

**PERSPECTIVES ON INNOVATIONS  
MANAGEMENT – ENVIRONMENTAL,  
SOCIAL AND PUBLIC SECTOR  
INNOVATIONS**

**Edited by  
Krzysztof Klincewicz  
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## From the Editors

Inventive activities and the diffusion of innovations usually result from collective efforts and their social aspects deserve particular attention. The 2nd issue of JEMI in 2014 explores a diversity of approaches to innovations, emphasizing the importance of relatively novel theoretical perspectives on environmental technologies, innovations in services and the public sector innovativeness. The issue offers extensive literature reviews, encompassing also studies based on qualitative research methods.

The first article concerns the importance of intellectual property rights (IPR) in global environmental technology markets. Patents, copyrights and trade secrets play an important role in promoting the development and diffusion of innovations. They are particularly significant in the international context, including developing countries. Countries need to take urgent actions to enhance efforts to mitigate the climate change and adapt to its adverse effects, and the development and diffusion of relevant innovations is critical to this endeavor. Government intervention might be needed to overcome the risk aversion and achieve the economies of scale. The article offers an extensive literature overview, presenting factors contributing to the diffusion of environmentally sound technologies. While identifying foreign direct investments (FDI) and licensing as important diffusion channels, the author points to the importance of absorptive capacities of host countries. There is an urgent need to build strong national innovations systems in order to benefit from the opportunities offered by environmental innovations, while adequate national IPR regulations contribute to the increased availability and adoption of environmental technologies.

Another article related to environmentally sound technologies focuses on the technology development process, sources of innovations and new product ideas. It highlights the role of customers and competitors as sources of inspiration for new technologies, exploring the concepts of user-driven innovations, competitive benchmarking and imitation of products or technological approaches. The study, based on in-depth interviews with a large sample of Polish technological companies, attempts to explain how companies can achieve uniqueness by differentiating own products from the already available alternatives and by listening to the voice of end users.

The third article concerns entrepreneurial opportunities in renewable energy markets, based on the example of wind generation technologies and three large economies: Brazil, China and South Africa. The author identifies

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positive and negative factors, affecting the development of wind energy businesses in the respective countries and outlines attractiveness of the analyzed markets.

The fourth article presents characteristics of intrapreneurs in scale-intensive professional service firms. This qualitative study involved companies from Norway, representing large-scale operations, reliant on specialist knowledge: financial sector, banking, insurance, telecom and logistics. It offers new insights into sources of innovativeness in the service sector. Altruistic service innovations are often driven by professional standards and norms, which are internalized by specialists working at the service firms, and thus contradict the focus on service standardization and repetitiveness, typical for scale-intensive firms. These professionals resort to autonomy and networking when developing new services, and their efforts turn out to be beneficial to their employing organizations.

The following paper discusses the experiences of entrepreneurs, acting as contractors delivering specialist services to municipalities. It explores the experiences of Finnish business enterprises involved in the delivery of social services. By analyzing the entrepreneurs' interactions with municipalities, the authors uncover the challenges of cooperation and dialogue, strengthened by the mutual interdependence accompanied by the imbalance of power, with municipalities having significantly more influence than their contractors. This imbalance might limit entrepreneurial perspectives, as business organizations primarily need to compete for the acceptance of their public sector clients instead of focusing on satisfying the expectations of the end users of their services.

The final article in this issue explores the concept of the middle income trap in relation to the innovativeness of national economy. This economic scenario concerns national economies which develop up to a certain level, considered as the 'middle income' in comparison to the most advanced countries, and subsequently they experience a stagnation of economic growth, not being able to exit the 'trap'. The provided literature overview presents examples from countries suffering from the phenomenon, but also cases of economies that have successfully avoided these risks. The authors apply the theoretical model to Poland, discussing the desirable mechanisms of economic development. They highlight the critical role of public policies in stimulating the innovativeness as an important factor, contributing to the sustainable economic growth.

Readers of this JEMI issue will certainly benefit from the variety of views and combination of theoretical perspectives with rigorous empirical studies, uncovering new facets of innovation management. We would like to express our gratitude to the Authors, who offered important scientific contributions

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included in the journal. This project would never be successful without the invaluable inputs from our Reviewers, who offered constructive feedback, critical comments and suggestions for improvement, stimulating the research excellence. We hope that the readers will find this issue of JEMI inspiring for their own research and exploring the multidimensional discipline of innovation management.

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# Innovation and Technology Dissemination in Clean Technology Markets and the Developing World: The Role of Trade, Intellectual Property Rights, and Uncertainty

*Kristina M. Lybecker\**

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## **Abstract**

*Innovation is an inherently risky and uncertain process. Many of the broader challenges to innovation in general are both mirrored and exaggerated in clean technology innovation. The development of environmental technologies is further complicated by the public goods nature of knowledge, environmental externalities, and uncertainty. This study on clean technology focuses on recent work on the role of uncertainty, the participation of emerging and developing nations, the controversy surrounding intellectual property rights, and the variety of market actors and strategies in place. The paper also considers the policy instruments that are available, the cost, benefits and consequences of their use. As scholars continue to analyze when, where, why and how clean technology innovations are developed and adopted, it is essential that government policymakers aim to reduce uncertainty and risk, incentivize innovation with effective intellectual property rights, and foster transparency in the market. This continues to be a field of increasing future importance, and a rich area for continued academic study and analysis. Consumers, government policymakers and innovators would all benefit from a greater understanding of the process of technological change in the development, diffusion and financing of clean technologies.*

**Keywords:** *clean technology, environmental innovation, innovation policy, barriers to innovation, developing countries.*

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## **INTRODUCTION**

Innovation is an inherently risky and uncertain process. Many of the broader challenges to innovation in general are both mirrored and exaggerated in clean

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technology innovation.<sup>1</sup> The four primary challenges for such innovation are externalities, uncertainty, asymmetric information, and market power. Clean technology is characterized by two market failures: the public goods nature of knowledge and environmental externalities. In addition, uncertainty regarding the qualities of the innovation, as well as future prices of inputs and substitutes will complicate the development and adoption processes. Ultimately, uncertainty and changing regulations may both encourage and inhibit clean technology innovation, providing policymakers with a critical and challenging role in the process.

Innovation is best encouraged with market forces and incentives. However, in the case of environmental technologies, the presence of dual externalities inhibits the innovative process (Hall and Helmers, 2010). The combination of knowledge spillovers from research and development efforts and the public goods nature of these technologies provide a clear case for government intervention and policy (Popp, Newell and Jaffe, 2009; Hall and Helmers, 2010; Popp, 2010; Popp, 2012). Without effective public policy, markets alone are not likely to provide sufficient incentives for the development of clean technology innovations. Markets for new technologies are frequently characterized by uncertainty surrounding adoption, the impact on markets for competing and complementary products, application of the existing legal system, enforcement of intellectual property rights, and acceptance in international markets (Groba and Breitschopf, 2013; Kalamova, Johnstone and Haščič, 2013; Hall and Helmers, 2010; Popp, 2010; Heal, 2009). Innovative industries would benefit from greater predictability in each of these areas (Popp, Newell and Jaffe, 2009; Johnson and Lybecker, 2009a, 2009b, 2009c, Popp, 2010).

The market for clean technologies is characterized by significant uncertainties and risks, making the transfer of environmental technologies particularly difficult. As described here this is especially true for developing nations and presents distinct challenges for their adoption of clean technology innovation. While market forces and market failures shape the environmental

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1 In the context of this study, the terms “environmental technology”, “green technology” and “clean technology” are all used interchangeably. Admittedly there are differences between them, though this author could not find consistent, agreed upon definitions that clarify the subtle distinctions between the terms. Given that this is a literature review that draws upon (and quotes) the work of numerous other authors who each elect to use different terminologies, each of the terms appears in this paper. While it is regrettable that more precise language is not used here, it is because the studies discussed do not use more uniform language as it could not be applied. The U.S. Environmental Protection Agency (EPA) defines “environmental technology” as follows: “Environmental technology is an all-inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from or prevent them from entering the environment. Environmental technology is utilized in many configurations and is applied to many environmental problems, including devices and systems used in environmental programs to duplicate environmental conditions for test purposes or to control, prevent, treat, or remediate waste in process discharges (e.g., emissions, effluents) or the ambient environment. Usually, this term will apply to hardware-based systems; however, it can also apply to general methods or techniques used for pollution prevention, source reduction, or containment of contamination to prevent further movement of the contaminants.” (U.S. EPA, 2014, <http://www.epa.gov/quality/envtech.html>).



technology sector, political and cultural forces further complicate every aspect. In particular, it is important to recognize the role of regulation in the development of environmental innovation. As described in a review of earlier literature, environmental regulation may result in cost-saving innovation if a) the fixed costs of innovation are lower than compliance plus production, or b) spillover effects make innovation strategically a bad idea for the firm but a good idea for the society, or c) regulation helps to fix incentive problems between managers and owners, or d) regulation helps to clear information flow (Johnson and Lybecker, 2009a). Nonetheless, a number of clear conclusions can be drawn, as outlined above and discussed in further detail below.

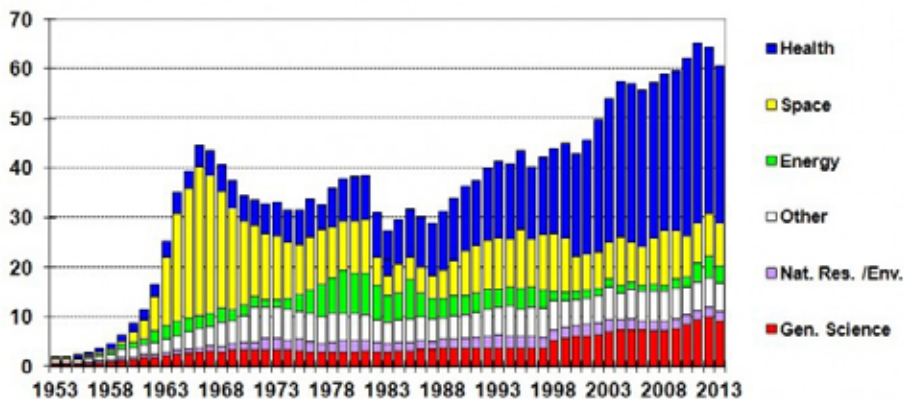
This paper summarizes some of the key results from an updated literature review that tracks and further builds upon three 2009 literature reviews on clean technologies (Johnson and Lybecker, 2009a, 2009b, 2009c). The earlier studies examined the challenges surrounding three aspects of clean technology: its development, dissemination and financing. As in this review, they looked at technology innovation, transfer, and use, and in doing so also considered the types of factors that determine a country's success in creating a national system of innovation and technology dissemination. This new literature review builds upon those papers, focusing on the most recent contributions to the literature.<sup>2</sup> The following sections focus on enabling environmental innovation, technology dissemination and use, the role of intellectual property rights, and the specific challenges facing developing countries. The paper concludes with a description of key findings and a discussion of the importance of balance in environmental policymaking.

## **ENABLING ENVIRONMENTAL INNOVATION, TECHNOLOGY DISSEMINATION, AND USE**

Spending on research and development (R&D) by the U.S. government in the energy sector continues to be relatively small, when compared to other industries and sectors, though it has increased in recent years. Given this, private investment is and will continue to be critical to funding the research and development that results in environmental innovations. Figure 1 plots nondefense research and development spending for the United States, 1953-2013. While the experience of the United States is not universal, it is illustrative since the United States is the source of the greatest share of these innovations. The American Association for the Advancement of Science reports that in 2012 the United States spent \$4.36 billion on non-defense energy research, double the amount from a decade ago. While energy has

<sup>2</sup> Given that this paper aims to update the collection of three 2009 literature reviews, the focus is primarily on papers written since 2009 in the fields of economics and innovation.

been the fastest-growing category of research and development spending, when adjusted for inflation, it continues to comprise a much smaller portion of the federal budget than health or space research (Plumer, 2013). In addition, since fossil fuels receive close to one-quarter of the federal funding it is perhaps not surprising that there is a dearth of research on funding for clean technology innovation.



**Figure 1.** Federal R&D Outlays for the United States, billions of USD

Source: Plumer (2013).

Environmental innovation is characterized by dual externalities: (1) private underinvestment in research and development (R&D) due to knowledge spillovers and (2) environmental externalities.<sup>3</sup> While each externality presents significant challenges, the two externalities interact which compounds the problem. Moreover, both externalities operate on a global scale, further complicating the issues of regulation, mitigation and cooperation.

In both the development and the diffusion of environmental technology, the challenges surrounding uncertainty loom large. From beginning to end environmental innovation is characterized by uncertainty: uncertainty about

<sup>3</sup> The dual externalities that characterize environmental innovation are beautifully described by Hall and Helmers (2010). "First, environmental pollution is a textbook example of an activity producing a negative externality, i.e., 'an unintended consequence of market decisions which affect individuals other than the decision maker' as the social costs associated with pollution exceed private costs. Second, knowledge required for the development of (green) technologies is characterized by non-excludability, i.e., other actors cannot be excluded from accessing and using the knowledge produced by the original source and non-rivalry or non-exhaustibility of knowledge, i.e., if one actor uses some specific knowledge, the value of its use is not reduced by other actors' also using it. Due to these characteristics, 'firms can acquire information created by others without paying for that information in a market transaction, and the creators (or current owners) of the information have no effective recourse, under prevailing laws, if other firms utilize information so acquired'. In this sense, incomplete appropriability of knowledge represents an externality and thus leads to a gap between private and social returns to innovation." (Hall and Helmers, 2010, p.4).

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actual costs, uncertainty about the end-product of a research process, uncertainty about the reception by the market, uncertainty about the ability to appropriate the returns to research while competitors try to produce similar results, uncertainty about current and future policies and regulations, uncertainty surrounding the pricing of competing as well as complementary goods, and uncertainty about regulatory impacts on the research process and end-result. This is exacerbated by the uncertainty surrounding the rate of innovation itself which complicates any estimate of global climate change, making it difficult to substantiate the reasons that justify further research funding. One of the key challenges, therefore, is for governments to reduce such uncertainties and create a stable and predictable regulatory and market environment that enhances innovation, and the development, diffusion and dissemination of technology.

Technological innovations are of minimal value if the society fails to adopt them and make use of them. As noted by Popp, Newell and Jaffe (2010), little scholarship has focused specifically on the international transfer of environmental technologies and that gap in the literature remains today. However, beyond the transfer of these technologies, diffusion and adoption are paramount to the ultimate usefulness of a new technology. It is not uncommon for a superior technology (in terms of performance and/or cost) to reach the market and fail to be widely adopted. Accordingly, it is important to examine the forces that contribute to the dissemination of technology.

Beyond the issues surrounding market and behavioral failures there are other factors that both facilitate and inhibit the diffusion of environmental technologies. While much work remains to be done in this area, existing work can illuminate some of the factors that matter to the diffusion and adoption of environmental technologies. Consider Table 1 below which provides a summary of the key research on the cost-effectiveness of past U.S. energy-efficiency programs. Within the table, Popp, Newell and Jaffe (2010) identify the barriers to adoption as well as the key results from each paper.

**Table 1.** Barriers to adoption of environmentally-friendly technologies

Article	Technology	Barrier(s) to Adoption	Data	Key Results
Jaffe and Stavins (1995)	Thermal insulation	Up-front costs matter more	US residential construction 1979-88	Lower adoption costs 3x more likely to encourage adoption than increased energy costs
Hassett and Metcalf (1995)	Residential energy conservation	Up-front costs matter more	US households 1979-1981	Installation cost savings via tax credits encourage adoption
Kemp (1997)	Thermal home insulation	Inadequate information	Netherlands households	Government subsidies do not lead to adoption. Epidemic model fits data better than rational choice model.
Metcalf and Hassett (1999)	Attic insulation	Inadequate information	U.S. Residential Energy Consumption Survey, 1984, 1987, & 1990	Actual energy savings are less than promised
Reppelin-Hill (1999)	Clean steel technologies	Import barriers	Adoption of electric arc furnace in 30 countries, 1970-1994	Import barriers restrain the adoption from foreign-produced goods
Howarth et al. (2000)	Energy-saving technology (efficient lighting equipment)	Agency decision making problems, Inadequate information	Green Lights and Energy Star programs	Voluntary programs lead to wider adoption in private firms. Inadequate information inhibits adoption.
Nijkamp et al. (2001)	Energy-efficient technology	Economic barriers - alternative investment - low energy costs - capital replacement	Survey of Dutch firms	Economic barriers affect adoption more than financial and uncertainty barriers
Mulder et al. (2003)	Energy efficiency technologies	Complementarities among technologies	N/A	Complementarities and learning-by-doing process impede adoption
Anderson and Newell (2004)	Firm-level adoption of energy-saving projects recommended by energy audits	Inadequate information on technologies, Initial costs and payback years of adoption	U.S. Department of Energy's Industrial Assessment Centers database, 1981-2000	Firms adopt additional projects with improved information. Up-front costs have 40% greater effect than energy costs.

Source: Popp, Newell and Jaffe (2010, p.70).

It is important to recognize that the dissemination of technology may depend on achieving an efficient scale of production, so as to reduce per-unit production costs and facilitate adoption. Given that a majority of environmental innovations are subject to economies of scale or increasing returns to scale, greater levels of output will generate lower per-unit costs which may indicate that larger firms are better able to both develop and deliver environmental technologies. "This benefit associated with the overall scale of technology adoption has sometimes been referred to as 'dynamic increasing returns,' which may be generated by learning-by-using, learning-by-doing, or network externalities. Thus, just like the creation of the technology itself, information about the performance of a technology has an important public goods component." (Popp, Newell and Jaffe, 2010, p.4) Accordingly, Popp, Newell and Jaffe note that the value of an innovation to one individual/firm may be dependent on the number of other users who have adopted the innovation (Popp, Newell and Jaffe, 2010). Across countries and technologies, in the presence of economies of scale, users will benefit from an increasing number of other users.

Henderson and Newell (2010) explore the history of innovation in several industries that may hold lessons for the energy industry. They focus on industries that have experienced extraordinary rates of technological progress and draw out four themes believed to be particularly important to energy innovation. These are: sustained federal support for fundamental research over a long period of time; effective governance balancing public and private funding such that private resources are not crowded out; well-designed institutional mechanisms for effective technology transfer; and the critical importance of public funding for training the scientific and technical personnel who become the backbone of an innovation private sector. The importance of public funding is striking given the relatively low levels of existing funding. That is, "publicly funded energy research constitutes about 3 percent of the total federal R&D budget or less than 0.03 percent of gross domestic product." (Henderson and Newell, 2010, p.5) Notably energy R&D budgets have risen most recently and were dramatically increased under the American Recovery and Reinvestment Act which added \$14 billion in spending in 2009. In a description of the importance of slow and steady growth in R&D budgets, Popp (2010) describes the experience of the U.S. National Institutes of Health (NIH), as analyzed by Freeman and van Reenen (2009). The studies draw striking parallels between the fields of medicine and energy, focusing on the importance of allowing time for the development of young talent in the field.

Any analysis of the development and dissemination of environmental technologies is complicated by the variety of market entities involved in

environmental innovation: commercial and industrial firms, government organizations, academic institutions, non-governmental organizations, as well as combinations of all of these agents through partnerships and joint ventures. Their roles both support and complement the activities of traditional market actors. Research coordination agreements remedy market failures in the development and diffusion of environmental innovation, preventing duplicative R&D efforts. Partnerships and joint ventures allow clean technology firms to increase their presence in developing country markets.

Numerous studies conclude that an unambiguous ranking of policy instruments is not possible given the variety of factors that play into their valuation: the policymakers' preferences, perceived costs of environmental externalities, the innovator's ability to appropriate knowledge spillover benefits, and the state of technology, among others (Popp 2010, Borenstein 2011).

As previous studies have frequently concluded (Johnson, Lybecker, 2009c), the literature on financing environmental innovation is very limited and has little to offer in terms of the benefits of private versus public funding or the merits of one financing mechanism over another. The most effective mechanism will undoubtedly depend on the type of technology, the maturity of the market, competing technologies, the lifecycle stage of the technology, and the risk and uncertainty surrounding the development process. In this vein, Stewart, Kingsbury and Rudyk (2009) point to the need for a variety of new arrangements to generate public and private financing for climate technologies since there is no one-size-fits-all solution. Ultimately the best case scenario would encourage financing and remove barriers to entry while allowing the wisdom of the market to prevail and guide investment choices.

## **THE ROLE OF INTELLECTUAL PROPERTY RIGHTS**

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A majority of economists agree that strong intellectual property rights are an essential prerequisite to the development of environmental technologies (Hall, 2014; U.S. Chamber of Commerce, 2013; Mansfield, 1986). Moreover, the majority of economic studies indicate that intellectual property rights are not a barrier to the transfer of technology to developing countries, though the concern remains a prominent theme in the literature (for a review of this literature, see Copenhagen Economics 2010). Although the value of patents, and other forms of protection, varies across countries, across industries and across innovations, numerous studies have documented the reasons to encourage strong patent law (Moser 2013, Copenhagen Economics 2010, Hall and Helmers 2010, Mansfield 1986, among many others). The majority

of the studies examining environmental innovation focus on the effectiveness of patent protection rather than intellectual property rights in general or other forms such as trade secrets, trademarks, or copyrights. The other instruments are found to be much less important for technology transfer. While dissemination of environmental innovations is enhanced by stronger levels of patent protection, it is essential to acknowledge the necessity of complementary factors such as infrastructure, absorptive capacity, effective government policies and regulations, knowledge institutions, access to credit and venture capital, skilled human capital, and networks for research collaboration.

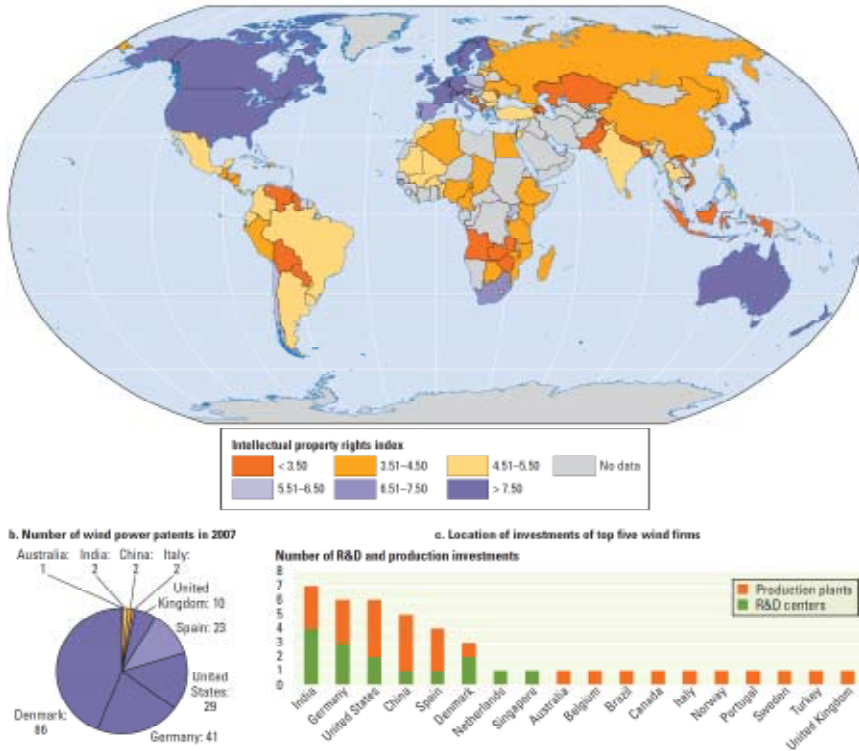
Theoretically the question of whether IPRs facilitate or inhibit technology transfer amounts to a trade-off between the potential of intellectual property rights enforcement raising the cost or limiting access to protected innovations against the potential for IPR protection to facilitate trade and foreign direct investment, which are themselves valuable means of technology transfer (Allan, Jaffe and Sin, 2014). However, rather than serve as a barrier there is evidence that inadequate intellectual property rights or weak enforcement of such rights are a barrier to technology transfer. A 2010 study by the World Bank examines precisely this issue in the context of renewable energy production.

*“When enforcement of intellectual property rights (IPR) is perceived to be weak, foreign firms may not be willing to license their most sophisticated technologies, for fear that competitors will use it—which is the situation for wind equipment in China. Weak IPR enforcement also discourages foreign subsidiaries from increasing the scale of their R&D activities and foreign venture capitalists from investing in promising domestic enterprises.” (World Bank, 2010, p.309)*

Consider Figure 2 below which maps the intellectual property rights performance of nations across the globe in the wind power industry. While Brazil, China<sup>4</sup>, India and Turkey have all received investments in local manufacturing and R&D, very few patents are registered in these nations presumably due to their weak IPR regimes (World Bank, 2010).<sup>5</sup> Alternatively, one could conclude that this is due to the lack of inventive capacity, necessary skills and knowledge within these nations.

4 Note that this reflects an overall increase in patenting in China (WIPO, 2013).

5 According to the World Bank (2010), the composition of the IPR performance measure is drawn from published patent data from U.S., Japanese, European, and international patent application databases, annual reports, and Web sites of Vestas, General Electric, Gamesa, Enercon, and Suzlon, as well as Dedigama 2009. They make a point of noting that a country's IPR score reflects its ranking according to an IPR index based on the strength of its intellectual property protection policies and their enforcement.



**Figure 2.** Middle-income countries are attracting investments from the top five wind equipment firms, but weak intellectual property rights constrain technology transfers and R&D capacity

Source: World Bank (2010, p.309).

According to the World Bank study, in the context of low-income countries, weak IPRs do not appear to be a barrier to the transfer of sophisticated climate-smart technologies. Clear, predictable and well-enforced IP rights can facilitate technology transfers to these nations. While the World Bank’s World Development Report emphasizes the importance of other forms of IP protection, strong trade secret protection is also critical. It has been shown, in particular, to be relevant to the growth of small businesses, which empirical studies have shown to play a substantial role in innovation (Lerner 1995; Lemley 2008). Given that trade secrets are significantly less expensive to obtain, maintain and enforce relative to patents, small businesses rely disproportionately on trade secrets to protect their innovations. Due to the risks of industrial espionage, this is particularly true of innovative small businesses in high technology sectors. In the words of Stanford Law School



Professor Mark Lemley, “Trade secret law develops as a substitute for the physical and contractual restrictions those companies would otherwise impose in an effort to prevent a competitor from acquiring their information” (Lemley, 2008, p.335). Strong trade secret protection provides employers with a degree of freedom otherwise unavailable to them. That is, it allows firms to seek out and hire employees based on their skills rather than loyalty. Employees are assigned responsibilities where their talents are the most beneficial, instead of making those decisions based on the risks of compromising confidential information.

The security of trade secrets and the strength of trade secret protection will also influence a firm’s investment decisions. The U.S. Chamber of Commerce study, cited above, notes that a lack of trade secret protection or ineffective enforcement of relevant laws may lead companies to “make excessive investments in ensuring physical protection for their secrets, rather than in innovation” (U.S. Chamber of Commerce, 2013, p.6). These findings are also evident in the empirical work of Png (2012), who analyzes the link between the historical evolution of trade secret protection in the United States and the corresponding levels of R&D investment. Png finds that greater trade secret protection is correlated with greater R&D investments in R&D-intensive industries.

Finally, the work of Kanwar and Evenson (2009) examines the relationship between higher levels of IP protection and R&D spending in a sample of 44 countries over the period 1981-2000. They fail to find a robust correlation between R&D intensity (R&D expenditure as a percentage of GDP) and IP strength. Hall and Helmers conclude that it is impossible to draw clear conclusions from the literature on the link between intellectual property rights and domestic development. “While there exists some coherent evidence pointing to the importance of IPRs for domestic innovation, especially in certain industries, there is also convincing (historical) evidence questioning the robustness of this relationship.” (Hall and Helmers, 2010, p.17) By contrast, Park and Lippoldt (2008) do find a positive correlation between the strength of IPRs and the number of patent applications by developing countries in addition to R&D expenditure as a share of GDP. They conclude that stronger IP rights are beneficial to domestic development of technology in developing nations and, as such, their findings appear to be more in line with the overwhelming direction of the economic literature on the topic.

An extensive review of the literature on patent protection is provided by Hall and Helmers (2010), in which they conclude that stronger intellectual property rights encourage innovation in general. Moreover, IP protection seems to facilitate technology transfer to middle-income countries with sufficient absorptive capacity. Within the clean technology sector, there is an

extensive variety of different technologies available for emission reductions. In addition, a significant proportion of these innovations as well as the underlying technologies are in the public domain. It is expected that the majority of technological progress will come from incremental improvements of existing off-patent technologies, especially as technologies are adapted for local conditions. Although these incremental innovations may be patentable, there is plenty of room in the market scope for competing technologies and which limits the role specific patents may play for technological progress in this area (Hall and Helmers, 2010; Johnson and Lybecker, 2009a).

### **THE SPECIFIC CHALLENGES FACED BY DEVELOPING COUNTRIES**

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While there is a small literature focused on the link between intellectual property rights and the development and dissemination of environmental innovations, very few studies examine the experience of developing countries (Popp and Newell, 2009). However, this is a very important issue since there is so much debate over the role of intellectual property in facilitating or inhibiting the adoption of clean technologies in developing countries. A focus on developing countries is critical because as described by Popp (2012), in 2010, 75% of the growth in CO<sub>2</sub> emissions came from non-OECD countries, and the emissions from these nations are projected to be double those of OECD nations by 2035. Given this, the design of policies that facilitate the transfer of clean technologies to developing nations has been a clear focus in climate negotiations.

Environmental innovation continues to be concentrated in developed nations. Accordingly, the lion's share of patents for these technologies is issued by the patent offices of industrialized economies. Table 2 below shows the share of climate patented inventions by country, for the period 2007 through 2009.<sup>6</sup> The United States, Germany and Japan clearly dominate this sector, though China does make the top ten list.

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<sup>6</sup> These calculations are based on PATSTAT data. The authors note that international patents refer to claimed priorities invented in the country as a share of world claimed priorities. Mean of 25 climate technology shares.

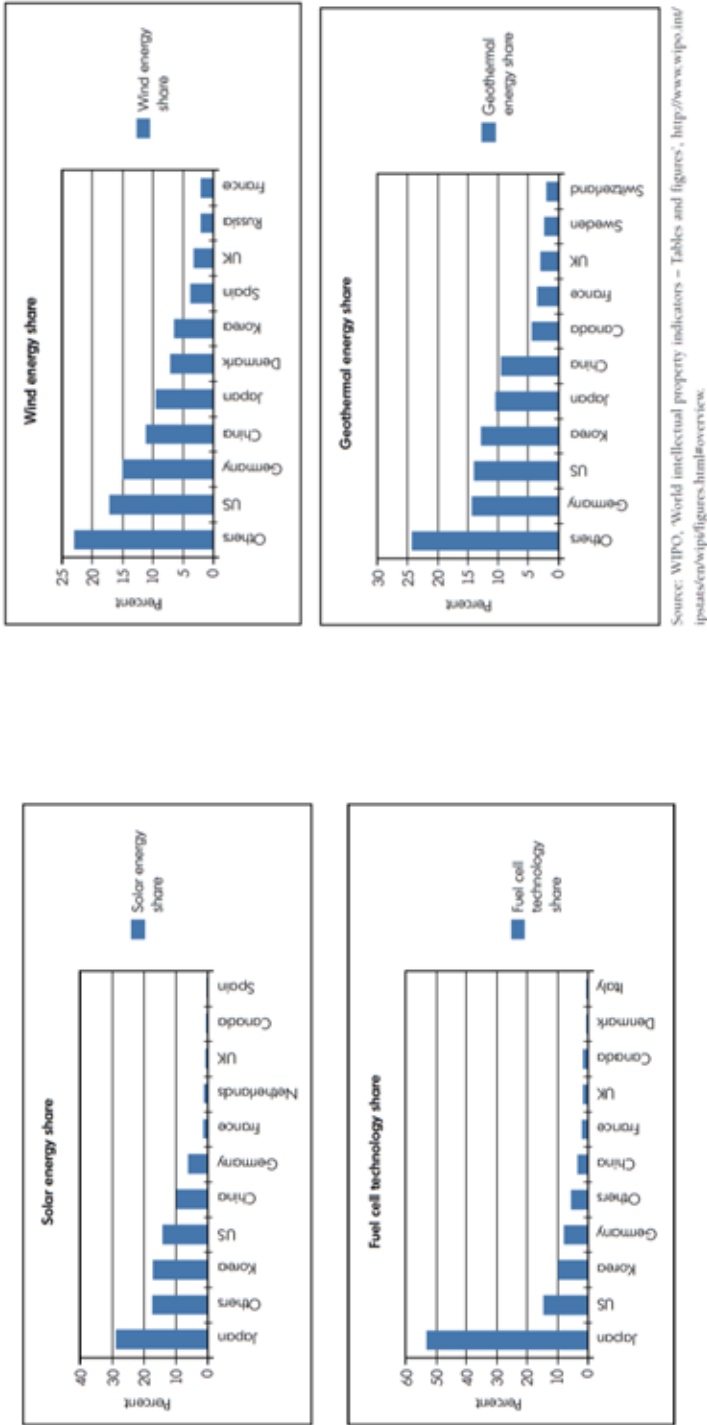
**Table 2.** Top ten inventor countries in climate innovation and selected emerging economies

Rank	Country	Share of world climate patented inventions (2007-2009)
1	USA	19.0%
2	Germany	18.7%
3	Japan	17.5%
4	South Korea	5.6%
5	France	4.8%
6	UK	3.6%
7	Italy	3.4%
8	Canada	2.7%
9	China	1.7%
10	The Netherlands	1.6%
<b>Total Top 10</b>		<b>78.6%</b>
18	Taiwan, China	0.9%
21	India	0.7%
22	Russia	0.5%
25	Brazil	0.4%
31	South Africa	0.2%

Source: Glachant, Dussaux, Ménière, and Dechezleprêtre (2013, p.5).

