Case Studies in Transformation towards Industrial Sustainability

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ABSTRACT

The paper identifies existing sustainability frameworks that help companies in decision-making, strategy and new thinking. The case studies explore: why the organisation is making the transformation, what is it actually doing and how it finds out what the possibilities are. The paper presents case study analysis of the applicability of the different frameworks for planning for transformation towards industrial sustainability. The paper reports the results of exploratory case studies observed through document analysis and interviews. Cradle-to-Cradle design defines a broad framework for creating eco-effective industrial systems, but for businesses to put this framework into practice they need both the right technologies and the right strategies, which implies a need to collaborate with different actors & stakeholders across the system. It is observed that companies that are willing to experiment, change the business model and work with new partners outside the firm boundary are able to move towards industrial sustainability.

Keywords: Cradle-to-Cradle, Industrial Sustainability, Sustainability by Design, System Innovation, Whole System Design

1. INTRODUCTION

In modern manufacturing systems, material and energy is being used inefficiently. In the first industrial revolution it can be argued that the challenge was that labour was scarce and material were abundant, drawing the focus of management onto labour productivity through automation and other practices. The rather profligate and linear business model of make-produce-sell-use and more often than not throwaway has been economically successful, but is argued to be at the root cause of some of the challenges industry is faced with today. Hawken et al. (1999) state that most businesses still operate according to a worldview that hasn’t changed since the start of the industrial revolution. Then labour was the limiting factor of production. But now, there is perhaps a surplus of people, while natural capital (natural resources) and the ecological system that supports industrial activity is increasing under threat from a sustainability perspective.

Today, as a global community, we face serious challenges where demand for resources is outstripping supply and where emissions and waste have accumulated to levels that endanger our current quality of life. Sustainability...
can be described as an emergent property of a well-run or well-designed system. The natural world works in cycles, and in order to interact with these systems in a sustainable way, the redesign of the industrial system according to the paradigm of cyclical thinking is required (McDonough, 2002). In the current economic paradigm, growth is partly based on the deterioration of social and environmental systems. Senge (1990) states that the un-healthiness of the world today is in direct proportion to our inability to see it as a whole. Organisations are focusing on sustainability as an objective, but they are largely limiting their efforts to what can be done within the boundary of the firm (Ehrenfeld, 2003).

Foresight (2013) in a report named ‘the future of manufacturing’ predicts that in the period up to 2050, interactions between manufacturing and the natural environment will be subject to a number of powerful changes. Growing global populations will raise demand for resources, particularly as they become wealthier. Climate change is likely to increase the vulnerability of global supply chains. Consumers will call for products that meet higher environmental standards, and governments may increase their use of environmental regulations. It is stated that manufacturers will therefore need to strive for greater efficiency in their use of materials and energy, which will provide resilience to the resulting volatility in the price and availability of resources. Manufacturers will also need to explore new ways of doing business, for example by expanding into ‘re-manufacturing’ of end of life products, or by producing increasingly robust products for ‘collaborative’ consumption by consumers. It is argued Industrial Sustainability will not be achieved simply by new technology: the configuration of the industrial system will need to change dramatically, introducing new concepts such as cradle-to-cradle (McDonough, 2002; Braungart 2007), slow manufacturing, local manufacturing (Piore, 1984, Kumar, 2004) and challenging today’s business models (Chesbrough, 2007; Comes 2008; Nidumolu, 2009). Society must also play a role Huppes (2009), as we explore new forms of value. Following on from eco-efficiency and eco-factory programmes, those organisations, which seek to lead in this field, are already beginning to explore what the new shapes of the industrial system may be (WBCSD, 2010).

Industrial Sustainability will encourage new configurations of the industrial system. Organisations preparing for such a disruptive change lack understanding of where to focus efforts to improve the short to long term performance of industry and plan for transformation to sustainable industrial systems (Connelly, 2007; Rittel, 1973; Christensen, 1985).

1.1. Research Aims and Objectives

The aim of the research is to identify existing sustainability frameworks that help companies in decision-making, strategy and new thinking. And assess the applicability of the different frameworks for planning for transformation towards industrial sustainability through the lens of a case study. The research will investigate the broad research question; what is important to practitioners in planning for a sustainable and resilient future? More specifically the research seeks to expose case companies to well-known industrial sustainability frameworks to answer the question ‘what are the relative strengths and weaknesses of different industrial sustainability frameworks when used by companies to guide decision-making?’

1.2. Research Approach

To investigate the research question, a two-phase research method was designed as illustrated in Figure 1:

**Phase 1**: Literature review of existing Industrial Sustainability frameworks.

**Phase 2**: Case study analysis of existing frameworks strengths and weakness in planning for transformation towards industrial sustainability.

Phase one in the research process was to explore current research and knowledge in the
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