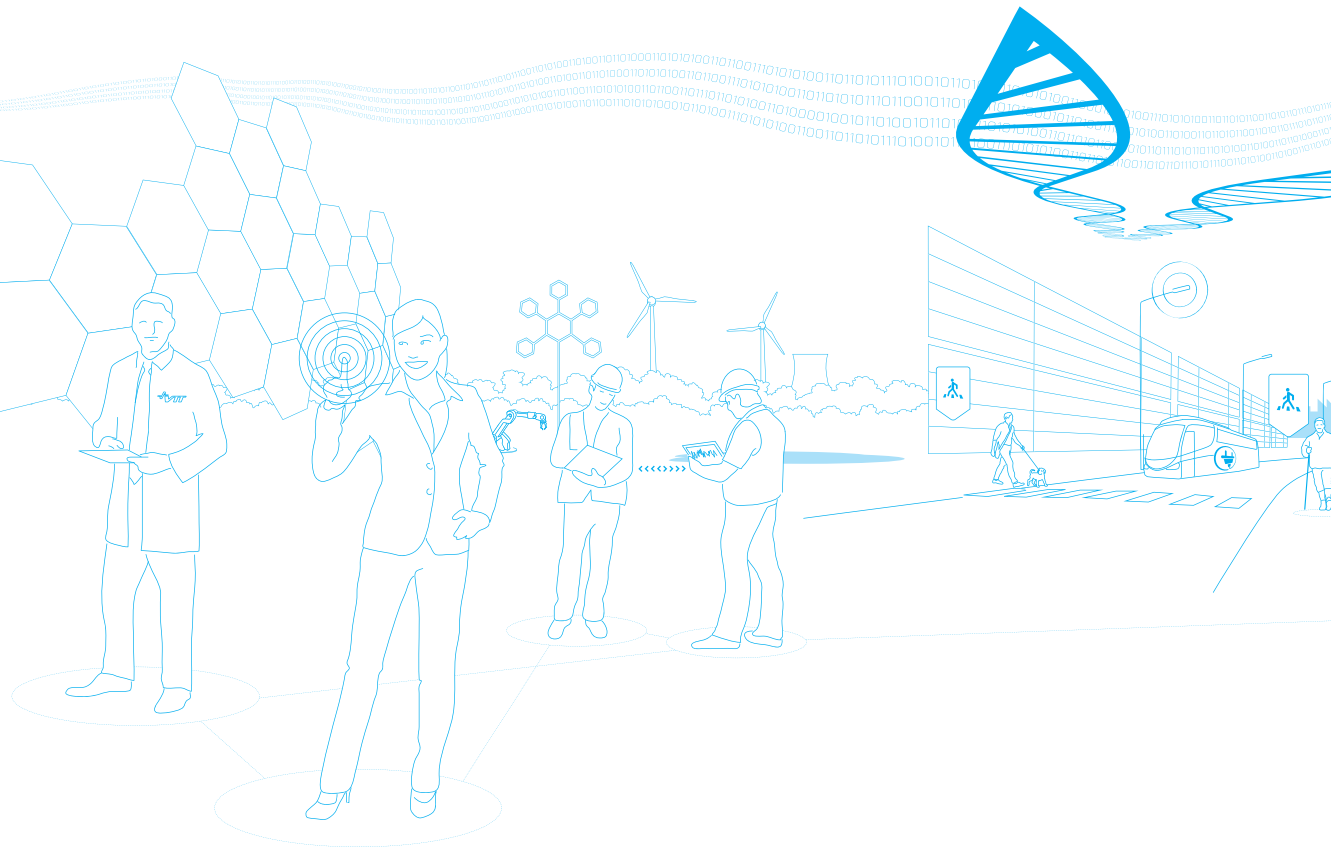


# Perspectives on the international business strategies of small Finnish technology companies in developing countries

The case of small scale gasification

Tatu Lyytinen





# **Perspectives on the international business strategies of small Finnish technology companies in developing countries**

The case of small-scale gasification

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## **Perspectives on the international business strategies of small Finnish technology companies in developing countries**

The case of small scale gasification

Näkökulmia pienten suomalaisten teknologiayritysten kansainvälisen liiketoiminnan strategioihin kehittyvillä markkinoilla: Pienen kokoluokan kaasutusteknologiat.

**Tatu Lyytinen.** Espoo 2014. VTT Technology 150. 49 p. + app. 2 p.

### **Abstract**

Renewable energy markets in developing countries provide significant opportunities and unique institutional and market challenges for companies willing to do business on a truly global scale. In this study we have conducted an explorative case study of two small Finnish renewable energy companies so as to better understand their current resources and international business strategies in order to enter markets and do business in developing countries, and especially low-income markets. In order to benefit from opportunities and to overcome the challenges in developing countries, companies need to rethink their international business strategies. In this study, we propose that companies need to develop proactive international business strategies (1) to analyse the local formal and informal institutional environment, (2) to travel to target markets to understand the practical realities before designing international technology and business model strategies, (3) to develop political strategies to influence local institutional environment so as to make markets more accessible, (4) to improve organizational resources by training or hiring people with the knowledge and skills to operate in the local market context, (5) to create partnerships in the home and host country with for-profit and not-for-profit organizations, (6) to modify the price/performance ratio of technologies and to develop holistic business models that suit local market needs and demand, (7) to co-create pilot demonstrations in target markets to demonstrate and assess technology, business and developmental viability, and (8) to utilize different international trade- and aid-oriented public support services and financial instruments. Our study concludes that small Finnish technology companies have limited resources to develop international business strategies that suit developing countries and the context of low-income markets. This project was funded by Tekes – the Finnish Funding Agency for Innovation and VTT Technical Research Centre of Finland.

#### **Keywords**

Developing countries, emerging markets, low-income markets, renewable energy, international business strategies, SME

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# 1. Introduction

The deployment of renewable energy technologies is critical for the ability of developing countries to move towards sustainable energy systems in the future. In this transition, small-scale renewable energy technologies that utilize biomass are one of the key sectors that can deliver mini-grid and off-grid solutions to urban and rural high-income, middle-income and low-income markets. The public and private sectors in developing countries have not been able to provide sustainable energy solutions for urban and rural middle-income and low-income markets. An estimated 2.7 billion people in developing countries rely on diesel and burn solid fuels in order to produce energy, and there are 1.4 billion people without access to electricity (OECD/IEA 2011).

Small-scale renewable energy companies coming from developed countries can increase the diffusion of sustainable energy solutions in developing countries and contribute to global development goals. At the same time, this market creates business opportunities for companies willing to benefit from these untapped markets. However, developing countries are remote from small technology companies and they often lack the resources to benefit from these opportunities. Small technology companies in developed countries need to rethink and seek external support for their international business strategies so as to conduct inclusive business in developing countries and low-income markets.

This report investigates the market opportunities, challenges, risks, uncertainties and preconditions for the deployment of international business strategies for small-scale gasification technologies in developing countries. There is little research in Finland on how small renewable energy companies can enter different market segments in developing countries. Currently, management studies focusing on developing countries have mainly addressed international business and the strategic management of multinational companies. There is a lack of understanding among academics and practitioners of how small and medium-sized enterprises (SMEs) might benefit from business opportunities in these markets. The purpose of this study is to understand better how Finnish small-scale renewable energy technology providers might overcome the challenges and benefit from opportunities in developing countries and low-income markets.

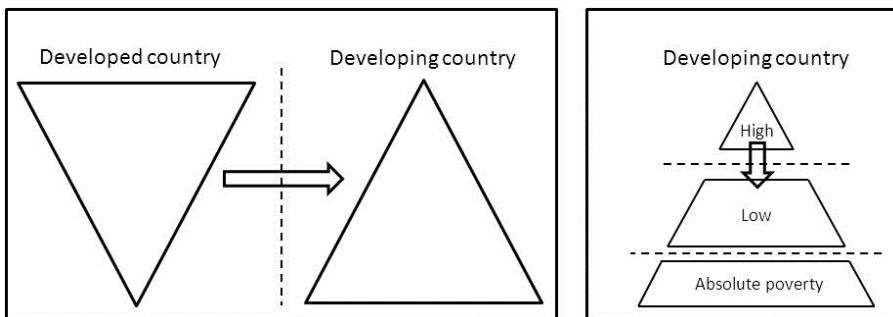
The paper is organized as follows. The introduction reviews the general opportunities in developing countries and renewable energy markets, and presents research questions, methods and data. The next section presents the theoretical

framework that integrates the literature on institutional and international business strategies in the context of developing countries. The findings report how small Finnish technology companies can develop international business strategies so as to overcome the challenges and benefit from the opportunities in developing countries and low-income markets. The final chapter presents the conclusions and discusses policy implications of our research.

## 1.1 Developing countries and emerging markets

Companies have turned to developing countries and emerging markets in Asia, Latin America and Africa as developed countries face more competition and have little growth opportunities (Hoskisson et al. 2000; London and Hart 2004). Developing countries have recently become the main drivers of global growth, while the prospects for growth in developed countries remains relatively modest (World Bank 2013; World Bank 2011). We need to understand these future markets better, how to develop international business strategies that suit these markets, and how to support the international business strategies of companies in these markets.

Webb et al. (2010) argue that the classification of a market as developed or developing does not depend upon national boundaries but rather upon market characteristics. The institutional and market context provide a boundary framework for market selection, the necessary internal resources and partnership networks, entry mode selection and market strategies in developing countries (Brouthers and Hennart 2007; London and Hart 2004). Seelos and Mair (2007) conclude that three different strategies are needed to enter markets in developing countries (Figure 1).



**Figure 1.** Different international business (IB) entry strategies for developing countries and BoP markets (Adapted from Seelos and Mair 2007; Schuster and Holtbrugge 2012).

London and Hart (2004) argued that foreign companies operating in developing countries have been focusing exclusively on a local elite by selling existing products and using business models similar to ones used in developed countries. The biggest



unsaturated market segment in developing countries consists of an estimated 4–5 billion growing middle income and low-income people globally (Seelos and Mair 2007; Hammond et al. 2007; Prahalad 2010). This market is also referred to as the bottom/base-of-the-pyramid (BoP) market (Prahalad and Hart 2002). Traditionally, small local companies, non-governmental organization (NGOs) and international donor organizations have been serving these markets, as local governments frequently do not have the resources or capacity to do this, and multinational companies (MNCs) have largely ignored these markets, as they are seen as unprofitable and difficult to access (Prahalad and Hart 2002). Recently, many success stories have been identified that provide encouraging indications of business opportunities in middle-income and low-income markets (Anderson and Markides 2007; London et al. 2010), meaning that no company willing to do business on a truly global scale can ignore these markets (Prahalad 2012).

There are already many successful examples in different sectors of how multinational companies have been able to make middle- and low-income markets profitable in developing countries. Vodafone's M-Pesa mobile banking service in Kenya (Hughes and Lonie 2007), the General Electric portable electrocardiogram device in China and India (Immelt et al. 2009), Haier Group house appliances in China (Duysters et al. 2009), the Tata low cost nano car in India (Wells 2010) and Phillips Lighting in Ghana (Van den waeyenberg and Hens 2012) are just few examples where multinational companies have been able to enter middle-income and low-income markets profitably and have contributed to the objectives of corporate social responsibility as well as global developmental goals.