Figure 3 below takes a closer look at environmental innovation, by specific technology.<sup>7</sup> Again, the most innovative nations listed above are among the most active in each of the technologies identified in figure. Figure 3 identifies the share of patent applications in energy-related technologies between 2006 and 2010. The graphs display data for solar energy, fuel cell technology, wind energy, and geothermal energy.

<sup>7</sup> According to de Plooy (2013), the data is taken from the World Intellectual Property Organization (WIPO), specifically 'World intellectual property indicators – Tables and figures'. <http://www.wipo.int/ipstats/en/wipi/figures.html#overview>.



**Figure 3.** Share of patent applications in energy-related technologies for the top origins (2006-2010)

Source: De Plooy (2013).

Recognizing that the majority of environmental innovation takes place in industrialized nations, it is valuable to examine what should be done to expand the rate of environmental research and development in all nations. In Table 3, the World Bank presents a summary of the key national policy priorities needed to facilitate environmental innovation, by national income level. These recommendations address a number of the challenges and problems surrounding environmental innovation: dual externalities, uncertainty, insufficient incentives, government regulation, and policy interventions (Groba and Breitschopf, 2013; Kalamova, Johnstone and Hašičič, 2013; Popp, 2012; Popp, 2010, Hall and Helmers, 2010; Popp, Newell and Jaffe, 2009; Heal, 2009; Johnson and Lybecker, 2009a, 2009b, 2009c).

**Table 3.** Key national policy priorities for innovation in countries of different income levels

Countries	Main Policies
Low-income	<ul style="list-style-type: none"> <li>Invest in engineering, design, and management skills</li> <li>Increase funding to research institutions for adaptation research, development, demonstration, and diffusion</li> <li>Increase links between academic and research institutions, the private sector, and public planning agencies</li> <li>Introduce subsidies for adopting adaptation technologies</li> <li>Improve the business environment</li> <li>Import outside knowledge and technology whenever possible</li> </ul>
Middle-income	<ul style="list-style-type: none"> <li>Introduce climate- smart standards</li> <li>Create incentives for imports of mitigation technologies and, in rapidly industrializing countries, create long- term conditions for local production</li> <li>Create incentives for climate- smart venture capital in rapidly industrializing countries with a critical density of innovation n(such as China and India)</li> <li>Improve the business environment</li> <li>Strengthen the intellectual property rights regime</li> <li>Facilitate climate- smart foreign direct investment</li> <li>Increase links between academic and research institutions, the private sector, and public planning agencies</li> </ul>
High-income	<ul style="list-style-type: none"> <li>Introduce climate- smart performance standards and carbon pricing</li> <li>Increase mitigation and adaptation innovation and diffusion through subsidies, prizes, venture capital incentives, and policies to encourage collaboration among firms and other sources and users of climate- smart innovation</li> <li>Assist developing countries in enhancing their technological absorptive and innovative capacities</li> <li>Support transfers of know- how and technologies to developing countries</li> <li>Support middle- income- country participation in long- term energy RDD&amp;D projects</li> <li>Share climate change–related data with developing countries</li> </ul>
All countries	<ul style="list-style-type: none"> <li>Remove barriers to trade in climate- smart technologies</li> <li>Remove subsidies to high- carbon technologies</li> <li>Redefine knowledge- based institutions, especially universities, as loci of the diffusion of low- carbon practices</li> </ul>

Source: World Bank (2010, p.303).

The 2010 World Development Report notes that stronger intellectual property rights should be a priority for all but the lowest-income nations. In addition, improvements in the business environment and greater funding for research institutions are widely recommended. Finally, innovation is universally enhanced by the removal of trade barriers in environmental technology sectors (World Bank, 2008a, 2008b; World Trade Organization, 2014). The World Trade Organization (WTO) describes this as a Win-Win-Win, pointing to the importance of trade negotiations in facilitating “the reduction or elimination of tariff and non-tariff barriers (NTBs). Domestic purchasers, including business and governments at all levels, will be able to acquire environmental technologies at lower costs. In addition, liberalizing trade in environmental goods will encourage the use of environmental technologies, which can in turn stimulate innovation and technology transfer.” (World Trade Organization, 2014, p.1) The potential impact of removing trade barriers is striking. As estimated by the World Bank, “Eliminating tariff and nontariff barriers on clean energy technologies—such as cleaner coal, wind power, solar photovoltaics, and energy- efficient lighting—could increase their traded volume by 14 percent in the 18 developing countries that emit high levels of greenhouse gases.” (World Bank, 2010, p.308)<sup>8</sup>

In an examination of six energy sectors (wind, solar, photovoltaic, concentrated solar power, biomass-to-electricity, cleaner coal, and carbon capture), a 2009 study by UK think tank Chatham House finds that most patenting activity is concentrated in large, developed economies.<sup>9</sup> Of the six technology sectors considered, they found that for all but one of the top ten geographic locations of patent assignees or owners are OECD economies. The United States tops the list, followed by Japan, Germany, China, Korea,

8 The study lists these countries as: Argentina, Bangladesh, Brazil, Chile, China, Colombia, Arab republic of Egypt, India, Indonesia, Kazakhstan, Malaysia, Mexico, Nigeria, the Philippines, South Africa, Thailand, República Bolivariana de Venezuela, and Zambia.

9 It is important to note that the convention of utilizing patents as a measure of innovation is not without criticism. In a review of the value of patents as measures of innovation, Archibugi and Pianta (1996) describe both their advantages and disadvantages. Advantages: “They are a direct outcome of the inventive process, and more specifically of those inventions which are expected to have a commercial impact. They are a particularly appropriate indicator for capturing the proprietary and competitive dimension of technological change. Because obtaining patent protection is time-consuming and costly, it is likely that applications are filed for those inventions which, on average, are expected to provide benefits that outweigh these costs. Patents are broken down by technical fields and thus provide information not only on the rate of inventive activity, but also on its direction. Patent statistics are available in large numbers and for a very long time series. Patents are public documents. All information, including patentees’ names, is not covered by statistical confidentiality.” Disadvantages: “Not all inventions are technically patentable. This is the case of software, which is generally legally protected by copyright. Not all inventions are patented. Firms sometimes protect their innovations with alternative methods, notably industrial secrecy. Firms have a different propensity to patent in their domestic market and in foreign countries, which largely depends on their expectations for exploiting their inventions commercially. In each national patent office, there are many more applications from domestic inventors than from foreigners. Although there are international patent agreements among most industrial countries, each national patent office has its own institutional characteristics, which affect the costs, length and effectiveness of the protection accorded. In turn, this affects the interest of inventors in applying for patent protection.” (Archibugi and Pianta, 1996, pp.452-454) Notably, while it is a convenient way to measure innovation performance and technology trends, patent citation lags utilized to distinguish between incremental and radical innovations (quality) have historically been too short.

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and the UK (Lee, Lliev, and Preston, 2009). In line with the findings of Lanjouw and Mody (1996), Dechezleprêtre *et al.* (2011), and Popp (2012), the technologies of greatest use, measured by the percentage of patents that have corresponding applications in other countries, are almost exclusively from developed economies.

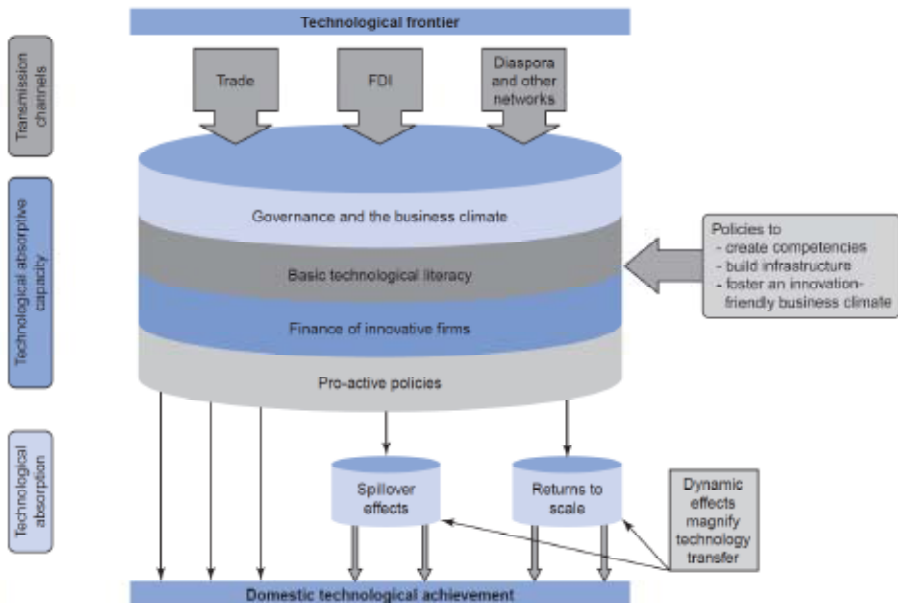
While the majority of environmental innovation emerges in developed countries, some developing countries are also making strides in this direction. The limited evidence that exists indicates that there is significant heterogeneity in innovative capacity across developing nations, and that countries fall into one of two groups (Hall and Helmers 2010). Emerging economies, primarily Brazil, China, India and Mexico, have begun to develop environmental technologies and gain a share in the global market for renewable energy technologies. In contrast, a larger group of less-developed countries have yet to make such progress. As in the case of the broader literature on technology development and dissemination, “the evidence on clean technologies suggests that a strengthening of IPRs for the group of emerging economies will most likely have a positive impact on the domestic development of technology and its transfer from developed economies. The available evidence does not allow drawing a similar conclusion in the case of less developed countries.” (Hall and Helmers, 2010, p.29) While stronger patents and IP rights encourage technology transfer to developing nations, through imports, FDI and licensing, they appear to have a negligible effect on technology transfer to the lowest income nations.

For many developing nations, foreign direct investment (FDI) is a principal channel of technology transfer. Hall and Helmers evaluate the existing literature on the correlation between intellectual property rights enforcement and foreign direct investment (FDI). They write, “Considering the extensive evidence on FDI serving as a channel for technology transfer, this implies a positive relation between IPR enforcement and technology transfer through the channel of FDI. However, the literature also points to other important factors in attracting FDI, such as country risk and the availability of low-cost highly-skilled labor” (Hall and Helmers, 2010, p.499). In another study, Park and Lippoldt (2008) examine the relationship between the strength of intellectual property rights protection and technology transfer as proxied by inward FDI stocks and imports of goods and services. They analyze a sample of 120 countries over the 1990-2005 period and find that strong IP rights induce foreigners to transfer new technologies. The authors also find a positive correlation between the strength of IPRs and the number of patent applications by developing countries in addition to R&D expenditure as a share of GDP. They conclude that stronger IP rights are beneficial to domestic development of technology in developing nations.

Beyond FDI as a channel for technology transfer, several private initiatives are also in place that facilitate the transfer of environmental innovations. The Eco-Patent Commons were established in 2008 by IBM, Nokia, Sony and Pitney Bowes, coordinated by the World Business Council for Sustainable Development (WBCSD), and have since been joined by Bosch, DuPont, Xerox, Ricoh, Taisei, Dow Chemical, Fuji-Xerox, Hewlett Packard and Hitachi. Under this initiative firms “pledge” patents to the commons which are then available to third parties without charge, though the patent rights remain with the innovative firm. According to the Eco-Patent Commons website, the commons were “founded on the commitment that anyone who wants to bring environmental benefits to market can use these patents to protect the environment and enable collaboration between businesses that foster innovations. The objectives of the Eco-Patent Commons are: To provide an avenue by which innovations and solutions may be easily shared to accelerate and facilitate implementation to protect the environment and perhaps lead to further innovation; To promote and encourage cooperation and collaboration between businesses that pledge patents and potential users to foster further joint innovations and the advancement and development of solutions that benefit the environment.” (World Business Council) Since the launch in January 2008, more than 100 patents have been pledged by thirteen companies.

Clearly exposure to new technologies is not sufficient for diffusion of the innovation. In order to bridge the gap between exposure and adoption an economy must possess an appropriate level of absorptive capacity (Png, 2012; Dechezleprêtre, Glachant, Hašič, Johnstone, and Ménière, 2011; World Bank, 2008a, among others). Figure 4 below describes the process, as depicted by the World Bank (2008a). This study creates an index of absorptive capacity, drawing on data on education, governance and macroeconomic stability. “Absorptive capacity depends on the overall macroeconomic and governance environment, which influences the willingness of entrepreneurs to take risks on new and new-to-the-market technologies; and the level of basic technological literacy and advanced skills in the population, which determines a country’s capacity to undertake the research necessary to understand, implement, and adapt them.” (World Bank, 2008a, p.25) Beyond these elements, the study notes that access to financing is also a key component to the absorption of new technologies.





**Figure 4.** Domestic absorptive capacity both conditions and attracts external flows

Source: World Bank (2008a, p.25).

While absorptive capacity is a necessary condition, it must be complemented by effective IP protection. In a review of the empirical evidence on intellectual property protection and technology transfer, Hall and Helmers examine the importance of both of these elements.

*“[Absorptive capacity] facilitates technology transfer through licensing, which is the channel involving the most disembodied technology transfer external to the multinational company ... absorptive capacity is necessary to make use of and learn from imported technology, but [the country is] more likely to receive the technology if the foreign firm from which it comes feels that its ownership rights will be protected. If the absorptive capacity is present but IP protection is weak foreign firms will tend to establish distribution rather than manufacturing subsidiaries” (Hall and Helmers, 2010, p.12).*

In addition, technology transfer is enhanced by openness to trade. Dechezleprêtre, Glachant, Haščič, Johnstone and Ménière (2011) demonstrate that the dissemination of information is more likely if a nation is more engaged in international trade. However, they also show that technology

transfer is less likely to occur if the nation is already pursuing similar projects domestically.

While the majority of evidence on absorptive capacity focuses on the role it plays in facilitating technology transfer, there is limited evidence that greater absorptive capacity also enhances innovation. Admittedly, for most developing nations the focus is on attracting technology transfer or facilitating adaptive R&D rather than innovation. As noted by Popp (2012) and others, the knowledge spillovers generated by technology transfers are very important. "For technology transfer, policy must manage a careful balancing act, so as to promote knowledge spillovers from technology transfer to the extent possible without discouraging investors from coming into the country at all." (Popp, 2012, p.34) Dechezleprêtre, Glachant, Haščič, Johnstone and Ménière (2011) find that countries with greater technological capacity are more equipped to develop their own innovations. This is particularly true in developing nations which also benefit from the reduced need for technology transfer from abroad (Popp, 2012). In a study of technology transfer to developing nations, Haščič and Johnstone use data from patent applications and find that increases in absorptive capacity increase wind energy patent applications filed in developing nations by developed country innovators (Haščič and Johnstone 2011). They go on to demonstrate that absorptive capacity is more important than traditional technology transfer policies, as well as the Clean Development Mechanism (CDM), a finding that has been shown in numerous other studies (World Bank, 2008a; Png, 2012; Dechezleprêtre, Glachant, Haščič, Johnstone, and Ménière, 2011, among others).

In their current form, the legal obligations of technology transfer (from developed to developing nations) under the UNFCCC/Kyoto framework are both vague and non-binding. Van Hoorebeek and Onzivu (2010) describe the Clean Development Mechanism (CDM) of the Kyoto Protocol not as a mechanism for technology transfer, but rather as a mechanism to facilitate investing in sustainable development projects for Certified Emission Reduction Credits (CER) in developing countries. While firms have an incentive to engage in the CDM since it is frequently less costly to achieve required emission reductions in developing countries, the benefits are more far-reaching. Costa, Doranova and Eenhoorn (2008) present case study evidence from Dutch waste management firms which shows that even firms exempt from emission limits pursue CDM projects.

In a deeper exploration of the benefits of the CDM, Dechezleprêtre, Glachant, and Ménière (2008) consider whether projects transfer 'hardware' (equipment and machinery) or 'software' (knowledge, skills and know-how). The study includes 644 CDM projects registered with the Executive Board of the UNFCCC, with 279 projects (43%) involving technology transfer. Most

of the projects transfer knowledge (101) or knowledge and equipment (121), as opposed to just equipment (57). Larger projects and those involving a subsidiary of a developed country company are more likely to involve technology transfers. While the great majority of projects (73%) are concentrated in four countries, Brazil, China, India and Mexico, there is significant variety in the types of projects across countries. Notably 59% of projects in China involve the transfer of technology, while a mere 12% of Indian projects do. In a more recent study, Seres, Haites and Murphy (2009) consider 3296 registered and proposed CDM projects. While they find that fewer projects (36%) involve some technology transfer, their results do confirm that technology transfer is more common for larger projects. It is encouraging that this is a marked increase from earlier studies that found approximately one third of projects transferred technology (de Coninck, Haake and van der Linden, 2007). Although Seres et al. also confirm that the rate of technology transfer has always been significantly lower in India; their findings indicate that the rate of technology transfer has decreased appreciably for Brazil and India. To account for this they note that “more projects of a given type in a host country tend to lower the rate of technology transfer for future projects, indicating the development of a broader technological capacity in the country.” (Seres et al., 2009, p.4926) Again this result provides an encouraging contrast to an earlier study that found that less than 1% of CDM projects were likely to contribute significantly to sustainable development in the host country (Sutter and Parreno, 2007). Clearly there are marked differences in the technology that is transferred and the opportunities for developing nations to utilize the knowledge and skills to make additional improvements and further lower their emission levels.

While adaptive research and development (R&D) is an essential component of environmental innovation by developing nations, they have not yet made adequate progress in this area. Adaptive innovation is essential to finding appropriate technologies for local conditions. Consider the following examples, highlighted in Popp (2012). Wang (2010) recounts the Chinese policy of evaluating potential CDM projects with an eye on local conditions. The government does not embrace technologies that are new to Chinese conditions since the risk of poor adaptation to local conditions would increase the risk to the CDM credits, lowering their value. In a similar vein, given slower prevailing wind speeds in India relative to Europe, wind turbines must be adapted to generate electricity (Kristinsson and Rao, 2007). Finally, de la Tour, Glachant and Ménière (2011) find that photovoltaic manufacturers in China adapt production processes, replacing costly capital with less expensive labor.

The World Bank 2010 World Development Report notes that while it is more cost-effective to adopt technologies from abroad rather than to reinvent them, there are some circumstances in which no international technological solution exists for a local problem. As an example, the report cites crops and growing methods that may need to be adapted to local climate, drought, soil and technological conditions. Popp (2012) describes the importance of adaptive innovation, in the context of both local and global benefits as well as immediate and eventual challenges.

Luo, Lovely and Popp (2013) study the patenting history of 806 Chinese solar photovoltaic firms between 1998 and 2008, finding that firms whose leaders have international experience are more likely to patent. In addition, patenting activity also increases for neighboring firms who reap spillover benefits from the intellectual returnees. Given this success, it is not surprising that recruiting high-skill returnees is a strategic imperative for China, emphasized in three national middle- and long-term plans. The authors note that China's policies now not only provide incentives for the return of émigrés, but also include imperatives for overseas experiences in some sectors. While recruiting intellectual returnees has brought clear benefits to China, the authors recommend caution. They describe the potential for trade conflicts as emerging economies enter high-tech sectors previously dominated by developed nations. In addition, a "final caution relates to the fine line between technology transfer and intellectual property espionage ... as more scientists return home with human capital acquired in technologically advanced economies, challenges grow for resolution of intellectual property conflicts within a weak global IP protection architecture." (Luo, Lovely and Popp, 2013, pp.27-28)

These findings are echoed in numerous other studies. The 2010 World Bank World Development report states, there "is no evidence that overly restrictive IPRs have been a big barrier to transferring renewable energy production capacity to middle-income countries ... . In low-income countries, weak IPRs do not appear to be a barrier to deploying sophisticated climate-smart technologies." (World Bank, 2008a, p.310) Barpujari and Nanda analyze the IPR regimes of five Asian nations at differing stages of economic development: China, India, Indonesia, Malaysia and Thailand. Following an assessment of the IPR environment in each nation, based on TRIPS-compatibility, enforcement and TRIPS-Plus provisions, the authors find that "the contention that weak IPRs in developing countries constitute the biggest barrier to technology transfer seems to be untenable." (Barpujari and Nanda, 2012, p.23) They do, however, acknowledge that developing nations need to make additional progress in enforcement and building administrative

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capabilities, though this is dependent upon securing the necessary financial and human resources.

Extending these conclusions, a recent study by the UK think tank Chatham House suggests that weak intellectual property rights are a barrier to technological diffusion. They conclude that intellectual property protection is a factor in the speed of diffusion. Specifically, many innovators are established industrial giants, and their perception of the strength of intellectual property protection in developing countries determines the speed of dissemination to the extent that it can be expected that weak intellectual property protection would slow the rate of technology transfer to some developing countries. The study notes that this is dependent on the willingness of such firms “to license for production or sale [and therefore] may depend on their confidence that they can do so without losing control.” (Lee, Lliev and Preston, 2009, p.21) Perez Pagatch (2011) notes that this is confirmed by leading firms, which “cite weak intellectual property protection in host countries among the reasons for withholding their latest technologies from certain markets.” (Perez Pagatch, 2011, p.9) Further confirmation comes from Awokuse and Yin (2010) who study the relationship between imports and IPR protection in China, utilizing panel data for 1991-2004. They find that China’s imports increase with stronger patent protection and that this effect is most dominant for high-tech industries.

Taking the longer view, it is critical to assist developing nations in building their own productive and technological capacity in the environmental goods sector. Jha (2009) discusses the importance of access to finance, venture capital and supportive policies by the government such as renewable energy regulations, feed-in tariffs and concessionary loans. Each of these is essential for market creation in renewable energy within developing nations. Although a number of industrialized nations, as well as China and South Korea, provide financial support through green fiscal stimulus packages, smaller developing countries may not have access to such resources. As described by Sugathan, these circumstances strengthen “the case for bilateral and multilateral support for these developing countries, including as part of a package within the UNFCCC. The World Bank report calls for smarter trade as an adjunct to freer trade, and proposes bundling trade liberalization with a package of technical and financial assistance.” (Sugathan, 2009, p.7)

In stark contrast to the policies that incentivize and encourage innovation, the presence of tariffs and nontariff barriers greatly inhibits the development, adoption and use of environmental technology. In a study of 18 developing countries that emit high levels of greenhouse gases, the World Bank (2010) concludes that the elimination of tariff and nontariff barriers on clean technologies (they specify: cleaner coal, wind power, solar photovolta-

ics, and energy-efficient lighting) could increase their traded volume by 14%. The authors argue that trade barriers on imports raises domestic prices, making energy efficient technologies less competitive and cost-ineffective. Consider the following examples: In Egypt, tariffs on photovoltaic panels average 32%, which is ten times the tariff they are subject to in high-income OECD member countries. In Nigeria, photovoltaic panels face tariffs of 20% and nontariff barriers of 70%. Due to tariffs on biofuels in Brazil and subsidies to biofuel producers by OECD countries, investments are not being made in biofuels in Brazil, the world's most efficient and least-cost ethanol producer. Brazilian ethanol production grew a modest 6% between 2004 and 2005. By comparison, the United States and Germany increased production by 20 and 60% respectively, protecting their producers with tariffs of 25% in the U.S. and more than 50% in the E.U. Relying on market forces and removing the tariffs, nontariff barriers and subsidies should reallocate production to the most efficient biofuel producers, allowing for increases in production and more competitive pricing<sup>10</sup>.

## CONCLUSIONS

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It is important to be aware of the lessons learned about innovation and the development and dissemination of technologies: innovation responds quickly to incentives; innovation in a given field experiences diminishing returns over time; the social returns to environmental research are high while the private returns may not be; and the type of policy used affects the nature, adoption and dissemination of innovations. For its part, technology development, diffusion and dissemination are best encouraged with market forces and incentives. However, in the case of environmental technologies, the presence of dual externalities inhibits the innovative process. Without effective public policy markets alone are not likely to provide sufficient incentives for the development of environmental innovations. Innovative industries would benefit from greater predictability in each of these areas. As described in the earlier studies, "in this context it is essential for policymakers to find a balance: encouraging competition while guaranteeing a large market for minimum economic scale, reducing uncertainty about future resource prices while keeping alternatives open, offering rights of exclusion to intellectual property holders while not curtailing the ability of sequential innovators to build upon past successes, promoting social goals while respecting market pressures." (Johnson and Lybecker, 2009a, p.5) This continues to be true,

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10 For additional information on the data utilized in these studies, please see the World Bank (2010) study, or the following references. Tsebelis (2002), Dolsak (2001), Vogel (2005), Bernauer and Caduff (2004), and Bernauer (2003).

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and even more so in developing nations seeking to develop and adopt clean technologies.

Key findings from this review of recent literature on environmental innovation:

- Environmental innovation is characterized by dual externalities and private underinvestment in research and development (R&D) due to knowledge spillovers and environmental externalities.
- In both the development and the diffusion of clean technology, the challenges surrounding uncertainty loom large. From beginning to end clean technology innovation is characterized by uncertainty: uncertainty about actual costs, uncertainty about the end-product of a research process, uncertainty about the reception by the market, uncertainty about the ability to appropriate the returns to research while competitors try to produce similar results, uncertainty about current and future policy platforms, uncertainty surrounding the pricing of competing as well as complementary goods, and uncertainty about regulatory impacts on the research process and end-result. This is exacerbated by the uncertainty surrounding the rate of innovation itself which complicates any estimate of global climate change, making it difficult to substantiate the reasons for further research funding.
- While diffusion and adoption are paramount to the ultimate usefulness of a new technology, little scholarship has focused specifically on the international transfer of environmental innovations. Moreover, even within the work on international technology transfer, the majority of work has been done on highly developed economies.
- In this sector, developing nations fall into two groups: emerging economies, primarily Brazil, China, India and Mexico, are developing environmental technologies while a large group of less-developed countries are not.
- In the case of developing nations in general, studies find a positive correlation between the strength of intellectual property rights (IPRs) and the domestic development of environmental innovations. Domestic development increases the likelihood that environmental innovations are appropriate for local conditions and that existing technologies can be successfully adapted to suit local environmental challenges. To ensure such technologies evolve, domestic innovation should be supported by strong IPRs.
- Although the value of patents, and other forms of protection, varies across countries, across industries and across innovations, numerous studies have documented the reasons to encourage strong patent law. A majority of economists agree that strong intellectual property rights are an essential prerequisite to the development of environmental technologies. Effective IPR protection also appears to play a role in

enabling foreign direct investment (FDI) and makes a country a more attractive destination for such FDI or various types of commercial partnerships and cooperation.

- Other factors are highly determinative as well. This includes the presence of tariffs and non-tariff barriers, which greatly inhibit the development, adoption and use of clean technology; the presence of qualified individuals, including management with industrialized country training and educational backgrounds; environmental regulations and other regulatory measures; and the size of the (local or regional) market.

The market for environmental technologies, as described above, is characterized by significant uncertainties and risks. These factors complicate the transfer of technologies, particularly to developing nations. Moreover, in the face of dual externalities, this presents distinct challenges for their adoption of clean technology innovation. While market forces and market failures shape the environmental technology sector, political and cultural forces further complicate every aspect.

As scholars continue to analyze when, where, why and how clean technology innovations are developed and adopted, it is essential that government policymakers aim to reduce uncertainty in the market. This continues to be a field of increasing future importance, and a rich area for continued academic study and analysis. Consumers, government policymakers and innovators would all benefit from a greater understanding of the process of technological change in the development, diffusion and financing of clean technologies.

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### **Abstrakt (in Polish)**

*Innowacja to proces z natury ryzykowny i niepewny. Wiele wyzwań związanych z innowacjami dotyczy również czystych technologii. Rozwój technologii środowiskowych jest ponadto utrudniony ze względu na specyfikę wiedzy, efekty zewnętrzne i niepewność. Niniejsza analiza koncentruje się na przeglądzie literatury na temat roli niepewności, zaangażowania państw rozwijających się, kontrowersji dotyczących praw własności intelektualnej oraz uczestników rynku i ich strategii. Praca ta rozważa także dostępne instrumenty polityki, koszty, korzyści i konsekwencje ich zastosowania. Naukowcy wciąż analizują to kiedy, gdzie, dlaczego i jak tworzone i rozwijane są innowacje dotyczące czystych technologii. Niezbędne jest, aby twórcy polityki rządów dążyli do redukcji niepewności i ryzyka, stymulowali innowacje poprzez skuteczne egzekwowanie praw własności intelektualnej oraz wspierali przejrzystość rynku. Kwestie te będą odgrywać coraz większą rolę w przyszłości, stając się przedmiotem dalszych badań i analiz naukowych. Konsumenci, twórcy polityki rządowej oraz innowatorzy mogliby odnieść korzyści z lepszego zrozumienia procesu zmian technologicznych, związanych z rozwojem, dyfuzją i finansowaniem czystych technologii.*

**Słowa kluczowe:** czyste technologie, innowacje środowiskowe, polityka innowacyjna, bariery innowacji, kraje rozwijające się.

### **Biographical note**

**Dr. Kristina M. Lybecker** is the Gerald R. Schlessman Professor of Economics and Associate Chair of the Department of Economics and Business at Colorado College in Colorado Springs, CO. She received her Ph.D. in Economics in 2000 from the University of California, Berkeley. Kristina's research analyzes the difficulties of strengthening intellectual property rights protection in developing countries, specifically in the context of the pharmaceutical and environmental technology industries. Recent publications have also

addressed alternatives to the existing patent system, the balance between pharmaceutical patent protection and access to essential medicines, and the markets for jointly produced goods such as blood and blood products. Kristina has testified in more than a dozen states on the economics of pharmaceutical counterfeiting. She has also worked with US Food and Drug Administration, Reconnaissance International, PhRMA, the National Peace Foundation, the OECD, the Fraser Institute, and the World Bank, on issues of innovation, international trade, and corruption.

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# The Role of Competitors and Customers in the Development of Environmentally Sound Technologies

*Magdalena Marczevska\**

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## **Abstract**

*The article presents two important forces influencing the development of product innovations by suppliers of environmentally sound technologies, namely competitors and consumers. It discusses these phenomena on the basis of different theoretical approaches (Ansoff and Stewart, 1967; Von Hippel, 1987, 2005, 2007; Prahalad and Ramaswamy, 2004). The results of the study show that Polish companies-suppliers of environmentally sound technologies are willing to gain inspiration from both demand and supply side market players. In case of supply side of the market, in most cases inspiration was not aimed at copying existing successful ideas. The competitors are perceived rather as a source of inspiration for further development of technological solutions. Although companies concentrate on having a relationship with customers and track their behavior, these relations have not been established by the Polish companies researched here in order to treat users as co-creators of product improvements or novelties.*

**Keywords:** *environmentally sound technologies, customers, competitors, product innovations, user-driven innovations.*

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## **INTRODUCTION**

In times of increasing competition and continuously changing customer needs, efficient response to environmental changes has become an important success factor for enterprises (Homburg, Grozdanovic and Klarmann, 2007, p. 18). In order to survive and thrive on such a competitive market, a company must seek to respond continuously to opportunities and threats posed by a dynamic environment (White, Varadarajan and Dacin, 2003, p. 63). Over the years, there has been a visible shift in the role of the consumer, from unaware to informed, from isolated to connected, from passive to active (Prahalad and Ramaswamy, 2004, p. 2). Empirical research has revealed that in many fields, users are more likely to contribute to the inquiring marketing researcher than

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research gathering data concerning their unmet needs. Moreover, they can prompt insights and new ideas regarding solutions that might better respond to their needs (Urban and Von Hippel, 1988, p. 569). Environmental markets represent a wide range of relationships between companies that collaborate and compete on this market. This system of forces is crucial for the innovative process and new products development (Skea, 1995, pp. 402-405).

