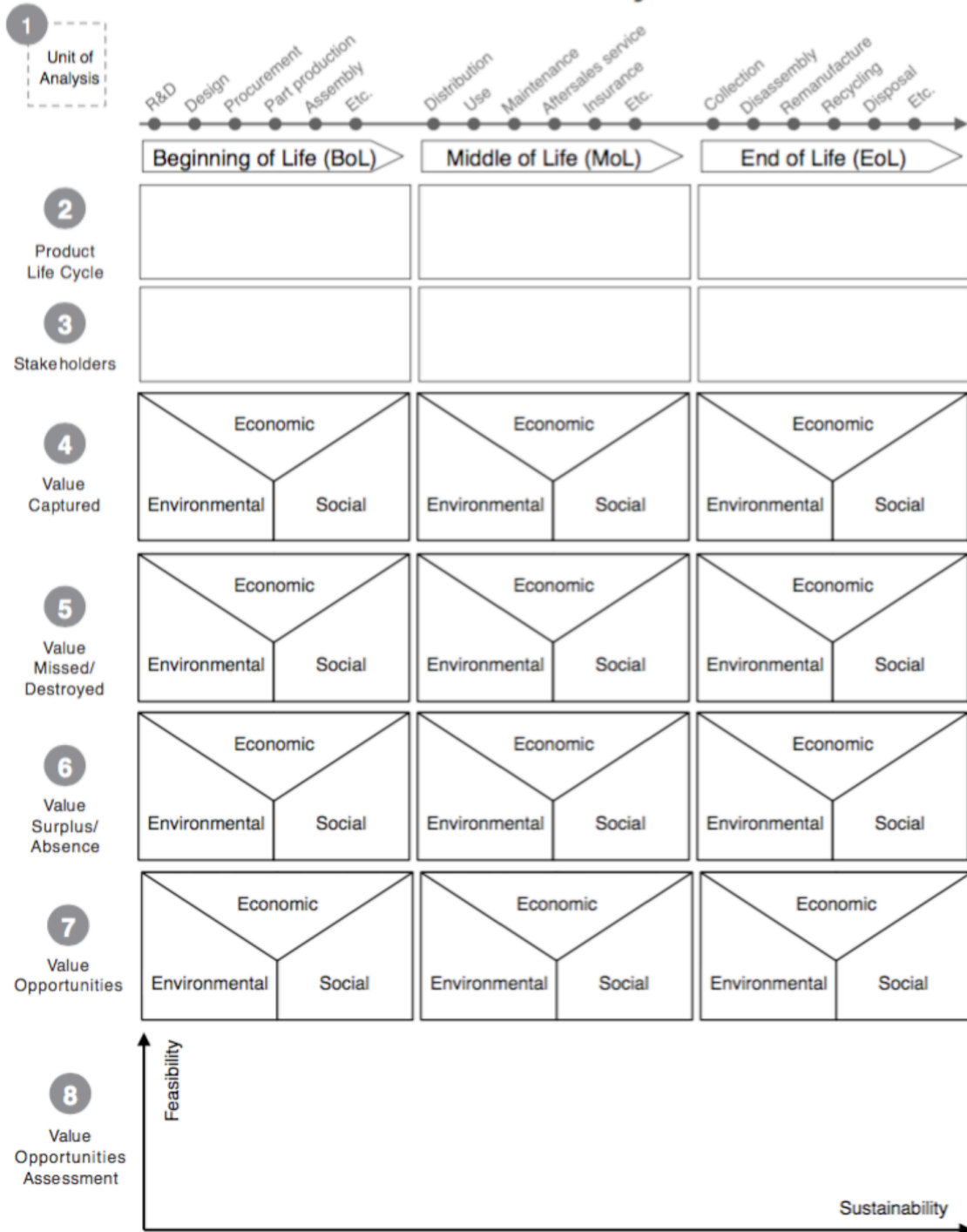


Figure 3. The Sustainable Value Analysis Tool

Table 2. The Sustainable Value Analysis Tool Process

Step	Activity	Prompts/Examples
<i>Before</i>	Facilitator describes the concepts and rationale of the tool and explains its purpose and use. Participants describe existing business models in the company.	What are the existing business models in the company? How does the company create, deliver and capture value to customers and other stakeholders?
1. <i>Decide the unit of analysis (product/service).</i>	Participants decide the unit of analysis, usually an existing product or service.	What company product or service do you want to analyze?
2. <i>Describe the lifecycle stages of the unit of analysis.</i>	Facilitator explains the product life cycle. Participants describe the actual life cycle of the unit of analysis, combining, adding to, or deleting the stages defined in the tool.	How is the product designed, produced, delivered, used, serviced, and disposed of? What are the detailed stages at beginning, middle, and end of life?
3. <i>Identify key stakeholders at each lifecycle stage.</i>	Participants identify key stakeholders at each stage of the product or service life cycle.	What entities, organizations, or individuals influence the business or are affected by it at each stage of the life cycle? <i>Examples:</i> Beginning—Suppliers, design partners, customers, university, government; Middle—Retailers, logistics partners, service partners, customers, trade unions; End—Recyclers, service partners, NGOs
4. <i>Identify value captured for stakeholders at each lifecycle stage.</i>	Participants identify and explain the economic, social, and environmental value delivered to stakeholders at each lifecycle stage.	What tangible and intangible value is created and delivered to stakeholders in each lifecycle stage? <i>Examples:</i> Beginning—Customization of product design, reduced energy consumption in production; Middle—Continuous income from services; End—Extended product life, reduced waste to landfill
5. <i>Identify environmental,</i>	Facilitator explains concepts of missed and destroyed value. Participants brainstorm to	What are the negative outcomes of the business at each lifecycle stage?

<i>social, and economic value missed or destroyed at each lifecycle stage.</i>	identify value missed and destroyed at each stage of the product or service life cycle.	Is there a potential or perceived risk of value being destroyed by continuing customary practices, for instance, a risk of reputational damage or loss of customers? Is the business creating value in some form that it is failing to capture, for instance, through the better use of data to enhance equipment use?
6. <i>Identify environmental, social, or economic value that is surplus or absent at each lifecycle stage.</i>	Facilitator explains the concepts of value surplus and absence. Participants brainstorm to identify surplus and absent value at each stage of the product or service life cycle.	Are there tangible or intangible resources that are underutilized, such as capital assets or human resources? Are there excessive benefits, such as through overproduction, excessive product functionality, or overservice? What tangible and intangible needs of the company and its stakeholders have not been realized?