There is no single universal definition of the middle-income and low-income market approach (BoP approach) that is useful (Pitta et al. 2008; Prahalad 2010; Kolk et al. 2012). However, the BoP approach provides a basic conceptualization for regarding middle-income and low-income population as customers who are able to spend the little money they have, and producers who are able to make markets accessible, efficient, competitive and inclusive:

*“Four billion poor people can be the engine of the next round of global trade and prosperity. Serving the Bottom of the Pyramid consumers will demand innovations in technology, products and services, and business models. More important, it will require large firms to work collaboratively with civil society organizations and local governments...” (Prahalad 2010)*

The BoP approach provides a foundation of business logic for low-income markets in developing countries. Initially, the BoP approach was business-oriented, and recently inclusive business and pro-poor approaches have emerged to address sustainable development and poverty reduction as part of international business strategies (for example, Kolk et al. 2012; George et al. 2012). Karnani (2007) argues that we should not romanticize the people living below the absolute poverty line (under \$1–\$2 per day) by selling to these markets and simultaneously remain profitable and eradicating poverty. Here we argue that the greatest international business market potential for small technology companies coming from developed countries is in the growing middle income and lower-middle income market seg-

ments in developing countries. In this study, we refer to these segments as low-income markets, as this reflects most accurately the comparison relative to developed countries. People living below the absolute poverty line will remain dependent on development aid, and will not provide significant business opportunities for small technology companies. Still, we acknowledge that inclusive business and pro-poor approaches should be considered as an important part of international business strategies of companies willing to do business in developing countries and low-income markets. Last, Wood et al. (2008) argue that targeting low-income markets in isolation is not effective, and that companies should simultaneously target high-income markets with their business strategies.

In conclusion, developing countries and middle-income and lower middle-income market segments present tremendous opportunities for companies willing to conduct business on a truly global scale. These markets are often underserved and are unable to enjoy the benefits of global technological development. This creates opportunities for companies willing to develop or modify their modern technologies, products, services and business models to suit these markets.

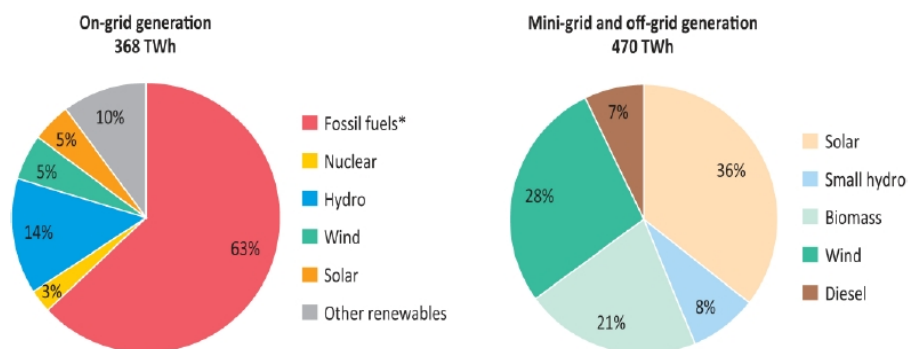
### **1.2 Renewable energy markets in developing countries**

Panwar et al. (2011) argue that renewable energy technologies provide an excellent opportunity for the mitigation of greenhouse gas emissions so as to reduce global warming as well as responding to sustainable economic and social development. Solar, wind, biomass and small hydro have expanded through rural entrepreneurship, government programmes and donor assistance to serve millions of customers in low-income markets in developing countries (Martinot et al. 2002). However, Becker and Fischer (2013) argue that fossil fuels continue to dominate the energy markets in developing countries, as they are believed to be cheaper than renewable energy sources. Renewable energy production technologies in developing countries can contribute simultaneously to social, economic and ecological development and climate change mitigation, bypassing fossil-fuel-based development models (Akella et al. 2009).

Developing countries are increasingly investing in renewable energy technologies. In 2010, developing countries invested an estimated \$72 billion (excluding large-scale hydro) in renewable energy compared to \$4 billion in 2004 and \$32 billion in 2007 (UNEP/BNEF 2011). This indicates an increasing potential for renewable energy business opportunities in developing countries. However, in 2010 developed countries invested an estimated \$56 billion in small-scale decentralized and distributed renewable energy solutions, while in developing countries the investment was only \$4 billion. This means that there exists untapped potential for distributed mini-grid and off-grid solutions in urban and rural markets in developing countries.

OECD/IEA (2011) estimates that there are a total of 1.4 billion people without access to electricity, and 2.7 billion people rely on the traditional use of biomass in productive uses. Most of this potential is located in Africa and the Asian countries

and to some extent in Latin America. OECD/IEA (2011) estimates that \$9.1 billion was invested in extending energy access for all in 2009 consisting of sources from multilateral organization (34%), domestic government finance (30%), private investors (22%) and bilateral aid (14%). It is estimated that in 2009–2030 an annual investment of around \$48 billion is needed to provide energy access for all. Around 45% of this investment is expected to be generated by extensions of national grids, 36% by mini-grid solutions and 20% by isolated off-grid solutions (Figure 2).

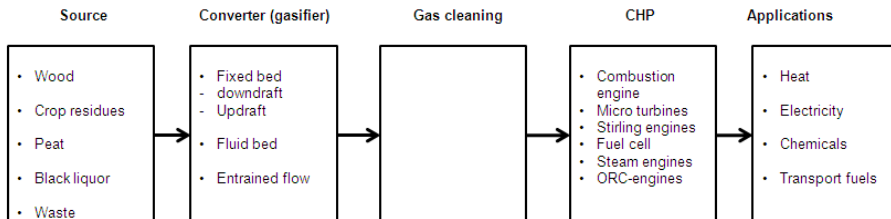


**Figure 2.** Additional electricity generation by grid solutions and fuel in the IEA scenario for 2030 (OECD/IEA 2011).

Energy in low-income markets in developing countries is used in the residential sector and on a smaller scale in the industrial, commercial, agricultural and transport sectors (Surendra et al. 2011). People in these markets often have to rely on candles or kerosene to produce lighting, forest wood, crop residues, charcoal and dried animal dung for heating, and diesel for other productive uses (Bhattacharyya and Ohiare 2012; Surendra et al. 2011; Balachandra 2011; Mondal et al. 2010; Gomez and Silveira 2010). Residential spending on energy in low-income segments is mainly used for lighting, cooking, radio, TV and in recent years for charging mobile phones. OECD/IEA (2011) estimates that the initial threshold level of electricity consumption for rural households is assumed to be 250kWh per year, and for urban households 500kWh per year. In addition, farmers and other industrial actors need energy to power their machines; electricity is needed to support infrastructure such as telecommunication towers, and hospitals and schools need energy to run their modern operations. Akella et al. (2009) argue that the increasing prices of kerosene and diesel are becoming economically non-viable, the use of solid biomass has negative environmental impacts in the form of deforestation, and emissions from burning solid fuels have a significant impact on health and climate change.

### 1.2.1 Small-scale gasification technologies

In this report, we focus on analysing gasification technologies and their potential for mini and off-grid markets in developing countries. Biomass can be converted to biogas and biodiesel using gasification, digestion, fermentation or extraction (Panwar et al. 2011). Kirkels and Verbong (2011) argue that gasification technologies offer flexibility and enable biomass use in advanced applications (Figure 3).



**Figure 3.** Sources, different gasification converting technologies, gas cleaning and applications (adapted from Kirkels and Verbong 2011).

Dong et al. (2009) argue in their literature review that combined heat and power (CHP) gasification technologies can replace traditional energy productions systems and increase energy savings, contribute to a reduction in greenhouse gas emissions and an improvement in energy security. They continue arguing that the greatest potential for CHP technologies is in small-scale and micro-scale power generation systems with less than 100kW electricity power. CHP technologies have the highest potential when suitable biomass is available with low transportation costs, where there is a high demand for total heat, and where there is competitive advantage compared to local energy market prices. Accordingly, the challenges of small-scale and micro-scale CHP installations are the high initial investment cost and long payback periods. Dong et al. (2009) conclude that a great potential exists for CHP solutions in remote areas of developing countries, where there is urgent need for development of low-cost CHP systems. CHP systems are often supported and funded by public organizations, meaning that a favourable political environment supporting renewable energy technologies and small-scale distributed electricity production is required (Dong et al. 2009). However, Kirkels and Verbong (2011) argue in their review of 30 years of biomass gasification that there seems to be an overly optimistic advocacy of the potential for the development of small-scale gasification technology. In addition, they argue, using the existing literature to support their arguments, that current applications of small-scale gasification technologies in developing countries remain troublesome with tar problems and high installation, operation and maintenance costs.

To conclude, there seem to be significant business opportunities for renewable energy technology suppliers in small-scale mini-grid and off-grid-distributed projects in developing countries in providing access to economically, socially and ecologically

sustainable energy for all. However, there seems not to be any clear agreement on the potential for small-scale biomass gasification technology, and this needs to be investigated further. Past experiments show that there has been challenges related to technological reliability, high investment costs, deforestation and socio-economic and environmental impacts. There is a need for technology development and the modification of current technologies to adapt them to low-income markets in developing countries. Moreover, there is a need for value chain development including a reduction in deforestation, and the supply of raw materials and assessments of how access to energy contributes to local social and economic development.

### **1.3 Research questions**

The general objective of this study is to explore how Finnish small and medium sized companies (SMEs) specializing in small-scale bioenergy production can reconfigure their international business strategies so as to overcome the challenges and benefit from opportunities in developing countries and more specifically low-income markets. The research question is following:

1. How small Finnish renewable energy companies need to change their international business strategies so as to overcome the challenges in developing countries?

Answering the research question provides greater insights into our understanding of the company side of the challenges of internationalization in developing countries. This also provides a greater insight into how the public sector in the home country can support the development of international business strategies of the private sector. Small technology companies frequently have limited resources for engaging in international business activities in developing countries and low-income markets, meaning that often public support is needed. The study is limited to a preliminary understanding of the international business strategies of SMEs targeting energy sector and low-income markets in developing countries.

### **1.4 Research approach, methods and data**

The empirical part of this research uses an abductive approach to understand the international business strategies in developing countries. The abductive approach is a continuous movement between the empirical and theoretical world (Dupois and Gadde 2002). The abductive research approach is different from the deductive and inductive approaches, and it is based on a systemic combining process in which theoretical discussion, framework development, empirical case studies and real life experiences evolve simultaneously. The abductive approach is especially useful for exploratory work on topics that do not have much previous scientific knowledge and is particularly useful for the development of new theories and hypotheses for further studies. The case study method and abductive approach

are important in international business research as often the institutional context of the target market, the necessary internal and external resources, entry mode selection and business strategies are firm-, industry- and market-specific.