The main purpose of this study is to identify and analyze two important factors influencing the development of product innovations by suppliers of environmentally sound technologies, namely competitors and consumers. The study examines an impact of competitors and consumers on the product portfolio of companies-suppliers of environmental technologies, including their decisions to develop new solutions, withdraw or improve originally created ones. Moreover, the importance of consumers and competitors as a source of inspiration for innovation will be identified. The research questions are the following:

To what extent has the imitation of competitors' ideas resulted in creating and developing successful product innovations by the companies-suppliers of environmentally sound technologies in Poland?

How do companies gather information about specific technologies offered by their competitors?

What is the role of customers in the development of environmentally sound technologies offered by the companies?

The paper seeks to show the influence of competitors and customers on companies' decisions on developing environmentally friendly product innovations and analyze this phenomena from management of technology and innovation management perspectives.

## **LITERATURE REVIEW**

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The issues of sustainable development and the relationships between the environment and economy are increasingly arising as the topics of discussions amongst the society, policy makers, researchers and businesses. Recent innovation studies concerned with the environmental issues are interested in capturing environmentally friendly changes in technology and the examining behavior of market players, such as companies, their competitors and customers. A previous generation of the research on environmental innovation was primarily focused on the generations of technologies and their diffusion (Weber and Hemmelskamp, 2005, pp. 58-59). However, this approach does not seem to be sufficient nowadays as it fails to adequately capture the relevant market forces. Therefore, this study goes in line with current research strands focusing on the role of two groups of market players,



such as competitors and consumers in innovation activity of the suppliers of environmentally sound technologies. Before going further with this analysis it is necessary to define environmentally sound technologies. These are “techniques and technologies capable of reducing environmental damage through processes and materials that generate fewer potentially damaging substances, recover such substances from emissions prior to discharge, or utilize and recycle production residues” (United Nations, 1997, p. 30). During the evaluation of such technologies, the interaction with socio-economic and cultural terms and conditions in which they are implemented should be taken into account (United Nations, 1997, p. 30). There are many studies that concentrate on classifying the environmentally sound technologies (Skea, 1995, pp. 389-393), their adoption (Luken and Van Rompaey, 2008), policy design and implementation (Taylor, Rubin and Hounshell, 2005; Jaffe, Newell and Stavins, 2004), technology transfer (Perez Pugatch, 2011; Tébar Less and McMillan, 2005; Juma, 1994), assessment (International Environmental Technology Centre, 2003), and intellectual property rights frameworks (Ebinger and Avasarala, 2009). Although all these topics are associated with the actions undertaken by the suppliers of environmental technologies, who design and launch environmentally friendly solutions, the process of the development of such products and services has not yet been widely examined.

Currently, there are two main tendencies that determine the activities of enterprises. On the one hand, it is striving to create new knowledge, innovations, new solutions because such actions are seen as opportunities for growth. On the other hand, there is a tendency to create a certain balance between the different types of activities for the sustainable development of the company (Azzone and Noci, 1996; Bansal and Roth, 2000). These two trends have influenced the companies’ need to focus on both ecology and innovation in their business activity (Cleff and Rennings, 1999).

There are many factors that influence companies’ behavior and willingness to introduce innovative products and technologies to the market. Among them, it is possible to distinguish two categories: internal factors, which origin from the company and external ones, coming from the organizational environment (Janasz and Koziół, 2007, p. 20). The first group consists of a firm’s R&D activity and knowledge, skills and resources gathered inside the company (Janasz and Leśkiewicz, 1995; Białoń, 2010). The later one is composed of the influential forces of competitors, information derived from the market demand (Sosnowska, 2000) and knowledge sourced for research institutions (Penc, 1999, pp. 160-163).

Innovations created in response to identified market needs are named demand-pull innovations (Janasz and Koziół, 2007). Their existence has

been highlighted in the Rothwell's five generations of innovation framework (Rothwell, 1992). Another demand side approach to the new products creation is the concept of user-driven innovation. According to this concept the users are involved in developing new products, services and ideas (Von Hippel, 2005). It requires understanding the needs of users and their engagement in the process of enterprise development (TemaNord, 2006).

Customers play an important role in a company's development. A well established relationship with the customers and examining their motivation to buy and use firm's products and services is important for defining company's opportunities for growth (Johnson, Christensen and Kagermann, 2010, pp. 51-61). Clients play a key role in improving and developing new product or service ideas (Carrillo-Hermosilla, Del Río and Könnölä, 2009, pp. 17-19). In literature a special group of clients named "lead users" has been identified (Urban and Von Hippel, 1988 p. 569). They can be defined using two following characteristics:

- these clients have needs that will be common in a marketplace long time before other customers;
- they will highly benefit by obtaining a solution (product or service), which is in line with the needs they present.

According to Von Hippel (1988, 2005), in order to identify the right group of customers who can be involved in the idea generation and development of the products, the lead user methodology should be applied (identification of trends on which users have leading position, identification of lead users, development of lead user product idea, market testing in order to see if the idea fulfills the needs of typical users). Moreover, the research shows that customers often use the products in ways that they were previously not designed for. Knowing such things can help the company to find new ways to extend its product portfolio (Anthony, Eyring and Gibson, 2010, pp. 125-126). Although many large companies gather information and data about the people and enterprises that buy their goods, these efforts do not guarantee gaining a sufficient amount of knowledge (Zook, 2010, pp. 161-164). Zook (2010) conducted the research within the companies that care about monitoring their clients' activity and found out that only 25% of them declare that they fully understand their customers. According to the findings of "Management Tools & Trends" survey, in 2013 Customer Relationship Management (CRM) is seen as an important investment priority (Rigby and Bilodeau, 2013). CRM was first introduced in the survey in 2000 and was ranked 15<sup>th</sup> in terms of usage and 22<sup>nd</sup> in terms of satisfaction out of 25 other tools. In 2013 it was ranked by the companies first in both usage and satisfaction. At the same time, CRM has moved from company-centric approach to the world of co-creating value with customers, where enterprises need to hold dialogues with their

clients, rather than simply target them (Prahalad and Ramaswamy, 2004, pp. 132-134). A successful company is able to create customer value proposition (CVP) (Johnson, Christensen and Kagermann, 2010, pp. 51-61). According to Bower and Christensen (2010), customers have extraordinary power in influencing enterprises paths of investment. It is important for the company to care about their preferences, especially while thinking about launching new product or developing innovative technology. In many firms, processes used to forecast technological trends, learn about customers' needs, allocate resources, asses profitability and commercialize new products are focused on current customers and markets in order to exclude the goods that do not meet clients' needs (Bower and Christensen, 2010, pp. 20-34). On the other hand, these companies focus on constant development of innovative technologies, both incremental and radical, in the direction of the future generations of customer's potential needs, but make the decision of commercialization only if their products meet the needs and requirements of mainstream customers (Bower and Christensen, 2010, pp. 20-34).

A review of empirical studies shows that there are customers who actively participate in the process of creating innovative solutions and become inventors or co-developers (Hienerth, Von Hippel and Baldwin, 2006, pp. 1291-1313). The evidence of such phenomenon are, among others, the cases of mountain bikes (Luthje, Herstatt, and Von Hippel, 2005, pp. 951-965), chemical production process (Freeman, 1968), CAD software (Urban and Von Hippel, 1988, pp. 569-582), innovations in oil refining (Enos, 2013), and scientific instruments (Riggs and Von Hippel, 1994, pp. 459-469). In addition, research reveals that users also play an important role in the development of consumer goods innovations (Franke and Shah, 2003, pp. 157-178). Users with similar needs form sometimes user-innovation communities, where they can cooperate and assist each other with their innovations development (e.g. open source communities in which information, assistance and innovative problem solutions are freely shared) (Foray, 2006, pp. 62-64). The output of such process can be called *experience innovation* (Prahalad and Ramaswamy, 2004, pp. 51-54).

The same mechanisms concerning enterprise-customer behavior practices apply to the companies that develop innovations, especially in the field of environmentally sound technologies (Carrillo-Hermosilla, Del Río and Könnölä, 2009, pp. 17-19). User-driven innovation can widely influence the extent and direction of products developed within the company or industry (Von Hippel, 2005).

Within the years, customers' relationship with the companies has changed, and along with it the tools that firms use to analyze and assess their behavior (see: Table 1). The recent research of Prahalad and Krishnan

(2010) has shown that in developing innovations companies should seek to co-create value with different types of customers, not only lead users. The authors state that such approach is helpful in the process of identifying and foreseeing evolution paths of all sorts of current and future customers (Prahalad and Krishnan, 2010, pp. 72-86).

**Table 1.** The evolution and transformation of the company-consumer interactions

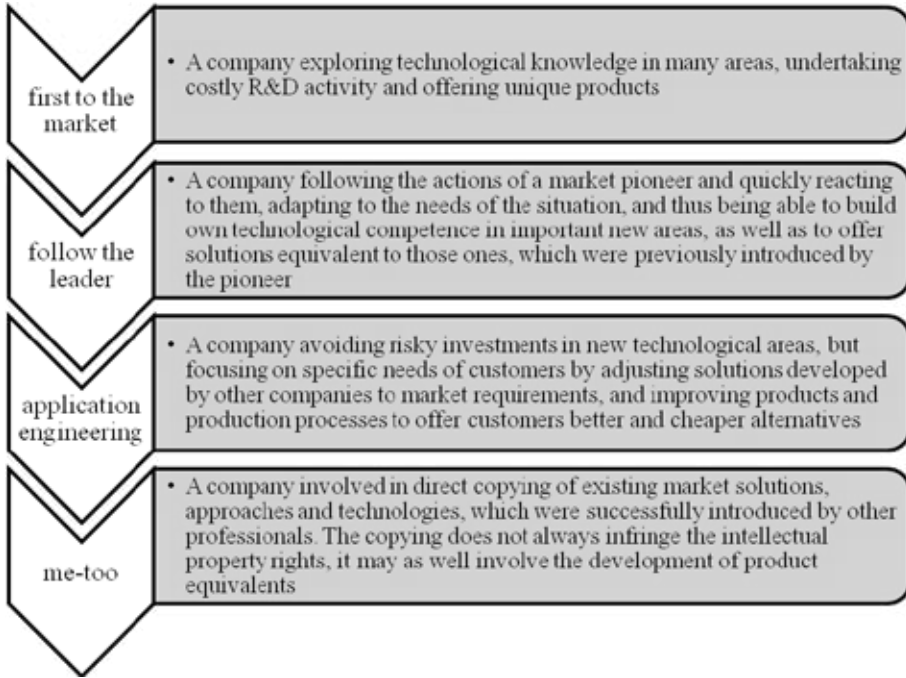
	Consumers as Passive Audience			Consumers as Co-Creators
Time Frame	1970s, early 1980s	Late 1980s and early 1990s	1990s	Beyond 2000
Role of the consumer and concept of the market	Consumers are “outside the firm”; they are seen as passive buyers with a predetermined role of consumption. Consumers are a target for exchanging the firm’s offerings.			Consumers are part of the enhanced network of competencies; they co-create (and co-extract) value. They are collaborators, co-developers, and competitors.
Managerial view of consumers	The consumer is an average statistic; groups of buyers are predetermined by company.	The consumer is an individual statistic in a transaction, anywhere from a database record to an individually addressable entity.	The consumer is a person; cultivate trust and relationships.	The consumer is not only a person whose individual identity must be respected, but also embedded in thematic communities and part of an emergent social and cultural fabric.
Company’s interaction with consumers and development of products and services	Traditional market research and inquiries. Preconfigured products and services are created without much feedback.	Shift from selling to helping consumers via help desks, call centers, and customer service. Identify problems, then redesign products and services based on feedback.	Identify solutions from lead users. Customize products and services from preconfigured menu of features.	Consumers are co-creators of value. Dialogue, access, risk assessment, and transparency are building blocks of co-creation of value. Companies and lead consumer co-shape expectations and market acceptance of experience environments.
Purpose and flow of communication	Gaining access to and targeting predetermined groups; one-way communication.	Database marketing; firm-to-individual access; two-way communication.	Relationship marketing; two-way access and communication.	Active dialogue with consumers to co-shape individual expectations and co-construct personalized experiences. Multiway access, network communication.

Source: Prahalad and Ramaswamy (2004, pp. 214-215).

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Another factor that can motivate company's managers to develop novelties, especially eco-innovations, is the good environmental performance of their competitors. Such action can be also undertaken in order to improve firm's reputation in the eyes of customers (Luken and Van Rompaey, 2008, p. 69). The behavior of company's competitors can be also impeding. The interest in the developing technology of powerful but less innovative market players can delay or hinder the innovation process (Visser, Jongen and Zwetsloot, 2008, pp. 85-94). In general, the existence of competitors can stimulate innovation. Enterprises may race to be first to the market with the innovative product of technology. Moreover, companies may come up with lower cost manufacturing and in this way, by increasing their profit, may reveal their ability to compete. In addition, competition can stimulate firms to identify and fulfill customers' yet undiscovered and unmet needs and develop new solutions to satisfy them (Federal Trade Commission, 2003). The presence of relevant competitors can also be a source of strategic advantages. These can be classified into four general categories: strengthening the competitive advantage, improving current structure of the industry, supporting market development and preventing new potential entries (Porter, 2006, pp. 254-265).

Ansoff and Stewart (1967) claim that a systematic analysis of the market is needed in order to adequately manage the corporate technology. On the basis of the characteristics of parameters of technologically intensive businesses they have proposed a model of strategies that examines the timing of a firm's entry into an emerging industry (see: Figure 1). Within the model, the company may choose one of the possible approaches to the market and technological knowledge: first to the market, follow the leader, application engineering and me-too (Ansoff and Stewart, 1967, pp. 81-83).



**Figure 1.** Possible approaches to the market and technological knowledge

Source: Own elaboration based on: Ansoff and Stewart (1967, pp. 81-83).

It is worth noting, that the commonly called “imitators” in the model of Ansoff and Stewart are represented by three types of strategies and should not be confused with the kind of companies that simply copy technologies without any own contribution. The concept of “creative imitations”, which are developed by the companies who offer new applications of previously present technologies that address different user segments was also put forward by Peter Drucker (1992, pp. 235-240). This phenomenon is created by markets, rather than solutions or technologies, and by customers rather than technology suppliers. It can be defined as market-oriented and market-inspired approach. Creative imitators serve the market niche that is not fulfilled by pioneers, so they do not create the demand for products, they satisfy the existing one (Drucker, 1992, pp. 235-240).

The economic literature has long pointed to the existence of imitation, especially in terms of innovative activity of the pioneers (Schumpeter, 1939). In order to distinguish the types of market players Schumpeter describes the leader as the one who effectively directs the means of production into new areas of application (Schumpeter, 1960, pp. 117-150). Like other researchers, Michael Porter also distinguishes market leaders from followers. He claims,

however, that appropriate actions that need to be undertaken to deal with competitors apply to both of these groups (Porter, 2006, p. 253).

The role of competition has been also discussed by Von Hippel (1987, 2005, 2007). He distinguishes the competition between two groups of market players: customers and rivals. He claims that there is a phenomenon named informal know-how trading, which is a routine and informal exchange of information between engineers and employees working in different enterprises. According to his findings, this type of behavior can be sometimes observed among even direct rivals (Von Hippel, 1988, pp. 76-90).

To sum up the literature review, it should be pointed out that the results of previous research suggest that both consumers and competitors can play an important role in the developing innovations, but their importance depends on company's strategy. Therefore, it is worth examining to what extent customers and competitors influence the development of product innovations by the companies-suppliers of environmentally sound technologies in Poland. The detailed analysis of the importance of this source of innovation for suppliers of environmentally sound technologies in Poland will be conducted in next sections of this article.

## RESEARCH METHODS

The research focuses on analyzing the development of environmentally sound technologies in Poland with regard to the role of competitors and customers. The data was gathered by conducting in-depth, semi-structured interviews with the representatives of selected 40 companies operating in the field of environmentally sound technologies. The chosen enterprises represent six broad areas of environmental technology:

- renewable energy sources: manufacturers of solar collectors, briquetting machines, fuel cells, hydro power and biogas solutions (10 firms);
- waste management: suppliers of solutions for treatment of hazardous waste and by-products of coal combustion, secure storage of liquid fuels, biomass gasification, processing plastics into liquid fuels (9 firms);
- water and wastewater management: suppliers of water treatment plants, water treatment solutions and drying of sewage sludge solutions (7 firms);
- air protection: suppliers of pollution emission reduction systems (2 firms);
- energy efficiency: suppliers of technologies that support saving electricity and heat, solutions for passive houses, energy-efficient lighting solutions, heat pumps, media management systems for energy (9 firms);

- biodiversity protection: suppliers of technologies for reclamation of lakes and barriers to protect fish (3 firms).

The companies distinguish themselves from other environmentally sound technologies industry market players in Poland as suppliers of own, eco-innovative products and their interest in international markets. The companies from the sample were examined by independent experts in terms of the originality and ecological significance of the innovative products and technologies they introduce to the market, as well as their environmental impact and potential for development. Interview with each company representative was based on the same script, which contained a list of detailed questions. The interviewees were allowed to interact freely with the interviewees in order to gather information on both facts and their interpretation, along with personal opinions of respondents. That is why during the interviews it was possible to discuss additional, relevant topics. The respondents were guaranteed anonymity. All of the respondents were either owners or managing board members, including sales managers and product managers. They were selected by their companies as well-informed, reliable sources of information.

The interviews were conducted in 2012. They were recorded, transcribed, divided into topic-based text segments and coded into 77 codes collected in the codebook. The codebook was the basis for analysis and interpretation of the qualitative data (Corbin, Strauss, 1990; Glaser, Strauss, 2006). Coded text segments allowed to convert some of the data into percentages and numbers in order to create the background for qualitative interpretation of the research results.

It is worth saying that the sample of companies selected for the purpose of this research consists of specific participants of the industry. They are actively engaged in research and development activities, are the suppliers of product innovations, provide their own solutions and actively operate on foreign markets. The research results drawn from such population cannot be applied to the whole population of the companies operating in the field of environmentally sound technologies. This, along with other methodological shortcomings of qualitative studies, can be seen as a research limitation. Moreover, the sample is narrowed down exclusively to the Polish companies and it might be beneficial for future studies to focus on cross-country analysis.



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## ANALYSIS OF FINDINGS

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### The origins of technology

Development of the best technology does not guarantee business success unless it is not commercialized. The first step to introduce the solution to the market is to sell the idea to an external party or set up a company in order to develop it. Nearly 80% of interview respondents declared that the technology was developed in the existing company, of which 57.5% claimed that the company existed long before the technology was developed.

*“First the company [was developed], and then the product was made. However, the product existed previously in my head. And the knowledge that was used to develop it existed before. I have to admit, that the ability to design turbines was related to the knowledge gained at the university (college and doctoral studies), in many research studies, other expertise researches and work in the laboratory (I researched more than 70 turbines in the laboratory in the University of Technology). This knowledge had been developed throughout the years, along with the product idea in my head.”*

*[Company 38]*

Every fifth company was founded to refine and implement the technology on the market, but its basic technology had been developed previously. Such scheme appeared frequently in companies that have developed innovative solutions using the employees, resources and engineering facilities of the parent company, and afterwards they established a new company dedicated to the development and implementation of this new technology. Moreover, such approach was also widely adopted by the innovators who had another job at the time of development of this technology. A small percentage of respondents at the design stage of the new solution had no intention to sell it. Most of the interviewees declared, however, that companies were established in order to fine-tune and start to sell the technology.

*“First there was the idea that there is a need for such technology. It started like this... one day I said to my partner, listen, I have a very good idea to use this technology... we should start a company to be able to sell it.”*

*[Company 24]*

No matter what the origin of the enterprise is, the most important thing that speeds up the commercialization of this new technology is the existence of the company in which it is possible to conduct research, work on the new

technology and test it. On the other hand, according to few respondents, it is a necessity to run the company while working on the new product, because the research is very expensive and public funds for this purpose are difficult to obtain by individuals, who have an idea to develop new technology.

Over 30% of the pre-existing businesses significantly changed the range of offered products or even moved to another industry during the time of their business development. In addition, 15% of respondents declared that over the years company's interests expanded significantly. This can be seen as the proof of the fact that enterprises from the interviewed sample concentrate on searching for new business opportunities and care about the development of their technologies and products portfolios.

*„At the beginning our firm was a service company focused on installing machinery and equipment. After gaining some experience in this field, we extended the range of our activities starting the commercialization of new products. This was followed by the development of trade and finally manufacturing. Now, our firm commercializes new products, manufactures them and sells them to consumers.”*

*[Company 23]*

### **The background of technology creation**

It is very difficult to define one driving force, which was the basis for the development of all new technologies and companies from the sample. However, it is possible to identify three most important factors that, according to interviewees, had a direct impact on the start of the activities aimed at creation of new solutions that led to start a new business. According to 55% of respondents the main source of their activity was the idea created thanks to different sources of inspiration (see: Figure 2). Most of the ideas were somehow influenced by external forces, such as work opportunity with competitors, partners or customers and country's economic condition. Amongst all, in 30% of cases the idea creation processes was inspired by other market players.

*“This was a negative inspiration, it means that we were looking what is out on the market and we saw that it was bad, so that we were inspired to make something different.”*

*[Company 29]*

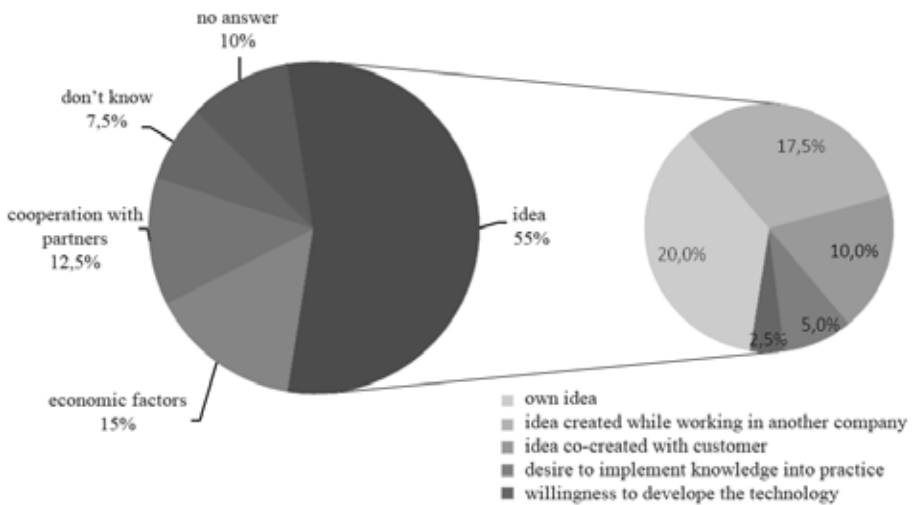
Furthermore, the interviews' results show that 12.5% of companies were established thanks to direct cooperation with partners: in joint ventures, with

the help of a parent company or in cooperation with the higher education institution. About 10% of respondents say that the development of the technology was directly affected by a client, who declared willingness to purchase a solution that was not yet mature. This customer's need created the opportunity for faster development and testing of the technology.

*"The consumer decided to buy our prototype of the product to use it and at the same time experiment with it. That's how everything began."*

[Company 10]

About 15% of respondents emphasized that the economic factors played an important role in technology development. These factors included the emergence of a market gap, the desire to make money or the transformation of the Polish economy in 1990s from plan to the free market system, which has opened the way for Polish businesses to expand to other countries. Just a few companies arose from the desire of their owners to implement into practice the knowledge gained during their studies.



**Figure 2.** The background of technology creation

### The role of other market players

The results of interviews conducted among the Polish enterprises revealed that entrepreneurs, while developing new technology, frequently examined and monitored the market in order to determine whether and in what areas there is a need to introduce new solutions or improvements to the

technologies that exist so far. The engineers examined existing technologies in order to identify their functional and technical deficiencies and imperfections. According to some interviewees it is the simplest way to find weak points and flaws of existing technologies. They believe that the weakness of other players in the market is a sufficient inspiration to create new solutions. Another way to study competitive products is to analyze existing patents. According to the respondents, this approach is often used to gather information on the progress of technology development and plan paths for further development of own technical solutions.

*“You cannot develop a technology from start to finish by yourself, without taking into account things that have been developed by others before. (...) If somebody made the first car, then it was preceded by a rack wagon, and so on... So we always draw inspiration from similar items. However, we do not copy them, because it makes no sense. We try to identify weaknesses of available solutions and improve them while developing our own [technologies].”*

*[Company 24]*

60% of respondents admit that in creating new technologies they drew inspiration from similar solutions of other companies. In such cases, innovation arises from a combination of knowledge and experience of innovators and designers with the effects of the work of other market players. A significant part of respondents stated that they were inspired by unique solutions developed by companies with whom they compete, especially in terms of product functionality. 57.5% of the companies admit that they constantly track the activities of direct competitors and see it as an important factor in technology development. A large proportion of these respondents consider such behavior as a common phenomenon. A small group of interviewees claimed that the best products are made on the basis of key technologies introduced to the Polish market by foreign companies.

There are many sources of knowledge for the development of new solutions in the field of environmentally sound technologies in Poland. The majority of respondents stated that a reliable way of gathering information about the actions of other players in the market and their products are market observation and the analysis of available solutions. Becoming familiar with technological systems available on the market is considered an important element in the development of new products. Tracking the activities of competitors may also lead to the effective sharing of knowledge and experience between enterprises. Most of the respondents declared that the information obtained at trade shows and industry conferences is often useful for creating new technological solutions. According to some interviewees,

to develop effective solutions, sufficient knowledge has to be also obtained from publicly available sources, such as books, the Internet, trade magazines and technical studies. The smallest percentage of respondents believe that in order to gather the information necessary for new product development it is indispensable to cooperate with competition, also on the international level. It also happens that entrepreneurs use business intelligence agencies to obtain information that is necessary to improve or create their own technology. But this is not a common practice among the Polish companies that have been interviewed. Nevertheless, majority of the companies from the sample perceive other market players as competitors, not potential cooperators.

When asked about the purpose of developing own equivalent of the existing solutions, the companies indicated most frequently a desire to improve its functionality or introduce modern technology approaches. A few of the interviewees have been inspired by the ideas of other market players sought to fill the technological gap in the domestic market.

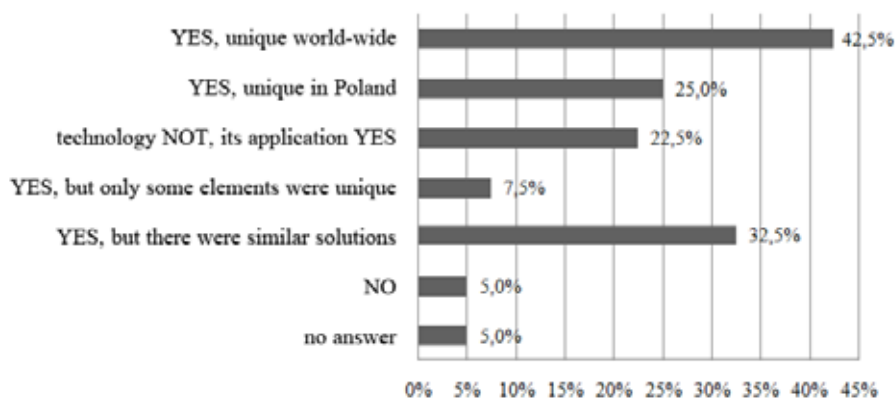
Developing the technology is not the only way to introduce to the domestic market solutions that are similar to those which successfully operate in other countries. The same effect can be achieved by using the technology of another company, by licensing or purchasing property rights related to the technology. Despite the fact that the companies have been aware of these possibilities, only a few have decided to follow this strategy. Regardless of whether cooperation with other market actors was present or not, according to some interviewees the main barrier that ultimately affect the failure of such cooperation regards financial issues.

Inspiration is not always associated with direct copying of complete solutions. Only 5% of the companies from the sample admit that their developed technology was not original and innovative (see: Figure 3). There has been only one case in the researched sample of companies of copying and implementing entire solutions developed by related entities operating in the industry. In such a situation one part of the technology was implemented in the same way as in the competing enterprise. In a few cases, the technologies that have been developed by the surveyed companies after their implementation turned out to be known before, but at the time of the creation, inventors were not aware of this.

30% of the companies from the sample declare that they have not built their product ideas on the achievements of competitors, or other supply side market players. Among them, the majority admit that they were the innovation pioneers who created the market which did not previously exist and there were no similar solutions. In other words, according to the respondents, there was no competition in the industry when the new idea emerged.

*“In fact, we had nothing to refer to or gain inspiration from. We did not know what would be the feature of this [new] material. Solutions were ours, original.”*

*[Company 22]*



**Figure 3.** Responses to the question: „Was the technology unique in the moment of its development?”

### Customers as inventors

As discussed in the literature review above, customers and users can be very important sources of improvements for existing technologies. 65% of respondents admitted that clients often come up with an idea for a new product or technology. It happens that potential users ask for a machine that has not been previously offered, and then a company is trying to meet their demand. Such a situation takes place more often when products are usually customized.

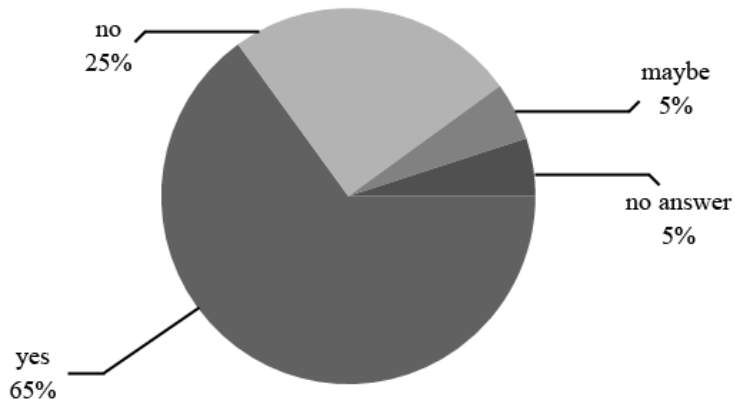
The experience of companies from the sample shows that acquisition of information from customers has been done in many different ways. Such information is usually gathered during conversations with clients concerning their needs and expectations, as well as possibilities to satisfy such needs by the new technology. Some respondents declared that their contact with customers was regulated in special agreements' clauses, which obliged users to provide information about technology performance. Surveys conducted among clients have been another important channel of information flow. In such surveys customers have been able to specify what additional features could better provide them excellent functionality of technology. Sometimes, it happens that the customers report problems encountered during the use of

technology. In such a situation, according to a large group of the interviewees, the company, together with customer, seeks the best way to provide the best solution for the problem.

*“We talk to the customers, [ask them] what they would like and what is their “dream” machine and what are the features that they would like the machine to have, to improve, to change. We also listen to these suggestions and on this basis we introduce more modern approaches in the new models of our products.”*

*[Company 10]*

Typically cooperation with customers turns out to be fruitful, but it does not always give expected results. Attempts to reach a compromise with the user are sometimes long and tedious. For these main reasons, 25% of the companies from the sample do not seek feedback on the efficiency of their technology. What is more, some respondents reported that the adjustments of the offered solutions to customer needs are too expensive and do not satisfy them fully, so it becomes not profitable for the company to do such adjustments. Interviewees presenting this point of view argue that the best way to develop effective and efficient technology is to rely on the knowledge and experience of designers and employees of the company.



**Figure 4.** Responses to the question: “Have customers ever helped the company to develop its technology?”

## DISCUSSION

As emphasized in the literature, the role of customers and competitors can be seen as important in designing new products by other market players. The literature on innovation and technology management provides a theoretical framework dedicated to the analysis of the development of innovative solutions by companies-suppliers of environmentally sound technologies.

The article has investigated the process of developing environmental technologies in a group of Polish enterprises. Results of the study show that Polish companies-suppliers of environmentally sound technologies are willing to gain inspiration from both demand and supply side market players. In case of supply side of the market, in most cases inspiration was not aimed at copying the existing successful ideas. The competitors are perceived as a source of inspiration for further development of technological solutions, which confirms the findings discussed in the theoretical part of this paper (Ansoff and Stewart, 1967; Von Hippel, 1987; Porter, 2006; Drucker, 1992). Classifying the final technologies established by the companies from the sample, it should be noted that only 5% of companies can be categorized in the framework of Ansoff and Stewart (1967) as “me-too”. More than 40% offered unique products, which can be seen as novelties on the global market and can be placed in the category “first to the market”. Majority of the researched companies can be placed right after the leader, in the category “follow the leader”, since the technologies developed by these companies were product-equivalent solutions previously introduced by the pioneers. Nevertheless, most technologies were not available previously on the local market.

