Renewable energy market
SMEs: antecedents of internationalization
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Abstract
Purpose – The purpose of this study is to provide a foundational understanding of the internationalization of small- and medium-sized enterprises (SMEs) operating in the context of renewable energy markets. The focus is on exploring and identifying the managerial-, firm- and environmental-level antecedents to their international expansion, which also furthers the understanding of the distinct SME's internationalization context within the renewable energy market.

Design/methodology/approach – The study adopts a qualitative multiple case study approach in a Finnish SME context and identifies the antecedents' relative prominence at the managerial, firm and environmental levels.

Findings – The findings indicate that, although internationalization antecedents of renewable energy SMEs differ owing to market forces such as trends, networks and changing regulatory policies, they share antecedents similar to those of SMEs in other industries.

Research limitations/implications – The main limitation of this study is its single-country home market empirical context. Future studies should expand analysis to different regulatory and regional environments.

Originality/value – To the authors' knowledge, there are few studies that explore the antecedents of SMEs' internationalization, especially in the renewable energy market context. Hence, this study contributes to the international business and entrepreneurship literature by illustrating the fundamental managerial-, firm- and environmental-level antecedents to the internationalization of SMEs operating in the renewable energy business. In addition, it highlights the peculiarities of renewable energy SMEs' internationalization, suggesting that extant research on SMEs' internationalization has not adequately captured the intricacies present in the internationalization of renewable energy enterprises.

Keywords Internationalization of SMEs, International entrepreneurship, Renewable energy, Sustainability, Cleantech, Antecedents to internationalization

Paper type Research paper

Introduction
Globalization and changing trends, coupled with interconnectedness in consumer behavior and preferences for more sustainable products and services, have led to a paradigm shift in the way small- and medium-sized enterprises (SMEs) operate internationally (Nummela et al., 2004; Zucchella et al., 2018). Changing environmental laws and regulations place pressure on firms to save costs and minimize pollution (Millennium Ecosystem Assessment, 2005; Sustainable Development Goals [SDGs], 2015). Thus, owing to increasing concerns about global and environmental challenges, individuals are willing to seek, purchase and create solutions to confront these challenges (Dean and McMullen, 2007; Giudici et al., 2019). As a result, SMEs are increasingly required to produce and consume more efficiently as they strive to meet sustainability standards. The role of renewable energy market technologies and trends has been very significant in mitigating the impacts of the SMEs' environmental footprint.
Although the growth of the renewable energy industry has been attributed to climate change and reduction in greenhouse emissions, it presents substantial opportunities and a new wave of enterprise interventions and venture capital investments with a vision of tackling these challenges globally (Dean and McMullen, 2007; O'Rourke, 2010). Furthermore, it also creates new jobs and private investments that strengthen the economy (Pernick and Wilder, 2007; Schonberger, 2013; Ellabban et al., 2014; Giudici et al., 2019).

Changing trends have also spurred the opportunities and investments in new ventures, new technology and related business models, which offer competitive returns for investors and customers and provide solutions to catch up with market trends and minimize global challenges (Pernick and Wilder, 2007; SDGs, 2015). However, these models or approaches do not necessarily explore how the SMEs’ international business (IB) activities shape the environment and respond to climate change, which is a crucial emerging concern for both international entrepreneurship (IE) and IB scholars (Roberts and Dörrenbächer, 2016). This lack of research may be owing to the novelty and distinctiveness of such (renewable energy) SMEs’ internationalization in comparison with the SMEs with conventional offerings that operate in other industries in general. Additionally, resulting from the broader socio-political environment – for example, the Paris climate agreement, the EU directives and regulations and the national initiatives on clean energy – the driving forces behind the internationalization of SMEs in the renewable energy market may well differ from the internationalization of SMEs in general.