Data collection and analysis was conducted in an iterative way, having continuous movement between theories, case studies, the empirical world and concepts explored during the process. The interviewees were selected using a snowball sampling process where known experts were interviewed and asked to provide the names of other relevant experts. First, a general literature review was conducted, exploring international business, strategic management, the BoP concept and renewable energy in developing countries. Second, a first round of semi-structured interviews (Appendix A) was conducted with two small Finnish small-scale biomass gasification technology companies in order to better understand their current resources, technologies and international business strategies, and with Finnish companies with experience in operating in energy markets in developing countries so as to support the analysis (Appendix A). Interview results were compared to theories and concepts discovered in the first literature review. Further theoretical exploration was conducted in order to support the new perspectives discovered in the interviews. Theories and concepts were reorganized accordingly, and a second round of interviews was conducted (Appendix B). The second round of interviews was arranged, as it became clear in the first phase that there is a need to better understand the role of public sector support for SMEs in Finland. With two iterative rounds we were able to achieve sufficient knowledge to understand the phenomena and draw conclusions.

The study is limited to understanding at a general level the phenomena of small Finnish technology companies' internationalization to developing countries and low-income markets. The study does not focus on specific countries or potential markets. It is acknowledged that to gain a more profound understanding of the phenomena, interviews should be conducted with companies and people with experience in developing countries and low-income markets, and systemic action-oriented qualitative studies should be conducted in target countries in order to understand the institutional environment, local realities and international business strategies (For example Chikweche and Fletcher 2012; Gradl and Knobloch 2011; Practical Action Consulting 2009; Simanis et al. 2008). This study provides background for further studies and raises some potential future research questions.

## 2. Theoretical background

So as to access developing countries and renewable energy markets, companies need to rethink their international business strategies. International business strategies in emerging markets include an understanding of institutional environment, developing internal and external resources, the selection of entry mode and the development of market creation strategies (Hoskisson et al. 2000; London and Hart 2004). First, Khanna et al. (2005) argue that, before doing business in a developing country, companies should carefully assess its market institutions and proactively improve them and work around them. Second, Luo (2002) emphasizes the importance of dynamic capability development, learning from other organizations and collaboration models in the internationalization process. Moreover, London and Hart (2004) argue that business strategies designed for developed countries rarely work in developing countries, and that companies need to modify their technologies and business models to adapt to developing countries.

Companies can adapt reactive or proactive international business strategies focusing on institutional, business and technology perspectives (Hillman and Hitt 1999; London and Hart 2004; Narver et al. 2004; Coviello 2006; Christensen et al. 2010b). A reactive international business strategy refers to a passive orientation to the local institutional and market environment and business model and technology development. In passive orientation, the firm make no attempt to play a role in policy formulation and implementation, relying on traditional international business partnerships, focussing on selling their existing technologies and focus on satisfying an explicit market demand. A proactive international business strategy instead takes an active stance on influencing policy and regulation formulation and implementation, focussing on dynamic networking in the international business process, modifying their technologies and business models and satisfying latent market needs. Lastly, corporate social responsibility (Kourula and Halme 2008) and inclusive business (George et al. 2012) approaches provide perspectives for generating profit and contributing to global development goals while operating in low-income markets in developing countries.

### 2.1 Institutional strategies

Companies willing to do international business in developing countries should carefully analyse and understand the formal and informal institutional and market environment of the host country (Brouthers and Hennart 2007; Khanna et al. 2005; Ghemawat 2001; Hoskisson et al. 2000). Developing countries normally have high institutional risks caused by political, economic, social, natural and legal uncertainties, and are culturally remote, creating challenges for managing international operations (Wright et al. 2005; Hoskisson et al. 2000; Miller 1992).

#### 2.1.1 Formal and informal institutions

Khanna et al. (2005) argue that many companies target the wrong emerging markets or deploy inappropriate international business strategies, as companies focus their market selection on general country rankings, market size and growth rather than analysing the local institutional context. An uncertain and remote formal institutional environment, including government procurement policies and regulations, taxation, the protection of property rights, environmental standards, market entry barriers, product markets, labour markets and capital markets, creates challenges for companies willing to do business in developing countries (Khanna et al. 2005; Hillman and Hitt 1999; Miller 1992).

Developing countries create risks and uncertainties at different levels for companies willing to do business in developing countries. Miller (1992) categorizes the general risks and uncertainties as environmental, industrial and firm-specific variables. General environmental or institution-level uncertainties are related to political instability, government policy instability, macroeconomic uncertainties, social uncertainties and natural uncertainties. Industry-level uncertainties are related to input market uncertainty, product uncertainty and competitive uncertainty. Lastly, firm level uncertainties include operating uncertainties, liability uncertainties, R&D uncertainty, credit uncertainty and behavioural uncertainty. Companies are not able to reduce all these uncertainties, especially when operating in developing countries. Companies should establish uncertainty profiles for countries and markets so as to optimize returns for the risk assumed.

Low-income markets create additional challenges for companies hoping to fully benefit from opportunities in developing countries. The low-income market can be characterized as informal markets that often lack an effective regulatory and legal environment, have limited infrastructure, are culturally heterogeneous and geographically dispersed and in which there is lack of market information (London and Hart 2004; London et al. 2010). In addition, people living in low-income markets frequently lack knowledge and skills, an awareness of and access to modern technologies and have limited access to financial services (Anderson and Markides 2007). Moreover, local government normally lacks the capacity or the resources to invest in transport, communication, education and health infrastructure development in low-income markets, meaning that technologies, products and



services need to be adapted to a weak existing or non-existent infrastructure (Karnani 2007; Prahalad 2010). Fragmented or weak distribution channels and poor roads and telecommunication connections increase the cost of installation, maintenance of equipment and, in the case of energy solutions, supply of fuels (Gradl and Knobloch 2011; Rivera-Santos and Rufin 2010). Companies need to develop institutional, business and technology strategies in order to overcome these challenges.

Secondary data in developing countries is often unavailable, biased or unreliable (Chikweche and Fletcher 2012). This means that companies need to understand the local realities so as to reduce uncertainties in developing countries. In addition, an uncertain and remote informal institutional environment including local languages, customs, routines, practices, habits, norms, beliefs and expectations, forces companies to understand the practical realities in developing countries and low-income markets (London et al. 2010; Webb et al. 2010). Simanis et al. (2008) argue that, before developing business strategies, companies should let their employees live in the target market gain an in-depth understanding of the local culture and needs. Chikweche and Fletcher (2012) argue that companies conducting market research in developing countries and low-income markets should train local researchers and community members in market research, as local people have a better understanding of local realities.

Energy markets are heavily regulated and subsidized around the world. This means that there is a need to reduce the investment risks and uncertainties by adopting long-term stable and reliable regulations and standards and procurement strategies, and by providing support mechanisms such as investment support, feed-in tariffs, fiscal incentives, loans and carbon offsets (Gurung et al. 2012; Surendra et al. 2011; Gradl and Knobloch 2011; OECD/IEA 2011). Surendra et al. (2011) argue that current subsidy policies in developing countries focus mainly on bigger utility-scale projects and imported fossil fuels, as renewable energy and smaller scale projects are seen expensive. Companies can lobby and increase the capacity of local governments to improve their policies and regulations so as to make emerging markets more accessible and increase awareness of renewable energy technologies (Cholez et al. 2012). In addition, the home country government can reduce the institutional distance by providing information on the formal and informal institutional environment, supporting capacity building, creation of network contacts, providing expertise on development issues and providing subsidies for local partners (Van den waeyenberg and Hens 2012).

### **2.1.2 Political strategies and capacity building**

Identifying institutional voids, developing political strategies and capacity building activities can provide support to overcome institutional challenges. Political influencing or lobbying and capacity building actions can be taken by individual firms or collectively by such organizations as trade associations and public sector (Hillman and Hitt 1999; Kaplan 2000; Holtbrugge et al. 2007). Silvestre and Silva Neto (2013)

argue that capability building strategies are required for local firms and public organizations to facilitate technology development and diffusion. Proactive policy lobbying and capacity building help overcome the challenges of weak policy making and governance capacity in developing countries. Passive or reactive political strategies create the risk that other interest groups are proactively working to shape government policies in a direction that benefits competitors' interests (Hillman and Hitt 1999). Companies can develop three specific strategies to influence policy development and implementation at different institutional levels (Hillman and Hitt 1999). First, information strategy includes lobbying, commissioning research projects and reporting research results, testifying as expert witnesses and supplying position papers or technical reports. Second, financial incentive strategy includes contributions to political parties, honorariums for speaking engagements, paid travel, and personal services. Third, constituency-building strategy includes grassroots mobilization of employees, suppliers and customers, advocacy advertising, public relations, press conferences and political education programs. These findings provide a general framework for corporate political strategies as well as public sector external political and economic relations.

In conclusion, a framework to analyse the institutional environment by Khanna et al. (2005) and Miller (1992) and taxonomy for political strategies developed by Hillman and Hitt (1999) support companies together with their public and private sector partners in overcoming the challenges of the formal institutional environment in developing countries. The process proposed by Simanis et al. (2008) and method proposed by Chikweche and Fletcher (2012) support an understanding of informal institutional distance in developing countries. These activities support companies in overcoming the challenges and modifying their international business strategies to suit developing countries.

## **2.2 International business strategies**

Formal and informal institutional distance in developing countries forces companies to build new internal capabilities, external partnerships and business strategies. Especially small and medium-sized enterprises (SMEs) often have limited human and financial resources to overcome the barriers and challenges in developing countries (Meyer et al. 2009). A traditional organizational mind-set, partnerships and international business strategies designed for developed countries rarely work in developing countries (London and Hart 2004; Seelos and Mair 2007).

### **2.2.1 Organizational development**

Companies can rely on their existing organizational resources or develop market-specific resources when entering developing countries. Organizational culture and practices can become a significant barrier for entering developing countries. Managers need to understand the role of informal and formal institutions and have knowledge and skills to work around them in emerging markets (Dhanaraj and

Khanna 2011). Olsen and Boxenbaum (2009) argue that companies need to develop new mind-sets and beliefs that international business strategies create mutual value benefiting both company and local customers and society by creating economic, social and environmental value in developing countries.

Hart and Milstein (2003) argue that companies should create separate funding pools for developing countries and emerging markets projects, as these normally have longer payback periods. They go on to argue that companies should also look for employees who have knowledge and motivation to work in developing countries. Companies should develop separate multidisciplinary teams from people who have complementary skills and are comfortable to work in developing countries (Simanis et al. 2008). This enables companies to extend the knowledge of emerging markets, develop strategies to use this knowledge and transfer that knowledge to other people in the organization and possibly to partners in other markets (Van den waeyenberg and Hens 2012).

