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The Impact of Technological Green New Product Introductions on Firm Profitability

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ABSTRACT

With changing customer preferences and volatile economic-technological environments, firms have accelerated the rate of new product introductions (NPIs) to sustain corporate growth. However, NPIs have adverse impacts on the environment. But what do we know about the impact of technological green NPIs on firm profitability? Can technological green products help limit or off-set the negative impact of NPIs on the environment? Accelerating the number of NPIs imposes additional costs for firms as well as environmental costs, particularly with greater resource depletion and waste generation. A well-supported solution to reconcile the economic-environmental preservation imperative is to create incentives for firms to use green technologies to offset the negative impact of new products on the environment. Using data on 1020 technological green products which were introduced between 2007 and 2012 by 79 global firms, we investigate whether there are any win–win situations in terms of financial advantages for firms, while reducing the adverse impacts of NPIs on the environment. The results show that the relationship between technological green NPIs and firm profitability is positive. The findings point to the financial incentives for firms to leverage on green technologies to limit the environmental impact of new product introductions.

1. Introduction

Accelerating Product Life Cycles (PLC) due to changing customer preferences are putting increasing pressures on firms to introduce new products continuously to maintain market share and sustain corporate growth (Chien et al., 2010). For example, according to a Forrester report (2015), smartphone owners in OECD countries renew their devices every year on average, as reflected by the annual introductions of a new version of successful smartphones at the World Mobile Congress in Barcelona. Yet, the heat-resistant tantalum powder needed for such smartphone devices – Coltan (columbite–tantalite) – has significantly depleted natural environments such as the Kivu provinces (North and South), near the border of Rwanda, and also greatly intensified the violence there by encouraging multiple groups and nation-states to implicate themselves in conflicts. Product replacement becomes even more severe when built-in obsolescence limits the life cycle of devices: A recent study from Öko-Institut found that built-in obsolescence grew from 3.5% in 2004 to 8.3% 2012 (Prakash et al., 2015). Taken together, these frequent new product introductions (NPI) harm the environment because they increase the consumption of often finite raw materials for production and create additional challenges for recycling older products (Pujari, 2006). In the case of mineral-based economies, such as Eastern Congo, moreover, it intensifies the violence and conflict in such environments. Harming and destabilizing the environment is not only detrimental to the planet but it can also jeopardize peace in regions as well as undermining the legitimate existence of any firm because it creates a negative attitude from stakeholders expecting socially responsible behaviors from corporations (Bansal and Clelland, 2004; Bansal and Roth, 2000; Hart, 1995). Consequently, sustaining corporate growth with NPIs and protecting the environment seem to be competing and contradictory goals.

Since firms are naturally interested in pursuing economic goals even at the expense of resource depletion (King and Toffel, 2007), scholars have directed their attention to building a business case that encourages sustainable practices among firms (Pujari, 2006). The underlying argument – 'it pays to be green' – that firms can be *both* green and competitive has been particularly forceful (Hart and Ahuja, 1996; Porter and van der Linde, 1995; Pujari et al., 2003). That is, environmental stewardship can help the greening firm gain competitive advantage through higher price premiums, increased market share, and lower the cost of production (Ambec and Lanoie, 2008). Nonetheless, while a number of studies have determined and examined the linkage between environmental performance and firm economic performance, the results are not yet sufficiently robust to claim a positive link, leaving the debate

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of whether 'it pays to be green' unresolved (Horváthová, 2010; Margolis et al., 2007).

In this study, we aim to contribute to that debate by examining the relationship between the introduction of new products based on green technologies and firm profitability. Following previous studies on environmental technologies (Klassen and Whybark, 1999; Shrivastava, 1995), we define "new technological green product" as any new product that builds on technological advances to limit or lower its environmental footprint or that of other products, for instance, through improved energy efficiency or waste management.

Our focus on green technologies is well-supported in the environmental literature. From an organizational point of view, green technologies can help firms lower the impact of production activities on the environment by preventing pollution and enhancing internal green capabilities (Klassen and Whybark, 1999). From a stakeholder point of view, such as customers, green technologies can improve a product's energy efficiency, material utilization, and recycling (Dangelico and Pujari, 2010). Besides the direct benefits, green technologies also produce numerous spillovers which improve the firm's capabilities and competitive position (Berrone et al., 2013; Shrivastava, 1995). In this sense, green technologies can play an important role at reconciling a firm's economic goals and the necessity to protect the natural environment.

