



Using industrial ecology and strategic management concepts to pursue the Sustainable Development Goals



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ABSTRACT

The subjectivity, complexity, and often competing interests of sustainable development have limited the effectiveness of integrating these important ideas into mainstream business strategy. With the adoption of the UN Sustainable Development Goals (SDGs) in January 2016, there are now global sustainability benchmarks that apply across diverse sectors and national contexts, allowing public and private organizations to orient and evaluate their activities, strategies, and business outcomes. However, it is not directly apparent where the advantage for business lies in pursuit of these actions within the prevailing economic paradigm, highlighting the need for new analytical frameworks and tools. Industrial ecology (IE) has been successfully used in engineering practice for decades and has been suggested as a method that can provide the concepts and methods necessary to bridge the gap between traditional business practice and sustainable development. To test this, literature bridging the fields of industrial ecology, business strategy, and sustainable development was collected and analyzed using the textual analysis software Leximancer™. The analysis showed that while the SDGs are primarily aimed at the national level, they also hold relevance for business through innovation, partnerships, and strategic positioning, *inter alia*. The analysis found that the integration of IE and business strategy is highly relevant for three of the SDGs, but captures elements of all 17 to varying degrees. IE has a strong focus on innovation and its potential in new markets, products, and business models. IE is also consciously aimed at the efficient use of energy and resources, ideas that are relevant to mitigating, adapting, and building resilience in a changing future, but are also relevant to traditional concepts of business strategy and competitive advantage. This paper shows that through the combination of IE and strategic management theory, commercial organizations can positively contribute to the Sustainable Development Goals while building competitive advantage.

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1. Introduction

In September 2015 the international community adopted the Sustainable Development Goals (SDGs), to address global challenges in health, education, social equity and justice, economic security, and environmental issues. The SDGs have been developed by the United Nations as a template for sustainable development globally, and are part of a wider 2030 Agenda that build on the Millennium Development Goals set in 2000. The SDGs came in to

force on 1 January 2016, and while not legally binding, offer a pathway for countries to mobilize efforts to end poverty, address climate change, and secure equitable livelihoods for all people ([Open Working Group of the General Assembly on Sustainable Development Goals, 2015](#)). The SDGs establish not only 17 goals, but 169 specific targets, indicators, and metrics of sustainability across a wide range of sectors, providing practical guidance for public and private organizations ([United Nations, 2015](#)). While the goals and targets are important indicators of success, specific examples of activities that directly and indirectly support the delivery of the SDGs remain unclear, especially for the business sector, suggesting a need for research that demonstrates how businesses can support these sustainability targets within the context of their

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commercial priorities and activities (cf. Byrom et al., 2014; Hoffman et al., 2014).

The economic benefits of business activities have improved prosperity and living conditions around the world. At the same time, many of these activities have directly and indirectly led to negative impacts including environmental damage and social inequality. With a growing imperative for large-scale societal transformations towards sustainability, it is evident that traditional business thinking is not able to effectively deliver the changes that are required, and is often continuing to contribute to the creation of further problems and reinforcing unsustainable activities (Geels and Schot, 2007; Westley et al., 2011). However, the nature of business is gradually changing, with increasing calls for commerce to be transformed into an engine of sustainable development through corporate citizenship, social entrepreneurship, and pro-environmental behaviors (Abram et al., 2016; Bayon and Jenkins, 2010; Hart et al., 2003; Marcus et al., 2010; Rahdari et al., 2016; Sutton-Grier et al., 2014; Westley et al., 2011). The traditional position that the relationships of society and the environment to the firm were those of client and (limitless) resource provision and waste disposal (e.g. Porter, 1979; Teece et al., 1997; Wernerfelt, 1984) have shifted, to a view where social licence to operate is critical to corporate survival, and the firm can derive competitive advantage from interaction with environmental management activities (Hart, 1995; Hart and Dowell, 2011). These changes are also evident in the movement towards sustainable materials programs and supporting policy programs incorporated in circular economy principles (Dentchev et al., 2016; Silva et al., 2017) and industrial symbiosis models (Rosano and Schianetz, 2014).

However, while organizational and technological innovations are disrupting incumbent actors in many areas, the integration of environmental and social aspects of sustainability in profit-oriented commercial activities remains elusive (Dentchev et al., 2016), suggesting that further evolution in business management strategy is necessary. Strategic thinking has reached the stage where stakeholder benefits and sustainability outcomes are intimately connected; new business philosophies and operational strategies that emphasize a more holistic approach to commerce help firms understand and explain not only how value is captured, but how it is created, and how extra value can be obtained by increasing focus on social and environmental outcomes (Baldassarre et al., 2017; Bocken et al., 2014; Zott et al., 2011).