### **2.2.2 Partnership development**

Companies can enter emerging markets by going alone or by collaborating with home or host country public and private sector partners. Small and medium-sized enterprises (SMEs) normally rely on agent entry partnership strategies as a first entry mode to foreign markets (Brouthers and Hennart 2007; Meyer et al. 2009). Schuster and Holtbrugge (2012) argue that traditional entry partnership strategies rarely function in entering low-income markets in developing countries. This creates risks for SMEs entering developing countries, and especially low-income markets, as local agents or subsidiaries, even those who are highly educated citizens of the host country, do not understand the low-income markets even though they might claim to do so (London and Hart 2004). In addition, agent and subsidiary entry modes obstruct development of autonomous knowledge of emerging markets, making it difficult to scale the business activities to the other market in developing countries (Schuster and Holtbrugge 2012).

The international business literature indicates that multinational companies (MNCs) are the in best position to understand and enter low-income markets in developing countries (Anderson and Markides 2007; London et al. 2010). MNCs learn and acquire knowledge of institutional and market conditions while operating in high-income markets in developing countries and consequently start building a commensurate knowledge basis for entering middle-income and low-income markets (Van den waeyenberg and Hens 2012; Schuster and Holtbrugge 2011). Welch (1991) argues that SME alliances with large companies (MNCs) enable SMEs to access necessary resources to reduce the risks and uncertainties in their international business activities. In addition, Halme and Laurila (2009) argue that MNCs' corporate social responsibility (CSR) projects can also support the creation of new products and services for low-income markets. SMEs should consider partnership strategies with multinational companies that could create synergies and benefits for both parties in international business activities.

There are fundamental differences between market entry partnership structures in high-income and low-income markets in developing countries (Webb et al. 2010; Rivera-Santos and Rufin 2010; London et al. 2010; Reficco and Marquez 2012). The major difference between high-income and low-income market partnership is that, while partners for high-income segments are market oriented, low-income market partnerships are often non-market oriented. Non-traditional or non-market partners can be bilateral and multilateral financial organizations, local governmental organizations, non-governmental organizations (NGOs) or intermediary organizations such as cooperatives, universities and research organizations as well as low-income suppliers and distributors (Rivera-Santos and Rufin 2010). These non-traditional actors normally have experience of, knowledge of and trust relationships with potential customers in low-income markets. Partnerships with non-traditional actors regularly require balancing between profit making and developmental objectives (Seelos and Mair 2007; Kourula and Halme 2008). Companies willing to partner with non-traditional actors need to evaluate and build common visions, objectives, resource commitments, roles and co-create mutual/shared value business models (London et al. 2010; Rivera-Santos and Rufin 2010; Sanchez and Ricart 2010). Traditional and non-traditional partnerships form a complex and context-specific dynamic network of strategic alliances supporting entry strategies to developing countries.

### **2.2.3 Business development**

Instead of focusing only on entry mode strategies and product sales, companies need to modify their business strategies so as to suit different market segments in developing countries. There are various factors that create differences between high-income and low-income markets in developing countries. Anderson and Markides (2007) and Prahalad (2012) argue that value creation in developing a country's markets starts from focusing on understanding who low-income people are (affordability), what products and services suit the markets (acceptability), how products are distributed or delivered (availability), and how marketing and sales is conducted (awareness). In addition, companies need to consider how products are used and what are the economic, social and ecological outcomes as well as broader development impacts (appropriateness) (London et al. 2010; Kolk et al. 2012).

The failure in low-income markets frequently stems from a misunderstanding of the demand side of these markets. First, people in low-income markets regularly work in an informal sector, and have low-income, low savings and seasonal variance in income. Second, people in low-income markets normally pay higher prices, receive lower quality and are paid less than people in high-income markets (Mendoza 2011). And third, customers in low-income markets regularly have a lack of awareness and understanding of the benefits and skills to use to maintain products and services (Ansari et al. 2012). Companies need to understand the practical realities in low-income markets and modify their strategies accordingly.

Christensen et al. (2010b) argue that the difference between a developed and a developing country can be drastic to the extent that a technology that is designed for developed countries can be used altogether for different purposes in emerging markets. Product and service need to be modified to have price/ performance ratios that are affordable, suit a local institutional and market context and respond to local demands and needs (London and Hart 2004). Affordable prices are needed to match the income and savings of the low-income customers, and performance modifications such as ease of use, ease of repair and maintenance are needed as low-income customers and producers often have lack of capacity and skills (Ramani et al. 2011). Performance modification can be done by reducing or modifying the features of products or services (Immelt et al. 2009) or offering the products in smaller sizes (Singh et al. 2009). The coverage of engineering and technical courses related to renewable energy technologies is frequently low in developing countries, and low-income communities lack the minimal level of technical knowledge to operate and maintain established renewable energy technologies (Surendra et al. 2011). General Electric (GE) modified its ultrasound machine to adapt to Chinese and Indian markets with a solution that had 80% of the performance and 20% of the price of the original machine (Immelt et al. 2009). In addition, to create markets in low-income market segments in developing countries, GE was also able to diffuse technologies designed for a developing market to developed markets. This phenomenon is generally known as reverse innovation (Govindarajan and Ramamurti 2011).

To successfully enter low-income markets, new ways of producing and delivering or distributing the products and services are needed. A low-income market environment often has a poor infrastructure such as bad roads, and customers regularly live in an informal economy in urban slums or remote rural areas. Unconventional supply chain strategies need to be developed in order to enter and operate in these markets. Local entrepreneurs can operate as intermediaries to support building the last mile in the value chain (Vachani and Smith 2008). London et al. (2010) argue that to access low-income markets requires integration of local intermediaries into the supply chain as distributors, wholesalers, agents and franchisees. Building capacity and trust in low-income markets requires education and training programmes for stakeholders and intermediaries (Anderson and Markides 2007; Webb et al. 2010). This involves educating the company's own staff and intermediaries as well as capacity building of local authorities so as to support market development (Gradl and Knobloch 2011). A French electricity company trained around 10,000 young people and supported 500 entrepreneurs in developing a local energy sector in Indonesia and Madagascar to test technological feasibility and regulatory mechanisms to build rural electricity systems in remote villages (Cholez et al. 2012).

Low-income customers are largely inaccessible to conventional advertising and marketing channels, and might simply not understand why they should consume new products and services with which they have had no previous experience (Anderson and Markides 2007). To solve the challenge of low awareness of new technologies, Nokia introduced the "Nokia Mobile Van Consumer Education Pro-

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gram” so as to educate consumers to use a wide range of products and services in rural India. A Honda distributor in Uttar Pradesh in India came up with a community lottery system which enabled one shopkeeper to buy one Honda generator each month until all community members “won” a generator (Anderson and Markides 2007). Companies conducting business in low-income markets should focus on understanding and educating the customers to increase their awareness of the benefits of new products and services and increase the customers’ capacity and skills to use products and services efficiently (Ansari et al. 2012). And creating financial schemes, such as microloans and community savings schemes which make products and service affordable (Christensen et al. 2010a). Last, Companies need to understand how to confirm the need (appropriateness) in the post-sales period by understanding the impacts of products and services related to human development and environmental sustainability (Davidson 2009).

In conclusion, Marinot et al. (2002) argued that in the past most renewable energy project financing in developing countries focused on technical demonstrations or projects that were narrowly self-sustaining but not replicable. Many projects were considered to be failures because of a lack of involvement by relevant stakeholders and a lack of technical and managerial and governance capacity building. In addition, projects were not able to demonstrate institutional and commercial viability and lacked the mechanisms for equipment maintenance, sources of credit and financing, and incentive structures. Companies willing to conduct business in low-income markets in developing countries should change their mind-set to better understand the customer’s needs and demand, configure product performance and pricing, develop new distribution partnerships and marketing strategies to create markets in developing countries.

### **3. Analysis**

In this section, a description is provided of the current resources, technologies and international business strategies of two case companies. Then, resources, technology and international business strategy potential are compared to empirical material collected during the study. Interactive discussion is conducted between theoretical findings, case companies and interview data.

#### **3.1 Case Volter Oy**

The company was founded in 1998 when Juha Sipilä was looking for an electricity supplier for his cottage. The project turned into a self-sufficient island in terms of energy, where electricity was produced using wind and diesel with an aggregate. An idea of replacing diesel with wood chips was soon born. The company is located in Kempele, Finland. The objective of Volter is to develop one basic product in which small variations can be made. In this way, Volter is able to ensure the quality and reliability of its products as well as a supply of spare parts.

There are five people working in Volter; all are from Finland and have an engineering background. The key competence areas in Volter are on gasification process and system design and control. The turnover in 2008–2012 was around €250,000 corresponding to one power plant sold each year. The expected turnover for 2013 is €1 000 000 corresponding to five power plants sold.

The main partners of Volter are Finnish engineering workshops, where production is outsourced, and Finnish and international component subcontractors. In international business, the main partners are sales representatives. In addition, Tekes has supported product development financially, and VTT has supported testing and analysis. VTT cooperation also creates added value for sales and marketing. On the other hand, Finnish energy policy does not currently support small-scale energy production. The minimum for tariff benefits for bioenergy is 100kW of electricity output.

Volter has two of its own electricity production solutions. Volter 30 has an electrical output of 30kW and a thermal output of 80kW. Fuel consumption is about 3.5 cubic metres per day. Volter 40 has an electrical output of 40kW and a thermal output of 100kW. Fuel consumption is about 4.5 cubic metres per day. The dimensions

### 3. Analysis

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of both are: a length of 6 m, width 2.5 m, height of 3m and a mass of about 10t. Both models include Schneider Electric programmable logic, a GSM fault alarm, and remote internet monitoring. Models allow four different electrical technical solutions:

1. Standard solution where Volter power plant works in parallel with the grid.
2. Pure off-grid island solution with Volter 30 including batteries and diesel back-up to areas without the grid.
3. Standard solution where Volter power plant works in parallel with the grid. If the grid is down, the Volter power plant can operate in island mode parallel with a diesel back-up.
4. Continuous island solution with connection to Volter power plant including batteries and grid. Continuous supply to island and electricity production is secured even with a fault on the grid. A good solution for areas where the grid is weak.

The Volter container-packed CHP plant produces enough electricity and heat for the annual needs of a farm or entire small housing area. In the first commercial solution by Volter in Finland, the waste heat is used in hydronic under floor heating, preheating of air-conditioning or domestic water heating. The production plant normally has a 10m<sup>3</sup> water charger and in domestic houses 0.75m<sup>3</sup>. The plant has also 320kWh batteries to support 24 hour supply. The electricity and heat production is based on wood gasification that has three processes:

1. Pyrolysis where wooden chips are charred and gasified in produced gas
2. Gas purification with fabric filter and cooling
3. Electricity and heat from gas using a combustion engine.

The main competitive advantages of the technology are simplicity, a good availability of spare parts, reliability and employee experience. Volter's technology has proved to be reliable and the gas is clean. This means that there is no negative environmental impact from tar and reduced maintenance for the combustion engine. Volter has a couple of pending patent applications.

Fuel requirements are very strict. Moisture of wooden chips should be less than 18% and chips cannot be too fine. Normally, chips are dried using a dryer for bulk solids. Common Finnish wood species such as birch, spruce, pine and willow can be used as raw material for fuel. There have also been some ideas of using bio-carbon produced from biowaste and briquettes produced from paper waste. There are no plans to make investments for testing alternative fuels in the near future.