It has been demonstrated that competition can also stimulate firms to identify and fulfill customers’ undiscovered and unmet needs and develop new solutions to satisfy them (Federal Trade Commission, 2003). Thus, a second crucial factor in the process of new ideas creation appears, which is the demand side element, i.e. clients. Many respondents agreed that the information gained from the market was used to develop better solutions in terms of functionality. Although companies concentrate on having a relationship with customers, these relations have not been established by the Polish companies researched here in order to treat users as co-creators of product improvements or novelties. This role of customers has been identified in the literature (Pralhad and Ramaswamy, 2004, pp. 214-215), but when it comes to the interviewed Polish firms, it was not the case. The cause of such inconsistency of the findings with the conclusions drawn from the literature may be related to the fact that the market for environmentally sound technologies in Poland is relatively young, and there are not many customers who adopt new solutions. What is more, since the adoption of such



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technologies is not common, companies focus their innovation development on the predictions of needs and wants of future customers and market observation. A major part of the respondents to this interview has declared that because of the fact that the solutions they have introduced were not known previously, creating a market for them took some time. These factors might have been an obstacle in having active dialogs with users. According to the classification of company-customer interactions proposed by Prahalad and Ramaswamy, Polish companies-suppliers of environmental technologies should be classified in the category named "lifetime bonds with buyers".

## **CONCLUSION**

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From the implications of the research it can be concluded that the behavior of competitors and customers is an important factor that drives innovativeness of companies-suppliers of environmentally sound technologies. Different theoretical approaches have been used to examine the role of competitors in the development of companies' innovative products (Ansoff and Stewart, 1967; Von Hippel, 1987; Porter, 2006; Drucker, 1992). In order to identify and evaluate the impact of customers on new solution creation, Prahalad's and Ramaswamy's classification has been recalled.

The contribution of this research is two-fold. First, using in-depth interviews, it examined the innovation behaviors of the Polish companies-suppliers of environmentally sound technologies and, second, it presented the evidence of the role of competitors and consumers in the innovation processes. Evidence from Poland goes in line with theoretical findings, showing that inspiration while developing new solutions cannot be immediately associated with imitation. This paper reveals specific features in innovation behavior of the analyzed Polish companies when it comes to the role of customers as a source of innovation. The case of Polish companies in environmentally sound technology sector does not confirm user-driven innovation approach in new solutions' creation. Although companies see the need to track their customers, they are not willing to focus on having close relationships with them and fully respond to their needs. The interviews show that users have not been used as co-creators of product improvements or development of novelties, they play only an indirect role in innovation processes.

It should be, however, pointed out that the evidence of this research cannot be applied to the whole population of companies. In-depth interviews' participants were the suppliers of own, advanced environmentally sound technologies in Poland, while among other enterprises from the sector there

are also distributors of technologies or manufacturers of less advanced solutions.

The next step in the study of this complex phenomenon could be a multiple case study research on the basis of which it will be possible to discover the reasons for such behavior of companies.

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### **Abstrakt (in Polish)**

Artykuł przedstawia dwie główne siły oddziałujące na tworzenie innowacji produktowych przez dostawców technologii nieszkodliwych dla środowiska, czyli konkurentów i klientów. Praca omawia te zjawiska na bazie rozmaitych podejść teoretycznych (Ansoff i Stewart, 1967; Von Hippel, 1987, 2005, 2007; Prahalad and Ramaswamy, 2004). Wyniki badań pokazują, że polskie firmy – dostawcy technologii nieszkodliwych dla środowiska chętnie szukają inspiracji zarówno po stronie popytu jak i podaży rynkowych graczy. W przypadku strony podaży, w większości sytuacji inspiracja nie miała prowadzić do kopiowania już istniejących idei, które odniosły sukces. Konkurenci są postrzegani raczej jako źródło inspiracji do dalszego rozwoju rozwiązań technologicznych. Chociaż firmy koncentrują się na tworzeniu relacji z klientami i śledzeniu ich zachowań, relacje te nie zostały jeszcze w pełni stworzone przez polskie firmy objęte naszym badaniem, a klienci nie są wciąż traktowani jako współtwórcy udoskonalień produktów czy nowych rozwiązań.

**Słowa kluczowe:** technologie środowiskowe, klienci, konkurencja, innowacje produktowe, innowacje popytowe.

### **Biographical note**

**Magdalena Marczevska**, doctoral candidate at the Faculty of Management, University of Warsaw. She graduated from the University of Warsaw, Faculty of Management and Warsaw School of Economics. Her research interests focus on innovation management and environmental management. She studied and carried out research at the University of Kentucky, the University of Padua and the London School of Economics and Political Science. Author and co-author of two management science books. Research grant holder in the “ETIUDA” program, funded by the National Science Center (NCN), the research agency of the Polish government.



# Entrepreneurial Opportunities for Wind-Energy Markets in Three Emerging Economies

*Chien-Chi Tseng\**

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## **Abstract**

*Wind power is currently perceived as an important source of clean renewable energy and a viable way of decreasing the levels of greenhouse gas emissions. This paper gives an overview of the opportunities and challenges for the emerging wind energy markets in Brazil, China, and South Africa. The specific information on cultural and legal system as well as economic condition in these emerging countries is reviewed briefly. The data from the Global Entrepreneurship Monitor, the World Bank, the Global Wind Report, and other public online sources are applied to this study. A practical framework is constructed to explore the relationships among entrepreneurial opportunities of wind energy businesses and their benefits, costs, and risks in these countries. The purpose of this study is to review a practical model that positions the benefits, costs, and risks as well as opportunities and challenges in the three emerging countries. This study begins by exploring the three selected countries in the efficiency-driven economies. Then, this study attempts to compare the wind energy markets in the three countries and highlighting the importance of benefits, costs, and risks for these emerging markets. Furthermore, the discussions for characteristics of opportunities and challenges are performed for the three selected nations. Finally, conclusions and implications are generated for the further study. From this research, it is concluded that there are different perspectives of wind energy business development in Brazil, China, and South Africa. Also, enhancing entrepreneurial opportunities is a good way to overcome the challenges for new business development in the emerging economic markets.*

**Keywords:** *emerging economies, efficiency-driven countries, wind-energy markets, renewable sources, entrepreneurial opportunity.*

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## INTRODUCTION

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The increase in global investment and cross-border entrepreneurship during the century reflects the growing opportunity of national economies. The entrepreneurial activity has played a central role in the process of economic change by creating new businesses and services in the global communities. Thus, globalization has significantly influenced entrepreneurial opportunity and performance (Chrysostome, 2010). Kelley, Bosma, and Amorós (2011) cite the survey results from the Global Entrepreneurship Monitor (GEM) to emphasize the positive impact of entrepreneurial activity on economic growth, innovation, and internationalization, within and across economies.

Since entrepreneurship is concerned with the discovery and exploitation of profitable opportunities (Shane and Venkataraman, 2000), it has followed certain waves in its own development across the world, much like other economic processes. The decades of the 70's and 80's represent one of these waves of entrepreneurial activities – during this time, the entrepreneurial concept and effects reflected the business mindset (Lumpkin, 2011) and it made significant contributions to the economy and society (Landstrom, 2005). These entrepreneurial effects lead to an increase of productivity in labor and capital, which enhance economic growth (Hill, 2011); and to the development of new management paradigms embedded in business strategies and practices (Timmons and Spinelli, 2009). The twenty-first century faces new challenges in the economic and management system as the global entrepreneurial age develops (Drucker, 2001). Based on Asif and Muneer's (2007) review for renewable and sustainable energy, these challenges include the quest to reduce greenhouse gas emissions associated with traditional (e.g., fossil fuel-based) power generation, and to seek sustainable, clean, renewable energy alternatives such as wind power. This specific challenge presents an opportunity for entrepreneurs.

However, although researchers have made many efforts in recognizing the importance of entrepreneurial opportunity (e.g., Ardichvili, Cardozo, and Ray, 2003; McMullen, Plummer, and Acs, 2007; Singh, 2001) and challenges (e.g., Brush, Greene, Hart, and Haller, 2001; Rodie and Martin, 2001), little existing theory or research has been involved in the discussion of entrepreneurial opportunity and challenge for wind energy business. In particular, the connection for entrepreneurial opportunity with wind energy business in the emerging market countries has not been discussed in the existing international business and entrepreneurship literature yet. Therefore, the opportunity of wind energy business will depend on entrepreneurship, offering quality products and services at affordable prices. This is a good way to promote entrepreneurial activity in the emerging market countries (Nonis and Relyea, 2012).



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Accordingly, the purpose of this study is to examine wind energy markets and related entrepreneurial opportunities within the selected emerging economies and to explore the practical framework relationships for developing wind turbine business in the emerging country contexts. This paper approaches a cross-border initiative in entrepreneurship in the emerging economies. Given the broader context of greener energy, global warming, and the often-mentioned, but rarely investigated role of emerging economies, we select three emerging wind markets for study. This study begins by exploring the theoretical backgrounds in defining entrepreneurial opportunity and discussing the three selected emerging markets in efficiency-driven economies. Then, this study attempts to construct the research model and hypotheses. In addition, research methodology and results are explored with comparing the wind energy markets in the three countries and highlighting the importance of benefits, costs, and risks for these emerging markets. Furthermore, the discussions of characteristics of opportunities and challenges are offered for the three selected nations. Finally, conclusions and implications are generated for practice and further study.

## **THEORETICAL BACKGROUNDS**

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Emerging multinationals' internationalization process often gives entrepreneurs access to new customers, innovation, and technological hubs as well as several possibilities to experience new things that were not available or feasible in their local markets (Zahra, Abdelgawad, and Tsang, 2011). Thus, researchers have recently shifted attention away from approaches that focus on identifying those people in society who prefer to become entrepreneurs towards understanding the nexus of enterprising development and valuable opportunities in the emerging country context (Venkataraman, 1997). This new focus has required scholars to explain the role of opportunities in the process of entrepreneurship (Eckhardt and Shane, 2003). Accordingly, Zahra et al. (2011) point to the fact that exploiting these opportunities in the new context requires firms to build an entrepreneurial capability that allows them to simultaneously leverage their inherent capabilities while stretching to build new ones in the emerging markets.

For the past decades, the dominant theories in entrepreneurship have sought to explain entrepreneurship as a function of the types of people engaged in entrepreneurial activity and, as a result, have largely overlooked the opportunity for entrepreneurship (Eckhardt and Shane, 2003). An opportunity focus therefore necessitates consideration of the process of entrepreneurship (Rasmussen et al., 2011) with benefit, risk, and cost for the wind energy business in the global emerging environment. Entrepreneurial

opportunity involves not only technical skills like financial analysis and market research, but also less tangible forms of creativity, team building, problem solving, and leadership (Hindle, 2004). Based on Shane and Venkataraman (2000), entrepreneurial opportunity is defined as a situation in which new goods, services, raw materials, markets, and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships. This definition suggests that identifying and selecting right opportunities for new businesses are among the most important abilities of a successful entrepreneur (Ardichvili et al., 2003).

Entrepreneurial opportunity recognition is the ability to identify institutional theory and practice in which new goods, services, raw materials, markets, and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships (Eckhardt and Shane, 2003). It is our thought that entrepreneurial opportunity recognition is also fundamental to institutional theory. Institutions are defined as regulative, normative, and cognitive structures and activities that provide stability and meaning to social behavior (Scott, 1995). Institutions govern societal transactions in the areas of politics (e.g. corruption, transparency), law (e.g., economic liberalization, regulatory regime), and society (e.g., ethical norms, attitudes toward entrepreneurship) (Peng, Wang, and Jiang, 2008). Therefore, integrating the notion of opportunity-recognition into research on entrepreneurship would add an important dimension to the institutional theory and provide a useful and interesting way of explaining the enterprise development in the international business environment.

The specific emerging wind energy markets are selected according to the criteria of national competitiveness in the emerging country study. The matching criteria of the national competitiveness for the three selected countries include Brazil, China, and South Africa. These criteria offer significant opportunities for entrepreneurship compared with well-established markets. "Competitiveness" involves static and dynamic components and is defined broadly as that "set of institutions, policies, and factors that determine that level of productivity of a country" (World Economic Forum, 2010) – and productivity in turn provides prosperity and well-being (Frankenstein, 2011). There are many determinant components driving productivity and competitiveness and "these components are grouped into 12 pillars of economic competitiveness" (World Economic Forum, 2010, pp. 4-8):

- 1) Institutions: the institutional environment in the emerging markets.
- 2) Infrastructure: Extensive and efficient infrastructure of the emerging markets.
- 3) Macroeconomic environment: the stability of the macroeconomic environment in an emerging market.

- 4) Health and primary education: a healthy workforce and good quantity and quality of basic education in the emerging markets.
- 5) Higher education and training: quality higher education and training is crucial for emerging markets.
- 6) The emerging markets with efficient-goods markets.
- 7) Labor market efficiency: the efficiency and flexibility of the labor market in the emerging markets.
- 8) Financial market development: the well-functioning financial sector for economic activities.
- 9) Technological readiness: an important element for firms to compete and prosper in the emerging markets.
- 10) Market size: the size of the market affects productivity.
- 11) Business sophistication: to enhance a nation's competitiveness, and
- 12) Innovation: is particularly important for emerging markets.

Economic development involves change and the entrepreneur becomes the best agent for this change (Acs and Virgill, 2010). In such a global economic environment under uncertainty and challenges, it is more important than ever for the emerging countries to put into place the fundamentals underpinning economic growth and development, to understand the key factors determining economic growth, and to explain why some emerging countries are more successful than others in raising entrepreneurial opportunities for their respective populations (World Economic Forum, 2010). Economic development in the emerging countries implies a process of structural transformations leading to an overall higher growth trajectory (Brinkman, 1995).

According to the World Economic Forum (2010), three different stages of economic development influence the perceived entrepreneurial opportunities and capabilities in the different countries. The first stage is factor-driven economy. In this stage, countries compete based on their factor endowments: primarily unskilled labor and natural resources (Porter, 1990). Maintaining competitiveness at this economic development stage hinges primarily on well-functioning public and private institutions, well-developed infrastructure, a stable macroeconomic environment, and a healthy workforce that has received at least a basic education (World Economic Forum, 2010). In the second stage of efficiency-driven economy, entrepreneurs with high aspirations fare better in countries with a stable economic and cultural climate, in addition to other well-developed institutions. At this point, entrepreneurial opportunities are increasingly driven by higher education and training, efficient goods markets, well-functioning labor markets, developed financial markets, the ability to harness the benefits of existing technologies, and a large domestic or foreign market (World Economic Forum, 2010). In the third stage of innovation-driven economies, knowledge is prevalent but labor

is expensive. Entrepreneurship-specific opportunities become the levers that drive dynamic, innovation-oriented behavior, while the foundation of basic requirements and efficiency enhancers needs to be maintained (Kelley et al., 2011).

Unlike “factor-driven” countries which are mainly characterized by agricultural production and natural resource extraction, the features of scale and capital in efficiency-driven countries are important to the context of wind power development. In many cases, technology is imported from “innovation-driven” countries, which also augments the opportunity for global entrepreneurship in this sector. Thus, we narrowed our scope to the list of “efficiency-driven” countries. Economic growth in these countries is connected to increasing economies of scale, the provision of support, opportunities for entrepreneurial activities, and the development of the banking sector as a backbone for capital-intensive organizations.

Given the widely varying wind patterns across the world, we decided to extend the geographic scope as broadly as possible. The regional groupings in the “efficiency-driven” category are used to achieve this geographic dispersion: Sub-Saharan Africa and North Africa (only *South Africa* and Tunisia); Latin America and the Caribbean (10 countries including Argentina, *Brazil*, Mexico and Uruguay); Eastern Europe and Asia Pacific (6 countries including Croatia, Hungary, Romania, Malaysia, *China*, and Taiwan).

## RESEARCH MODEL AND HYPOTHESES

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This research focuses on distinguishing the relationships between entrepreneurial opportunity and wind energy business in the three representative emerging countries. What does this approach look like to develop wind energy business with entrepreneurial opportunity in the three emerging economies? How are the relationships between entrepreneurial opportunity and wind energy business benefits, costs, and risks in the three emerging countries? The research argues that this fundamental underlying mechanism is embodied within the hypothesized framework and the research concepts of entrepreneurial opportunity, business benefits, costs, and risks in this study.

**Table 1.** Indicators of GEM Entrepreneurship Activity in the Selected Countries

<b>GEM Entrepreneurship Activity Indicators in 2010</b>	<b>Brazil</b>	<b>China</b>	<b>South Africa</b>
Total early-stage Entrepreneurial Activity (TEA) (%)	17.5	14.4	8.9
Total early-stage Entrepreneurial Activity for Female Working Age Population (%)	16.4	12.4	8.1
Total early-stage Entrepreneurial Activity for Male Working Age Population (%)	18.6	16.4	9.6
Improvement-Driven Opportunity Entrepreneurial Activity (%)	46	34	31
Necessity-Driven Entrepreneurial Activity (%)	31	42	36
Established Business Ownership Rate	15.3	13.8	2.1
New Business Ownership Rate (%)	11.8	10	3.9
Nascent Entrepreneurship Rate (%)	5.8	4.6	5.1

**Note:** The numbers in this table represent the percentage of each related entrepreneurship activity. The higher number has the better comparing percentage data in the indicators. The columns with shading have the best comparing data in the indicators.

**Source:** Global Entrepreneurship Monitor Report (2010).

Within these regional groupings, we selected emerging economies with the highest GDP in recognition of the fact that higher economic activity, especially in terms of large projects, does indirectly benefit entrepreneurial activity – as is borne out by comparing the Total Early-Stage Entrepreneurship Activity (TEA) rates from GEM report. Table 1 demonstrates the comparative information of the entrepreneurial activity and opportunity indicators in the three selected countries – Brazil, China, and South Africa. In the GEM report, several indicators are measured for the extent to which people think there are good opportunities for starting a business and their capabilities for doing so (Kelley et al., 2011). Those indicators include TEA, TEA for Male and Female Working Age Population, Improvement-Driven and Necessity-Driven Opportunity Entrepreneurial Activity, and New and Established Entrepreneurship Rate. The numbers in Table 1 represent the percentage of each related entrepreneurship activity. The higher number has the better comparing percentage data in the indicators.

Entrepreneurial opportunity is a benefit development activity that involves the discovery, evaluation, and exploitation of opportunities to introduce new goods and services, ways of organizing, markets, processes, and raw materials through organizing efforts that previously had not existed (Shane and Venkataraman, 2000; Venkataraman, 1997). Drawing on the above contributions to the activities of benefit increase in the emerging economies, entrepreneurial opportunity is identified as the manifest ability

and willingness of nations (Wennekers and Thurik, 1999) to perceive new economic opportunities and to introduce their ways of seizing these opportunities into the global market in the face of uncertainty (Bjørnskov and Foss, 2008).

Entrepreneurs are recognized as the single most important player in a modern economy (Lazear, 2002) because they in many ways personify market forces, and it is expected that entrepreneurs shall be the central figures in economics (Bjørnskov and Foss, 2008). Opportunities, in the sense of entrepreneurship and management benefits, are treated as a construct that is manifested in entrepreneurial action—investment, creating new organizations, bringing products to market (Klein, 2008), and develop approaches for national growth.

Therefore, we take a viewpoint that opportunities can exist independently of the different benefit development levels (Shane and Venkataraman, 2000). In any circumstance, characteristics of size of economy, government incentives, or wind resource capability may create different benefits for wind-energy entrepreneurship (Stephan and Uhlener, 2010) in the emerging markets. Accordingly, the first hypothesis is provided:

**Hypothesis 1:** Entrepreneurial opportunities have a significant relationship with wind energy market benefits in the emerging economies.

Entrepreneurial opportunities are increasingly recognized as the main driver of economic growth and prosperity at local, national, and regional levels, and worthy of considerable support and cost investment in infrastructure (Floyd and McManus, 2005), technology improvement, and human resource quality. Klein (2008) points out these opportunities include creating a new firm or starting a new business arrangement, introducing a new product or service, or developing a new method of production. These activities are significantly influenced by entrepreneurial costs.

Moreover, based on Kelley et al. (2011) in the 2010 Global Report of Global Entrepreneurship Monitor, if the country in general has positive attitudes toward entrepreneurship, this will generate economic support, financial resources and costs, networking benefits and various other forms of assistance to current and potential entrepreneurs. Therefore, the costs toward entrepreneurship are affected by environmental supports and personality traits (Chen and Lai, 2010) and the enterprise development can benefit from people who are able to recognize valuable business costs (Kelley et al., 2011), and who perceive they have the required skills to reduce the costs in the international operation. Therefore, the second hypothesis is provided:

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**Hypothesis 2:** Entrepreneurial opportunities have a significant relationship with wind energy market costs in the emerging economies.

The concept of risk-taking and its linkages with the construct of entrepreneurial opportunity have been reasonable to capture. As a result, it has been fair to explain why entrepreneurs rush in to take advantage of opportunities that others fail to see or act upon (Palich and Bagby, 1995). According to Palich and Bagby (1995), entrepreneurs may not think of themselves as being any more likely to take risks than non-entrepreneurs, but they are nonetheless predisposed to cognitively categorize business situations more positively. In this study, risks for engaging a new business include the corruption risk, freedom and rule of law risk, and legal systems and protection risk. These risks challenge entrepreneurs to identify and exploit business opportunities, even when they are distracted by the perceived high risk of these ventures (Palich and Bagby, 1995). Consequently, the third hypothesis is offered:

**Hypothesis 3:** Entrepreneurial opportunities have a significant relationship with wind energy market risks in the emerging economies.

## **RESEARCH METHODOLOGY**

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This study comprises a comparative analysis of the political, legal, and economic systems in the selected countries as a means to understand the influence of these systems on doing business in the respective countries on a broad level. Relevant data were assembled from several secondary sources including: the World Bank, the World Trade Organization, the World Economic Forum, the International Monetary Fund, the United Nations Environment Program, Transparency International, the Freedom House, the Global Wind Energy Council, Global and National Wind Power Atlases, National Wind Energy Associations, and Government agencies like Ministries of Mines and Energy, and Environment. Also, correlation analysis is used to verify hypothesized relationships between entrepreneurial opportunities and wind energy business benefits, costs, and risks in the selected emerging countries.

We compare the countries from the perspective of a start-up in the wind energy business seeking to establish operations in a foreign country. This perspective is relevant considering that the transportation of turbine blades to wind sites, for example, presents a cost challenge if the blades are not manufactured sufficiently close to the sites where they will be installed. Therefore, entrepreneurs in the wind energy business may need to

evaluate international locations that will optimize the need to achieve both production efficiency and market responsiveness. In this regard, we extend our comparative analysis of the broader business context to wind-specific entrepreneurial circumstances and evaluate the attractiveness or otherwise of making wind power investments within the selected markets. Thus, we discuss the issues of opportunities and challenges in the entrepreneurial process, and offer insights into how wind energy businesses might successfully be involved in the three selected emerging markets.

## RESEARCH RESULTS

This selection process allowed Brazil, China, and South Africa to represent different regions in the world within the efficiency-driven category, all with energy security concerns and with emerging markets in the wind sector. A cross country comparison matrix of national statistical information in the wind energy industry by these three countries is illustrated in Table 2.

**Table 2.** Indicators of Benefits, Costs, and Risks of Doing Business in Three Countries

Item	Indicators (2010)	Brazil	China	South Africa
1	Population (total, million)	194.9	1338.3	49.9
2	Population growth (annual %)	0.9	0.50	1.4
3	GDP (current US\$ billion)	2087.9	5878.6	363.7
4	GDP growth (annual %)	7.5	10.3	2.8
5	GDP per capita (current US\$)	10710.1	4392.6	7275.3
6	Total Installed Wind Power Capacity (MW)	931	42287	8
7	Wind energy price with government subsidies (US\$ / MWh)	65.3	94.0	30.5
8	Number of Wind Turbine Manufacturers (5 MW or more)	4	7	0
9	Ease of doing business index (1= most business-friendly regulations)	127	79	34
10	Ease of obtaining credit (Rank out of 183 countries)	89	65	2
11	Ease of registering property (costs as % property value)	2.7	4	8.8
12	Ease of enforcing contracts (cost as % of claim)	16.5	11.1	33.2
13	Credit depth of information index [0 (low) to 6 (high)]	5	4	6
14	Taxation (% of profits)	69	63.5	30.5
15	Inflation, consumer price (annual %)	5.0	3.3	4.3



16	Time required to start a business(days)	120	38	22
17	Strength of Investor Protection [0 (low) to 10 (high)]	5.3	5	8
18	Protecting Investors (Rank out of 183 countries)	74	93	10
19	Corruption index-1 (Rank out of 183 countries)	69	73	54
20	Corruption index-2 [0 (poor) to 10 (good)]	3.7	3.6	4.5
21	Anti-corruption efforts [-2,5 (weak) to 2,5 (strong)]	-0.06	-0.52	0.1

**Note:** The columns with shading have the best comparing data in the indicators. Items 1 – 8 belong to the category of Benefits; Items 9 – 14 belong to the category of Costs; Items 15 – 21 belong to the category of Risks.

**Source:** Global Wind Energy Council (2011); Transparency International (2009); World Bank (2010); and World Economic Forum (2010).

Table 2 compares the selected countries in terms of indices that describe the size and potential growth of the market, risks and challenges of doing business within and across borders, and the costs associated with the legal framework.

Tables 1 and 2 appear to highlight the entrepreneurial opportunities as well as benefits, costs, and risks in different respects for the markets of Brazil, China, and South Africa. The significantly easier access to credit in South Africa is an advantage for investors. Also, South Africa's membership in the Southern African Development Community (SADC) and its aggressive efforts to establish a business presence in several African countries increase the market size that must be taken into account in this analysis. Brazil is clearly committed to developing renewable energy. However, the exposure to competition from outsiders entering these markets may be unhealthy for start-ups in this industry because they are not well competitive with strong outsiders. This is a similar situation for China which already has large players (4 of the 10 largest manufacturers) in the market. Table 3 presents positive and negative factors extending the comparison of quantitative data presented in Tables 1 and 2.

**Table 3.** Cross-Country Comparison of Qualitative Factors Affecting Attractiveness of Wind Energy Business

Country	Positive Factors	Negative Factors
Brazil	<ol style="list-style-type: none"> <li>1. Federal government incentives provide substantial resources for entrepreneurial investments and human resource training; Organized auctions have been hosted exclusive to wind energy</li> <li>2. Wealthy nation with political stability and sustained growth in renewable energy; capacity in nation insufficient to exploit wind resources fully</li> <li>3. Technological improvements in aerodynamic efficiency and wind turbine speed optimization</li> </ol>	<ol style="list-style-type: none"> <li>1. Exposure to intense national and international competition</li> <li>2. High share of state-owned enterprises (60%)</li> <li>3. Poor relative perceptions of “ease of doing business” and investor protection</li> <li>4. Current concerns about weak efforts at stemming corruption</li> </ol>
China	<ol style="list-style-type: none"> <li>1. Government policies support massive integration of wind power into future energy systems; Status in 2010 as largest wind energy provider worldwide</li> <li>2. Opportunity to establish long-term working relationships through <i>guanxi</i> concept</li> <li>3. Sustained growth in consumer markets</li> <li>4. Available inexpensive, qualified human resource; and exceptional wind resources to harness</li> </ol>	<ol style="list-style-type: none"> <li>1. Restrictive legal systems (e.g. foreign lawyers prohibited from representing clients in Chinese courts)</li> <li>2. Rampant corruption</li> <li>3. Skewed development with concentration in the eastern coastal regions with remainder of country left behind</li> <li>4. Crime and social disorder an increasing concern; also massive water and air pollution (has 20 of world’s 30 most polluted cities)</li> </ol>
South Africa	<ol style="list-style-type: none"> <li>1. Strong signals about political will to develop wind sector, including government incentives and power purchase agreements</li> <li>2. Provincial governments are potential allies; potential for first-mover advantages</li> <li>3. Critical mass of emerging manufacturing and technology base; Long coastline with suitable wind speeds</li> <li>4. Potential access to South African Development Community</li> </ol>	<ol style="list-style-type: none"> <li>1. Negative rankings on corruption</li> <li>2. Cultural challenges and social transitions impacting business structure</li> <li>3. Several multinationals seeking to launch businesses in Africa through South Africa as launch – adding to the intensity of industry competition</li> </ol>

**Source:** Global Wind Energy Council (2011); Global Entrepreneurship Monitor Report (2010); and World Economic Forum (2010).

Table 4 shows the correlation matrix of 23 indicators for the three wind energy emerging markets. These 23 indicators are categorized into four groups:

Entrepreneurial opportunities (4 indicators – Total Early-Stage Entrepreneurial Activity, Established Business Ownership Rate, New Business Ownership Rate, and Nascent Entrepreneurship Rate);

Wind energy market benefits (7 indicators – Population, Population Growth, GDP Growth, GDP per Capita, Total Installed Wind Power Capacity,

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Wind Energy Price with Government Subsidies, and Number of Wind Turbine Manufacturers);

Wind energy market costs (6 indicators – Ease of Doing Business Index, Ease of Obtaining Credit, Ease of Registering Property, Ease of Enforcing Contracts, Credit Depth of Information Index, and Taxation); and

Wind energy market risks (6 indicators – Inflation: Consumer Price, Time Required to Start a Business, Strength of Investor Protection, Protecting Investors, Corruption Index, and Anti-Corruption Efforts)

From the analysis results in Table 4, correlations among four indicators of the group of entrepreneurial opportunities are significant (ranging from 0.53 to 0.98). Correlations among seven indicators of the group of wind energy market benefits are significant (ranging from 0.21 to 0.99). Correlations among six indicators of the group of wind energy market costs are significant (ranging from -0.82 to 0.78). Correlations among six indicators of the group of wind energy market risks are significant as well (ranging from -0.91 to 0.89).

In addition, the correlations between the indicators of entrepreneurial opportunities and wind energy market benefits are found to indicate a significant relationship (ranging from 0.32 to 0.85). The correlation between the indicators of entrepreneurial opportunities and wind energy market costs are also found to indicate a significant relationship (ranging from -0.94 to 0.98). Similarly, the indicators of entrepreneurial opportunities and wind energy market risks show a significant relationship (ranging from -0.97 to 0.93).