Building on a historical view of SMEs in different time contexts, it is established that SMEs and their internationalization activities are emerging as a highly relevant contributor to the world economy, meriting great attention (Knight, 2001; Ruzzier et al., 2006; Kalinic and Forza, 2012). Furthermore, the share of SMEs aiming for international growth and reaching a wide international presence has risen recently because of interest in new ventures that engage in internationalization from their inception to obtain competitive advantage (Oviatt and McDougall, 1994, 2005). For instance, in the late 1990s and early 2000s, the removal of trade barriers and technological advances, as well as a wider adoption of the internet, led to governments’ support of SMEs’ internationalization (European Commission, 2003; Kalinic and Forza, 2012). Particularly in small open economies, both the SMEs’ role and the necessity to support them in reaching the global market space have increased (Loane and Bell, 2006; Knight, 2001; Kuivalainen et al., 2015) because of global integration and other economic trends, entrepreneurs have the propensity to radically innovate their offerings and their business models. Thereby altering competitive dynamics and redefining value chains differently from existing competitors in international environments (Zahra, 1991; Zahra et al., 2005). For that reason, business research emphasizes the value in exploring the role of entrepreneurs, their values, goals, and activities, toward the provision of solutions and services aimed to mitigate market failures that produce environmental degradation (Dean and McMullen, 2007; Hall et al., 2010; Dhahri and Omir, 2018). Nonetheless, having established that IE has the promise of not just the discovery of sustainable innovations, but also successful introductions of innovations and sustainable products globally (Acs et al., 2011; Hall et al., 2010). It is also noted that the discourse on the motivations driving the commercialization and operations of such firms – how they exploit market opportunities and/or sell their unique products and services across national borders – is scarce (Hall et al., 2010; Bolzani and Der Foo, 2018).

Research also illuminates that SMEs tend to combine various kinds of internationalization models, approaches and strategies when they expand into new foreign
markets (Ruzzier et al., 2006; Ribau et al., 2016). Supplementary findings attest that SMEs are the key drivers for economic growth, innovation and social integration and, thus, represent the “backbone” for the growth of European economies (Mandl and Esser, 2015). In this regard, given the global growth and interest in renewable energy technologies for mitigating climate change, the IB and IE research has significant potential to establish the foundational understanding on the internationalization of SMEs in the renewable energy market (Hall et al., 2010; Dhahri and Omir, 2018). Consequently, international SMEs and entrepreneurs hold the promise of being instrumental agents of change toward sustainable products and services and a panacea for many environmental and social concerns (Schumpeter, 1943; Dhahri and Omir, 2018; Zucchella et al., 2018). SME research would benefit from exploring such entrepreneurial firms because they have the propensity to take more risks and use innovations in response to global market needs and for future sustainable developments (Oviatt and McDougall, 2005; Acts et al., 2011; Dhahri and Omir, 2018).

Although some studies have criticized the earlier dominant models of internationalization for not being fully applicable to explaining how small firms in this new era internationalize (Bell, 1995), Zahra et al. (2005) suggest that exploring personal objectives, goals and motivations of managers promises to provide valuable insights about the motives, as well as future intentions, of internationalizing ventures. Hence, linking SMEs’ internationalization patterns and their antecedents or motivations would allow for a deeper understanding about how firms navigate competitive landscapes in both domestic and international contextual environments and/or industrial settings (Zahra et al., 2005, 2014; Kalinic and Forza, 2012; Kuivalainen et al., 2012a, 2012b). Thus, by exploring the managerial-, firm- and environmental-level antecedents to internationalizing SMEs within the renewable market context, this paper provides visualization on how the new wave of entrepreneurial firms interacts in a time-sensitive context with the external realities and challenges that accompany the renewable energy market sector.

In sum, this study presents foundational knowledge by identifying the motivations that foster the international expansion of firms operating in the renewable energy market. It does so by focusing on three levels of analysis – managerial, firm and environmental. This allows for a simultaneous examination of the behavioral, firm-specific and environmental characteristics that drive the internationalization of SMEs in the renewable energy market. Following a qualitative approach through a multiple case study, this study explores the distinct internationalization antecedents of SMEs in renewable energy businesses. This is important because what drives such SMEs to internationalize is one of the main questions for sustainable industries – such as that of renewable energy (Manesh and Rialp-Criado, 2018). The study explores, in general, how the internationalization of such SMEs may differ from or resemble the internationalization of SMEs in other industries. The study also provides insights for both academia and practice on what is important for emerging SMEs in the renewable energy sector to consider to navigate their internationalization operations amid emerging global climate change concerns.