The benefits of the technology for the customer are self-sufficient electricity and heat production, the use of local raw materials and energy security. The competitive advantage of the technology depends on the raw material price compared to the national market price of electricity and utilization of heat.

Volter has experience of international business, but limited financial and human resources to actively participate in international markets. Recently, the importance of international markets has increased as Finland is seen as challenging markets



caused by energy policies favouring bigger utility companies. Most potential international markets for Volter are in Germany, UK and Slovakia, where government policies are supporting small-scale distributed renewable energy production. Volter has recently made agreements with sales representatives in these countries.

Volter is not actively mapping potential international partners. International partners normally make contact with Volter. Volter has the motivation to go to international markets based on their current resources. Currently, Volter does not have the resources to pursue marketing activities for their products and services in international markets. First, Volter needs to increase sales in Finland, acquire the benefits from economies of scale in production, increasing cash flow and in this way reducing the price.

### **3.2 Case GASEK Oy**

GASEK was established in 2008 and develops and manufactures wood chip-fuelled CHP plants, which are based on wood gasification technology, as well as power plant gasification reactors. In February 2013, Gasek Oy and CCM-Power Oy – who specialized in renewable energy – and Asmacon Oy – who specialized in power plant automation – combined their business. The new company will combine wood gasifier and drying technologies as well as power plant and automation know-how. At the same time, VNT Management Oy, Power Fund II and Aloitusrahoista Vera made investments in the company to support business growth.

There are 16 people working at GASEK; all are from Finland, and employees come from business and engineering backgrounds. The company's key competencies are gasification, process knowledge, mechanical expertise and automation know-how. GASEK managers have worked abroad and have experience from the U.S., Asia, especially from India, and also Latin America and Africa. Their turnover in 2012 was €677,000. About half of the turnover came from automation projects and the other half from gasification systems. The biggest competitors for GASEK currently are Ankur from India (<http://www.ankurscientific.com/>) in larger sizes, and Spanner from Germany (<http://www.holz-kraft.de/>) in smaller sizes.

The main partners for GASEK are the contractors, research cooperation partners and commercial partners. Subcontractors include engineering service provider Stancon Oy in Jyväskylä, as well as a number of smaller sub-contractors. Final assembly is carried out at their own factory in Reisjärvi. Research partners are the University of Jyväskylä, the University of Oulu, VTT and Central Ostrobothnia University of Applied Sciences Centria research center. On the commercial side, current partners are Lignogen for German markets and GT Green Technology for emerging markets. The partners' role is very important for GASEK caused by their juxtaposition of the value chain. GASEK is highly dependent on sub-contractors and in particular on OEM partnerships. The role of research institutions has been important in testing and measurement, as well as on the external side of the verification which has been used to support marketing. Collaborative research has not shown any significant new technologies or products.

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TeKes has played an important role in supporting product development with larger resources. TeKes has also funded some market research, and GASEK is considering applying for TeKes market-oriented Young Innovative Companies (NIY) programme. Otherwise, public sector support is two-fold. On the one hand, the problem is that the government does not support small-scale production of electricity. On the other hand, tightening the emission requirements enables business opportunities for steam and heat solutions when companies need to get rid of their sulphur emissions. Tariffs and public support have a major role, especially in the early stages in order to acquire early users and references. Germany and Italy are good markets because they have the best support mechanisms for CHP applications and thus the shortest payback periods.

The company strategy is not to sell complete energy plant solutions, but focus on core technologies. Core technologies are automation solutions, fuel pre-treatment and gasification systems. This means that products are sold to actors offering complete power plant solutions. GASEK has mapped with Finpro 88 container CHP power plant providers, which use diesel, natural gas or biogas as fuel. The purpose is not to compete with power plant providers, but to sell wood gasification technologies to be integrated into existing solutions. The purpose is to find OEM (Original Equipment Manufacturer) partners to sell the GASEK products. GASEK aims to go into international markets using OEM partners, who take care of integration, sales and maintenance. The first phase of this strategy is to sell steam and heating solutions to Finland and Sweden to replace heavy fuel oils. In the second phase of the strategy Gasek will target electricity markets in Europe, such as Germany and Italy, when bigger size (100kWe) gasification technology is ready.

The price of the earlier 35kWe gasifier was around €150,000. The price of the current 50kWe gasifier is around €250,000. The estimate for the 100kWe gasifier is €600,000. The price decreases when production volumes increase. The payback time for wood energy solutions at current oil prices is estimated to be up to two years in steam plant applications. In Finland, a small-scale decentralized production is not profitable because of the existing tariff system.

Wood gasification technologies have been tested and developed for over 100 years. The challenges in managing a controlled and sufficiently clean gasification process have complicated the implementation of commercial applications. The greatest obstacle to their development has been tar resulting from the pyrolysis process, which has been damaging engines during long-term use. Furthermore, wood chip quality, in particular its moisture content, has been setting strict requirements for the selection and handling of chopped biomass. Traditionally only chips made from debarked birch were suited for the process, so that bark tar would not ruin the engine. The core of the technology is the patented gasifier, which produces pure gas from mixed wood chips. The greatest difference from the old and problematic technique is in the combustion temperature and as purification methods. The key factor in the gasification process is achieving a high temperature (800–1200°C), which prevents the formation of damaging tar compounds.

The typical applications of the power plants are sparsely populated areas, as well as small and medium-sized businesses, e.g. farms and greenhouses. The

solution provides a possibility of independent electricity and heat generation, and power plants can be linked to national grids. GASEK CHP 250 has an electrical output of 50kW and a thermal output of 175kW. Currently, Gasek is developing CHP gasification technology with an electrical output of 100kW to be able to benefit from the Finnish tariff system. The electricity and heat production is based on wood gasification that has four processes:

1. In fuel pre-treatment, moisture is removed from the process partly as liquid, whereby condensation energy can be used to pre-heat the material in need of drying.
2. Wood gasification is based on the pyrolysis process, where gasifying particles are extracted from wood biomass at high temperatures and with controlled oxygen intake.
3. Wood gas, generated by low-oxygen combustion and gasification, is purified from soot, coal and other particles.
4. Wood gas containing plenty of hydrogen and carbon monoxide is used in internal combustion engines. When burning, the combustion does not generate any emissions hazardous to the environment.

The competitive advantages of a smaller size (50kWe) gasification solution are an ability to gasify higher moisture level woodchips, simple mechanics, cost benefits and operational safety. The larger sized (100kWe) gasification solutions will have a similar competitive advantage in the future. At the moment, larger sized gasification solutions need to use drier chips (25% moisture level) and operational safety has been the main problem for many competitors. GASEK has a couple of dozen patents and some core patent portfolios. The patents consider some details such as a rotating chip bin, heat exchanger and gas remover and the ability to adjust the average temperature in the nozzle.

GASEK slogan is "Pure gas from fresh wood". This means that fresher wood material can be used as fuel. In the smaller sized plant, gasification moisture levels can be up to 30 per cent. In the bigger sized plant, steam and heat gasification moisture levels can be up to 35 per cent. In a bigger sized CHP, gasification moisture needs to be below 25 per cent. Any Nordic wood materials can be used for chips. However, chips cannot be too fine-grained.

The potential market for small-scale decentralized energy production is in other parts of Europe where the tariff systems are more developed. The problem in domestic markets is that Finland does not support small-scale (under 100kWe) renewable electricity production. The advantage of larger size (100kWe) electricity production is that energy companies can benefit from the current tariff system.

GASEK gets many requests for alternative fuels from different parts of the world. The company has its own testing facilities, and tests have been made, for example, on grain husk pellets. The challenge of many alternative fuels such as coconut palm and olive stones is that the high temperature makes ash melt and creates pumice stone on the grate. The gasification technology needs to be modified if alternative fuels are used.

GASEK has tentatively identified OEM partners from more than twenty countries. However, currently GASEK is focusing on the German and Swedish markets. GT Green Technology from Vaasa is planning to sell Gasek small-scale gasification solutions on African and Russian markets. GT Green Technology is building a small and simple CHP solution for emerging markets, and GASEK provides them with a gasifier. GASEK aims to provide information on their solutions using Web pages, e-marketing, as well as focused customer visits. The focus of GASEK is not in complete CHP power plant solutions, but in gasification solutions. The OEM supplier must have the capacity to build and customize the power plant to local regulations and to suit local markets.

Future potential markets will be in Canada and Russia when product certifications are approved. Furthermore, GASEK has been observing Brazilian and Chilean markets, where the price of electricity is on the rise. GASEK is willing to enter new markets if their OEM partner is willing and able to build a pilot plant. The OEM partner can learn to use the gasification technology, design their own power plant and demonstrate technologies to potential customers. Emerging markets are seen as important future markets, because there is more demand for decentralized energy solutions. For example, in African markets additional applications such as water disinfection, and cooling food (CCHP) could be integrated in to the power plant.

### **3.3 International business strategies**

In this study we have included International business strategies, institutional, organizational, partnership, business strategy and public sector support system perspectives. International business strategies are firm-, industry- and market-specific. For this reason, we acknowledge that it is not possible to provide a comprehensive and detailed description of the best practises of international business strategies and public support for emerging markets. Instead, we provide general factors that can reduce the risks and uncertainties of doing business in developing countries and emerging markets, focusing on two case companies. This will increase our understanding of international business strategies for developing countries and encourage and support Finnish companies in taking the first steps towards truly global markets.

#### **3.3.1 Institutional strategies**

Many companies target the wrong markets and deploy inappropriate international business strategies, as they do not carefully analyse the country level entry barriers and market level risks and uncertainties (Miller 1992; Khanna et al. 2005). Companies should carefully identify and assess the general institutional, market and industry risks and uncertainties in developing countries.

One of the companies interviewed has developed a traffic light system to monitor global business opportunities. They use the traffic light system to monitor the changes in institutional environments globally (Interview 05). Systemic monitoring

of institutional development and changes in potential markets in developing countries were highlighted. This means that companies should systematically analyse and try to foresee the changes in institutional environment including factors such as general trade barriers, policies and regulations and industry factors such as competition, input markets and product markets (Miller 1992).

The two case companies have not been systematically analysing the potential in developing countries and emerging markets. Their current strategies are focussed on nearby European markets, where there is a suitable institutional environment with regulatory support for small-scale (less than 100kW) renewable energy electricity production. Comprehensive institutional and markets analysis is needed for developing countries, as these markets normally have additional risks and uncertainties than developed countries. This can reduce risks and uncertainties as well as improve returns for international business investments. On the other hand, this might be challenging for small companies with limited resources. It was proposed that small companies should create consortiums with other smaller companies (Interview 07) or create joint ventures with larger companies to join their resources so as to overcome the risks and uncertainties in developing countries (Interview 12).