7. <i>Identify value opportunities.</i>	Facilitator provides methods for identifying value opportunities and guides participants in analyzing each source of uncaptured value identified in previous steps and looking for opportunities for value creation.	How can destroyed and absent value be eliminated? How can missed and surplus value be captured? What innovations could extend the value captured in new and radical ways? How can greater value be captured from the existing business? Where in the life cycle are there conflicts of interests between stakeholders? How can they be resolved?
8. <i>Assess feasibility and sustainability of value opportunities.</i>	Participants assess the feasibility and sustainability of each identified value opportunity and rank opportunities, first by the economic, social, and environmental value they are likely to deliver and then by their feasibility, effectiveness, and ease of implementation.	Which value opportunities create higher economic, social, and environmental value? Which value opportunities are more feasible, more effective, and easier to implement?
<i>After</i>	Participants further discuss how to implement selected value opportunities.	How can value opportunities be realized? What new business models are needed to capture value opportunities?

The facilitator plays an important role in guiding the process, especially in identifying various types of value uncaptured across product life cycle (Steps 5 and 6), which may be difficult for participants who are quite close to the current business models. In general, the facilitator needs to understand the theoretical and practical elements of business model innovation and value innovation, as well as the conceptual rationale behind the tool. The facilitator also needs to be able to guide the process of using the tool by asking relevant, provocative questions and providing appropriate examples. The facilitator should tailor prompts and examples to the specific situation of the company and workshop participants.

It should be noted that the Sustainable Value Analysis Tool is intended to support ideation, not implementation. However, it can be used together with other tools to in implementing the value opportunities identified in the process. For example, the tool can be used in conjunction with the Business Transformation Tool (Vladimirova 2012), by embedding the identified opportunities into business model designs to create action plans for business transformation.

Testing the Tool

We investigated the usability, and utility of the Sustainable Value Analysis Tool in a series of 32 workshops (all facilitated by the research team); the process included more than 100 participants from 35 companies. Participating companies ranged in size from small startups and SMEs to large multinational firms and came from various industrial sectors, including steam turbines, digital video recorders, automotive, and food. They were based in a number of countries, including among others the United Kingdom, China, Brazil, Spain, and the United States. Individual participants were designers, general managers, C-suite executives, and engineers.

After each workshop we asked participants to provide feedback, either orally or on a printed form, regarding the usefulness and value of the process. Participants were asked to respond to three questions on a four-point scale, from “Not at all” to “Very.” Responses were largely positive, with most participants finding the process both useful and highly usable. For instance, at a workshop with 32 industrial participants from 18 companies, all participants agreed that they could easily follow the step-by-step process for using the tool and that the tool was helpful to their companies to some degree; 56 percent of them thought the tool was very helpful (Figure 4).