The paper proceeds as follows. First, a review of the literature on the internationalization of SMEs and the renewable energy market is provided. Second, the methodological procedures used in the study are discussed – i.e. cases selection, data collection and analysis. Next, the findings based on the analysis are presented and discussed in detail. The paper concludes with a discussion of the implications of the findings and an agenda for future research.
Small- and medium-sized enterprise’s internationalization: antecedents and emergence of firms in a new, time-sensitive context

SMEs are defined as non-subsidiary, independent firms that employ fewer than a given number of employees (OECD, 2009). Several alternative definitions offer differing threshold numbers for what this “given number of employees” is. The European Commission considers SMEs to be independent enterprises with less than 250 employees, whose yearly balance sheet total/turnover is less than €43-50m. This study focuses on the Finnish SMEs context in particular owing to the fact that Finland is a small, open economy that provides a research setting in which SMEs constitute over 99 per cent of the total enterprise population and in which the majority of SMEs considers internationalization to be their primary growth strategy, with approximately 20 per cent of all SMEs already operating internationally (Kuismanen et al., 2017; Kuivalainen et al., 2015).

The concept of internationalization has drawn a lot of research interest over the years. Different internationalization theories, either independently or collectively, provide an understanding of entrepreneurial and SMEs’ internationalization processes (Knight, 2001; Hollensen, 2007; Ruzzier et al., 2006). In the early 1920s, internationalization began to gain prominence as a replacement for imperialism, which was the main organizational principle that framed the interactions of market economies (Ruzzier et al., 2006). A firm is said to be internationalized when it crosses its national borders (Schweizer et al., 2010); yet, depending on the context, different definitions of internationalization exist.

Even though the extant IB literature has focused more on multinational enterprises or large-firm internationalization, there has also been a rise in SMEs’ internationalization research (Knight, 2001; Ruzzier et al., 2006). Accordingly, studies show that SMEs face similar internationalization problems as their larger counterparts (Baum et al., 2015; Ruzzier et al., 2006). Some studies highlight that the proactive entrepreneurial orientation (EO) and strategic flexibility of SMEs favor their development, adaptability and commitment to investments across national borders (Kalinic and Forza, 2012). Hence, SMEs are constantly in search for niche markets and opportunities through which they can provide unique and customized offerings to customers (Rialp et al., 2005; Kalinic and Forza, 2012; Reuber et al., 2018). SMEs’ internationalization is distinct from the internationalization of larger firms because of the liability of foreignness and newness, as well as the (value-driven) motivations of entrepreneurs (Hollensen, 2007; Onkelinx and Sleuwaegen, 2008). Researchers continually emphasize that exploring internationalization motivations provides explanations on entrepreneur’s intentions, international market choices, entry modes, and other strategic antecedents driving the internationalization of SMEs (Zahra et al., 2005; Kuivalainen and Saarenketo, 2012; Bolzani and Der Foo, 2018). In their study, Zahra et al. (2014) add that the activities of international entrepreneurs are significantly related to changes that occur in an industry owing to consistent global and market changes. Thus, they urge IE researchers to contextually explore motivations and entrepreneurial activities across borders, as well as the influence of entrepreneurial activities in the form of products, services, processes or even their business models, to advance entrepreneurship research.

IB scholars highlight several antecedents to internationalization. Luostarinen (1979) evaluates internationalization motivations on the basis of global and domestic constructs, stating that generic motives (global and international) or domestic and country-specific motives affect a firm’s internationalization. Hutchinson et al. (2007) also mention that the antecedents to SMEs’ internationalization can be based on domestic saturation, industry competition, legislation, economic activities, profitability and foreign market stability. Other motivations driving SMEs’ internationalization can be triggered by market demands...
(demand-driven), strategic resources (core competence) and network-seeking (strategic alliance and social connection) motives (Dunning, 1993, 1995, 2000).

Some studies also mention opportunity seeking and learning as essential antecedents to SMEs’ internationalization (Karagozoglu and Lindell, 1998; Dunning, 2000). Zahra and George (2002) emphasize that learning thrives through proper integration and transformation of new knowledge into new products, systems and processes. To identify the antecedents of internationalization patterns, following Kuivalainen et al. (2012a), the analysis in this study is conducted at three levels: managerial, firm and environmental (Figure 1).

Managerial-level antecedents address the role of SMEs’ entrepreneurial activities and their influence on the internationalization of firms. Kuivalainen et al. (2012a, 2012b) suggest that managerial factors are based on the exploration of the mindset, education, international experience and orientation of an entrepreneur. Baum et al. (2015) mention that the international growth orientation of a firm and its ability to operate efficiently across its national borders are potential antecedents relevant to the internationalization of small firms. Peiris et al. (2012) define EO as behavior which investigates firm-level strategic orientation as influencing various outcome variables such as firm performance and venture growth. International entrepreneurial literature, however, highlights that positive links exist between the managerial-level factors and the entrepreneur’s mindset (global, international or traditional), with empirical evidence that EO is a relevant antecedent to rapid internationalization (Nummela et al., 2004, 2009).