Two case companies have limited human and financial resources to carry out extensive institutional analyses, travel to developing countries to understand the practical realities and influence the institutional environment in developing countries. Small companies can utilize the public sector services to better understand the institutional and market challenges in emerging markets. In Finland, there seem to be two main public organizations providing information on institutional and market environments in developing countries. The Finnish Ministry of Foreign Affairs (FORMIN) is providing information on general trade and investment barriers in different countries (For example Nieminen et. al. 2013). On the other hand, the Ministry of Employment and Economy (TEM) has several instruments providing information on international business opportunities and challenges (For example Laaksonen et al. 2012). These organizations can support Finnish SMEs in better understanding the country-level barriers and market-level challenges in developing countries so as to reduce risks and uncertainties.

However, most of the awareness and capacity building activities related to developing countries and low-income markets are centralized in Helsinki. The information services of FORMIN should be better integrated with regional ELY-centres, as there are many potential companies in different regions in Finland (Interview 14), and ELY-centres could more actively utilize FORMIN information services and analyse opportunities in developing countries and low-income markets (Interview 10). There is a need in Finland for better integration of information services on challenges and opportunities in developing countries between FORMIN and TEM. In the future, it seems that Tekes will coordinate information services on opportunities and challenges in foreign markets, but it remains unclear how information services are to be organized for developing countries and especially for low-income markets (see Team Finland: Strategy 2014).

### 3. Analysis

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Conducting institutional and market analysis of low-income markets is challenging in developing countries, as secondary data is often unavailable, biased or unreliable (Chikweche and Fletcher 2012). In addition, finding competent market research firms might be challenging (Khanna et al. 2005). Companies need to develop alternative market research strategies when targeting low-income markets in developing countries. Understanding the realities of the institutional and markets environment requires longer stays in the target country and hiring people who have experience and relevant contact networks in the target country:

*“The team, including one native Indian, spend long periods of time in the target country and they were able to modify their service offering to respond to local needs, and build a relevant contact network to facilitate their business operations.” (Interview 06)*

*“Making a bonfire during the night was so strongly embedded in local culture and practices that it made it difficult to convince local people to use alternative technologies to produce heat (Interview 03)”*

The two case companies are not planning to conduct market research in developing countries. Instead, they are relying on contact requests coming from different countries and agent-based international business entry modes. This can impede the development of autonomous knowledge of emerging markets and transferring the knowledge to other markets. Companies should travel to target countries to understand the practical realities and needs before designing their international business strategies (Simanis et al. 2008). Chikweche and Fletcher (2012) highlight that companies conducting market research in developing countries and low-income markets should also train local researchers and community members to conduct market research, as local people have a better understanding of local realities.

In addition to proactive institutional and market analysis and assessment, companies should also try to engage in proactive political strategies in developing countries. The current subsidy policies in developing countries focus mainly on bigger utility-scale projects, and imported fossil fuels as renewable energy and smaller scale projects are seen as expensive (Surendra et al. 2011; OECD/IEA 2011). Dong et al. (2009) argue that CHP systems are often supported and funded by public organizations, meaning that a favourable political environment is required, supporting renewable energy technologies and small-scale distributed electricity production. Companies (together with public sector support) can create political strategies to influence and increase the capacity of local governments to improve their policies and regulations in order to make small-scale renewable energy markets more accessible and increase awareness of the benefits of renewable energy technologies in general (Hillman and Hitt 1999; Cholez et al. 2012). Passive or reactive political strategies create the risk that other interest groups are proactively working to shape government policies in a direction that benefits competitors' interests (Hillman and Hitt 1999).

The two case companies demonstrate reactive or passive political strategies by entering markets which already have a favourable political environment such as

the UK and Slovenia. The companies do not have human or financial resources to engage in proactive political strategies. Currently, the companies need to wait for political changes or adapt their strategies to current ones that rarely support small-scale bioenergy production in developing countries.

Many developing countries are implementing strategies to support renewable energy technologies, but these initiatives stay on the level of political discussion, as there is no capacity to implement the planned strategies (Interview 03; Interview 06). The case companies could join forces with other Finnish companies and public sector actors in their home country in order to influence institutional environments in developing countries and make markets more accessible (Interview 8). Companies can utilize the support of public sector actors, such as Finnish embassies and Team Finland to assist their proactive political strategies. There is a need for proactive international political strategies to influence local governmental decision making and increase the capacity to support implementation of policies and regulations for small-scale bioenergy production.

The two case companies need support in influencing the institutional environment in developing countries to make low-income markets more accessible. In Finland, there are many public instruments focusing on institutional cooperation and capacity building in developing countries. FORMIN have institutional capacity-building instruments such as ICI HEI and ICI to increase capacity in developing countries. In addition, there are many other initiatives funded by FORMIN to support market creation in developing countries, such as EEPs (Energy and Environment Partnership Programs) that might provide support for Finnish companies (Interview 11). However, Finnish private sector companies are often not participating or are unaware of these activities. In addition, it remains unclear how Finnish embassies are supporting proactive political strategies. Currently, Finnish embassies seem to focus on providing traditional consular services and on cultural and traditional development and aid cooperation in developing countries (see Sierla 2009).

Team Finland aims to influence the global operating environment with special emphasis on industrial policy, state subsidies and public procurement (Team Finland: Strategy 2014). However, it remains unclear who provides this and how these support activities are carried out in practice. Corporate political strategy literature provides frameworks and guidelines on how to influence the institutional environment and political decision-making in the host countries (Hillman and Hitt 1999). Companies should be drivers of these activities, and the public sector should provide support in particular for SMEs that have limited resources to develop and implement political strategies in developing countries.

In conclusion, the two case companies have reactive or passive international political strategies to analyse, assess and influence the institutional and market environment in their target countries. Currently, the two case companies do not have human or financial resources to engage in proactive political strategies. This increases the risks and uncertainties for companies entering developing countries. Developing countries create significant opportunities and challenges for Finnish technology SMEs, and different public support strategies should be created for developed and developing countries and low-income markets.

#### **3.3.2 Organizational strategies**

Organizational culture and practices can become a significant barrier for entering developing countries. Managers need to understand the role of informal and formal institutions and have knowledge and skills to work around them in emerging markets (Dhanaraj and Khanna 2011). Companies should create separate funding pools and form multidisciplinary teams that have complementary skills and are comfortable to work in developing countries and different market segments (Hart and Milstein 2003; Simanis et al. 2008). This enables companies to extend their knowledge of emerging markets, develop strategies to use this knowledge and transfer that knowledge to other people in the organization and possibly to partners in other markets.

Motivation and passion to do business in developing countries and low-income markets are the most significant barriers for Finnish companies (Interview 06; interview 03; interview 08). Finnish SMEs lack the courage to enter developing countries, as they seem to be too risky and lack market opportunities (Interview 03). This is surprising, as developing countries are currently the main source of global growth; there is demand for high quality technologies; there is less competition than in developed countries for high quality products, and there is a high market potential for renewable energy solutions for the growing middle-class in urban and rural areas (Interview 03). Finnish companies should be aware of these opportunities and dynamically improve their organizational strategies.

There are many reasons why developing countries are challenging and remote for Finnish companies. Developing countries and low-income markets are culturally heterogeneous, geographically remote, administratively challenging and economically risky (Ghemawat 2001). Finnish companies willing to expand their business into developing countries should recruit people who have language skills, cultural sensitivity and the motivation to do business in different developing countries (Interview 05; Interview 03). In addition, it was argued that the Finnish public support system have a lack of instruments and people with interest in and knowledge of developing countries and low-income markets to support Finnish companies' business activities (Interview 03).

In conclusion, interviews with the two Finnish case companies revealed that they do not have strategies, experience or motivation to do business in low-income markets in developing countries. There seems to be no strategies to create separate funding pools for emerging market projects or plans to hire people with the knowledge and motivation to work around the challenges in developing countries and low-income markets.

#### **3.3.3 Entry partnership strategies**

Traditional entry partnership strategies rarely function when entering developing countries, as local agents and subsidiaries, even highly educated citizens of the host country, do not often understand the low-income markets, even though they



might claim to do so (London and Hart 2004). In addition, traditional entry models impede the development of autonomous knowledge of low-income markets, making it difficult to scale the business activities to other markets in developing countries (Schuster and Holtbrugge 2012).

Finding a suitable partner in developing countries is a significant challenge. Frequently, companies make a mistake in selecting the first contact who they meet as an entry partner (Interview 05). Local presence is normally needed to find suitable partners and to understand how local partners need to be trained to use, sell and maintain new technologies. The best local partners are normally locals who have received an education abroad and have good local networks (Interview 03). However, local partners often do not have the capacity to sell new technologies or to create new value chains in low-income markets (Interview 03). In addition, in developing countries relationships are based on mutual trust rather than on high quality products and brands (Interview 03; Interview 07). This creates challenges for small Finnish companies that normally do not have the resources to consider entry mode strategies other than traditional agent based models, engage in training the activities of agents and subsidiaries or spend time in target markets to create trust relationships with local people.

Multinational companies (MNCs) are generally in the best position to do business in low-income markets. MNCs learn and acquire knowledge of institutional and market conditions while operating in high-income markets, and consequently start building a commensurable knowledge basis for entering the middle-income and low-income markets (Van den Waeyenberg and Hens 2012; Schuster and Holtbrugge 2012). MNCs can support the entry strategies of SMEs. However, it is frequently difficult to find the right people in the large and complex organizations of MNCs. MNCs are not often interested in cooperating with SMEs, and SMEs are afraid of MNCs stealing their ideas (Interview 05). Lastly, the corporate Social Responsibility (CSR) programs of MNCs often addressing low-income markets in developing countries, focus on traditional charity activities and do not support the international business strategies of small Finnish technology companies (Interview 03). MNCs can become a good partner for SMEs, as they normally have the resources to operate in developing countries and low-income markets. On the other hand, the creation of consortiums with other small companies might be a better strategy than partnerships with MNCs (Interview 07).

Companies can also develop entry partnership strategies with non-traditional actors. Non-traditional or non-market partners can be bilateral and multilateral finance organizations, local governmental organizations, non-governmental organizations (NGOs) or intermediary organizations such as cooperatives, universities and research organization, as well as low-income suppliers and distributors (Rivera-Santos and Rufin 2010). Companies willing to partner with non-traditional actors need to evaluate and build common visions, objectives, resource commitments, roles and co-create mutual/shared value business models (London et al. 2010; Rivera-Santos and Rufin 2010).

The two case companies do not have the resources to actively seek new entry partners, and they rely on contacts coming from foreign agents willing to represent

their products in local markets. This strategy is valid for developed countries, where there are normally sophisticated agent networks (Khanna et al. 2005). The case companies should consider partnerships with Finnish multinational companies or build consortiums with other small companies and learn how to cooperate with non-traditional/ non-profit partners.

In conclusion, companies willing to do business in developing countries should carefully search for, analyse and select the partners that have knowledge and networks in target markets. In addition, small companies should consider partnerships with larger companies and non-traditional partners such as NGOs and local governments, and utilize development aid-oriented support organizations such as Finnpartnership and World Bank to access the low-income markets in developing countries.