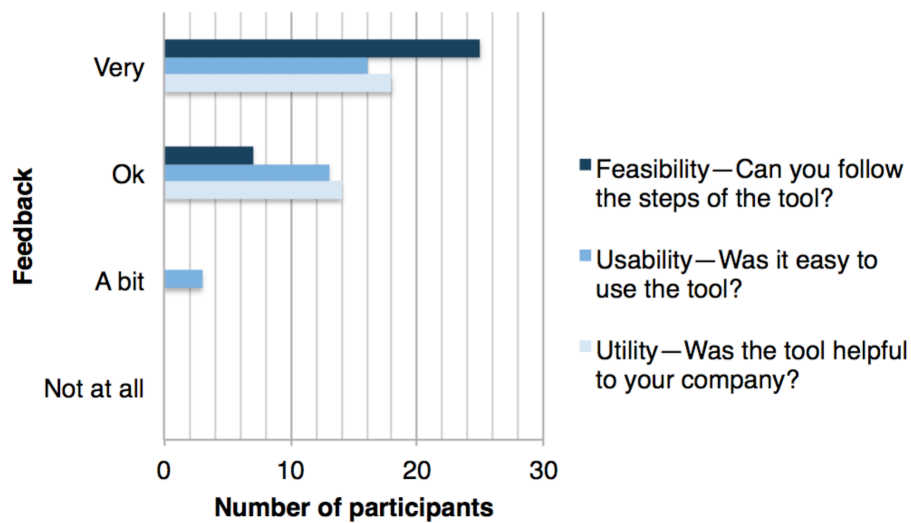


Figure 4. Participant feedback on the Sustainable Value Analysis Tool

Using the Tool: A Case Study

One company that participated in our development process, a state-owned industrial steam turbine manufacturer in China, used the Sustainable Value Analysis Tool to analyze new opportunities for energy management contract (EMC) projects. The company’s turbines are mainly used as auxiliary engines to convert the heat or steam produced in engineering processes into electrical or mechanical energy. Since most of its customers are high energy-consuming companies, the company is aiming to transform itself from a provider of turbines into an energy management advisor for its customers. In EMC projects, the company sells electricity rather than steam turbines (a servitization model). These projects are achieved by building a whole turbine system that turns wasted heat into electricity. Because it retains ownership of the turbines, the company must maximize the value harvested from the entire life cycle of the turbines. Thus, workshop participants sought to identify opportunities for value creation and capture at each stage of the turbines’ life cycle, especially at the end of life.

The company held six facilitated workshops with a total of 26 participants from all levels of the company, including the general manager, supply chain manager, director of the company’s computing institute, the director of the integrated management office, and service managers. Following the step-by-step value analysis process, participants identified 156 instances of value uncaptured and 47 value opportunities across the life cycle of the turbines. For example, they identified a significant amount of wasted heat and steam in customers’ processes, representing value uncaptured in the middle of life. To capture that value, participants then identified a value opportunity in the form of an upgrade to the current steam turbines that would allow them to utilize the wasted heat. This opportunity provided a new way of creating value for customers (reduced energy waste) that would also yield value for the company, as the electricity produced from the wasted heat could then be sold back to customers. The workshops also identified opportunities to link recyclers and suppliers of turbine components to create recycling schemes for old turbines. For example, suppliers could rent turbine components rather

than selling them and then take back at the end of the turbines' life, to be repurposed or recycled. This is a significant opportunity that could change the business models of suppliers, manufacturers, and recyclers, and ultimately reconfigure the company's supply chain.

Feedback from the company has indicated that, beyond the immediate opportunities identified by the tool, its use has engendered a new way of thinking about value that has provided ongoing benefits. For example, after using the tool, the company has come to regard "customer's wastes" as value uncaptured and has identified opportunities to help customers reduce waste. This effort has yielded new value for both the customer and the company.

Conclusion

The Sustainable Value Analysis Tool addresses a critical need for tools that can help companies integrate issues and opportunities related to sustainability into business model innovation. Working through the concepts of value captured and uncaptured, the tool can help companies understand both the positive (value captured) and negative (value uncaptured) aspects of their current business models and identify value creation opportunities presented by both.

Many companies think rather narrowly about value creation and where value may be found, focusing only on customer value (value in the eyes of the customers) and value created in production. The Sustainable Value Analysis Tool can change mindsets about what is regarded as value and open participants' eyes to a wider universe of value opportunities. In this way, the tool provides a new lens through which companies can understand value and a structured approach to discovering value opportunities embedded in a sustainability-focused approach to business model innovation.

This study was supported by the EPSRC Centre for Innovative Manufacturing in Industrial Sustainability (grant EP/I033351/1) and the EPSRC project Business Models for Sustainable Industrial Systems (grant EP/L019914/1).