**Table 4. Correlations among indicators in this study**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1. Total Early-Stage Entrepreneurial Activity	1																							
2. Established Business Ownership Rate	0.78*	1																						
3. New Business Ownership Rate	0.98*	0.87*	1																					
4. Nascent Entrepreneurship Rate	0.68*	0.90*	0.53*	1																				
5. Population	0.41*	0.45*	0.50*	0.84*	1																			
6. Population Growth	0.74*	0.77*	0.82*	0.51*	0.90*	1																		
7. GDP Growth	0.39*	0.85*	0.56*	0.47*	0.63*	0.51*	1																	
8. GDP Per Capita	0.43*	0.48*	0.46*	0.41*	0.81*	0.58*	0.69*	1																
9. Total Installed Wind Power Capacity	0.32*	0.40*	0.43*	0.35*	0.99*	0.52*	0.74*	0.47*	1															
10. Wind Energy Price with Government Subsidies	0.44*	0.83*	0.59*	0.36*	0.75*	0.46*	0.63*	0.45*	0.51*	1														
11. Number of Wind Turbine Manufacturers	0.76*	0.76*	0.83*	0.71*	0.89*	0.25*	0.37*	0.21*	0.30*	0.24*	1													
12. Ease of Doing Business Index	0.90*	0.88*	0.92*	0.48*	0.46*	0.34*	0.51*	0.57*	0.65*	0.61*	0.46*	1												
13. Ease of Obtaining Credit	0.64*	0.96*	0.74*	0.41*	0.57*	0.43*	0.49*	0.33*	0.69*	0.56*	0.41*	0.61*	1											
14. Ease of Registering Property	-0.53*	-0.93*	-0.65*	-0.49*	-0.22*	0.24*	0.49*	-0.48*	0.62*	0.71*	-0.39*	0.50*	-0.66*	1										
15. Ease of Enforcing Contracts	-0.63*	-0.94*	-0.76*	-0.62*	-0.68*	-0.45*	0.51*	-0.74*	-0.59*	0.71*	-0.82*	0.44*	0.69*	-0.51*	1									
16. Credit Depth of Information Index	-0.52*	-0.81*	-0.66*	-0.52*	-0.85*	-0.57*	0.15*	-0.68*	-0.52*	0.81*	-0.56*	0.43*	-0.75*	0.71*	-0.69*	1								
17. Taxation	0.93*	0.95*	0.98*	0.91*	-0.53*	0.46*	0.49*	0.60*	0.42*	0.53*	0.46*	0.65*	0.40*	0.61*	0.78*	0.63*	1							
18. Inflation, Consumer Price	-0.48*	-0.54*	-0.43*	-0.63*	-0.59*	-0.37*	-0.55*	-0.45*	-0.64*	0.51*	-0.67*	-0.53*	-0.45*	-0.70*	-0.57*	0.49*	-0.56*	1						
19. Time Required to Start a Business	0.90*	0.58*	0.83*	0.84*	0.69*	0.57*	0.46*	0.71*	0.83*	0.67*	0.86*	0.53*	0.94*	0.46*	0.73*	0.55*	0.66*	0.84*	1					
20. Strength of Investor Protection	-0.64*	-0.97*	-0.77*	-0.68*	-0.74*	-0.69*	-0.75*	-0.80*	-0.62*	-0.15*	-0.75*	-0.57*	-0.65*	-0.61*	-0.88*	-0.52*	-0.64*	-0.42*	-0.91*	1				
21. Protecting Investors	0.68*	0.95*	0.81*	0.69*	0.51*	0.57*	0.45*	0.60*	0.68*	0.51*	0.70*	0.53*	0.46*	0.63*	0.59*	0.81*	0.62*	0.55*	0.49*	0.65*	1			
22. Corruption Index	0.89*	0.82*	0.93*	0.84*	0.68*	0.24*	0.52*	0.46*	0.72*	0.61*	0.66*	0.47*	0.89*	0.21*	0.59*	0.49*	0.79*	0.78*	0.62*	0.51*	0.89*	1		
23. Anti-Corruption Efforts	-0.54*	-0.55*	-0.62*	-0.53*	-0.73*	-0.47*	-0.55*	-0.60*	-0.62*	-0.51*	-0.86*	-0.73*	-0.65*	-0.74*	-0.99*	-0.61*	-0.50*	-0.53*	-0.68*	-0.51*	-0.70*	-0.70*	1	

\*Pearson Correlation is significant at the 0.01 level (2-tailed).

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## DISCUSSIONS

Through wind energy market comparison in the three selected emerging countries, this study not only provides a new direction for wind energy development research in the emerging markets, but also generates an interesting discussion for international business and entrepreneurship. We believe that strengthening entrepreneurial opportunity would be a wise way to achieve wind energy market development in the emerging countries. Through the correlation analysis, the study found that three hypotheses are well verified. Correlations among the four indicators of entrepreneurial opportunity are significant. Similarly, correlations among the indicators for each group of wind energy market benefits, costs, and risks are significant. In addition, the correlations between the different groups of entrepreneurial opportunity with wind energy market benefits, wind energy market costs, and wind energy market risks are also found to indicate significant relationships. The findings from this study suggest that entrepreneurial opportunity can be viewed as an important influencing factor for wind energy business development in the emerging economies.

The next section provides additional insights into the business environment of various countries.

### Brazil

Brazil is on the forefront of alternative energy projects with a voluntary commitment to reduce its greenhouse gas emissions by 2020 (The World Bank, 2011); with the national consumption of ethanol in automobiles surpassing gasoline consumption in 2008; and with 45 percent of energy needs supplied from renewable sources (Ministry of Mines and Energy, 2008a). Development of wind power is one positive spillover effect of the alternative energy projects; and has been aided by political will expressed through state incentives, the improvement of aerodynamic efficiencies and the optimization of wind turbine speeds (Marques et al., 2003). Government support frameworks include the Alternative Sources Incentive Program which seeks to promote the diversification of the Brazilian energy matrix through joint ventures in wind, biomass and small hydroelectric systems. However, much interest in wind power has been concentrated in the Northeastern region in line with the fact that this region has the largest wind power potential (Rosas et al., 2004). Furthermore, there has been an increase in the development of diverse entrepreneurial entities in this region (Brasil, 2010), providing a ready application for energy generation.

For foreign investors in the wind sector, the opportunities and challenges of engaging the wind power business have been summarized in Table 3.

Based on the work of de Araújo and de Freitas (2008), Pereira et al. (2011), and on other sources listed earlier, there exists a demand gap that foreign investors can exploit in this market. The high levels of taxation are currently being addressed, and entrants need to have a long-term perspective on their involvement.

## China

China became the largest wind energy provider worldwide, with the installed wind power capacity reaching 41.8 GW at the end of 2010 (Kroldrup, 2010). According to the Global Wind Energy Council (2011), the development of wind energy in China, in terms of scale and rhythm, is absolutely unparalleled in the world. The large land mass and long coastline provides exceptional wind resources for China, which can be harnessed to fuel growth in the economy (Gow, 2009). According to Li et al. (2010), the potential for exploiting wind energy in China is enormous, with a total exploitable capacity for both land-based and offshore wind energy of around 700-1,200 GW. The need for alternative energy sources in China is great, given that it has now become the world's largest energy consumer relying on coal to supply about 70 percent of its energy needs (Swartz and Oster, 2010). Nevertheless, the larger Chinese wind turbine manufacturers have also entered the international competition for large-scale wind power equipment - developing 5 MW or larger turbines (Global Wind Energy Council, 2011) - and expanding into overseas markets (Lema and Ruby, 2006) with the support of several component manufacturers (Federico, 2009).

China is a unitary state that has experienced a drive to establish a functioning legal system, and promulgated over 300 laws and regulations from the late 1970s to the mid-1990s (Potter, 1999). As a result of a pending trade war with United States over violations of intellectual property right of U.S. corporations in the early 1990s, China's trademark law has been modified, and now offers significant protections to foreign trademark owners. Even though China has maintained its unity and domestic stability, and has achieved rapid economic growth and a higher standard of living for the overwhelming majority of its people, there are challenges for its current political situation. Besides the challenge of Taiwan's de facto independence, growing urban unemployment, rising crime, social disorder, and corruption challenge the government's ability to maintain stability (Oksenberg, 2001).

Businesses intending to invest in China may fare poorly unless they get sound advice. Obtaining good advice has much to do with "guanxi" which literally means "relationship(s)" (Tsang, 1998). It is a concept essential to one's effective functioning in the Chinese society because the Chinese often

feel obligated to do business with their friends first (Leung and Wong, 2001). Existing pricing policies, however, affect the level of active investment by developers (Li et al., 2010). If a foreign company has the financial muscle to counter the entry barriers, including some technological advantages in turbine design, for example, then a long-term approach to entering the Chinese market will be desirable.

### **South Africa**

South Africa is the dominant economic player within the Southern African Development Community. It is also viewed as a gateway to many other African countries. According to the World Bank (2011), South Africa is the best African country in which to do business, next only to Mauritius by ranking. The International Monetary Fund (IMF) forecasts that economic growth rates in Africa could surpass that of Asia in the next five years, noting that over the ten years preceding 2010, six of the world's ten fastest growing economies were in Africa. The strong growth of Foreign Direct Investment in Africa, especially from China, can be seen as signaling the readiness of Africa to do business with the world. In this regard, a higher incidence of industrial investments will put an even greater strain on the existing limited energy resources, and strengthen the case for supply-side interventions on the continent. Furthermore, Africa's population exceeded one billion in 2009, is growing at an average rate of 2.4 percent, and is expected to double by the year 2050 (United Nation Environment Program, 2010). McKinsey (2010) put the number of middle class households, defined as those with annual incomes of at least \$20,000.00, in Africa at fifty million, as many as in India.

Within this larger context, South Africa has a growing economy, a critical mass of industries and an associated need for reliable sources of electricity (Kirsten and Rogerson, 2002). Its increasing industrialization and the robust growth of industries like mining, automobile assembly, metalworking, machinery, and textiles has placed unprecedented demands on its energy resources (Kirsten and Rogerson, 2002). A severe electricity crisis interrupted economic development in 2007, necessitating the import of several billion KW of power to meet demand (Von Schnitzler, 2008). The commitment of the government to energy security was expressed in the 2011 State of the Nation address and followed the 2010 release of the country's Integrated Resource Plan (IRP). The IRP seeks to generate 10,000 GW of electricity from alternative sources by 2013, and includes private renewable energy suppliers (Von Schnitzler, 2008). According to the United Nations Environment Program (2011), wind power constitutes about 74 percent of the potential to produce power from technically feasible renewable energy technologies.

Diab (1995) describes a significant band of coastal land area along South Africa's long coastline with desirable good wind power generation potential. There are also federal and provincial government incentives, besides an established clear Power Purchase Agreement, to encourage investment in the wind energy sector (Global Wind Energy Council, 2011). Nevertheless, there is a growing presence of international wind power providers such as Vestas, Enercon, Siemens, Goldwind, and Juwi. A measured entry through agreements with Provincial Governments, while retaining the capacity and flexibility to quickly ramp up production after gaining access to high volume projects, may be a useful approach in South Africa.

## **CONCLUSIONS**

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In this paper we have presented the entrepreneurial opportunity as a means of exploring and evaluating how wind energy markets might affect the opportunities (Dunning and Lundan, 2008) of entrepreneurship in the three emerging economies. Developing countries have an important role in the efforts to stop global warming. While the international climate negotiations have failed to deliver new accomplishments for the reduction of carbon emissions, national policies and measures have made significant progress, and the renewable energy market is rapidly changing.

According to Winkler (2006), the usual environmental arguments against wind farms – visual pollution, bird strikes and turbine noise – are somewhat muted by broader considerations such as the noise emission of a wind turbine at 1100ft distance being 35-45dB, compared with that of a car traveling at 40mph (55dB) or a heavy-duty truck (65dB). Thus, various governmental or private sector-led wind energy initiatives have emerged around the world. Nevertheless, the fact that location efficiencies for production and consumption might be different implies that cross-nation perspectives need to be considered together within this entrepreneurial opportunity. Johansen and Knight (2010) indicated that smaller firms may rely on an international entrepreneurial orientation in an attempt to optimize their performance.

The countries within the scope of this study include Brazil, China, and South Africa. These countries are selected for the purpose of representing different regions in the world with similar emerging economies. This research focuses on a wide range of aspects for a thorough comparison of the wind energy market conditions in each country for enterprises. Analyzing entrepreneurial and economic aspects of wind power markets are an essential technique for understanding the dynamics of business development in the emerging economy contexts. Doing business in another country is similar to understanding guanxi anywhere, as it takes a significant amount of effort



to understand the characteristics of the market that prevail in the place of future enterprise. A new global enterprise needs to have a firm grasp on the main challenges and advantages for renewable energy sources in a new market; a clean electric array where environment and economic benefits are incalculable. Hence, the effort will pay off as Brazil, China, and South Africa are growing in the right direction.

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## **IMPLICATIONS**

The discussions of this study provide valuable suggestions and implications for governments and national leaders in understanding the present status and country differences among entrepreneurial opportunity, challenges, as well as benefits, costs, and risks in the global wind power markets, particularly in Brazil, China, and South Africa.

### **Implications for practice**

Firstly, institutional entrepreneurship is a crucial component in the transformation from a developing country to a developed country (Gilley and Maycunich, 2000; Peng, Wang, and Jiang, 2008). In addition, institutional entrepreneurship has the potential for being a valued component by contributing to entrepreneurial development and economic competitiveness. For this reason, institutional entrepreneurship appears to be important not only for businesses, but also for countries. For practical applications, instilling more institutional entrepreneurship through entrepreneurial opportunities may lead to more desired outcomes for wind energy businesses and emerging countries.

Secondly, political, legal, and economic systems in the global environment appear to be beneficial when a country promotes entrepreneurial opportunities and activities. Entrepreneurial opportunities may help a country in integrating its vision, mission, strategy, and practices. Thus, implementing these entrepreneurial opportunities may encourage people and businesses to create innovation and practical performance for national and global societies.

Thirdly, the cross-country comparison in Table 3 is useful, but the results in the negative column offer insights that are mostly known in the international business and entrepreneurship area. They are mostly macro-environment related and have very little implication regarding sector-specific effects. The assessment may be undertaken in the future at two levels. At the general level, it will sum up the generic barriers to conducting international business as it is done in the article; at the sector specific level, it will highlight

the main factors negatively influencing establishing operations in each of the selected countries.

### **Implications for future study**

Firstly, there is a need to perform an approach and to develop an institutional analysis of country attractiveness in reflection of the complexity of the political, legal and economic systems in the selected countries. The development of institutional framework would also allow additional countries to be added into the list as the research expands. Engaging in cross-border business activity provides many entrepreneurial opportunities for the creation and exploitation of new institutional forms (Dunning and Lundan, 2008). We believe that institutional analysis will offer great promise for reinvigorating many areas of international business research by providing the intellectual tools that allow scholars to confront the complexities that characterize the contemporary global economy (Dunning and Lundan, 2008).

Secondly, there is a need for the future study to integrate the research framework with Porter's five forces model and other existing related research which analyze competition in the wind energy industry. Issues such as new entrants, substitutes, and suppliers will also be interesting for consideration in the future.

Finally, in addition to the emerging wind power markets in Brazil, China, And South Africa, there is a need to consider the whole wind energy industry in the other emerging markets for future study. Those emerging countries include India, Malaysia, Mexico, Russia, and others. Furthermore, using reliable and valid measurements and methodologies to conduct the related researches in the other developing and developed countries will be of interest for future study.

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### **Abstract (in Polish)**

*Energia pochodząca z wiatru jest postrzegana jako ważne źródło czystej, odnawialnej energii i realny sposób obniżenia poziomu emisji gazów cieplarnianych. Niniejszy artykuł oferuje przegląd możliwości i wyzwań stojących przed rozwijającymi się rynkami energii z wiatru w Brazylii, Chinach i RPA. Praca przedstawia także konkretne informacje dotyczące systemów kulturowych i prawnych jak również warunków ekonomicznych w tych rozwijających się państwach. Dane pochodzą z Global Entrepreneurship Monitor, Banku Światowego, the Global Wind Report oraz innych publicznie dostępnych źródeł. Praca proponuje schemat analityczny do analizy relacji pomiędzy okazjami przedsiębiorczymi firm działających w sektorze energii wiatrowej, a korzyściami, kosztami i ryzykiem typowymi dla danego kraju. Celem badania była prezentacja praktycznego modelu, który porównuje korzyści, koszty oraz czynniki ryzyka, jak również szanse i wyzwania w trzech krajach rozwijających się. Badanie rozpoczęła się od analizy efektywności gospodarek w trzech krajach i podkreślenia znaczenia korzyści, kosztów i czynników ryzyka dla tych państw. Następnie scharakteryzowane zostaną szanse i wyzwania dla trzech wybranych państw. Wreszcie oferujemy wnioski i praktyczne implikacje użyteczne w dalszych badaniach. Badania pozwalają wyciągnąć wnioski, iż Brazylia, Chiny i RPA oferują różne perspektywy rozwoju dla firm z branży energii pochodzącej z wiatru. Poprawa szans dla przedsiębiorców stanowi dobry sposób na pokonanie wyzwań stojących przed rozwojem nowych firm na rynkach państw rozwijających się.*

**Słowa kluczowe:** *Gospodarki państw rozwijających się, kraje z efektywną gospodarką, rynki energii wiatrowej, energia ze źródeł odnawialnych, okazje przedsiębiorcze.*

### **Biographical note**

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# Characteristics of Intrapreneurs in Scale-Intensive Service Firms

*Katja Maria Hydle\**, *Tor Helge Aas\*\**  
and *Karl Joachim Breunig\*\*\**

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## **Abstract**

*This empirical paper explores the work of employees in charge of service innovation when firms develop and launch new scale-intensive services by addressing two research questions: i) How do employees responsible for service innovation work? and ii) what are the related managerial implications when developing and launching new scale-intensive services? To this end, 21 qualitative, in-depth interviews were conducted with employees in five large scale-intensive service firms. The findings suggest that the involvement of internal professionals is an asset when new scale-intensive services are developed, and that internal professionals act as intrapreneurs when they are involved in the development of radically new scale-intensive services. This paper integrates understanding from the innovation management literature with knowledge of professionals from extant literature on professional service firms since we find that professionals in scale-intensive firms act as intrapreneurs. Thus, this paper extends the theory on determinants of innovation in scale-intensive service firms, blending insights from both findings and theory.*

**Keywords:** *innovation management, service innovation, scale-intensive services, intrapreneurship.*

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## **INTRODUCTION**

This paper reveals how internal professionals are central for innovation work in scale-intensive service firms. Scale-intensive services are standardized services that are produced at a large scale, mainly by large firms. Examples include bank, insurance, telecommunication, and logistics services (De Jong, Bruins, Dolfsma, & Meijgaard, 2003; Pavitt, 1984). These services have some characteristics that distinguish them from other services: for example, they are

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often dependent on physical networks or information- and communication-technology (ICT) networks (Soete & Miozzo, 1989).

Insights into how scale-intensive service firms innovate successfully is of relevance also for firms in other service sectors that partly follow a standardization strategy (Hansen, Nohria, & Tierney, 1999). This is because service firms that do not traditionally belong to the scale-intensive services category also experience pressure to achieve greater uniformity and standardization (Ellingsen, Monteiro, & Munkvold, 2007). This trend is increasing in both knowledge-intensive services, such as legal and consultancy services (Sako, 2009), and supplier-dominated service sectors, such as tourism services (Casadesus, Marimon, & Alonso, 2010).

The existing innovation management research has highlighted a number of determinants of innovation in scale-intensive firms without focusing on the particular role of employees with specialized knowledge and their role in innovation projects. Therefore, we address the role of internal employees when they are involved in service innovation processes in the scale-intensive service firms where they are employed. Moreover, since our focus is particularly on employees rather than on top managers, who deal with service innovation within scale-intensive firms, we ask the following research questions: i) How do employees responsible for service innovation work? and ii) how can managers facilitate service innovation work in scale-intensive firms? The contribution of this paper is to bridge the literature on innovation management with the findings that draw on insights from professional service firm (PSF) theory with the understanding of professionals and their work. PSFs include among others law firms, management consultant firms and engineering consultants, where the work is characterised as highly knowledge intensive, involving customization and personal judgement and delivered according to professional norms of conduct (Løwendahl, 2005). We build on extant research on professions and professional service firms to structure our empirical investigation into how professionals perform innovation activities in the observed scale intensive service firms.

The remainder of this article is organized as follows. The next section presents the related theoretical background from the available literature on innovation management. A section on the research design is followed by empirical findings from five scale-intensive firms. Next, the findings are discussed and the last section provides a summary of the findings with contributions and limitations.

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## LITERATURE REVIEW

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To address the two research questions, we draw on insights from both innovation management research and research on professional service firms (Greenwood and Empson, 2003; Løwendahl, 2005; Von Nordenflycht, 2010). In innovation management, researchers have investigated how innovation in services should be managed, often referring to new service development (Castro, Montoro-Sanchez and Ortiz-De-Urbina-Criado, 2011; Heusinkveld and Benders, 2002; Menor and Roth, 2007; Sundbo, 1997; Toivonen and Tuominen, 2009). The study of relevant drivers for successfully developing new services, so-called success factors for innovation in services, has emerged as one of the most important topics in this research stream (Droege, Hildebrand and Forcada, 2009). The literature suggests several success factors for service innovation, including: the co-workers of service firms and their knowledge (De Jong et al., 2003); the existence of a development staff with knowledge about the firm's technologies, customers, and delivery processes (Drew, 1995; Fischer, Garrelfs and van der Meer, 1993); and the presence of certain key roles, such as decision makers, project leaders, sponsors, and ambassadors (De Jong et al., 2003). These success factors have primarily been discussed relative to innovation in knowledge-intensive business services (Amara, Landry and Doloreux, 2009) or PSFs (Leiponen, 2005), but neglected in other service sectors (Droege et al., 2009). Consequently, relatively little is known about the role of professionals (i.e., co-workers with specialized knowledge) who are internally involved when service firms launch innovative service offerings to the market.

This literature gap causes concern, given the diversity of the service sectors (De Jong et al., 2003; Zomerdijk and Voss, 2011), which range from scale-intensive and consumer markets to expert advice and individual clients. Projects performed in different service sectors are expected to require very different resources (MacCormack and Verganti, 2003), and the role of internal professionals may vary significantly between service sectors.

In a study of service firms, Sundbo identifies three paradigms for understanding innovation in service firms (Sundbo, 1997). The first paradigm is technological development, which is often organized in R&D departments. According to Sundbo, this paradigm is not relevant to service firms since he stresses that most innovation in service firms happens in ad hoc project groups and is not necessarily linked to technology development. The second paradigm is entrepreneurship or intrapreneurship within organizations (Pinchot, 1985). However, since entrepreneurship is related to the establishment of new firms, and intrapreneurship is hard to manage, Sundbo does not consider this second paradigm to be very relevant to service firms. The third and most

apt paradigm is connected to how a firm's strategy is the core determinant of innovation.

Sundbo presents an empirically derived taxonomy regarding the organization and management of innovation in service firms (Sundbo, 1997). Scale-intensive firms are understood to be top-strategic organizations, in which the top-manager may be an intrapreneur. Intrapreneurs are managers or employees that transform ideas into new or improved products and services in their organization (Pinchot, 1985; Pinchot and Pellman, 1999). Tourist firms are organized as network organizations. Finally, PSFs are viewed as professional organizations, either as a collective of professionals or representing entrepreneurs. The role of the top managers is emphasized in scale-intensive firms, whereas the role of professionals is more accentuated in PSFs. From Sundbo's study we can derive that in scale-intensive firms, top managers operate as intrapreneurs, while in PSFs the professionals are involved in innovation activities.

Although top managers are understood as intrapreneurs, the understanding of professionals from PSF theory may be informative to our study since they, according to Sundbo, are in charge of service innovation activities when working for PSFs (Løwendahl, 1997; Maister, 1993; von Nordenflycht, 2010). In PSFs, relatively few professionals work on service innovation internally, because most projects are tailor-made to customer needs. As Løwendahl (2005) indicates, PSFs often have a high degree of innovation when developing new concepts and solutions for clients (2005: 39). Some studies have explored the process of new concept development in contexts other than projects for clients in PSFs, focusing on the related internal key activities and managerial tensions (Heusinkveld and Benders, 2002; Heusinkveld and Benders, 2005). The findings show that the process of developing new concepts: i) exposes tensions between the needs for a disciplined corporate approach and individual professional autonomy (Heusinkveld and Benders, 2002), and ii) requires persuasive skills to gain organizational support (Heusinkveld and Benders, 2005).

Empirical research on the roles and functions of professionals outside of PSFs has been underemphasized. There is some research available concerning 'internal consulting', in which an understanding of external management consulting is used internally within a firm (Johri, Cooper and Prokopenko, 1998; Lacey, 1995; Lacey and Tompkins, 2007; Wright, 2008, 2009). These studies have focused on identifying firms that employ internal consulting (Wright, 2009), as well as elucidating how internal consultants promote and implement changes internally (Johri et al., 1998; Lacey, 1995) and how they manage their external counterparts as active clients (Sturdy and Wright, 2011). However, this research stream does not address how internal consultants or

professionals are involved in innovation processes when they are employed by service firm types other than PSFs.

To further understand the professionals, we turn to PSF theory. Professionals contribute their skills, expertise, experiences, relationships, professional reputations, and networks to the firms (Greenwood, Li, Prakash and Deephouse, 2005; Løwendahl, 2005). A central characteristic of professionals is their mastery of a particular expertise or knowledge base (von Nordenflycht, 2010, p. 156). Professionals follow the core professional norm (von Nordenflycht, 2010) of exhibiting altruistic service by having responsibility towards their clients and protecting their interests (Løwendahl, 2005) or trusteeship (Greenwood et al., 2005). The notion of altruism is related to the strong professional norms that guide conduct in professions that are subject to a high degree of autonomy i.e. the expectation towards a doctor or a lawyer to put self-interest aside for the best of their client (Abbott, 1988). Moreover, the notion of altruism is related to shared professional norms and values and far extends a traditional customer-orientation. In the case of conflicting demands between what is the best solution for the customer versus what is most profitable for the service provider, altruistic service means that customer-centric solution will be applied (Løwendahl, 2005). Further, professionals show a preference for autonomy (Alvesson and Karreman, 2006), exhibiting a distaste for control, supervision, and formal organizational processes (Greenwood and Empson, 2003; Løwendahl, 2005; von Nordenflycht, 2010). Moreover, successful professionals learn and display knowledge and appropriate behaviour through networking (Anderson-Gough, Grey and Robson, 2000). Networking is the outcome of a socialization process through which 'how things work' and 'what is appropriate' are learned (Anderson-Gough et al., 2000, p. 239). Direct supervision is of little use in PSFs, because the manager may know less about a topic than the professional experts they are set to supervise (Løwendahl, 2005). In this case, detailed and direct instructions are fruitless. Thus, informal management processes may be more useful than formal processes in PSFs (von Nordenflycht, 2010). For managers, managing people that make their own decisions is referred to as the challenge of 'herding wild cats' (Løwendahl, 2005, p. 69), where the term 'wild cats' refers to the characteristics of highly individual professionals. According to Løwendahl (2005), professionals are members of a highly professionalized group, have higher education, emphasize the use and development of knowledge, respect core professional norms, and participate in peer reviews (Løwendahl, 2005, p. 28). Being a professional is, therefore, not synonymous with being a 'wild cat', although the management of knowledgeable experts may be challenging. This concept includes dealing

with professionals who suggest ideas that extend beyond the firm's strategy (Løwendahl, 2005).

Thus, according to PSF literature, professionals use their expertise to provide altruistic services; they prefer autonomy and learn through networking. To manage these professionals, informal processes are most apt. These insights are highly relevant for our study on how employees within scale-intensive service firms work in relation to service innovation and how managers can facilitate their work. In the next section we describe the research design and methods used in this study to explore in-house service innovation by employees.

## **RESEARCH METHODS**

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In this study, we aimed to understand how employees in scale-intensive firms work with service innovation. We conducted interviews with partly open-ended questions related to the employees' practices of service innovation (Orlikowski, 2010; Schatzki, Knorr Cetina and von Savigny, 2001; Schatzki, 2012), and then asked theory-informed questions related to service innovation. In this way, we followed a research process which is explained by Alvesson and Kärreman (2007) as a critical dialogue between theoretical framework and empirical work using a reflexive approach, sensitive construction and interpretive repertoire. A reflexive approach refers to an interpretative, open and locally aware study (Alvesson and Deetz, 2000, p. 113). Sensitive construction implies being surprised and challenged by the empirical material in opposition to having order and control (Alvesson and Kärreman, 2007). Interpretive repertoire refers to combining theories in order to view different perspectives and understand the results from different point of views (Alvesson and Kärreman, 2007, p. 1273). The units of analysis were service innovation projects. Our goal in questioning employees and studying service innovation projects was to investigate what the employees' do, what types of problems employees solve, what kinds of tools are used, and how the actors interact.

Since we also wanted to use theory-informed questions, we used a semi-structured interview guide that was designed according to the new service development practice framework suggested by Froehle and Roth (2007). This framework consists of three levels of practices. On the highest level, Froehle and Roth (2007) distinguish resource- from process-oriented practices. Resource-oriented practices are subdivided into intellectual, organizational, and physical resources, whereas process-oriented practices are subdivided into design, analysis, development, and launch stages.

To identify the service-innovation practices within each dimension, multiple interviews were necessary. The theory-informed interview guide reflected all of the service innovation management practice dimensions suggested by Frohle and Roth (2007). To obtain concrete and specific answers about service innovation, the informants were asked to select two service innovation projects that had been carried out in their firms, and they were asked open questions about the practices in the aforementioned dimensions. Thereafter, the employees were asked several closed follow-up questions (e.g., related to whether specific tools or measures were used) to obtain a more in-depth and complete understanding. We also asked whether the management practices for these projects were representative of the firm's normal practices, and whether or not the informant believed the practices were successful. This theory-informed top-down approach following Froehle and Roth (2007) is relevant to understanding how service innovation is linked to managerial processes, organizational structures, and strategy. The open-ended practice reflects a bottom-up approach, in which the starting point is the identification of the employees' practices.

### **Cases and data collection**

The study is based on five scale-intensive service firms. The selected firms operate in both business-to-consumer (B2C) and business-to-business (B2B) markets, and they all provide services both to other firms and to consumers. The five firms provide different types of scale-intensive services: three firms provide financial and insurance services, one firm provides telecom services and one firm provides logistics services. All of the firms claimed in their annual reports that innovation was of strategic importance for the firm. Thus, we expected that the in depth study of the firms' innovation practices would offer opportunities to learn how employees responsible for service innovation in scale-intensive services work, and how managers facilitate service innovation work in these firms. All of the firms were also successful in the market and have expanded beyond their national borders to more than three countries. To preserve anonymity, in this paper, we refer to the five firms as 'Alpha', 'Beta', 'Gamma', 'Delta', and 'Epsilon'.

**Table 1.** The list of five scale-intensive service firms, included in the research

Firm	Number of employees	Type of services provided	Annual turnover (2010)	Informants
Alpha	13 500	Financial, banking, insurance	£* 4.24 billion	Top/Line/Unit managers: 1 Innovation managers: 1 Experts: 2
Beta	20 000	Logistics, transportation	£* 2.41 billion	Top/Line/Unit managers: 1 Innovation managers: 1 Experts: 1
Gamma	2 221	Financial, banking, insurance	£* 5.16 billion	Top/Line/Unit managers: 1 Innovation managers: 1 Experts: 1
Delta	30 000	Telecom	£* 10.1 billion	Top/Line/Unit managers: 4 Innovation managers: 2 Experts: 1
Epsilon	4 300	Insurance	£* 1.95 billion	Top/Line/Unit managers: 2 Innovation managers: 1 Experts: 1

\* Values converted into British pounds using average exchange rates from (2010).

Between three and five employees at each firm were interviewed. The selection of informants followed a snowball sampling procedure. We first asked the firm to appoint an employee who had a central role in the firm's innovation activities, and conducted an in-depth interview with him/her. During the interview, this informant was asked to appoint other key-informants with central roles in the firm's innovation activities. As a result between three and seven employees were interviewed in each firm. The interviews were conducted in Norway in 2011 and 2012. Each interview lasted between 1 and 2 hours. The interviews were recorded and transcribed as text. To reflect the overall innovation practices of the firms and the practices of internal employees, interviewees with different roles and from different firm levels were chosen, including managers, project managers, and IT specialists. The main commonality between them was that they were involved in service innovation. The interviewees were selected by representatives from the firms in dialogue with the involved researchers. In this process, the main selection criterion was their involvement with existing or previous service innovation projects, while also obtaining triangulation of data sources since several employees within the same company were expected to cast different lights on the service innovation work. The cross-case comparisons were performed to obtain validation and generalizations of our findings.



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## **Coding and analysis**

The data was coded using NVivo, the first iterative coding according to what the informants stated that they did when working with service innovation and then we also coded according to the predefined-structures following the service innovation management practices dimensions suggested by Froehle and Roth (2007). We started to code the data during the process of interviewing. The data were examined relative to the research questions, with specific consideration of how employees undertake service innovation. While interviewing those who were involved in and managed the service innovation projects in the studied firms, we learned their background and characteristics. Iterating between in-depth analysis of the empirical findings from each firm and comparisons across the firms and connections to the literature (Alvesson and Kärreman, 2007), we identified that the internal employees in charge of the service innovation projects were all former consultants and professionals with long experience from professional service firms. Throughout the interviews and during the data analysis process, we clearly observed that the internal service innovators had previously worked as professionals in other PSFs, and that they had different backgrounds and roles compared to other employees in their companies. We thus coded our collected material according to this literature (Alvesson and Karreman, 2006; Anderson-Gough et al., 2000; Greenwood and Empson, 2003; Løwendahl, 2005; Swan, Newell, Scarbrough and Hislop, 1999; von Nordenflycht, 2010), emphasizing altruistic services, autonomy, networking, informal management processes, and cat herding. Using these themes to explore the data, we found variations within each theme, which are reported in the Findings section and further analysed in the Discussion section. The material and our analysis was thoroughly discussed and presented in Power Point to selected employees and managers at the firms through a workshop, to validate the veracity of the data and enhance the trustworthiness of the analysis (Lincoln and Guba, 1985).