#### **3.3.4 Business strategies**

Companies willing to benefit from opportunities in developing countries and emerging markets should modify their technology and business strategies to adapt to the local market context. The value creation in developing emerging markets starts from focusing on understanding who the customers are (affordability), what product design and services suit the markets (acceptability), how products are distributed or delivered (availability), and how marketing and sales is conducted (awareness) (Anderson and Markides 2007; Prahalad 2012).

##### **3.3.4.1 Technology modification**

High quality Finnish technologies have the potential in developing countries and there is need for modifications for existing technologies. Christensen et al. (2010b) argue that the difference between a developed and developing country can be drastic to the extent that a technology that is designed in developed countries can be used for altogether different purposes in an emerging market. There seem to be no clear agreement on small-scale biomass gasification technology potential in developing countries, and this need to be investigated further. Past experiments show that there have been challenges related to technological reliability, high investment costs, deforestation and socio-economic and environmental impacts (Dong et al. 2009; Kirkels and Verbong 2011). There should be a balance between price/ performance ratio when developing products specifically for low-income markets in developing countries (Markides and Andersen 2007; Prahalad 2012). One of the interviewees concluded that:

*“The biggest challenge for Finnish companies in developing countries is that they try to sell Mercedes when the customer wants Toyota” (Interview 08)*

Small-scale 35–100 kW electricity production gasification technologies have a potential in developing countries in urban and rural off-grid and mini-grid markets. Especially the Volter technology has global potential, as the gas is clean and it has

been able to solve the tar problems which reduces environmental impact and increases the operability of the combustion engine. Current technologies are fine-tuned to function well with Nordic biomass sources, and fuel requirements are very strict including moisture levels. There has been some interest in testing technologies with alternative fuels, but there are no future plans to conduct more extensive studies. Finnish gasification companies are relying on their existing technologies, and are willing to do business in developing countries if there are suitable biomass sources that function with their current technologies. This means that support is needed for Finnish companies to test and modify their technologies to adapt to different markets in developing countries as well as to develop a supply chain for the distribution of biomass fuel. Moreover, the competitive advantage of gasification technologies depends on a demand for heat and a comparative advantage over local electricity prices. Lastly, Finnish companies should consider modifying their technologies by reducing the features in such a way that their performance remains superior to that of their competitors, lower the price to compete with low cost solutions and make technologies more affordable.

The two case companies need external support to modify their technologies to suit low-income markets in developing countries. There are many instruments in FORMIN such as Finnpartnership and in TEM such as Finpro that provide support services for development of an international business model in developing countries. Neither Finpro nor Finnpartnership alone have a mandate to support companies in evaluating or modifying their technologies to adapt to the market context in developing countries (Interview 08; Interview 10). Finpro has limitations in supporting companies in evaluating or modifying their technologies to suit to the market context of low-income markets in developing countries only with their own resources (Interview 15; Interview 16). In addition, there are challenges as regards how to include technology or innovation perspective in Finnish development aid activities (Interview 10; Interview 11).

In Finland, TEM is responsible for the deployment of innovation policies, but Finland seems to lack a clear strategy to support technology development and modification to serve the needs and demand in developing countries and low-income markets. VTT Technical Research Centre of Finland is the main public organization supporting applied the research and technology development of Finnish renewable energy companies. VTT could take a more active role in supporting technology development and modification as part of international business support activities for developing countries and cooperate in a more strategic way with Finpro and Finnpartnership (Interview 08; interview 12).

#### 3.3.4.2 Market creation

Companies need to focus on their business strategies so as to understand who the customers are, how products are distributed and how marketing and sales are organized. It was highlighted that companies should also consider how products and services are used by customers and how they create economic, social and

ecological value is created for local people and society (London et al. 2010; Kolk et al. 2012).

In their international business strategies small Finnish technology companies generally focus on technology supply and sales and rarely participate in market creation activities (Interview 03). This strategy works well in high-income markets in developing countries, but rarely in low-income markets. Low-income markets have structural challenges meaning that there are rarely markets for modern technologies (Interview 03). Companies should focus on market creation rather than product exports and sales:

*“You cannot come here to sell products... there are too many product salesmen here... Chinese and Indian products are much cheaper... the locals do not have the knowledge to buy quality products... here markets need to be created for high quality technologies... who collects and processes wood material, how transportation is organized, who sells the electricity and heat, who buys the electricity and heat, what kind of societal and economic activities do electricity and heat create in a local context? ...you cannot come here and tell a farmer to buy this kind product if you don't understand how and what value it creates for the farmer” (Interview 03)*

*“You don't do anything with just technologies in developing countries if there is no demand... you need to create systemic concepts that create demand and value in a local context... you need to plan in advance what value technologies create for local people” (Interview 05)*

It seems that case companies do not have an interest or resources to create holistic market concepts in developing countries and participate in proactive market creation. Finnish technology SMEs willing to enter and do business in developing countries and low-income markets should build consortiums that are able to co-create systemic concepts so as to create value in local context (Interview 07; Interview 12). For example, forest management capacity building is needed to secure a supply of raw materials and reduce deforestation; there is a need for capacity building for local decision-makers to understand the value of renewable energy technologies and the implementation of policies and regulations; local intermediaries need to be trained to operate, maintain and to sell technologies, and awareness creation is needed to create demand for electricity and heat:

*“In Ethiopia the invader bush *prosopis juliflora* is causing lot of problems for local agriculture... it is very difficult to get rid of... someone should come and organize harvesting and treatment of this invader bush... educate local people, provide the necessary tools for harvesting and treatment, implement a biomass energy plant for local productive uses to produce electricity and heating or cooling, for example for the use of chicken farms.” (Interview 03)*

Potential clients and decision-makers in developing countries generally lack the capacity and knowledge and are sceptical and conservative as regards adapting new technologies (Interview 03). One reason is that the initial investment price of

renewable energy technologies is high, meaning long payback periods. This makes it difficult to create sales arguments and convince local users to adapt new renewable energy technologies (Interview 04). Instead of focusing on traditional distribution, marketing and sales strategies, companies should include capacity building as part of their business strategies to create marketing campaigns to increase the awareness of benefits of new technologies, create financing schemes to make products and services affordable and intermediary strategies to make products and services available.

The two case companies receive many cooperation requests from developing countries, but they have limited human and financial resources to further explore these opportunities. Case companies would be interested in creating pilot plants in developing countries if they could find suitable partners and funding (Interview 02). A pilot plant could be used for the training of potential partners and users and it could be used to support local sales activities.

#### 3.3.4.3 Pilot demonstrations

Technology pilots and market demonstrations can support market creation and modification of technologies to respond to local needs and demand. The two Finnish companies do not have the financial resources to make investments in technology pilots and market demonstration in developing countries.

External funding is needed for small Finnish companies to create their first market demonstrations in developing countries. This could support market creation strategies in developing countries. Multilateral or bilateral donor organizations such as the Finnish Ministry of Foreign Affairs or the World Bank are the most promising financiers and supporters of first market entry, especially in low-income markets in developing countries (Interview 05). Companies need references from target markets to be able to register as donor preferred suppliers:

*“It is not enough if technologies are certified to work in a developed country. Sometimes it is not even enough to have market demonstrations, references and certifications in other developing regions. If a company wants to become a preferred supplier, for example, in Zambia, it should have references from the African continent or regional markets.” (Interview 5)*

Donor funded projects are important in the early stages of internationalization for low-income markets in developing countries as they support the creation of market demonstrations, references and networks for future market-oriented sales. The biggest challenge for donor funding is the bureaucratic application processes, and it can take almost one person month to make the first successful application for donor funding. (Interview 05) In addition, most of the donor-funded projects are targeted to large companies that have the resources to invest in the bureaucratic application and reporting processes (Interview 03). On the other hand, companies need to have a strategic interest in developing countries and allocate their own funding and resources to support a first market entry for developing countries (Interview 05).

### 3. Analysis

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There seems to be a gap in current investment support system in Finland for small technology companies targeting low-income markets and with an investment support need of less than €1,000,000. While Finnpartnership cannot support hardware investment, Finnfund is providing investment support for investments of more than €1,000,000 and is even planning to raise this level to €2,000,000 (Interview 12). The high investment support limit is justified by the high costs and risks of entering developing countries. High costs and risks are related to market uncertainties and the high cost of market studies, partner search, import declarations, taxation, legal issues, contractual issues etc. (Interview 12). Small Finnish companies together with other companies could form consortiums to create larger concepts so as to share the risks and costs and provide a clear value proposal for the local market context. Often Finnfund participates on projects where investments are made jointly with companies and private and public investors (Interview 12). Successful technology pilots and market demonstrations, including evidence of developmental impacts enables companies to become preferred suppliers of donors such as the World Bank and UN and scale their products and services to global low-income markets (Interview 08). It remains unclear how to support piloting and the market demonstration projects of Finnish technology intensive SME companies in developing countries.

In conclusion, Finnish companies should focus on proactive business strategies where markets are created in developing countries. This includes the modification of price/ performance ratios of products and services, the creation of distribution strategies involving the capacity building of local intermediaries, marketing strategies to increase awareness of the benefits of new technologies and evaluation of developmental impacts. Companies should develop business strategies together with other companies and with the support of public sector actors improve the whole value chain from forest management to bioenergy production and use of electricity and heat in developing countries. Joint private and donor funding strategies for pilot demonstrations were proposed as entry mode with the greatest potential for low-income markets. Pilot demonstrations enable companies to learn how to develop business strategies in developing countries, evaluate and demonstrate development impacts, become preferred suppliers of donor-funded projects and scale the business strategies to other developing countries.

## 4. Conclusions

The purpose of this paper was to study international business opportunities and challenges and international business strategies in low-income markets in developing countries. Despite the research on international business strategies in developing countries and low-income markets have emerged recent years, previous studies mainly provide insights from the perspective of multinational companies. Our study describes general opportunities and challenges in developing countries and renewable energy markets, and demonstrates how small technology companies need to rethink their international business strategies when targeting these markets. The theoretical discussion covers key international business theories, namely a practical description of institutional, organizational, partnership and business strategy perspectives. Research questions are formulated to understand how small Finnish renewable energy technology companies need to rethink their international business strategies when targeting developing countries and low-income markets. To answer these research questions, interviews have been conducted with private and public sector actors in Finland.

Our study indicates that there is significant business potential in low-income markets in developing countries where there are many unmet needs and less competition for modern technologies. OECD/IEA (2011) estimates that more than half of the energy infrastructure investment in developing countries is needed to mini-grid and off-grid solutions in the future to provide sustainable energy for all. Moreover, there are an estimated 1.4 billion people without access to electricity, and 2.7 billion people rely on diesel and burning solid fuels. Currently low quality technologies dominate, especially in low-income markets as there is no awareness of buying the best available technologies. This creates huge opportunities for Finnish technology companies willing to benefit from these untapped markets. However, many challenges were identified in this study increasing the risks and uncertainties for companies willing to benefit from these opportunities, including weak policy-making and implementation capacity, a lack of reliable market information, limited infrastructure, a lack of knowledge and skills, a low awareness of the benefits of new technologies, limited purchasing power and limited access to finance.