Our study makes three contributions to the environmental literature. First, to the best of our knowledge, insufficient research attention has been paid to understanding of how green technology upgrades can build both a viable business and environmental case, leading to more profitability for firms. Moreover, our approach differs from previous approaches by examining the environmental activities that are directed toward market actors such as customers and investors (Hawn and Ioannou, 2015). Second, there is limited empirical understanding of whether or not green NPIs can bring short term benefits because of external market-oriented logics, rather than internal efficiency oriented gains. Indeed, existing studies seem to suggest that environmental activities are beneficial to a firm's competitive position only in the long-run (Horváthová, 2012). Finally, while past studies have mostly used survey-based questionnaires to capture firms' new green products, we used the press releases of actual NPIs as a measure instead of relying on respondents' reporting which may be less reliable and less objective. Overall, our sample consists of 1020 technological green new product introductions emanating from 79 global firms between 2007 and 2012.

2. Theoretical Background

2.1. Environmental Actions and Firm Performance

A traditional study focus of environmental scholars is the linkage between environmental performance and firm performance, partly following the well-known Porter hypothesis which suggests that firms can be both green and competitive (Porter and van der Linde, 1995). An exhaustive review of the literature linking environmental performance and financial performance is beyond the scope of this paper but can be found in previous research (see Horváthová, 2010; Horváthová, 2012 for a useful overview and summary). Overall, however, the results from a comprehensive meta-analysis by Horváthová (2010) concluded that the evidence on the direct relationship between environmental performance and financial performance is, at least, equivocal and inconclusive: it was positive in only about 55% of the past studies, while it was either neutral (30%) or even negative (15%) in the remaining studies. Despite the substantial insights from research at the linkage between environmental performance and firm performance, it is fair to characterize this linkage as a complex issue that requires a more nuanced understanding of the relationships.

One general observation from this work is the way that many studies measure environmental performance through emissions (e.g. Hart and Ahuja, 1996; King and Lenox, 2001) or ratings by external audit agencies (e.g. Guenster et al., 2011; Russo and Fouts, 1997). Such measures are oriented toward the internal efficiency of a firm's environmental management. It follows that existing evidence mainly favors internal efficiency-oriented gains arguments, based on long-term benefits, rather than understanding the external market-oriented logics when firms face pressures relating to changing customer preferences and volatile economic-technological environments, and where firms have to accelerate the rate of new product introductions to sustain corporate growth. A further issue; little evidence exists as to whether being green can yield short-term benefits to the firm. This may be due to the predominant use of internal green efficiency as a measure of environmental performance, which by its nature needs more time – the long-run perspective – to translate into corporate advantage. In contrast, green NPIs are market-oriented environmental activities hold commercial value, thus yielding a greater potential for short-term benefits to the firm. By paying attention to the environmental activities that are directed toward market actors such as customers (Hawn and Ioannou, 2015), environmental theorists can expand what they study and develop more complete models of environmental performance, while also demonstrating how firms can simultaneously be both green and competitive.

2.2. New Product Introductions and Firm Performance

New product introduction, which is defined as any change in a product's design (Katila and Ahuja, 2002), is often used as a proxy for firm innovative performance and represent the commercial outcome of a firm's R&D activities. Because new products help a firm gain market share and ensure its survival in the long run, the contribution of NPIs to financial performance is commonly accepted in both the strategy and marketing literature (Banbury and Mitchell, 1995; Chaney and Devinney, 1992; Damanpour, 1991; Pauwels et al., 2004). The role of NPI has become even more critical in the digital environment not least because customers have become more connected, knowledgeable and unpredictable; with accelerating and shortening Product Life Cycles and converging industries requiring firms to develop ambidextrous capabilities (McGrath, 2013). When combined, these conditions are making competitive advantages more temporary and less sustainable even in the medium run. In such competitive conditions, a firm's capability to introduce new products that are based on innovative features has become decisive in sustaining long-term corporate growth (Katila and Ahuja, 2002; Smith et al., 2005). Nowhere is this NPI more evident than in the digitally interconnected world where firms ranging from Apple and Samsung in the smartphone industry, Google and Facebook in online advertising, and Salesforce.com and Amazon in software-as-a-service, frequently launch new products to sustain corporate growth. Yet such NPIs also lead to environmental degradation through the increasing extraction of natural resources to produce new products and the potential challenge to recycling the hazardous waste of older versions (Norberg-Bohm, 2000).

Rather than focusing on market-oriented environmental activities and measures such as NPIs, scholarly attention linking environmental performance and financial performance has mostly used internal-oriented measures of environmental performance. Such measures indicate the impact of a firm's business activities on the natural environment rather than its market capabilities for adopting and using green technologies to improve firm profitability. The most common measures have been pollution emissions (e.g. Hart and Ahuja, 1996; Iwata and Okada, 2011; King and Lenox, 2001; Stanwick and Stanwick, 1998), toxic releases (e.g. Horváthová, 2012; Konar and Cohen, 2001; Patten, 1992), and internal environmental management policies (e.g. Darnall and Edwards, 2006; Lo et al., 2012; Yang et al., 2011). Although these measures have been very useful in assessing how internal green efficiency can lead to financial performance in the long-run, they do not capture a firm's market capabilities which can affect both its short-term and long-term financial performance.