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## **FINDINGS**

In this section, we first expose the professional backgrounds of the employees in charge of the service innovation projects, explain the organizational belonging of the employees involved in service innovation, and then briefly describe how the service innovation projects generally proceeded, and expose the different types of service innovation projects (i.e., incremental and radical). After providing these contextual descriptions, we show that how the employees work is in line with the understanding of how PSFs work: i) how professionals work reflects the understanding of altruistic service innovation,

in terms of ii) having autonomy and iii) networking, and its managerial implications, including iv) management processes and v) wild cat herding.

## Characteristics of service innovation

### ***Employees in charge of service innovation projects***

The professional backgrounds of the “service innovators” differed from the primary fields of their companies and from the particular scale-intensive services provided by their companies (i.e., telecom, finance, insurance, or logistics services). This fact was in contrast to the background of other employees at these firms, who represented the firms’ core businesses.

These findings are exemplified by several quotes from employees in the different firms. For example, the director of Strategy and Innovation at Epsilon, in charge of service innovation projects, explained:

*“I don’t have an insurance background. I have worked in a business lab. I have worked in auditing, in adult learning, in many different jobs. I have worked as a pedagogical consultant, in marketing, and I have a Masters in Management and Organization from CBS. I have a mosaic background...”*

At Gamma, a person working across the entire company with the title “Innovation Captain” explained that, before being asked to work in their new position:

*“I had a Masters degree in Innovation Management and I had worked for the Idea Laboratory for 5 years as an Idea Astronaut, facilitating business processes. Before [that position], I had worked as an Innovation Consultant at a leading consumer goods company, facilitating, prototyping and developing ideas for management...”*

Likewise, a business developer at Alpha in charge of their youth segment explained her background before joining Alpha:

*“I had worked for 3 years as a consultant at a small company called “Sun Talk”. There, I worked with innovation processes for large companies. Now, I am on the inside. I previously have worked with banking services, although as a consultant, and have managed the innovation processes for companies.”*

These employees had backgrounds from neo-PSFs, such as management, IT, business modelling consultancy, and business process consultancy (von

Nordenflycht, 2010), and had started their careers in consulting or business development at other firms.

The everyday work of these middle managers, business developers, IT experts, innovation captains, and facilitators included working with different departments, units, and levels internally within the firm and relating to customers externally. The following quotes illustrate the unique roles of these employees within their firms:

*“I am responsible for everything [related to] new services and new ways of working internally in relation to offerings to customers. That does not mean that I work alone, since there are many people who need to be involved in order to realize something; that is my role.”*

*“My everyday work depends on the projects. I receive an inquiry to undertake a project that the units don’t have capacity or knowledge to perform. They don’t know how to go out and talk with customers. I am thus assigned a project, often with an innovation component. Often it is incremental innovation, something substantially new, and then I make a project design with inherent customer innovation... a good project manager here is someone who knows people internally to gain organizational support, which is extremely important.”*

In contrast, other employees were described by how they had been groomed and socialized into the organization as ‘banking people’, ‘insurance people’, ‘engineers’, etc.

### ***Organizational belonging and service innovation***

The employees responsible for and actively involved in service innovation within these scale-intensive firms were all positioned differently in their respective organizations. Regardless of whether the employees were part of the business development section, innovation and strategy unit, innovation and research department, IT department, project management group, or belonged to a specific long-term development project, the work and activities for service innovation were very similar. Service innovation projects were either explicitly demanded (due to needs identified by other units) and channelled to the ‘service innovator’ in charge, or the needs were identified directly by the service innovator. As aforementioned, these service innovators all had earlier work experiences from PSFs, which motivated us to label them as ‘internal professionals’.

The projects generally proceeded as follows. Internal professionals initiated projects based on identified needs, while focusing on and involving end customers. To ensure support and convince decision makers, the internal professionals followed their own methods according to experience, used internal systems if needed, made cost estimates or 'guestimates', made PowerPoint presentations, mock-up models, or initiated pilot applications, and talked with and involved others internally. Finally, the internal professionals divided work by involving internal units (e.g., IT, front-end employees, and back-office employees), while collaborating with others externally (e.g., agencies, researchers, partners, and suppliers). An 'Innovation Captain' summarized the internal involvement and types of resources allocated to the service innovation project as follows:

*"The incremental service innovation is my responsibility, the programming in Expression (software) is "Berit's" responsibility and print is "Tor". I work with them and make a suggestion for [the] progress plan."*

Thus, the internal professionals had roles as project managers for the ad-hoc teams that they initiated and led. The other participants represented fields of expertise from other departments.

Service innovation projects could be categorized as incrementally or radically new market service innovations. As an example of an incremental service innovation, we consider the 'business portal'. This B2B service was developed by Gamma, which implemented incremental service innovations to meet customer needs. A manager at Gamma explained:

*"Several independent advisors had a lot of objections to the [business portal] system. We worked to improve the business aspect of the portal system. We drove the project through 67 deliveries to improve customer value. This time frame was untraditional because, in most projects, it will take us a year to have a new solution. Here, we used incremental development, continuous input, and frequent, small efforts..."*

The business portal is a typical example of an incremental service innovation in which professional expertise was used for project management. Some of what was previously used by business customers as professional expertise (e.g., an intricate understanding of the pension systems, new legislative impacts, and differentiated pension schemes) was integrated into the system and automated.

A good example of a radically new to the market service innovation is the Digital Postal Service (DPS). DPS is a new national digital postal system that allows private businesses, public authorities, and private persons to send post digitally. The DPS system reduces distribution costs and increases the efficiency of customer processes to other businesses. DPS is a solution that will manage all formal and informal documents, such as health information, insurance papers, information from local authorities, and receipts, with a higher security requirement than e-mail. The manager of DPS explained:

*“We started with the physical value chain of postal services, what the Postal Services offer as physical post distribution. There are a lot of similarities between the systems—the distribution of documents from A to B, things to be added—and the core is similar. The core in the customer segment is similar, too. The traditional core customers of the Postal Services, such as the energy services, telecom services, and public sector, have a lot of documents to be distributed. So, in relation to Osterwalder’s business model, we differentiate ourselves with respect to how we sell, how we serve these customers, and where we wish to exploit the digital service. We have worked with many large business customers regarding direct services. Middle-sized businesses will be served through partner contracts, similar to software contracts, in which there are integration points... Small business customers will have self-service... We have some advantages, and one is electronic ID. One has to be 100% sure of what one gets as a user... In Norway, we have come far with electronic ID... The rest of Europe and the USA have not come that far yet...”*

Because it is a radical service innovation, DPS was organised as a large project that has spanned over several years, involving 20 people. Apart from two sellers, all of the project participants have their background from management, IT consulting, and business modelling consulting.

### **Providing altruistic service innovations**

An important dimension of professionals is related in literature to the strong norms that guide their conduct. These norms, organizational requirements, client needs and self-interest can pose a dilemma for the professional. It appears that professionals continue to abide to the norms of their professions also when they are sole representatives of their profession and employed by big firms such as scale-intensive service firms. The professionals consequently bring with them a different perspective that has a bearing on the way they interact with innovation processes in the scale-intensive service firms observed. Whereas scale-intensive firms focus on standardization to

harvest scale-advantages, the internal innovation professionals maintain a different perspective critical for the new service development. A manager at Gamma gave the following example of providing services while exploring in-house service innovation:

*“Service innovation is a nice concept that should be a primary focus; this opinion is shared by most people in our organization. Innovation is often associated with our delivery of new products. Service innovation implies that we consider everything—business processes, automation, and off-shoring—while also remembering customer involvement and satisfaction.”*

Service innovation, in which customers are put in the front seat, was a common denominator at all five firms. A Gamma manager explained:

*“We focus on two axes: what is most important to our customers, and where we have the most volume. Then, we identify three areas that are high in both axes—in value and volume—and we choose those three areas... Our new vision is: “Our customers recommend us.”*”

The service innovation entails substantial digitalization and automation in B2C and B2B relationships. A typical service innovation in B2C was explained by a business developer in Alpha as:

*“...a service concept on Facebook where our advisors help you with your first home.”*

To achieve scale advantages on their services, the firms emphasized replication and repetition, often by enabling their services through ICT. This goal of providing service innovations was seen as different from the goal of other employees, who had more of a “trade” focus that was product- rather than customer-oriented. This difference can be illustrated by the following quotes:

*“...they don’t see the customer perspective, and then innovation projects don’t fit in such a system...”*

*“...it is not that strange, since banks and insurance companies write pages up and down about the products they have. So, they are very product-oriented and not that customer-focused...”*

We understand these findings as providing altruistic service innovation. Having responsibility towards the client by protecting their interests is referred to as altruistic service (Løwendahl, 2005) or trusteeship (Greenwood et al., 2005). Our findings show that this principle is used for service innovation and we thus found altruistic service innovation in scale-intensive firms.

## Professionals' work

### *Having autonomy*

We next consider how professionals provide their work for service innovation. In the case of Alpha, the work involves operative authority in business development, autonomy in service development, and obtaining new ways of collaborating internally. A business developer explained:

*"[Having operative autonomy and authority] is a lot about process methodology, building projects, and making people communicate....I have obtained a lot [of autonomy] because people want to collaborate when we have a nice framing. I let others take credit for projects. I don't need to put my own name on things, because I really think that I will get more done over time if those who are supposed to do the job are put in front..."*

According to our findings, it seems that the professional has autonomy due to their expertise, or they take operative autonomy by following their own process and developing the project as they see most fit. A manager in Beta explained:

*"We started by setting up some of the elements that would be delivered to the customer. We spent a lot of time evaluating...what we actually have, what we cannot do, and what we can obtain externally. Then, the process was to develop the concept, develop an outline, and start with a business model. Rather early [in this process], we proposed a solution to the corporate management at Beta. Instead of using Power Point, we created something that the corporate management was not used to: a descriptive memo with pictures and stuff, demonstrating, "This is our challenge, this is what Beta can solve, this is in line with digital communication, this is the start of our business model, and we think that Beta can earn money with this."*

Another Beta employee explained regarding operative authority:

*"We have had extremely free reins. It is not like they steer what we do."*

Following the norms of autonomy, there were professionals that even took risks on behalf of the company. A Beta employee said that, in relation to the service innovation project:

*"[In terms of] risk profiles, we need to take some risks."*

The findings show that the professionals have autonomy and operative authority while performing their organizations' innovation activities, as long as they report to relevant management and involve other employees. The autonomy of the professionals is legitimized by their competence in their particular area of expertise and how well they perform their work. In these scale-intensive firms, we found that the professionals had a high level of operative autonomy and authority.

### **Networking**

In some of the companies, internal networking was important for ensuring that the service innovation project would be realized. A Gamma employee explained:

*"Networking and creating ownership is extremely important. Even with the top manager in Sweden, with 400,000 customers, even she said yes. There is so much power. A good project internal manager is one who knows people, and networking is extremely important; excessively important."*

Others emphasized external networking with existing and potential customers. A Beta manager explained:

*"[We talk to customers], first and foremost, because decision-making processes in these kinds of large companies require that we have a relationship [with them]... I think that it helps to talk with them, to have a relationship [with them], so that they will buy services that we will have to work with. Also, it is important for us to listen to their needs."*

Both internal and external networking as proactive activities was important for others. An employee at Alpha explained:

*"I have "followed the book," but it has been extremely demanding. It is as if my job is a "talking" job, and I go around and talk and talk, and I get so tired of my own voice. I meet people and often I'll ask, "Why don't you talk with him? Why don't you know each other?" and they'll answer "I have never*



*talked to him,” and I reply “But, I know that he is sitting and working on exactly the same things as you do!” I take it for granted that people collaborate; if they don’t, then we won’t make it... I have faced a lot of challenges and have made communities work together that have never worked together before. For instance, [there are] two different external agencies that do the same job... I have intervened and said “This is not working, you have to do the same thing.” I have even tried to make these two agencies collaborate on my project...”*

Internal networking is used by professionals to involve other employees in the service innovation project and to ensure that the project will be realized. External networking is related to understanding customer needs and building the customer relationship. This is in line with PSF literature finding that successful professionals learn and display knowledge and appropriate behaviour through networking (Anderson-Gough et al., 2000). Research has shown that networking and knowing who to contact, such as direct person-to-person contact, is important in service firms and for knowledge creation and innovation (Hydle and Breunig, 2013; Swan et al., 1999). A personalization method involves building and using informal social networks between people in order to create and deliver services which is called a personalization strategy by Hansen *et al.* (1999). In these scale-intensive firms, internal and external networking was part of the service innovation.

## **Managing innovation processes**

### ***Using management processes***

When inquiring about the service innovation processes, all of the reviewed firms had formal processes, although they were used to varying degrees. A manager in Delta explained:

*“The unit I work in is the one that owns the innovation process at Delta, and I am the operative owner of that process. The innovation process at Delta is a line duty, so it is line management. [The process] starts with something happening: a new technology is introduced, or there is a customer need, or we see gains in a market that we want a share of, or someone had a great idea in the shower that morning. These ideas come from all levels. Then, we start the innovation process. At Delta, we have very strong milestones, where we make decisions about whether a project can continue or not, if it will get Capex funding or not, those kinds of things...”*

Regarding a highly visible service innovation project at Delta, we asked whether the project was a standard Delta project and how it went through the decision gates. The project manager explained:

*“Yes, we went through those, but not as a standard project, because it was more of a collaborative project than an internal development project.”*

Although interviewees reported that formal processes are used to develop new services at Delta, the formal processes at Gamma are merely used to legitimize projects. A Gamma innovation manager explained:

*“There is a steering committee for all of the projects that I lead... I put forward a document to them and state what we are going to do, what the solution is, and what we are changing, and I provide a gross prototype... When I presented [this idea] to them, the steering committee decided that it was a good idea... [The decision was based on] a mixture of logical arguments and ethos—our competitor had done it—and pathos—we can’t send this out. In the end, they said yes, do it.”*

In relation to the formal Gamma process, he explained:

*“Looking at our intranet pages, you can see our development process, very generally: how we do it, and what we structurally intend to do. The process is very clear about what to do, but what happens before [the formal process] is random...”*

In contrast to the standard processes at Delta and Gamma, professionals working with service innovation at Beta and Alpha made their own processes for service innovation projects. A business developer within Alpha explained:

*“I don’t draw up a process and follow it from A to Z. I take it a bit more on a feeling. However, I am very strict in every meeting, coffee talk, workshop, or presentation. I know exactly what I want and why I do it this way. I have always thought through every single step, but it is not like I make a large project plan. I don’t have a real project plan, although I probably should have, but I do have a few milestones, some visual drawings that show how we could do it. But, this approach is really unorthodox. People have asked, “Where is the project plan? Where is the mandate?” And I respond: “I don’t have any” (laughter)...”*

These findings show that the firms have formal processes, but the professionals do not necessarily completely comply with them for service innovation projects. Some professionals even make their own processes and follow their own logic. On the whole this practice is different from the practice prescribed to New Product Development (NPD). The normative NPD literature suggests that firms should implement a formal development process with pre-defined stages and go/kill criteria (e.g., Cooper, 2008). Overall, it appears that the professionals in our cases are used to enjoying autonomy and, thus, find new opportunities and solutions that are not provided by the pre-defined formal processes. Our findings, thus, are in line with the PSF literature stressing that with professionals informal management processes may be more useful than formal rules and systems (von Nordenflycht, 2010).

### ***Herding wild cats***

During the service innovation projects, the professionals may convince others, often their managers, and gain support for their ideas. Other times, professionals believe so strongly in their ideas that they leave the firm. As a middle manager in Beta explained:

*“Eric [and I] came from the outside... we are not “Beta men”... To make a structure and have acceptance all the way from the top is unique. All honour to Beta for daring to be that resilient; it is a success story in itself that we managed to make this kind of project with such a structure.”*

The results show that, in these companies, innovative service work involves convincing other employees and gaining top management backing, financial funding, and the freedom to use and involve people from different parts of the companies. Regarding managerial support, an Alpha employee explained:

*“I almost had to present things to the corporate management before Christmas, but then they decided that I did not need to present the project to them again, only to the director of my division...”*

A project manager at Beta explained managerial support and how to achieve self-management within a large organization:

*“The best practice is to involve the CEO so that he believes in you, because he talks to the Board of Directors, etc.”*

Regarding financial support, an employee working with service innovation at Beta explained:

*“Beta stands for confidence, which is about quality. People rely on Beta, which is our strength. Beta is a large organization with weight. When Beta decides to do something, Beta has the necessary funding to make it happen.”*

During our interviews we also encountered two professionals at different firms who were central for service innovation projects at their firms, but who quit their positions to work even more with service innovation. One started a service innovation position with another company. About the initial company, he said:

*“There is knowledge in the company, but nothing about innovation. We have a lean unit, and they continuously seek to improve the company... Implicitly, they deal with incremental innovation, development, and service maintenance, but [that approach] does not satisfy my understanding of an innovative business.”*

The other individual started a business as an entrepreneur:

*“Idea creator and innovator: that is what I am. I am an entrepreneur. I started building my own services and business models. It is all about risk profiles. I accept more risks.”*

These two employees demonstrate how professionals who do not want to be stuck between the enabling and restricting factors of being part of large-scale intensive firms leave to other firms or start a competing business. The findings are similar to what the PSF literature refers to as ‘herding wild cats’ (Løwendahl, 2005). For our scale-intensive firms, the cat-herding challenge is to enable professionals to develop successfully and implement service innovation projects within certain organizational limits.

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## **DISCUSSION**

In this section, we discuss our findings in relation to the theory and suggest future research. Based on our findings we offer three propositions in the following section.

### **Internal professionals (P1)**

The service management literature (e.g. Johnes and Storey, 1998) suggests that, because services are often produced and delivered simultaneously, front-line employees in service firms obtain unique knowledge about customer needs. Hence, several authors suggest that it is particularly important to involve front-line employees in service innovation (e.g. de Brentani, 2001). Our findings also suggest that front-line employees are often involved when new scale-intensive services are developed. However, in the scale-intensive service firms explored in this study, the front-line employees seemed to have had a more retracted role than prior service innovation studies indicate. Front-line employees were consulted about specific questions, but did not have a role during the entire service innovation process. Most of the in-house employees that participated during the entire service innovation process were co-workers with specialized knowledge, a group referred to as professionals (Løwendahl, 2005). These internal professionals had formal roles as experts, facilitators, project managers, innovation captains, and innovation directors. Based on this observation, we suggest that internal professionals play an important role of intrapreneurs when new scale-intensive services are developed.

Our findings also suggest that when the degree of novelty of the new service to be developed is high (i.e., a radical innovation), many additional characteristics may be derived. The professionals take risks, develop and use their own processes, and are more proactive and self-managing. According to the intrapreneurship literature (Hostager, Neil, Decker and Lorentz, 1998; Miller, 1983; Morrison, Rimmington and Williams, 1999; Pinchot, 1985; Pinchot and Pellman, 1999), these features are classic characteristics of intrapreneurs. Thus, by definition (Miller, 1983), our findings suggest that internal professionals operate as intrapreneurs, or in-house entrepreneurs (Altinay, 2005; Geisler, 1993; Honig, 2001; Pinchot, 1985; Rathna and Vijaya, 2009).

Professionalism can be understood relative to the mastery of a particular expertise or knowledge base (von Nordenflycht, 2010), whereas intrapreneurship involves risk-taking, proactiveness, and new innovations (Miller, 1983; Pinchot, 1985; Pinchot and Pellman, 1999). Despite this duality of roles between professionals and intrapreneurs, our findings indicate that professionals are “just doing their job” when they take roles as intrapreneurs. Intrapreneurs are important in developing and creating revenue for companies (Geisler, 1993; Hisrich and Peters, 2002; Hostager et al., 1998; Pinchot, 1985). Thus, professionals are intrapreneurs when they take the initiative to develop radically new services for their own service firm. This conclusion is consistent with Sundbo, who stated: “Intrapreneurship in the classic sense (where an

individual is responsible for the whole innovation process) is possible and was reported in the interviews, but it is rare" (1997, p. 444). However, our findings show that intrapreneurship is the rule when internal professionals develop radical services.

The experience of being a professional appears to contribute to the employee's solutions, problem-solving abilities, and unique competences when acting in-house in the role of intrapreneur. Our findings extend the existing theory regarding service innovation by demonstrating that professionals who previously worked for PSFs become internal professionals in scale-intensive firms. Thus, we extend Sundbo's taxonomy on the organization and management of innovation in service firms by exposing that the combination of scale-intensive firms with professionals generates employees who act as professional intrapreneurs. Sundbo's taxonomy mainly highlights the role of top managers in scale-intensive firms as intrapreneurs; professionals in PSFs are understood to be engaging in collective or team intrapreneurship. In contrast, our findings expose individual professional intrapreneurs in scale-intensive firms.

Sundbo identifies three paradigms for understanding innovation in service firms, with technology, entrepreneurship, and strategy being the core determinants of innovation (Sundbo, 1997). He considers the technological and entrepreneurial paradigms to be less relevant in service firms, due to limited amount of technological development and the difficulty of managing intrapreneurs. Thus, he follows the strategic paradigm. In the present paper, the service-innovation projects were both B2B and B2C, incremental and radical, and involved automation and digitalisation. The internal professionals, as the planned or ad-hoc project managers of the service innovations, acted as intrapreneurs, while they followed and sometimes even went beyond their firms' strategies. Thus, our findings show that all three of Sundbo's paradigms are joined in scale-intensive service innovation. In particular, scale-intensive service innovation involves automation and digitalisation through both incremental and radical services, reflecting the technological paradigm. The project managers are internal professionals who act as hard-to-manage intrapreneurs, according to the entrepreneurial paradigm. Finally, the projects are legitimized relative to existing strategy, while sometimes going beyond the firm's strategy. Although these findings are not reported in this paper, they follow the third paradigm of strategy. Thus, in relation to service innovation in scale-intensive firms, our findings show that all of the paradigms are involved and are not mutually exclusive. Future research should investigate whether these findings are also applicable in other scale-intensive service firms.

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Consequently, we offer the following proposition:

*P1: Internal professionals act as intrapreneurs when they are involved in the development of radically new scale-intensive services.*

### **Practices of internal professionals (P2) and managerial challenges (P3)**

In addition, our findings suggest that the involved professionals use experience from their earlier employment in PSFs that is beyond the focus of the core services delivered by their current firms. Examples of important competence areas that professionals use include innovation management, process innovation, IT, business model design, and business process design. By definition, the professionals appear to have unique competences that are required for innovation projects in scale-intensive service firms. They have an overview of what resources are needed to carry out an innovation project, and they are able to involve and manage relevant internal and external resources in its different stages. For example, in the early stages of a project, the professionals typically involve internal front-line employees and customers to understand the current challenges. In the development stage, they comprise IT personnel to design an IT platform for new services. In the final stages, the professionals often involve customers in testing new solutions. As a result, the professionals are both customer-centric and solutions-oriented managers of the service innovation process.

There were differences in how the service innovation projects were managed by professionals. Following norms of autonomy, some professionals took risks on behalf of the company. Some professionals partly used the internal processes to perform the project or to legitimize the project in the organization. Other professionals created and used their own processes relative to the project. The professionals highlighted the importance of networking internally and externally; however, some were more proactive in reaching out than others. The professionals reported on the duality of enabling and restraining conditions for service innovation within the firms. Two of the informants even left their companies during the data collection period. Some professionals were hard to manage within the firms, whereas others were self-managing. Therefore, we identified all of the typical characteristics of professionals and related managerial implications described in the literature: providing altruistic service, having autonomy, using networking, informal processes, and cat herding. Moreover, previous studies of new concept development within PSFs found a tension between the need for a disciplined corporate approach and individual professional autonomy (Heusinkveld and Benders, 2002). Our findings from scale-intensive firms

confirm this conclusion: the firms did have formal corporate processes to follow, but individual professionals followed their own operational autonomy and authority.

Our findings show that internal and external networking is important, as is the ability to convince managers and others to follow the internal professionals' ideas. Therefore, we claim that findings related to professionals' work and service innovations are not only of relevance for PSFs, but are also of use for other service sectors that involve professionals.

We explicate these findings in the following two propositions:

*P2: The practices of the internal professionals are characterized by altruism, autonomy and internal networking when they are involved in the development of new scale-intensive services.*

*P3: The managerial challenges when new scale-intensive services are developed are related to informal management processes and cat herding.*

## **CONCLUSION**

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This paper contributes to literature on service innovation theory and professional services by extending knowledge of the role of professionals in innovation processes. We believe that not only the specialized knowledge of professionals but also their professional norms are determinants of success in innovation projects and we explicate our findings in three propositions for further research to confirm.

In this paper, we have addressed two research questions: i) How do employees responsible for service innovation work? and ii) how can managers facilitate service innovation work in scale-intensive firms? This study was based on five scale-intensive service firms theoretically sampled to increase the transferability of its findings. There is a growing interest in how firms achieve higher standardization when services are offered globally. In addition, with the trend of increased *servitization* (as traditional manufacturing firms transform their portfolios of offerings to services), there is a need to improve the understanding of innovation in scale-intensive services. Consequently, the lessons learned from scale-intensive service firms may be applied to a broader set of firms that innovate and offer standardized services.

We combined two research streams, innovation management and PSF theorizing to understand our findings regarding the employees in charge of the service innovation projects when firms develop and launch new scale-intensive services. We conducted an explorative study in five scale-intensive service firms on service innovation and identified how professionals work



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and found that managerial implications were in line with PSF theory, in scale-intensive service firms. Based on the existing literature we identified five characteristics of professionals' work and coded our findings according to: altruistic services, autonomy, networking, informal management processes, and cat herding. Our study develops the understanding of professionals, specifically, as in-house professionals for service innovation, by recording and analysing data on the practice of professionals employed in large scale-intensive firms. The study reveals how the employment of professionals enables intrapreneurial activities and enhances innovation. Moreover, it appears to be particularly relevant to advocate a client-centric external perspective in organizations where the innovation projects are aimed at standardizations such as in scale-intensive service firms.

We extend knowledge on the roles and functions of internal professionals and how they contribute to innovation. Exposing the differences and similarities between the roles of a professional and an intrapreneur, we highlighted the blend of professionals within other service firms. From an innovation management perspective, the challenge for scale-intensive firms is arguably that much of the workforce has been trained to follow specific norms and codes of conduct for the firm. Therefore, professionals from PSFs who can act as risk-taking and opportunity-seeking intrapreneurs are needed to enable and unfold innovation. These findings have important managerial implications: Large scale-intensive service providers aiming to carry out successful innovation activities should endeavour to employ professionals from relevant disciplines, preferably those with experience from PSFs. These professionals should be given the opportunity to act as intrapreneurs. For example, they may be given key roles in the firm's innovation activities and a certain freedom to organize the innovation processes in the way that they prefer.

On a more general level, this study shows how insights from the available literature on PSFs can be successfully integrated with knowledge from other types of organizations, thus emphasizing how PSFs can be viewed as models for several types of modern organizations.

There are obvious limitations to this study, because we conducted only a few interviews in five firms and only found professionals with a consulting background. A more nuanced perspective on how different types of professionals, such as lawyers and accountants, contribute to service innovations in other firms could be beneficial to pursue in further research. Future studies could also follow service innovation projects from their initiation to their launch to customers, or could even shadow internal professionals during service innovation projects. Continued exploration of the

role of in-house in other firms is important to further nuance the observations presented in this study.

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### **Abstrakt (in Polish)**

*W niniejszej empirycznej pracy badamy zagadnienie pracowników zajmujących się innowacjami z dziedziny usług podczas tworzenia i wprowadzania nowych usług o intensywnej skali. Próbujemy znaleźć odpowiedź na dwa pytania: i) W jaki sposób pracują osoby odpowiedzialne za innowacje w usługach?, oraz ii) Jakie są implikacje dla kierownictwa podczas tworzenia i uruchamiania usług o intensywnej skali? W tym celu przeprowadzono 21 jakościowych, pogłębionych wywiadów z pracownikami pięciu firm świadczących usługi o intensywnej skali. Wyniki tych wywiadów sugerują, że zaangażowanie wewnętrznych profesjonalistów jest poważnym atutem podczas tworzenia takich usług, oraz że profesjonaliści działają jako przedsiębiorcy wewnętrzni gdy są angażowani w tworzenie radykalnie nowych usług o intensywnej skali. Praca ta integruje pojmowanie typowe dla literatury o innowacyjnym zarządzaniu z wiedzą profesjonalistów z dostępnej literatury na temat firm świadczących profesjonalne usługi, ponieważ przekonujemy się, że profesjonaliści w firmach świadczących usługi o intensywnej skali występują jako wewnętrzni przedsiębiorcy. Praca ta poszerza wiedzę na temat źródeł innowacji w firmach świadczących usługi o intensywnej skali, łącząc spostrzeżenia wyciągnięte z badań jak i teorii.*

**Słowa kluczowe:** zarządzanie innowacjami, innowacje dotyczące usług, usługi o intensywnej skali, przedsiębiorczość wewnętrzna.

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# Imbalance of Power: Social Service Entrepreneurs' Experiences of Entrepreneur-Municipality Relationship

*Tarja Niemelä\*, Sofia Kauko-Valli\*\**

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## **Abstract**

*We investigate the complex dynamics between social service entrepreneurs and social sector managers through the lens of network metaphor, utilizing our data on social service entrepreneurs' experiences of cooperation with municipalities. We examine what kinds of dependencies exist in the entrepreneur–municipality relationships and what kind of consequences these dependencies have on social service businesses run by entrepreneurs. Basing on the social service entrepreneurs experience, our findings suggest that while the cooperation with the municipality represents a prerequisite for success, their business represent only one alternative for the renewal of social service structures from the point of view of municipalities. In addition, the existence of legally enforced supervisory duties incorporates a considerable amount of power that influences areas of the entrepreneur–municipality relationships and interaction other than just those defined by the supervisory and regulatory rights.*

**Keywords:** *social service enterprise, public-private-partnerships, social service entrepreneurship, cooperation, network metaphors.*

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## **INTRODUCTION**

This article highlights social service entrepreneurship as a particular form of entrepreneurial activity, one that emphasizes the role of public–private partnership as a context for cooperation and effective networking with municipalities. It seems that little attention has been paid previously to dependencies in cooperation between social service entrepreneurs and social sector managers. By applying metaphoric thinking (Kostera, 2008; Morgan, 1980; Sulkowski, 2011) and a range of network metaphors (Easton, 1992) we want to explore the cooperation relationship between social

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service entrepreneurs and social sector managers from the social service entrepreneurs' point of view.

Most Western countries are, to varying degrees, battling with a situation where some kind of reform is needed to continue producing high-quality social services that are affordable as well as attainable in the future (Blank, 2000; Blomqvist, 2004; Lin, 2009; Van Slyke, 2003). Both outsourcing and privatization of traditionally publicly provided services (Jensen and Stonecash, 2004) have been seen as a solution to the growing gap between available resources and pressing needs (Rissanen, Hujala, and Helisten, 2010). New forms of enterprises as well as public-private-partnerships are looked upon with heightened interest, and a better and more creative interplay between public and private actors is hoped for (Forrer et al., 2010; Neck, Brush, and Allen, 2009; McGahan, Zelner, and Barney, 2013) to solve challenges related to, among others, the environment, global economic turmoil and instability, heavily aging populations and other rapid changes. Previous discussion can be anchored to the New Public Management trend (Pollit, 1995) which has had also an increasing impact on care service provision as a part of a global management trend.

Entrepreneurship research has had multiple foci (Gartner 1990; Gartner et al., 2004; Krueger 2005), but a special call to focus on entrepreneurship in the public interest has already been issued (Klein et al., 2010; McGahan et al. 2013). Increasingly, entrepreneurship is considered as a driving force behind the expansion of the social service sector (Austin, Stevenson, and Wei-Skillern, 2006) as means to meet the growing welfare needs of nations. Welter (2011) speaks for many (Audretsch, 2012; Johannisson, 2011) by stressing that in entrepreneurship research economic behavior can be better understood if it is looked at within its historical, temporal, institutional, spatial, and social contexts. These contexts provide individuals with opportunities and set boundaries for their actions, but it is worth remembering that entrepreneurship itself can also impact these contexts (Mason and Harvey, 2013).

Today, there is an increasing discussion on the privatization of social services and in the international context the private agents (such as social service entrepreneurs) are often seen as the key actors in leading a move from welfare state towards welfare society (Rissanen, et al., 2010). We wanted to study the Finnish context as it is similar to the overall situation in Scandinavia in that the institutional power of private agents is still relatively weak and the whole field is rapidly developing. The production of social services in Finland has been largely monopolized by municipalities and other publicly funded organizations. Over the past decade, the demand for the pluralization of the production of services and more efficient utilization of the private sector have



surfaced in the discussion on social policy in Finland. The increasing costs of maintaining a welfare state have led to competitive bidding for services and distribution of public responsibility. This has given rise to opportunities for social service entrepreneurship. However, the growth of private social service entrepreneurship has been rather modest. From the entrepreneurs point of view this is due to atypical market conditions created by the controlling power of state and municipalities and overall heavy regulation concerning public services (Lyytinen, 2005), i.e., markets are in many ways controlled by buyers (municipalities) and it is a buyer who defines the final price level. Central Finland was further chosen as a research area due to its geographic and structural variation as it gives good insight into other provinces in Finland as well.