Traditional international business strategies designed for developed markets rarely work in developing countries, as there are unique challenges in developing countries increasing the risks and uncertainties of international business activities.

This study provides various recommendations that can lower the risks and uncertainties when companies are targeting developing countries and low-income markets. Companies need to develop proactive international business strategies:

- 1. to analyse local formal and informal institutional environment.** Companies need to better analyse and understand the general distance between developed and developing countries (Ghemawat 2001), general trade barriers (Miller 1992) and the local institutional environment (Khanna et al. 2005). This supports the selection of emerging markets with the greatest potential and development of context-specific international business strategies.
- 2. to travel to target markets to understand the practical realities before designing international technology and business model strategies.** Secondary data in developing countries and especially in low-income markets is generally unavailable, biased or unreliable. Companies should travel to target markets and train local researchers and community members to conduct market research in order to understand the practical realities and market conditions (Chikweche and Fletcher 2012). Simanis et al. (2008) provide a framework and process to better understand local needs and demand. This supports the development and modification of technology and business models that fit in a local context as well as the creation of partnerships with local actors.
- 3. to develop political strategies to influence the local institutional environment so as to make markets more accessible.** Companies together with other companies and with public sector support can create political strategies to influence and increase the capacity of local governments to improve their policies and regulations. This can make small-scale renewable energy markets more accessible and increase the awareness of the benefits of renewable energy technologies in general (Hillman and Hitt 1999; Cholez et al. 2012). Passive or reactive political strategies create the risk that other interest groups are proactively working to shape government policies in a direction that benefits competitors' interests (Hillman and Hitt 1999).
- 4. to improve organizational resources by training or hiring people that have the knowledge and skills to operate in a local market context.** Managers need to understand the role of informal and formal institutions and have knowledge and skills to work around them in emerging markets (Dhanaraj and Khanna 2011). Companies should create separate funding pools and form multidisciplinary teams that have complementary skills and are comfortable to work in developing countries and different market segments (Hart and Milstein 2003; Simanis et al 2008). This enables companies to extend their knowledge of emerging markets, develop strategies to use this knowledge and transfer the knowledge to other people in organization and possibly to partners in other markets.



- 5. to create partnerships in home and in the host country with profit and not-for-profit organizations.** Small companies can create consortiums in their home country with multinational companies or with small and medium-sized companies, joining resources to overcome the challenges and co-value creating solutions to emerging markets in developing countries. Partnership with local intermediaries can support reaching the last mile in low-income markets. Training and capacity building is frequently needed for local partners to operate and maintain modern technologies. Moreover, not-for-profit partners such as local governmental organizations, non-governmental organizations (NGOs), cooperatives, universities and research organization can help provide an understanding of the local context and help to overcome the challenges in low-income markets (Rivera-Santos and Rufin 2010). Companies willing to partner with for-profit and not-for-profit actors need to evaluate and build common visions, objectives, resource commitments, roles and co-create mutual/shared value business models (London et al. 2010; Rivera-Santos and Rufin 2010).
- 6. to modify the price/ performance ratio of technologies and to develop holistic business models that suit local market needs and demand.** Often markets need to be created in developing countries for modern technologies. The business model modification to create markets starts from focusing on understanding who the customers are (affordability), what product design and services suit to the markets (acceptability), how products are distributed or delivered (availability), and how marketing and sales is conducted (awareness) (Anderson and Markides 2007; Prahalad 2012). Technologies need to be modified so as to have price/ performance ratios that are affordable and suit local market context (London and Hart 2004; Immelt et al. 2009).
- 7. to co-create pilots in target markets to demonstrate and assess technology, business and developmental viability.** A pilot plant could be used for training of potential partners and users and use it to support local sales activities. External funding is needed for small Finnish companies to create first market demonstrations in developing countries. Moreover, pilots demonstrating developmental impacts open opportunities for Finnish companies to become certified/ preferred suppliers for donor funded projects globally.
- 8. to utilize different international trade and aid-oriented public support services and financial instruments.** Companies need to develop different approaches to benefit from different public support services. While trade-oriented public services support traditional international business strategies, aid-oriented public services require international business strategies that consider developmental impacts as part of profit making.

Development of proactive international business strategies requires motivation and significant resources and sacrifices on the part of companies willing to benefit

from opportunities in emerging markets. The current international business strategies of the two case companies seem to focus on familiar European markets using traditional entry modes such as sales representatives and relying on existing technologies. This indicates that companies are focusing on reactive or passive international business strategies. This is mainly caused by a lack of human and financial resources and a lack of partnership networks. The potential of Finnish small-scale gasification technologies in developing countries is unclear, as they have not been tested with alternative biomass sources, and current initial investment cost remains relatively high. There is a need to support testing of existing technologies with alternative biomass sources and for support to modify technologies and business models to suit the local market context. Moreover, companies need support for market creation using pilot demonstrations to improve the whole bioenergy value chain in target markets so as to reduce deforestation, secure the supply of raw materials, to build the capacity to use and maintain technologies, and create a demand for heating and electricity. Lastly, companies should simultaneously target and develop different strategies for high-income, middle-income and low-income markets in developing countries in order to become profitable.

Small Finnish technology companies need external support to be able to benefit more quickly from market opportunities in developing countries. Competitors from developed countries, such as Spanner from Germany, and from developing countries, such as Ankur from India, are already developing strategies to enter bioenergy markets in low-income segments in developing countries. The public sector in Finland can provide valuable support for Finnish small technology companies to overcome the barriers and challenges and reduce the risks and uncertainties in developing countries. Companies can use the resources and activities of their home country public sector in order to support their international business strategies in developing countries. Small Finnish companies need support for information services on challenges and opportunities in developing countries, influencing institutional environment, modification of technologies and business models and financing for first technology pilots and market demonstrations in developing countries.

Different political ideologies result in different systems for supporting international business activities of small technology companies targeting developed countries. The current Finnish public support system for internationalization is driven by trade and development aid determinism, and there is a need to find synergies between different support instruments. Public sector actors need to change their mental models for understanding the challenges and opportunities of small technology companies targeting developing countries. This can create economic and social benefits for Finland and developing countries. Based on an analysis of two case companies, several challenges have been identified in the Finnish public support system for international business strategies in developing countries:

- 1. Information services on opportunities and challenges in developing countries.** Current information services are fragmented in Finland, and information flows on opportunities and challenges in low-income market do not reach companies outside Helsinki. This means that there is a need

for better integration of information services and wider coverage in Finland to reach the potential Finnish companies.

2. **Support for proactive political strategies in developing countries.** It remains unclear how proactive corporate political strategies are supported. Large Finnish companies have resources to develop and implement their own political strategies, but generally speaking this is not the case for small and medium-sized companies. The Finnish Ministry for Foreign Affairs has many instruments for institutional capacity building, but small Finnish companies are rarely involved or aware of these activities. In addition, Finnish embassies and other actors present in developing countries should re-think how they support Finnish companies in their political strategies.
3. **Support for technology modification for low-income markets.** The study does not find any explicit national policy support for proactive technology development strategies for Finnish SMEs to make technologies more affordable and appropriate for low-income markets in developing countries. Current international business support services do not include technology perspective on their activities. On the basis of the study, Tekes could for example play a more active role in supporting the international business activities of Finnish companies and VTT, and other applied research organization in Finland could cooperate more with Finnpartnership.
4. **Support for pilot demonstrations.** It remains unclear how financial support is organized for small Finnish technology companies to make the first market pilots in low-income markets in developing countries. In particular, there seems to be a gap for financing small-scale technology solutions below €1,000,000. There is a need for the harmonization of financial instruments and technical support to participate in donor-funded projects. Moreover, there is a need for support for small Finnish technology companies to become the preferred suppliers of bureaucratic donor-funded projects.

In conclusion, on the basis of the study the public promotion for supporting the international business activities of the private sector in developing countries remains insufficient. There is a need for demand-driven intervention strategies as private sector challenges are generally speaking firm-, industry- and market-specific. This means that support for developing inclusive international business strategies in developing countries should be integrated more closely to existing public promotion services targeting technology companies. Companies from different industries targeting developing country markets will need flexible and versatile public support system.

Further research is needed to better understand how small technology companies can reconfigure their international business strategies so as to contribute in a profitable and inclusive way to supporting economic, social and ecological development in low-income markets in developing countries. Second, research is needed on the role of different political institutions in the home country to support the international business activities of small Finnish technology companies targeting developing countries.

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## **Appendix A: List of interviews**

### **First round of interviews:**

Interview 01: Jarno Haapakoski, CEO, Volter, 4. 4.2013

Interview 02: Kauko Väinämö, CEO, Gasek, 8.4.2013

Interview 03: Mika Turpeinen, ABB, Sales manager, East-Africa, 30.4.2013

Interview 04: Johan Tallberg, Country manager, Oilon Brazil, 3.5.2013

Interview 05: Markus Andersen, Sales manager, Napssystems, 21.5.2013

### **Second round of interviews:**

Interview 06: Riku Mäkelä, Country manager, Tekes, 24.5.2013

Interview 07: Kimmo Aura, Finpro regional manager, Finpro, 8.8.2013

Interview 08: Sami Humala, Finpro manager, Finpro Washington, 15.8.2013

Interview 09: Birgit Nevala, Business coordinator, Finnpartnership, 9.2.2013

Interview 10: Siv Ahlberg, Program director, Finnpartnership, 9.2.2013

Interview 11: Mika Vehnämäki, Economic adviser, UM, 13.9.2013

Interview 12: Jaakko Kangasniemi, Director, Finnfund, 20.9.2013

Interview 13: Mari Hakkarainen, Senior adviser, TEM, 1.10.2013

Interview 14: Juho Korteniemi, Ministerial Cleantech adviser, TEM, 1.10.2013

Interview 15: Jusa Susia, Director, Finpro, 21.10.2013

Interview 16: Anna Erkkilä, Senior adviser, Finpro, 21.10.2013



## **Appendix B: Interview structure**

1. Interview structure for the first round
  - a. General description of the company
  - b. Technology
  - c. Internal resources and external resources
  - d. International business strategies
2. Interview structure for the second round
  - a. General description of the company/organization
  - b. Challenges and business opportunities in developing countries
  - c. How your organization supports international business in developing countries





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|---------------------|---|
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| Author(s)           | Tatu Lyytinen   |
| Abstract            | Renewable energy markets in developing countries provide significant opportunities and unique institutional and market challenges for companies willing to do business on a truly global scale. In this study we conducted an explorative case study of two small Finnish renewable energy companies to better understand their current resources and international business strategies to enter and do business in developing countries and especially in low-income markets. To benefit from opportunities and to overcome the challenges in developing countries, companies need to rethink their international business strategies. Our study concludes that small Finnish technology companies have limited resources to develop international business strategies that suit developing countries and the context of low-income markets. |
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