References

- Allee, V. 2011. *Value Networks and the True Nature of Collaboration*. Tampa, FL: Meghan Kiffer Press.
- Amit, R., and Zott, C. 2012. Creating value through business model innovation. *MIT Sloan Management Review* 53(3): 41–49.
- Argandoña, A. 2011. Stakeholder theory and value creation. IESE Business School Working Paper No. 922. University of Navarra, Barcelona, Spain, May. <http://www.iese.edu/research/pdfs/di-0922-e.pdf>
- Bicheno, J., and Holweg, M. 2008. *The Lean Toolbox: The Essential Guide to Lean Transformation*. 4th ed. Buckingham, UK: Picsie Books.

- Bocken, N. M. P., Short, S. W., Rana, P., and Evans, S. 2013. A value mapping tool for sustainable business modelling. *Corporate Governance* 13(5): 482–497.
- Boons, F., Montalvo, C., Quist, J., and Wagner, M. 2013. Sustainable innovation, business models and economic performance: An overview. *Journal of Cleaner Production* 45: 1–8.
- Camarinha-Matos, L. M. 2011. *Technological Innovation for Sustainability*. 1st ed. Berlin: Springer-Verlag.
- Casadesus-Masanell, R., and Zhu, F. 2013. Business model innovation and competitive imitation: The case of sponsor-based business models. *Strategic Management Journal* 34(4): 464–482.
- Den Ouden, E. 2012. *Innovation Design: Creating Value for People, Organizations and Society*. 1st ed. London, UK: Springer.
- Elkington, J. 1997. *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Conscientious Commerce. Oxford, UK: Capstone Publishing.
- Evans, S., Rana, P., and Short, S. W. 2014. Final set of tools & methods that enable analysis of future oriented, novel, sustainable, value adding business-models and value-networks. Deliverable D2.6, Project 262931, SustainValue: Sustainable value creation in manufacturing networks.
http://www.sustainvalue.eu/publications/D2_6_Final_v2.pdf
- Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E., and Barlow, C., *forthcoming*. Business model innovation for sustainability: Towards a unified perspective for creation of sustainable business models. *Business Strategy and the Environment*. In press.
- Freeman, E. 2007. *Managing for Stakeholders: Survival Reputation and Success*. New Haven, CT: Yale University Press.
- Hart, S. L., and Milstein, M. B. 2003. Creating sustainable value. *Academy of Management Executives* 17(2): 56–67.
- Jun, H., Kiritsis, D., and Xirouchakis, P. 2007. Research issues on closed-loop PLM. *Computers in Industry* 58(8–9): 855–868.
- Magretta, J. 2002. Why business models matter. *Harvard Business Review* 80(5): 86–92.
- Micheli, P., Schoeman M., Baxter, D., and Goffin, K. 2012. New business models for public-sector innovation: Successful technological innovation for government. *Research-Technology Management* 55(5): 51–57.
- Nidumolu, R., Prahalad, C. K., and Rangaswami, M. R. 2009. Why sustainability is now the key driver of innovation. *Harvard Business Review* 87(9): 57–64.

- Osterwalder, A., and Pigneur, Y. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. New York: John Wiley & Sons.
- Porter, M. E., and Kramer, M. R. 2011. Creating shared value. *Harvard Business Review* 89(1–2): 63–77.
- Richardson, J. 2008. The business model: An integrative framework for strategy execution. *Strategic Change* 17:133–44.
- Stubbs, W., and Cocklin, C. 2008. Conceptualizing a sustainability business model. *Organization Environment* 21(2): 103–127.
- Szekely, F., and Strebler, H. 2013. Incremental, radical and game-changing: Strategic innovation for sustainability. *Corporate Governance* 13(5): 467–481.
- Tukker, A. 2000. Life cycle assessment as a tool in environmental impact assessment. *Environmental Impact Assessment Review* 20:435–456.
- Vladimirova, D. 2012. Transformation of traditional manufacturers towards servitized organisations. PhD thesis, School of Applied Sciences, Cranfield University.
- Yang, M. 2015. Sustainable value analysis for product-service systems. PhD thesis, Department of Engineering, University of Cambridge.
- Yang, M., Evans, S., Vladimirova, D., and Rana, P. 2017. Value uncaptured perspective for sustainable business model innovation. *Journal of Cleaner Production* 140:1794–1804.
- Yang, M., Vladimirova, D., Rana, P., and Evans, S. 2014. Sustainable value analysis tool for value creation. *Asian Journal of Management Science and Applications* 1(4): 312–332.
- Zott, C., Amit, R., and Massa, L. 2011. The business model: Recent developments and future research. *Journal of Management* 37(4): 1019–1042.