Because we are interested in the view of social service entrepreneurs on their cooperative relationship with social sector managers we take a theoretical look at the relationship through the lens of Easton's four network metaphors: networks as relationships, structures, positions and processes. Empirically we provide insight into the complex dynamics between social service entrepreneurs and social sector managers by utilizing explorative data on social service entrepreneurs' experiences of cooperation with municipalities conducted in Finland. Our empirical research questions are: 1) What kinds of dependencies exist between social service entrepreneurs and social sector managers? 2) How and why are these dependencies formed? and 3) What kind of consequences do public-private-partnerships have for the profitability of social service enterprises?

The results of our study revealed that social service entrepreneurs feel that there is a need for deeper cooperation and dialogue between social service entrepreneurs and social sector managers. This cooperation calls for new ways to enhance the innovation capacity and demand-based development of social service entrepreneurship. Our findings further suggest that whereas for entrepreneurs the municipality represents a prerequisite for business success, for municipalities' entrepreneurs represent only one alternative among others for the renewal of social service structures. In addition, the existence of a legally enforced supervisory duty incorporates a considerable amount of power that influences areas of the entrepreneur–municipality relationships and interaction other than just those defined by the supervisory and regulatory rights. Because our results revealed the effects of the imbalance of power between the municipality and the entrepreneurs, we saw how the cooperative relationships had many negative impacts on a practical level.

We propose that the network metaphors provide a rich and multidimensional framework to analyze the cooperative relationships

of social service enterprises and municipalities. Policy objectives and the cooperation governance can strengthen, weaken or restructure the cooperative relationships in the social service sector. Due to this dynamics, we argue that social service entrepreneurship requires a new reality with new venture models as a solution for markets and hierarchies. We explain and address these results in three sections. First we discuss theoretical ground for the study by introducing the network metaphors we have applied. Second, we introduce our methodology. Third, we consider how our findings apply to current theory as well as how applicable they are for social service entrepreneurs and municipality decision-makers. We also discuss limitations and suggest future research directions.

Definitional foundation of this article follows. We use the term *social service entrepreneurship* to refer to businesses that operate in the social service sector, usually in close cooperation and collaboration with municipalities that are responsible for the service production as a whole. The term *commissioner-supplier model* refers to a process of service acquisition in which the organizing responsibility and the actual production of the service in question have been separated from each other. The *commissioned services* are supplied by an organization either within or outside the municipality, according to the contract between the municipality and the social service entrepreneur. *Social service entrepreneur* refers to an entrepreneur who supplies services according the commissioner's specific instructions. The service commissioner can be e.g. municipality government, the municipal manager and council, or commissioners that have received their authorization (e.g. boards). By *social sector manager* we refer to municipal official, namely social welfare directors in municipal. By *cooperation* we mean that the social service entrepreneurs and social sector managers both seek to achieve their own different ends as suppliers of services and as commissioners of services to their customers. The concepts of *power* and *dependence* are discussed more in-depth in a network metaphor analysis of this study. *Power* is the central concept in network analysis and one important model to realize the cooperation relationships between social service entrepreneurs and social sector managers (municipalities). Power is an ability to influence the decisions and actions or other and power is linked to dependence and interdependence in the cooperation relationship between social service entrepreneurs and social sector managers in their exchange formulations and processes. We have used the definition of *dependency*, as explained in the *resource dependence theory*, and the *principal – agent theory* in studying entrepreneurs' viewpoint on the cooperation relationships between social service entrepreneurs and

social sector managers with the notion of equality with those of hierarchy and unequal distribution of power. We were interested in the ways in which the elements of co-operation reflect the positions suggested by the above-mentioned theories, that is, to what extent the supposed position as 'Principal' and the possible position of entrepreneurs as 'agents' corresponds with reality, and how the features of these positions become apparent in the experiences of social service entrepreneurs.

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## LITERATURE REVIEW

The widespread nature of networking has attracted considerable attention in management literature and has become a useful concept because of its ability to constitute a specific, generic model of economic exchange, spreading in a broad range of industrial settings (Jenssen and Nybakk, 2013; Kogut, 2000; Niemelä, 2004; Nohria and Eccles, 1992; Tsai, 2001). The relationships between social service entrepreneurs and the municipality can be looked at through the lens of agency theory. Agency theory is applicable in several settings, ranging from macro-level issues, such as regulatory policy, to micro-level dyad phenomena, such as impression management. The domain of agency theory is the relationships that mirror the basic agency structure of a principal and an agent who are engaged in cooperative behavior, but have differing goals and differing attitudes towards risk (Eisenhard, 1989).

In our study, agency theory serves as an interesting mirror to analyze the operating conditions and entrepreneurial action in which principal and agent are likely to have not only shared goals, but also conflicting goals and in which there are some special governance mechanisms that limit the agent's self-serving behavior. Accordingly, the principal-agent theory provides us with one theoretical model with which we can try to find solutions for cooperative resource dependencies and interdependencies created in economic relationships, such as commissioner-supplier is in our case study. Principal-agent theory is concerned with finding out how a municipality (principal) can design a compensation system (a contract) which motivates social service entrepreneurs (agent) to act in the principal's interest. A principal-agent relationship arises when principal contracts with an agent to perform some tasks on behalf of the principal and these actions affect the welfare of both the principal and the agent (Petersen, 1993).

To sum up, the principal-agent relationships is interesting in varied ways, i.e., a) there is some uncertainty in the way the agent's action gets transformed into output and b) there is asymmetrical information – for example – the agent observes his/her own action but the principal is not sure whether the agent acts in the principal's interest. (e.g. Petersen, 1993) When the network

relations are seen as serving the critical resources, the basis of power between actors is typically based on resource dependence. Organizations become interdependent with other organizations, in other words organizational behavior becomes externally influenced because the focal organization must attend to the demands of those in its environment that provide resources necessary and important for continuous survival (Pfeffer, 1982). Managers and entrepreneurs alike are trying to strike a balance between seeking to achieve autonomy from those holding power and controlling their action and seeking to reduce uncertainty by developing inter-organizational structures of coordinated behavior, based on interdependencies. (Pfeffer and Salancik, 1987) In this article, it is argued from the social service enterprises point of view to find a sufficient balance between (external) dependence and interdependence (or strategic autonomy), and autonomy which is equally necessary to create and maintain a stock of strategic resources for sustaining competitiveness not only for market nor for commissioner.

### **Networks as relationships**

To begin with, we view relationships from different perspectives, such as *mutual orientation, dependence, bonds and investments*. *Mutual orientation* can be seen as cooperation required in order to gain joint and different ends from the same means or service production processes. Also mutually accepted and mutually held objectives and regulations of cooperation interactions, norms as operational conditions for interactions between suppliers and commissioners can advance to achieve both the economic and non-economic goals of the cooperation. As Easton (1992: 9) has put it, "by knowing a partner firm better and appreciating what they can do and have to offer it is possible to both reduce costs and increase sales". The absence of mutuality can also occur if either one of the cooperative partners suddenly changes the objectives of the cooperation or if the process of interactions is not satisfactorily managed by one or both of them.

The concepts of *dependency* and power are intertwined and are used here interchangeably in describing cooperative relationships and networking. The relationship in the commissioner-supplier model seems to be based on both competitive and cooperative *interdependencies* (Baraldi, Gressetvold, and Harrison, 2012) and imperatives. Power can be measured in terms of the larger firms influence on decision-making within the smaller firm in areas such as pricing or investment. In consequence, domination or control characterizes the form of network constitution (Szarka, 1990). Following this, due to the power of the network, a firm may be legally independent, but not necessarily *de facto* independent: its actions may be influenced or

controlled from outside its legal boundaries. From the resource dependence theory points of view (Pfeffer and Salancik, 2003) the development of inter-organizational power affects the activities of organizations. Processes of reciprocity or cooperation do not insulate practitioners from considerations of power (Brizzi and Langley, 2012; Grabhner, 1994). In contrast to the market model, in which power is seen as some kind of imperfection, the network model views power as a necessary ingredient in exploiting interdependencies, and this exploitation of interdependencies may be asymmetrical because the more powerful economic actors are able to frame decision by which the constraints and opportunities of their exchange partners are shaped (Grabhner, 1994).

*Bonds* between cooperative partners can vary and have economic, social, technical, logistical and for example time based dimensions (Easton, 1992). In Easton's (1992: 10) words: "strong bonds provide a more stable and predictable structure and one which is more likely to be able to withstand change". The partners are bonded by their own will with various rules, laws and physical contracts that are not always easy to dissolve. As it comes to relationships there certainly exists strong and weak relationships, but also potential and residual relationships that refer e.g. to non-economic or indirect relationships (Easton and Araujo, 1986) and network management (e.g. division of work).

*Investments* refer to returns including for example time spent in building good and trustful social relationships between cooperative partners. Cooperative relationships are vulnerable to tension of conflicts in terms of the expected outcomes of the cooperative relationships, when it comes to equality of shares of the benefits. The quality and amount of investments made by cooperative partners plays a crucial role. To conclude: economic relationships are also social in terms of social exchange (Aldrich and Whetten, 1981; Thorelli, 1986) and should call for mutual investments to build trustful bonds that provide a more predictable structure and relation to withstand the uncertainty and constant change in the markets (Easton and Araujo, 1992; Ring and Van de Ven, 1994).

### **Networks as structures**

The structure in any industrial system implies specific behavior of individual firms and their various interdependencies. Each firm has its own role in creating new possibilities for new forms of relationships which also reduce uncertainty within the network. (Easton, 1992). Furthermore, agency theory depicts agency structure where a principal and an agent are engaged in cooperative behavior, but have differing goals and attitudes toward risk

(Eisenhardt, 1989). Agency theory is applicable to a variety of settings, ranging from macro-level issues, such as regulatory policy, to micro-level dyad phenomena, such as impression management. According to Jensen (1983) agency theory can be seen as the foundation put into place to create a powerful theory of organizations, while Perrow (1986) claims that the theory is trivial and dehumanizing at best. Despite the differences and disagreements (Barney and Ouchi, 1986; Demski and Feltham, 1978; Eccles, 1985; Eisenhardt, 1989) agency theory gives us a valuable mirror to analyze the situations in which the principal and agent are likely to have not only shared but also conflicting goals and missions, and in which there are some special governance mechanisms at play limiting the agent's self-serving behavior. The agency structure (Petersen, 1993) has many effects from the point of view of cooperation that account for outcomes and performance of the enterprises. Both external and internal changes can further reframe the structure of the network relationships.

### **Networks as positions**

The focus of position perspective lies on single firms not on the whole network as such. Easton (1992, p. 19) refers to Mattsson (1984) who defines a position as a "role that the organization has for other organizations that it is related to, directly or indirectly" and this implies a definition of social role which in turn suggests, according to Mattsson (1984) that "the firm is expected by other firms to behave according to the norms associated with the position". When it comes to relationships as positions, history tends to determine the prevailing positions in cooperation whereas the future may offer opportunities for change. It can be argued that positions provide a language to negotiate changes in network positions and cooperation patterns although positions are not easy to achieve or to defend.

### **Networks as process**

Networking and cooperation processes are dominated by the power relationships and interest structures of cooperative partners (Easton, 1992). Cooperation relationships are asymmetrical in terms of power and interest structures. In a network or cooperation relationship strong bonds call for cooperation and weak bonds call for competition. Network processes are dominated by the distribution of power and interest structures that constantly change. From the management point of view some enterprises have better access and opportunities to acquire additional resources than others. In networks, cooperation and competition are typical for the existence of strong bonding of cooperation relationships. Competition can be replaced by rivalry

for the control of resources. Changes in network relationships are a result of evolutionary developmental processes in interaction of enterprises. As Easton (1992, p. 23) puts it, “networks are stable but not static”, which provides opportunities for innovation and renewal of both the structures and positions of cooperation interests between firms.

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## RESEARCH METHODS AND DATA

This article is based on data about the operating conditions, cooperative relationships and the inherent dependencies between entrepreneurs and social sector managers in a new context where the roles and relationships of the public and private partnerships in social service sector were just beginning to emerge in Finland. The data for this study was collected in 2005 as part of a larger research project, studying social service entrepreneur-municipality cooperation relationships. Although the situation has changed somewhat during the last decade, the same issues of fragmentation, high levels of competition, scarce resources and need for innovativeness in creating sustainable services have remained.

The survey was designed to gather information about the operating conditions, needs and attitudes affecting the future development of social service entrepreneurship in Central Finland particularly from the social service entrepreneurs' point of view. The following open-ended questions were asked: What qualities describe a good and functional cooperation relationship with the local municipality? How would you like the relationship between your company and the municipality to develop in the future? Are there any other notions about social service entrepreneurship you would like to mention?

The questionnaire was planned by the experts of the research group and some questions had been adapted from the earlier national surveys on social and health service enterprises. The questionnaire was piloted on social service entrepreneurs (n=3) for feedback before finalizing the survey. A total of 133 questionnaires were sent to social service entrepreneurs, who had registered themselves in the company register of the county of Central Finland or who had acquired a Business ID (Business Identity Code). After the initial round one additional reminder was sent. The questionnaire comprised mainly multiple choice questions and some open-ended questions. The data was analyzed both statistically and by qualitative content analysis. The applied statistical methods were, in connection with linear distributions, mutual correlation and chi-square testing. The software used in this study was SPSS. Accordingly, we also used qualitative methods, because we thought that by asking open-ended questions we could obtain real-life experiences

of interaction and cooperation between social service entrepreneurs and social sector managers by using the lens of network metaphors. (Denzin, and Lincoln, 2000). The qualitative aspect of the analysis was important in terms of the interest in attitudes and power relations in general. Open-ended questions asked in this study allowed entrepreneurs to elaborate on their experiences of cooperation. The qualitative content analysis was done with InVivo software. To analyze and code cooperative relationships and their inherent dependencies basing on our case material we used four metaphors to approach the complex dynamics between social service entrepreneurs and social sector managers: relationships, structures, positions and processes as introduced by Easton (1992). Assessing the four metaphors as a research technic and approach accounts for the fact that cooperation between social service entrepreneurs and social sector managers deals with issues of mutual orientation, bonds, dependence and investments but also the structures, positions and processes as relationships which are to be important in our case setting.

Our final sample consists of 72 (54%) social service entrepreneurs, covering a broad range of service branches (Table 1).

**Table 1.** The background data of social service entrepreneurs

<b>The background data of social service entrepreneurs (n=72)</b>	
Gender	Female 53 (78%) and male 14 (21%)
Average age	46 years
Respondent's employment in the firm (in years)	$\bar{x}$ =7 years (0-17 years)
Respondent has education related to the sector	90 % (yes)
Former employer of respondent by sector	Public (56%), private (27%), other (17%)
Prior work experience	Public (84%), private (50%)
Firm established (year)	$\bar{x}$ =1998 (1988-2005)
Turnover (last season)	$\bar{x}$ =158,000 € (984-800,000€)
Main service area of the firm	
Foster care	26.5%
Home service, household management	23.5%
Cleaning, meals, errand assistance	20.6%
Child day care	16.2%
Rehabilitation of mental illness patients	10.3%

26 per cent of entrepreneurs offered services for relocating children at risk, 23 per cent offered home care services for the elderly and a total of 16% concentrated on children's day-care services. Of the firms, 10 per cent offered rehabilitation services for mental health patients, and 10 per cent offered different mental stimulation and day-time activity services. These percentages represent the general distribution of the various branches of the social service sector in the county of Central Finland. To a large extent, the local actors who responded to the questionnaires were women (78%) with



a relatively short working history as entrepreneurs in the social service sector. The surveyed entrepreneurs employed three persons on average, with the overall range being between 0 and 27 employees. There was also variation in the turnover of businesses: 47 of the firms that responded (out of a total of 72) provided us with information of their latest accounting period. The turnovers varied between 9 846 euros and 800 000 euros, the average being 158 000 euros. Qualitative descriptions of profitability of business showed that 28 per cent of respondents described it as “excellent” or “good”, 63 per cent as “average” or “satisfactory”, and 6 per cent as “barely adequate” or “weak”. 90 per cent of the respondents had education related to social services.

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## ANALYSIS AND RESULTS

### **Entrepreneurs experience of cooperation as relationships**

Our data revealed that the two-way cooperative relationship between the social service entrepreneurs and social sector managers can be seen very distinctly. Unlike cooperation and networking between equal, privately held firms, in our case the relationship between social service entrepreneurs and social sector managers is dominated by both the context of social services and the multiple roles municipalities play in the equation of service production. Entrepreneurs operate in a context where there is still a lot of attitudinal resistance and confusion when it comes to the role that private businesses should have in the public-private-partnerships.

From the point of view of the mutual orientation, entrepreneurs see the cooperation predominantly as a necessity in order to maintain a profitable business, whereas for the social sector managers, it appears as an opportunity to fulfill the municipal social service duties in a more cost-efficient way. The entrepreneurs in the social services sector largely see themselves as highly dependent on the operational prerequisites that they receive from the social sector managers. It is not only a question of resource dependence (i.e., cooperation in the form of bought services); it is as much a question of the conditions of entrepreneurship as dictated by the prejudiced views towards development in the sector (i.e., whether social services should be offered in entrepreneurial form at all).

Four out of five (80%) social service entrepreneurs agreed with the statement that the relationship between their firm and the municipality is a crucial factor in their business operations. The stronger the entrepreneur’s belief was in the growing importance of entrepreneurship-based social services, the more important the functioning of the municipal relationship

was seen to be for the business to be successful. ( $\chi^2(2, N=67)=45.1, df=20, p=0.001$ ). Those entrepreneurs who gave most optimistic estimates about the possibilities of growth in the importance of entrepreneurship-based social services as regards the municipal service production as a whole, stated also their own municipal relationship was based on a positive attitude of the municipality towards cooperation. ( $\chi^2(2, N=67)=37.4, df=20, p=0.010$ ).

The dependence between the entrepreneur and the municipality that characterizes the social services sector is not only a prerequisite for profitable business; it is also an obstacle to the formation of genuine competitive settings and to the development of normal supply and demand mechanisms. There is a considerable imbalance of power inherent in the relationship between the social service entrepreneurs and social sector managers, which was reflected in the entrepreneurs' experiences of cooperation.

### **Entrepreneurs experience of cooperation as structures**

For the municipalities, the entrepreneurs represent one possible alternative for the renewal of their service structure, whereas for the entrepreneurs, the social sector managers represent a prerequisite for business success. This setting unavoidably creates a hierarchy within the cooperation. Because of the insufficiently developed market demand, when trying to get involved with the market the social service entrepreneurs are bound to be the underdogs, and face a situation where they primarily compete not for the acceptance of their customers, but for that of their market competitor, the public sector. In its role as the financier, the municipality can set the conditions and take advantage of its power position in ways that leave only little choice to the entrepreneur. To attract a positive response from the decision-makers, entrepreneurs need to be ready to modify their service concept to fit the needs expressed by the decision-maker; a promise of quality that can win the trust of the commissioner must also be made.

The will of the social service entrepreneurs to provide services according to the conditions set by the municipality is not motivated only by financial needs but also by the fact that they are bound to do so by law. There were considerable differences in the ways in which the municipal supervisory and regulatory rights were exercised in different municipalities. The answers of the entrepreneurs showed a full spectrum of variation. However, in the answers of the social sector managers, uniformity is the dominant feature. According to them, the most common means to ensure that the supervisory duties are fulfilled include meetings, annual control visits and regular customer feedback procedures. Also the diversity of the existing supervisory policies was mentioned according to entrepreneurs as follows:

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*“The quality of firm is supervised through visits by the social authorities and the health inspector, as well as through fire inspections.” (Entrepreneur 59)*

*“Quality is supervised by checking that we have enough personnel considering the amount of children we take care of, and that our personnel is competent. On top of that there are also the visits and the inspections of the premises”. (Entrepreneur 71)*

*“There are plans for a quality manual for the private sector. The county council also supervises the operation and the quality of the unit”. (Entrepreneur 92)*

*“The municipality employees do not have any quality of their own!” (Entrepreneur 17)*

Most of the respondents directed their criticism at the one-way nature of cooperation, the practices which, instead of fostering a dialog, tend to resemble a hierarchical ‘take it or leave it’ ultimatum. The entrepreneurs’ will to become equal partners in the interaction is very much highlighted in the answers.

*“The relationship should be developed more towards cooperation. The municipality should at least ask the entrepreneur about possible care placements, and also, the customers should be presented with the whole spectrum of available services, not forgetting the private service providers”. (Entrepreneur 119)*

*“There is certainly a lot of work to be done in openness and communications”. (Entrepreneur 28)*

*“The people in charge at the municipality should be interested in the private service provider. I have offered to come and present my services but not once have they found time in their schedules for that! Sharing and receiving information are the cornerstones of a functioning cooperation”. (Entrepreneur 75)*

They wish to become actors who, instead of the one-way right to be heard, have the right to be active partners and to make long-term service strategy plans within the cooperative relationship. When we asked the entrepreneurs about the turnover covered by the services bought by the municipality, it

became apparent that only 9 out of 68 (13%) respondents could get by on the customer demand created by the market. An analysis of the total amount of social services bought within the region revealed that 88% of the purchases were financed by the municipality and 12% by independent consumers.

### **Entrepreneurs experience of cooperation as positions**

The municipality has the ultimate right to decide who is fit to operate in the field of social services and what kind of conditions a firm needs to meet in its operations in order to make its business profitable. The need for tailoring that is apparent within the branch is based both on the right of the buyer to define what is desired, and on the law-based supervisory duties of the municipality regarding the services they purchase. In this sense, the entrepreneurs' interest towards the development of the cooperation is fascinating: they have a distinct will to intensify cooperation and interaction, even though the relationship entails the regulatory right and supervisory role of the municipality.

When the focus of attention was extended to cover areas outside of the urban areas, the share of private market demand disappears completely from the total turnover percentages. Nearly one half (43%) of the social service entrepreneurs who answered our survey were completely dependent on the municipalities' desire and ability to buy their services. On the practical level, this dependence may surface as a kind of a spontaneously activated control mechanism: the need of the service providers to maintain a working relationship with the municipality adds to the entrepreneurs' motivation to ensure both the quality of their services and the fulfilment of the service criteria as set by the municipality. The relationships with the municipality were characterized as "riddled with suspicion" and "distrustful": it looked like the municipal actors easily took on a domineering and patronizing role, which –in addition to their general attitude- was experienced as deficient, one-way communication. Entrepreneurs' felt that their opinions were only rarely listened to, and then only if it was profitable to the municipality. On the practical level, this silent discord became most apparent in conflicts in agreement policies and bidding competition processes – usually involving questions concerning the balance between quality and cost. The entrepreneurs' demand for strengthening their profile is not only based on the need to become valued partners in a dialogue, but also (and predominantly) in their desire to develop their role as entrepreneurs creating profitable business.

*"Cooperation should be uncomplicated and genuine. The entrepreneur should be aware of the needs of the municipality well in advance, so that the*

*firm could tailor suitable services for the municipality. The cooperation should be open and happen in real-time". (Entrepreneur 114)*

When estimates were made concerning the current profitability of the firm, those respondents that on the one hand considered the financial profitability of their firm to be very good felt that their current municipal relationship was based on a positive attitude of the municipality towards cooperation ( $\chi^2$  (2, N=67)=17.51, df=8, p=0.025). Those entrepreneurs who considered their profitability to be very good also thought that their own municipal relationship was based on the advantages of mutual cooperation ( $\chi^2$  (2, N=67)=17.1, df=8, p=0.029) and that, over the next few years, the relationship would develop further in a positive manner ( $\chi^2$  (2, N=67)=17.7, df=8, p=0.024).

### **Entrepreneurs experience of cooperation as processes**

Entrepreneurs are fully aware of the fact that the demand for private-sector services on the social services market is not yet extensive enough to maintain profitable business. This is because the will to actually pay for such services is virtually non-existent. Citizens still hold a strong belief in the availability of free public welfare services and society including the decision-makers and the media generally supports the public sector as the primary source of social service production. In the social services sector, the criteria for buying services are not defined by the experience customers have from their earlier purchases. Instead, they are defined by the social sector managers who, when making the agreements on the buying of services, also set the options for choices available for the customers. It can also be statistically proven that a functioning municipal relationship bears considerable significance on the growth of the firm's familiarity within the municipality ( $\chi^2$  (2, N=67)=34.6, df=20, p=0.022). It can also be statistically proven that those entrepreneurs that evaluate the relationship between the development of the operating conditions of one's own firm place considerable significance on the necessity of developing the municipal cooperation ( $\chi^2$  (2, N=67)=44.2, df=20, p=0.001).

None of the customers of the said firms paid for their services themselves. Instead, they all held agreements to buy service from the entrepreneurs in question, paid fully by the municipality. The relationship between the municipality and the entrepreneur is quite vulnerable. In the light of our data it indeed seems obvious that the existence of a law-enforced supervisory duty incorporates a considerable amount of power, which will spread its influence also over other areas of the entrepreneur-municipality interaction than just that defined by the supervisory and regulatory rights.

## DISCUSSION AND CONCLUSIONS

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This study contributes to the understanding of public–private partnerships as a context for cooperation with municipalities. To further our understanding of the experiences of social entrepreneurs' cooperation relationships with municipalities, we used network metaphors, mixed-methods analysis and our explorative data. We examined what kind of dependencies exist in the relationships between social service entrepreneurs and municipal decision-makers from the social service entrepreneurs point of view, how and why these dependencies are formed and what kind of consequences they may have on the profitability of social service business. Our study focused on operational restrictions as dependencies and their effects on the conditions for entrepreneurial opportunities created by the demand-based market mechanism. This focus revealed, as it comes to social service entrepreneurs' experiences, that in the field of social service entrepreneurship, there is a need for deeper cooperation and dialogue between social service entrepreneurs and the social sector managers.

Our findings suggest, basing on the social service entrepreneurs experience, that although the municipality represents a prerequisite for social service entrepreneurs own business success, their business represent only one alternative for the renewal of social service structures from the point of view of municipalities. In addition, the existence of a legally enforced supervisory duty incorporates a considerable amount of power in the hands of the municipality. This concentration influences in turn other areas of the entrepreneur-municipality relationships and interaction, more than just those areas defined by the supervisory and regulatory rights. Because our results revealed the effects of the imbalance of power between the municipality and the entrepreneurs, we saw how the cooperative relationships had many negative impacts on a practical level.

Social service entrepreneurship is a promising field within entrepreneurship research due to its specific context, which inherently combines social, economic and historical (as attitudes, beliefs, and needs) perspectives. By looking at the phenomenon through the contextual lens as Welter (2011) and Watson (2013) suggest, we were given an opportunity to approach the research phenomenon in a new way. For example, in the stream of networking and cooperation theories there is a tendency to focus on the positive side of networking outcomes and often neglect the idea that there might also be a dark side to it.

Our main conclusions contribute to the research questions of the study as follows:

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*What kinds of dependencies exist between social service entrepreneurs and municipality decision-makers relationship?*

Entrepreneurs need the municipality to succeed in business. On the other hand, they are forced to shape their business concept according to decisions and wishes arising from the municipal sector. However, the relationship is not only one-sided. The municipality needs entrepreneurs to renew the business structure in social service sector.

*How and why are these dependencies formed?*

Citizens are used to enjoying free public welfare services offered by the public sector, a notion that is enforced by society including the decision-makers and the media. Contemporary development is neither increasing the willingness of individuals to actually pay for welfare services nor is it beneficial to creating profitable business. The municipality as the financier can set the conditions and utilize the power position in ways that leave little choice to the entrepreneur. The municipality also ultimately decides who is fit to operate in the field of social services and how the business should be organized. This imbalance in demand and supply means that instead of customers deciding the services they want to buy, the decisions are made by social sector managers.

*What kind of consequences may the decisions of the municipality have on the profitability of social service businesses?*

The entrepreneurs in the social services sector largely regard themselves as highly dependent on the suggestions of the social sector managers. When entering a market, social services entrepreneurs are forced to compete for the acceptance of the public sector instead of the acceptance of the customers. Entrepreneurs are asked for adjustability, flexibility and high quality in their service concept to meet the needs expressed by the decision-makers. In the welfare services sector the keys to prevent or enhance the diversification of the structuring are held by the social sector managers.

**LIMITATIONS**

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When assessing the external validity of our research, it is important to consider some limitations our data may have. The results of our survey suffer, to an extent, from the fact that the sample was both relatively small and confined to a geographically limited area. However, in a country like Finland, where

the traditions of public responsibility for welfare are strong, the number of social service enterprises is still relatively small regardless of geographical location. The small number of firms is admittedly accentuated in those areas where the population is the sparsest, and some of these areas were also found within the borders of the region of our research. Nevertheless, Central Finland represents the Finnish municipalities well, both in population density and the traditions of public services. Central Finland provides a thorough representation of the reality of the Finnish social service context, where strong traditions of public services and the more reform-oriented new aspirations are mixed in a fascinating way.

### **IMPLICATIONS FOR PRACTICE AND FURTHER RESEARCH**

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This study offers many new avenues for further research. Building on the theoretical underpinnings and the conceptual definitions introduced at the beginning of the article, we suggest increasing the focus on both the social and economic aspects of development possibilities of social service entrepreneurship. We would also like to reconsider how the social aspect is emphasized in social service entrepreneurship. How do social aspects affect decision-making and the dependencies in relationships of various forms of venture typologies and business platforms? What does the social aspect mean in cooperation relationships and how is it associated with the demand-based social service entrepreneurship? How does this kind of cooperation between entrepreneurs and municipalities call for new ways to enhance the innovation capacity and demand-based development of social service entrepreneurship?

It would also be interesting to study what kind of role and influence the social aspect has on social service entrepreneurship and its development. This should include examination of how the social aspect affects opportunities for building innovation capacity and utilizing effectual strategy in social service entrepreneurship. Theoretically it would be interesting to conceptualize the social aspects of building on the effectual logic of social service entrepreneurs.

When looked at from the social point of view, a further question emerges: Does the market failure and dependency between social sector managers and social service entrepreneurs call for a new business model and a whole new way of thinking and doing business versus the traditional, commercial way of doing business?

New social and wellness innovations are usually generated in the interface between different industry sectors in response to changing



customer needs and market demand. There is a genuine call for diversifying products and services by allowing different venture forms to find their role in the field of social service production. Municipalities have the opportunity to have a significant impact on their own area by buying services from local companies, thereby supporting enterprises and encouraging the creation of new business and service models.

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### **Abstrakt (in Polish)**

*W naszej pracy badamy złożoną dynamikę między przedsiębiorcami oferującymi usługi społeczne a menadżerami sektora społecznego za pomocą metafory sieci, używając danych dotyczących doświadczeń, jakie mają tacy przedsiębiorcy we współpracy z władzami lokalnymi. Badamy jakiego rodzaju zależności istnieją w relacji przedsiębiorca – władza lokalna oraz jakie konsekwencje zależności te mają na firmy prowadzące działalność w sektorze usług społecznych. W oparciu o doświadczenia przedsiębiorców z tego sektora, wyniki naszych badań sugerują, że o ile współpraca z władzami lokalnymi jest warunkiem niezbędnym powodzenia działalności, ich przedsiębiorstwa stanowią tylko jedną alternatywę dla odnowienia usług społecznych z punktu widzenia władz lokalnych. Ponadto, istnienie narzuconych przez prawo obowiązków nadzorowania zawiera w sobie znaczny ładunek władzy, która wpływa na relacje między przedsiębiorcami a władzami lokalnymi oraz interakcje inne niż te zdefiniowane prawami nadzoru i regulacjami.*

**Kluczowe słowa:** przedsiębiorstwo oferujące usługi społeczne, partnerstwo publiczno-prywatne, przedsiębiorczość usług społecznych, współpraca, metafory sieci.