Many organizations, including mining and resource companies, environmental NGOs, and government agencies, are now far more likely to publicly acknowledge the importance of issues beyond their core business, such as poverty alleviation, biodiversity conservation, and sustainable supply chains (Hahn and Kühnen, 2013). Yet gender equity and the urgent need to address climate change through greenhouse gas emission reductions are still rarely identified as core organizational concerns (Garnett et al., 2016). It is therefore important to understand not only the role sustainable businesses can play in achieving the SDGs, but how “green competition” and new business activities can stimulate innovation and be recognized as a source of future competitive advantage (Amit and Zott, 2012; Hajer et al., 2015; Rahdari et al., 2016). Progress toward sustainability management, and the achievement of the SDGs can be measured with specific indicators across diverse sectors, and thus public and private organizations have global sustainability benchmarks such as the Global Reporting Initiative (GRI), ISO 14001, the Carbon Disclosure Project (CDP) (see Siew, 2015 for larger list and review) that can be applied to evaluate their activities, strategies, and business outcomes. The example of firms such as Interface, Inc. – on track to reduce carbon emissions, waste, water and fossil fuel use to zero across its supply chains by 2020, with significant sales increases – has demonstrated that

sustainable corporate behaviors can not only allow for profits and growth, but also drive them (Anderson and White, 2011; Hoffman et al., 2014).

Commercial landscapes are now different than in the past, with resource constraints, emerging markets, unprecedented rates of change in technology, and novel business models creating disruptions for traditional strategic management paradigms. The commercial parameters of 21st century business are more dynamic, distributed, transparent, and global than ever before (Guillén and Baeza, 2012; Palmer and Flanagan, 2016). These factors – the external pressures of social licence to operate and regulation, internal changes to corporate cultures, and the challenges and opportunities of digitalized global markets – mean that business requires new models of strategic management to survive and succeed, necessitating a realistic and genuine reflection on traditional business thinking and assumptions about the future (Hart and Dowell, 2011). However, it is not always apparent how sustainability behaviors offer advantages for business, highlighting the need for new analytical frameworks and tools (Hoffman et al., 2014). The principles of industrial ecology (IE) can facilitate the integration of sustainability into business practice, and have the potential to provide the breakthrough tools and methodologies that support and deliver sustainable business activity (Hoffman et al., 2014; Korhonen, 2004, 2005). This paper explores the overlaps between IE principles and strategic management theory, and investigates how these synergies might allow businesses to contribute to the achievement of the SDGs. Ongoing quantitative research into the financial benefits of IE in delivering strategic sustainability outcomes for business will further assist in highlighting the value of IE concepts and methodologies (Hoffman et al., 2014; Williams et al., 2017).

The paper proceeds as follows. In Section 2, we present a brief review of literature that examines the relationships between business and sustainable development, with a focus on IE and its role in facilitating business activity in line with sustainable development. In Section 3 we provide detailed explanations of the methods applied in the study, including the text-mining analysis conducted with Leximancer™ software. Section 3 presents results, and in Section 4 we discuss the findings and implications of the analysis. Section 5 concludes the paper, highlighting important next steps for the integration of IE concepts within strategic management theory.

2. Business, sustainable development, and industrial ecology

Business and the private sector have a critical role to play in achieving the SDGs. Governments of both developed and newly developing countries do not have the finances, resources, and indeed capabilities to provide all the solutions necessary to achieve the SDGs. The private sector will need to play a central part in sustainable development, not only in terms of economic growth, but also in terms of the environmental and social needs of the 21st century. Firms have traditionally viewed sustainability policies as necessarily subordinate to financial and operational priorities. Since Friedman's (2007) declaration that the sole social responsibility of firms is to provide a return to shareholders, rather than benefit to the wider community, sustainability has been considered an unnecessary cost, external to the primary role of the business (Porter and Kramer, 2011; Westley et al., 2011). Negative environmental impacts have been seen as an inevitable result of resource and product development. This perspective is apparent in early strategic management literature, where social and environmental sustainability principles are not explicitly considered, instead focussing on internal capabilities and external market dynamics for the competitive advantage of a firm (e.g. Porter, 1979;

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