### **Biographical notes**

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# Low Level of Innovativeness and the Middle Income Trap – Polish Case Study

*Kamil Pruchnik\**, *Jerzy Toborowicz\*\**

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## **Abstract**

*The aim of this paper was to verify whether Poland managed to avoid or still might fall into the middle income trap. The paper provides a literature overview concerning the middle income trap. Though there are diverging interpretations of the notion of middle income trap, common conclusions of economists emphasize the importance of innovation-based transformation of economies as a way of avoiding the trap. Further, the paper overviews literature concerning public policies which support this much-needed transformation. We conclude that countries such as Finland, Israel or the USA implemented well-designed top-down economic strategies, which promoted the development of innovations and established effective implementation agencies. Exceptions from this model are some resource rich countries, which managed to avoid the middle income trap without the implementation of such policies, but these countries face in most cases the danger of falling into another trap, called ‘the Dutch disease’. In a subsequent part of the article, we attempt to apply the middle income trap concept to Poland and conclude that it is not possible to clearly state whether Poland avoided the trap or not. This is followed up by a literature-based review of the most common obstacles to innovativeness in Poland. The current growth engines might not be sufficient to ensure economic growth fast enough to speed up the catching up with the most developed countries.*

**Keywords:** *innovation, economy, strategy, social capital, institutions, human capital, infrastructure, middle income trap.*

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## **INTRODUCTION**

Undoubtedly, Poland has made a remarkable progress in terms of economic development over the last 25 years. We can identify two major engines powering its growth. The first one were free-market reforms implemented at the beginning of the 1990s. Transformation of the economy and creation of foundations for its further development (by liberalizing, privatizing and

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stabilizing it), as well as radical abandonment of the former political system, freed the economic potential of entrepreneurial Poles, suppressed for decades (Winiński, 2012). The other growth engine was Poland's accession to the European Union (hereinafter referred to as EU). The World Bank economists (Gill and Raiser, 2012) named the EU 'the convergence machine', emphasizing how the strong process of integration with the community supports the convergence process in Central and Eastern European countries (hereinafter referred to as CEE). Simultaneously to the advancing economic integration we observed the tightening and harmonizing of the Polish law, institutions and infrastructure with European requirements. All these changes accelerated the process of transformation in Poland, acting in the economic, social and political dimensions at the same time (Piątkowski, 2013).

However, the scientific research shows that periods of accelerating growth lasting 20-30 years are not necessarily permanent. Some countries, after decades of dynamic catching up, 'used up' their primitive growth engines such a cheap labor or productivity growth powered by import of know-how and innovation from abroad. As a result, they 'get stuck' among countries which are poorer and compete by low prices, e.g. China, and countries which are richer and compete by their innovations, e.g. USA. This phenomenon of slowing down or stopping the process of catching up with the richest countries has been called 'the middle income trap' by the World Bank economists. Thus, a questions arises – is the Polish economic growth powered by forces that will enable it to avoid the middle income trap? Or has Poland managed to avoid the trap already? If not, what is the potential danger for falling into the trap? In this paper, we try to answer these questions.

## **RESEARCH METHOD**

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This paper is based on literature review. In order to determine whether Poland has already avoided the middle income trap or might fall into it in the future, it is essential to first understand what the middle income trap really is. Thus, we start our paper by providing literature review on what the middle income trap is and how countries managed to avoid it. We look at academic research as well as at research conducted by international institutions such as the World Bank or the International Monetary Fund. We find out that there is no universal definition of middle income trap and research offers different thresholds for it. However, researchers conclude that one of the main reasons some countries managed to avoid it is the high level of innovativeness of their economies.

Next we try to determine the possible cause for innovative growth of selected countries. We concentrate our literature review on Finland, Israel

and the USA as these countries avoided the middle income trap according to interpretations of middle income trap provided in the previous section. The literature review suggests that one of the possible explanations of their innovative growth is the implementation of a top-down strategy aimed at supporting innovative growth, which was carried out by public agencies responsible for it.

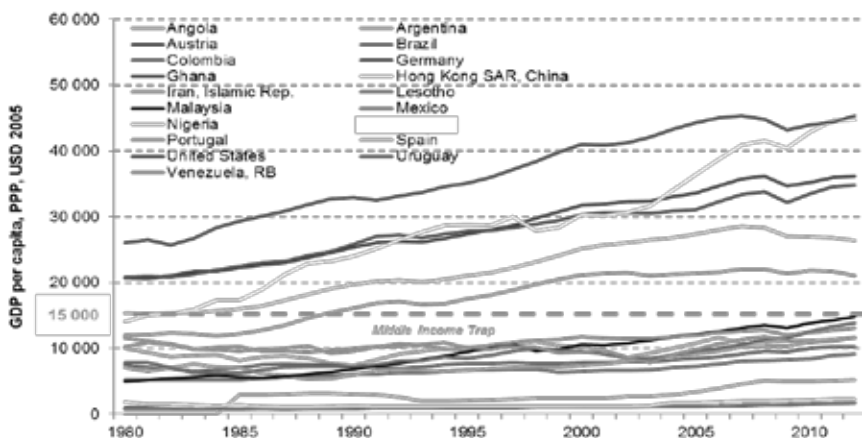
In the next section we use the various interpretations of the middle income trap and try to see whether Poland managed to avoid it or fall into it. It seems that experts are divided on this subject. However, regardless of how we define the middle income trap thresholds, what is more important is whether the Polish economic growth is powered by innovations or more primitive growth engines. In order to determine this, we provide literature review of most recognizable rankings of innovation and conclude that Poland is not an innovative economy. Thus, there is a risk of a substantial slowdown in economic growth in the medium term. This is supported by research from Poland and abroad. We finish this section with a review of the most common obstacles for innovations in Poland.

## **UNDERSTANDING THE MIDDLE INCOME TRAP**

The middle income trap is a relatively new phenomenon in economics. The term was coined by Indermit Gill in 2007 and presented in a World Bank report entitled "An East Asian Renaissance". He found that out of the countries that were middle-income in 1960, almost three-fourths remained middle-income or regressed to low-income by 2007 – hence the term "middle income trap". Since 2007, the term has become very popular among economists and policy makers.

There are many different interpretations of this phenomenon among researchers. We decided to present four most frequently cited papers on the subject internationally and one Polish paper that was published by the Institute for Structural Research (Polish name: *Instytut Badań Strukturalnych*).

We start with an academic study conducted by Eichengreen, Park and Shin (2012), which might be the most comprehensive one on the matter. In their paper, the team identifies the thresholds for the middle income trap at the level of GDP per capita at 15 000 USD (2005 USD PPP). They conclude that countries that fall into the middle income trap have a set of common characteristics such as: unfavorable demographics, undervalued exchange rate, low share of economically active population with higher education and low share of high-tech sectors in GDP and exports. They argue that countries that avoided the trap had a high level of productivity growth and innovation.



**Figure 1.** Middle income trap – interpretation by Eichengreen et al. (2012) and Ayiar et al. (2013)

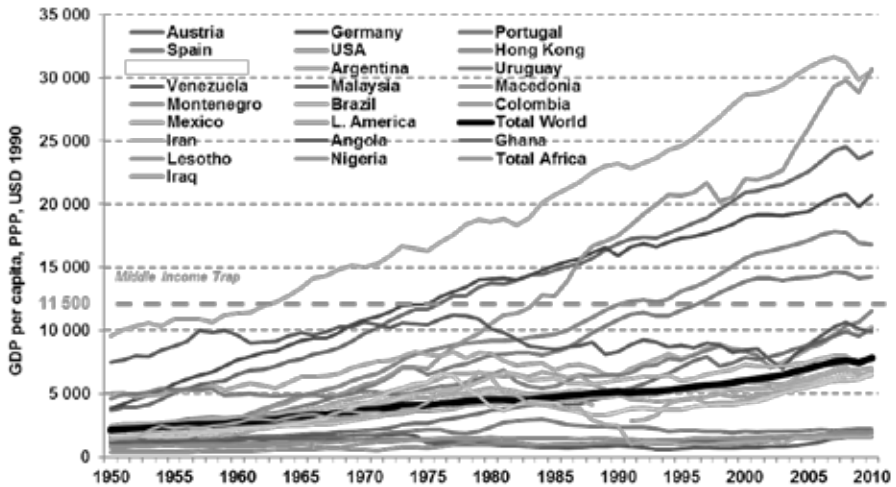
**Note:** for each of the following graphics illustrating different concepts of middle income trap we updated the original charts from the articles to the newest available data (from 10.2014).

**Source:** own elaboration based on World Development Indicators (World Bank, 2014).

Another study that we would like to introduce is a paper published by the International Monetary Fund. Ayiar, Duval, Puy, Wu and Zhang (2013) set their threshold for the middle income trap at the level of 15 000 USD of GDP per capita (2005 USD PPP). They point out that what increases the probability of a country to fall into the trap are: poor quality of the legal system, poor enforcement of contracts and property rights, excessive growth of the public sector, over-regulation and unfavorable demographics. Again, the productivity growth as well as innovations increase the probability of avoiding the middle income trap.

Further academic research was conducted by Felipe, Abdon and Krumar (2012). According to their research, countries that fell into the trap typically had low levels of diversification of the economy, low levels of human capital, weak legal and institutional set-ups and low levels of diversification of exports, with exports dominated by low-processed goods. They set up the threshold for the middle income trap at the level of 11 500 USD GDP per capita (1990 USD PPP). Similarly to Eichengreen et al. (2012) and Ayiar et al. (2013), they pointed out that productivity growth and innovations help countries avoid the trap.

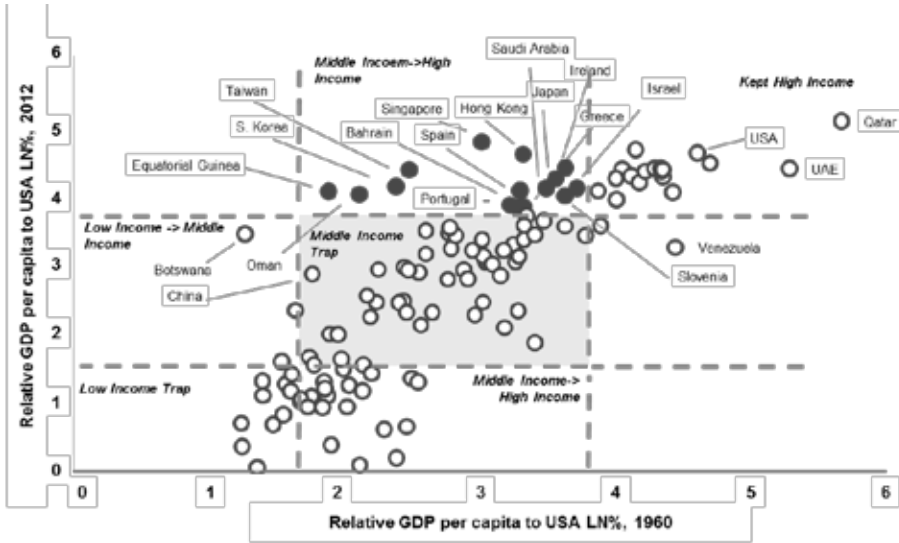




**Figure 2.** Middle income trap – interpretation by Felipe et al. (2012)

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).

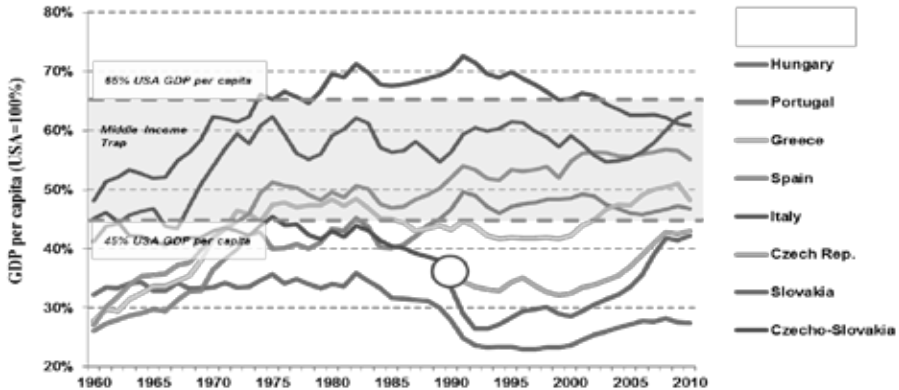
It is important to notice that setting ‘fixed’ thresholds such as GDP per capita in USD might be problematic. One can argue that by following this approach in the long run, all countries will eventually escape the middle income trap. Agenor and Canuto (2012) from the World Bank understand middle income trap differently as they compare the level of economic development by GDP per capita relative to the USA GDP per capita. To the best of our knowledge, the United States of America is recognized by all papers which concentrate on the middle income trap as an example of a country that managed to avoid the trap. The USA is internationally recognized as a highly successful and innovative economy. Thus, it was selected as the benchmark for other countries in many articles – the World Bank article used by us being among them. Agenor and Canuto (2012) conclude that countries which fell into the middle income trap, were stuck between 5% and 45% of GDP per capita of the USA between 1960 and 2009. They argue that countries that fell into the trap had typically low level of human capital, low level of infrastructure development and their institutions were not well adequately designed nor were they based on good governance practices. Following the examples of Eichengreen et al. (2012), Ayiar et al. (2013) and Felipe et al. (2012), they suggest that what increases the chances of avoiding the trap are: productivity and innovation growth.



**Figure 3.** Middle income trap – interpretation by Agenor and Canuto

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).

The last piece of research presented in our paper is a Polish report published by the Institute for Structural Research. Bukowski, Szpor and Śniegocki (2012) argue that the middle income threshold is at the level between 45% and 65% of GDP per capita of the USA. They suggest that excessive regulation, high share of public sector in the economy and dependency on cheap labor increase the risk of falling into the trap. Again, the Polish analysts follow the previously mentioned international researchers and emphasize the important role that productivity and innovation play in avoiding the middle income trap.



**Figure 4.** Middle income trap – interpretation by Bukowski et al. (2012)

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).

As discussed above, there are many ways economists understand “where” the middle income trap is, in terms of the thresholds. However, there are relevant common grounds. The first of them is the basic understanding that a middle income trap occurs when a country ‘used up’ its initial, primitive sources of growth. The second element is the fact that all of the papers suggested that low level of innovativeness of the economy increases the probability of falling into the trap. Of course, there are exceptions. Most noticeable are the resource-rich countries that managed to avoid the trap without much effort put into increasing innovativeness or productivity. However, as pointed out by Brahmhatt, Canuta and Vostroknutova (2010), those countries in most cases risk falling into another ‘trap’ called the ‘Dutch disease’. The World Bank economists argue that as resource rich countries become more and more dependant on the extraction of natural resources, their economies go through structural changes that are expected to include contraction or stagnation of other tradable sectors of the economy (in most cases manufacturing), accompanied by an appreciation of the country’s real exchange rate. In the long run, these countries will have to deal with high wage expectations and low levels of competitiveness. Eventually, they might see their economic growth slow down as well and will face similar challenges as other middle income trap countries. Thus, a follow up question appears: what public polices make it possible for countries to transform economies into more innovation driven ones?

## **SUCCESSFUL PUBLIC POLICIES AIMED AT INCREASING INNOVATION**

As previously noted, we will concentrate on the examples of Finland, Israel and the USA. Their economies belong to different economic areas and have various cultural foundations. Economists such as: Eichengreen et al. (2012), Agenor and Canuto (2012), Felipe et al. (2012), Bukowski et al. (2012) and Ayiar et al. (2013) agree that these countries managed to escape the trap thanks to one common feature – by initiating a well-designed economic strategy they preserved the growth of innovativeness and transformed from importers into exporters of innovations. It was this innovative growth that resulted in the increases in productivity, allowed these countries to maintain their high rates of economic growth, and eventually allowed them to avoid the middle income trap. It is important however to notice that all three examples provided in the paper face significant economic problems nowadays. Nevertheless, in this section we aim to investigate what historical triggers helped these countries transform from low to highly innovative economies, disregarding their present economic challenges.

The support for innovations is a central part of strategies for Finland, Israel and the USA. The proposal that the state may effectively stimulate innovative development by means of appropriate economic policies was analyzed, among others, by Breznitz and Zimmermann (2008). They suggest that the advances of management science make it possible to design economic policies that will effectively promote innovative growth. However, they note that the essence of effective interventions lies in creation of appropriate environment for the development of innovation and a relevant system of stimuli. The state support is especially needed in the first stage of the development of innovations. Contrary to common beliefs, Venture Capital (VC) funds are not strongly involved in supporting the research and development stage. Studies conducted by Mazzucato (2013), Breznitz (2007), Breznitz and Zimmermann (2008) and Breznitz and Ornston (2013) suggest that even these high-risk VC funds decide mostly to get involved in a particular investment when they can see a product prototype that has already undergone tests and the trial period. This, however, requires financial expenditure and an initial investor who accepts the fact that the research may never generate results that could be commercialized. Therefore, the state can act as a very important player at the very beginning of the cycle of innovation development. Of course, there are examples of private investors being successful at this stage as well. However, in most cases, private actors tend to be risk-averse, which justifies public interventions.

Scientific research shows that such public interventions are effectively made via specialized state institutions (or public-private hybrids). For example,

Mazzucato (2013) points out that the work on a new drug may last more than 10 years, while the average life of a VC fund investment is only 3-5 years. The average time needed to develop a drug that could be marketed in the USA is 17 years, and the costs amount to 403 million dollars. Simultaneously, only 1 in 10,000 drugs is allowed to be marketed. That is why, according to Mazzucato's estimates (2013), 75% of all new drugs in the USA have been developed as a result of research projects funded by the public National Institutes of Health.

The same author also indicates that the technological breakthroughs which led to the establishment of companies such as: Google, Apple or Microsoft, were also originally financed by the state. The search algorithm on which Google's success rests was financed by National Science Foundation Grant (NSF, 2013). In its initial development stage, Apple was also financed by public systems of innovation support, including the Small Business Innovation Research Program. Many major computer innovations can be attributed to the American Defense Advanced Research Project Agency (for example: the Internet, based on the ARPANET).

The key role of the state in the first stage of creating innovations and the importance of well-constructed institutions supporting the financing of primary research were also emphasized by Breznitz and Ornston (2013). They suggest that the transformation of Israel and Finland into countries whose growth became innovation-based, was caused by public interventions conducted by peripheral institutions that were delegated such tasks. In case of Finland it was Sitra – a state investment fund, established in 1967 as part of the Bank of Finland. It was this institution that financed investment in technological innovations in Finland. In Israel, a similar role was performed by the Office of the Chief Scientist, which financed investments in new technologies (Breznitz and Ornston, 2013). This was supported also by YOZMA – a publicly co-funded VC initiative, which played a key role in strengthening the innovativeness of the economy.

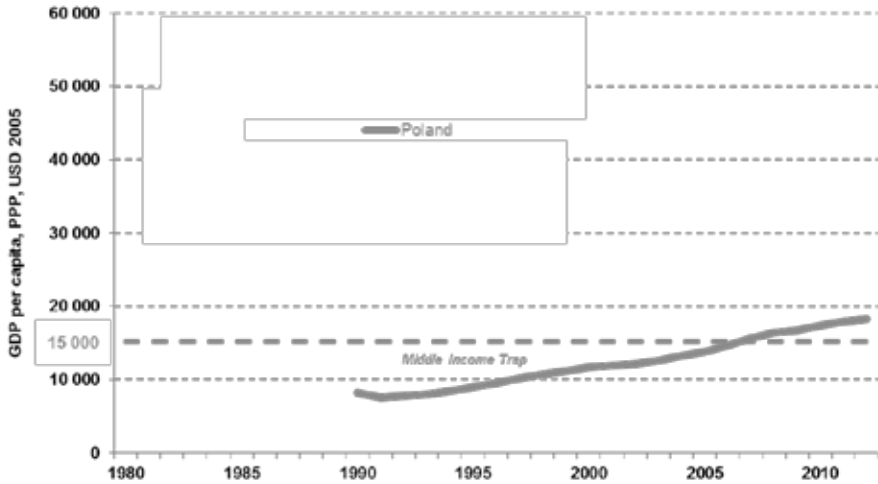
## **POLAND AND THE MIDDLE INCOME TRAP**

In the first section of the paper, we reviewed five selected papers showing alternative interpretations of the middle income trap. These four papers provided three different thresholds for the middle income trap. All of them are once again presented below – however, this time only for the Polish economy.

Poland managed to avoid the trap according to the middle income trap interpretation presented by Eichengreen et al. (2012) and Ayiar et al. (2013). However, it still remains within the scope of the middle income trap according

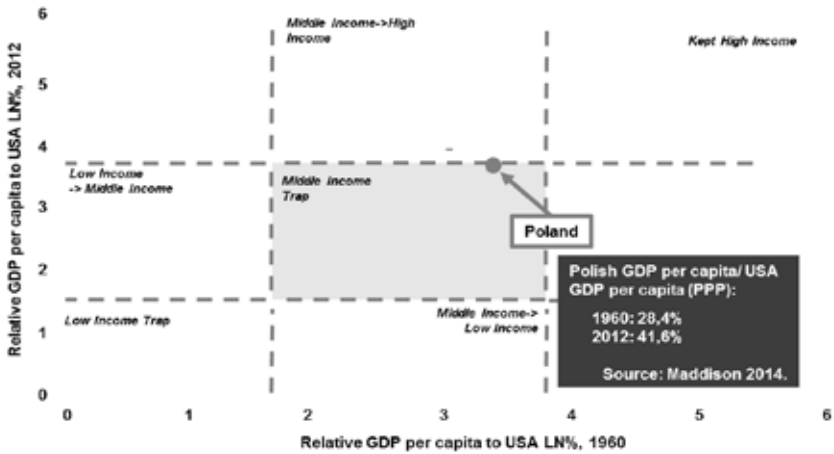
to Felipe et al. (2012), Agenor and Canuto (2012) and Bukowski et al. (2012). Thus, it is hard to decide whether Poland managed to avoid the trap or faces the danger of falling into it.

There is a growing consensus among economists that since the Polish economic growth is fueled by low labor costs and productivity achieved mainly through import of know-how and innovations from abroad, thus being similar to case to countries that were stuck in the middle income trap (as previously presented), there also is a significant risk of a substantial economic slowdown in the medium term (Bukowski, Halesiak and Petru, 2013; Geodecki, Hausner, Majchrowska, Marczewski, Piątkowski, Tchorek, Tomkiewicz and Weresa, 2013). While short-term economic growth forecasts for Poland are beneficial, long-term projections support the thesis that Poland might lose its dynamic momentum. According to foreign sources (such as the International Monetary Fund or World Bank) and domestic forecasts (such as the National Bank of Poland or Ministry of Finance), the economic growth in the next 3-5 years will reach around 3.0-3.5% of GDP and be among the highest rates in the EU. Long-term forecasts, however, predict that Poland will stop bridging the gap which separates it from the most developed countries (as e.g. USA) around 2030. OECD analyses (2012) indicate that in the next 50 years, the Polish economy growth rate will be among the lowest ones in OECD countries. According to these institutions, within the next 15 years, Polish GDP per capita will grow at an average annual rate of 2.3%. However, this growth will gradually slow down and from 2030 on, it will fall to a mediocre 1.1% per year. According to OECD estimates, the highest wealth level per capita in Poland (compared to the US level) will be reached in 2030 (amounting to 55% of USA GDP per capita) and since that moment, the distance will start to grow again (the wealth level will fall to 51% of USA GDP per capita in 2060). OECD suggests that Poland will not manage to catch up with Greece or Portugal. Significant decline of the economic growth rate in the future will result from the declining productivity growth rates in our economy and low levels of innovativeness - this is in line with analyses conducted by Polish economists as well (Bukowski et al. 2013, Hausner et al. 2013).



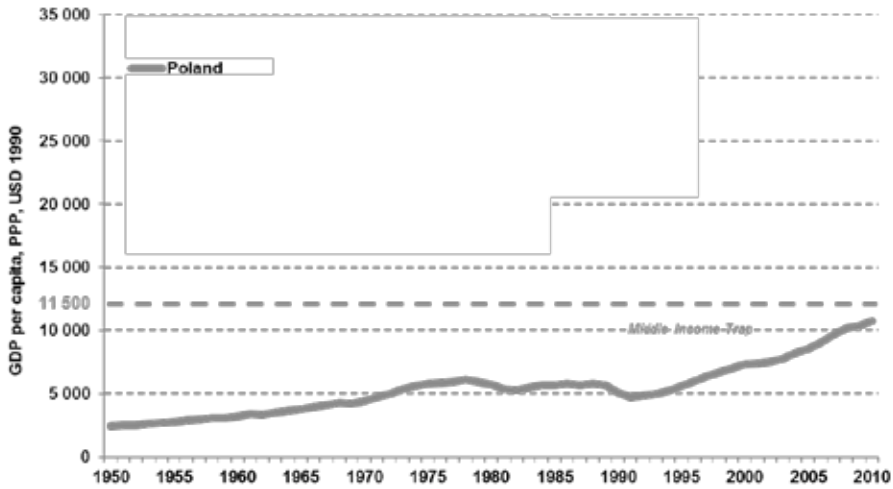
**Figure 5.** Middle income trap – interpretation by Eichengreen et al. (2012) and Ayiar et al. (2013)

Source: own elaboration based on World Development Indicators (World Bank, 2014).



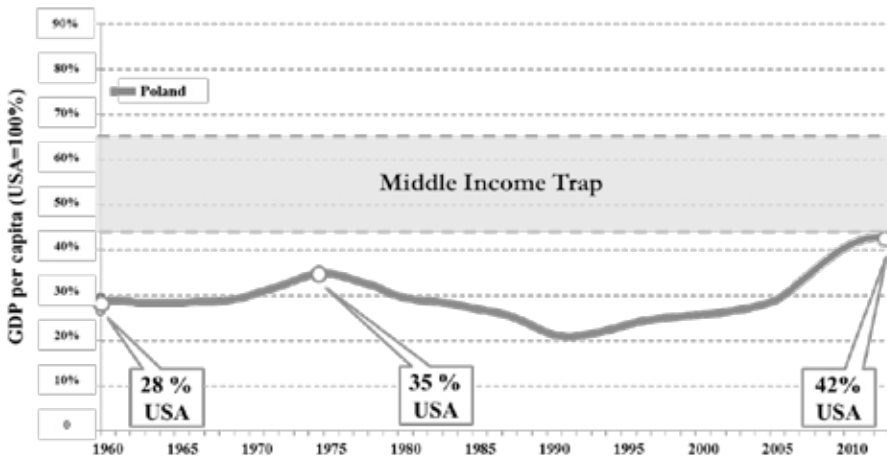
**Figure 6.** Middle income trap – interpretation by Agenor and Canuto (2012)

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).



**Figure 7.** Middle income trap – interpretation by Felipe et al. (2012)

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).



**Figure 8.** Middle income trap – interpretation by Bukowski et al. (2012)

Source: own elaboration based on Maddison Project (Maddison Project Database, 2014).

In view of the rankings, statistical data and reports of international institutions, Poland’s economy is not innovative. According to the World Economic Forum, Poland occupies the 23<sup>rd</sup> position in the competitiveness ranking of 27 European Union countries. The innovative level and potential of our country (22<sup>nd</sup> place in the EU), broadly understood business environment (22<sup>nd</sup> position in the EU) or application of digital technologies (23<sup>rd</sup> position



in the EU) leave a lot to be desired. Another EU report (Regional Innovation Scoreboard 2012), reveals a very low evaluation of Polish innovative capabilities – we are the fourth least innovative country in the European Union. The most significant recommendations and comments concerning the low level of innovativeness in Poland are presented in the table below.

**Table 1.** Selected reports on economic innovativeness in Poland

<b>Ranking</b>	<b>Poland's position</b>
<b>Bloomberg</b> Bloomberg sees the main problems of Poland in: low total expenditure on R&D, low productivity per employee (calculated as GDP per employee), small number of professional (including PhDs) involved in R&D processes <u>per one million of population.</u>	<b>24/110</b>
<b>Global Innovation Index</b> According to Global Innovation Index ranking, Poland has the following problems: total innovation performance (counted as innovation influence on economic growth), lack of company cooperation clusters, a small number of new forms of activity among population aged 15-64.	<b>49/142</b> Poland achieves a low score in <i>Creativity Output</i> category. The factors that pull down our score are: lack of ICT applications in creating business and organizational models or a large share of non-returnable assets in companies.
<b>International I Index (BCG)</b> In BCG ranking Polish innovation performance does not look effective. The ranking takes into account such indicators as: productivity of innovative solutions (including patents, technology transfers, R&D efficiency).	<b>52/110</b> Poland also has low labor productivity and shareholders' profits. Poland does not come well in influence of innovation on company migration and economic growth, either.
<b>World Economic Forum</b> Poland has few patent applications, companies are less able to adopt new technologies, access to them is the most difficult in the whole EU.	<b>23/27</b> Poland should focus on improving the business surroundings, for example by simplifying the establishing and running of a company and promoting digital technologies.
<b>Union Scoreboard 2014</b> In the EU scoreboard, Poland is presented as "a moderate innovator". The authors emphasize low investment in innovations. This indicator has slightly improved since 2006, but it has been deteriorating compared to the EU, where it has been increasing much faster.	<b>25/28</b> Most indicators of the EU index are below the European average, the worst of them being: a small number of PhDs from outside the EU, a small number of patent applications concerning social challenges and low incomes from Polish licenses and patents abroad.

**Source:** based on: Innovation Union Scoreboard, 2014, Global Competitiveness Report, 2014, International I BCG Index (2014), Bloomberg Innovation Index (2014).

## CONCLUSION

The aim of this paper was to verify whether Poland managed to avoid or still might fall into the middle income trap. In order to answer that question we started with a literature review concerning the notion of middle income

trap. We presented five articles on this subject. We concluded the section by stating that there is no universal definition of the middle income trap. However, there are some common grounds among researches with regards to this phenomenon. Those include (but are not limited to) the basic understanding that middle income trap occurs when countries ‘used up’ their primitive growth engines (such as cheap labor for instance). As a result, they get ‘stuck’ between richer countries that compete using their innovations and poorer countries that compete by means of low prices. All of the cited studies agree that countries which managed to avoid the trap, increased the levels of innovativeness of their economies. In the next part we tried then to understand what public policies might be responsible for improving innovations. Literature suggests that countries such as the USA, Finland or Israel transformed their economies into innovation driven thanks to (but not limited to) top-down strategies, which were carried out by specialist public agencies. The literature also suggests that the state can act as a particularly important player in supporting innovation in the early stage of its development. This is the most risky phase of the development of innovation which requires (typically) not only substantial financial investments but also a long time horizon which in most cases can be discouraging for private investors. In the last part we tried to determine whether Poland managed to avoid falling into the middle income trap in accordance with various definitions of the trap. We came to a conclusion that while there is no clear answer to that question, Polish economy show signs that it might have difficulties keeping up the impressive pace of catching up with high-income countries. This is due to the limitations of primitive growth engines such as low-cost labor and productivity increases achieved through imports of know-how and innovations, which have fuelled the Polish growth so far. At the same time, as Poland – according to international rankings – is not a highly innovative country, there are substantial risks of a significant slowdown of economic growth in the medium and long term.

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### **Abstrakt (in Polish)**

Celem naszej pracy była zweryfikowanie czy Polska zdołała uniknąć czy też wciąż może wpaść w pułapkę średniego dochodu. Artykuł omawia literaturę dotyczącą pułapki średniego dochodu. Chociaż istnieją rozbieżne interpretacje pojęcia pułapki średniego dochodu, ekonomiści doszli do wspólnych wniosków podkreślających znaczenie transformacji ekonomii opartej na innowacjach jako metody uniknięcia pułapki. W dalszej części naszej pracy przedstawiamy przegląd polityki publicznej wspierającej te niezmiernie potrzebne transformacje. Dochodzimy do wniosku, iż państwa takie jak Finlandia, Izrael czy USA wprowadziły dobrze zaprojektowane, odgórne strategie ekonomiczne, promujące rozwój innowacji i powołały skutecznie działające agencje zajmujące się wdrażaniem innowacji. Wyjątek stanowią tutaj państwa dysponujące bogatymi zasobami, którym udało się uniknąć pułapki średniego dochodu bez wdrażania takich działań, jednak w większości przypadków państwa takie stają w obliczu zagrożenia znalezienia się w innej pułapce, zwanej „chorobą holenderską”. W dalszej części artykułu próbujemy zastosować koncepcję pułapki średniego dochodu wobec Polski i dochodzimy do wniosku, iż nie da się jednoznacznie określić czy Polsce udało się uniknąć tej pułapki czy też nie. Następnie dokonujemy przeglądu najpowszechniejszych przeszkód dla innowacyjności w Polsce. Obecne źródła wzrostu mogą okazać się niewystarczające by zapewnić wzrost gospodarczy pozwalający nam dogonić najbardziej rozwinięte państwa.

**Kluczowe słowa:** innowacja, gospodarka, strategia, kapitał społeczny, instytucje, kapitał ludzki, infrastruktura, pułapka średniego dochodu.

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