On the other hand, firm-level antecedents affecting internationalization are largely based on the capabilities and resources of a company, which are rare, non-imitable and non-substitutable assets that are both tangible and intangible and which provide a sustainable competitive advantage (Barney, 1991). Such resources are considered to be the essential and salient determinants for early internationalization (Baum et al., 2015). Thus, unavailability and lack of resource control tend to be constraints for the internationalization of a firm (Eisenhardt and Martin, 2000). Networks and networking activities also foster internationalization at the firm level and are essential in the early internationalization and transition of SMEs (Coviello, 2006; Freeman et al., 2006; Kuivalainen et al., 2012a). Additionally, the strategic orientation of a firm is instrumental for motivating SMEs’ internationalization because it determines the extent to which knowledge is disseminated within the firm, as well as how the company performs in specific international markets (Kuivalainen et al., 2012a, 2012b).

<table>
<thead>
<tr>
<th>Source: adapted from Kuivalainen et al. (2012b)</th>
<th>Internationalization Antecedents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Managerial Factors</strong></td>
<td><strong>Firm Factors</strong></td>
</tr>
<tr>
<td>- International mindset</td>
<td>- Resources</td>
</tr>
<tr>
<td>- Experience</td>
<td>- Knowledge</td>
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<tr>
<td>- Entrepreneurial orientation (Risk taking,</td>
<td>- Strategic orientation</td>
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<td>Proactiveness)</td>
<td>- Networks</td>
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<td>- Industry factors</td>
<td>- Capabilities</td>
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<td>- Liabilities</td>
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Figure 1. Antecedents to SME internationalization
At the environmental level, a broad spectrum of factors is considered to be antecedent to SMEs’ internationalization. These factors include the country of origin, market distance, customers, regulations, level of technology, environmental dynamism, market structure and local and international competitions (Luostarinen, 1979; Kuivalainen et al., 2012a). Thus, it can be concluded that, when aiming to assess the prevalence of antecedents to the internationalization of an SME, the managerial-, firm- and environmental-level factors potentially all have an impact. All these factors should be included in the assessment of internationalization antecedents, as their influence on the renewable energy context is specifically examined.

As Kuivalainen et al. (2012a) discuss, these antecedents lead to different internationalization patterns, which vary in the timing of internationalization (when it begins and how quickly it proceeds), the scale and scope of internationalization, the foreign to total sales and the entry modes. The outcomes of these patterns are firm performance, firm survival, market value and company brand. Although not explicitly mentioned, the patterns with their antecedents and outcomes seem to be generic. However, it is yet unknown whether the same antecedents lead to the internationalization of SMEs in the renewable energy market, given its distinct context. To address this, the renewable energy market within an international context is first discussed.

Renewable energy market

Environmental concerns and economic trends, such as sustainable development and the need to accelerate environmental awareness and economic growth of entrepreneurial firms, are emerging areas of study in SMEs’ internationalization studies (Ruzzier et al., 2006; Hall et al., 2010). However, it is yet unknown whether the same antecedents (as discussed in the previous section) lead to the internationalization of SMEs in the renewable energy market, given its distinct context. To address this, the renewable energy market within an international Finnish cleantech SME context was chosen. The cleantech company category is appropriate for this study because these companies “aim at reducing humankind’s impact on the environment, and they leverage new technologies to create environmentally friendly products and services” (Giudici et al., 2019, p. 816).

The generally accepted definition of renewable energy according to the International Energy Agency (IEA, 2013a, p. 11) is: “Energy derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun or heat generated deep within the earth.” Renewable energy includes, for example, solar photovoltaic, wind, tide, wave, ocean, solid and liquid biofuel, renewable municipal waste and hydroelectricity (Engelken et al., 2016). Owing to significant global issues, such as climate change, increase in global energy consumption and exponential rise in globalization, there is a significant need for renewable energy to substitute conventional energy (Bloomberg, 2017; Ellabban et al., 2014). This would foster sustainable development and offer new energy solutions to mitigate issues related to energy and environment (Lund, 2007; Usher, 2008; Evans et al., 2009; Baños et al., 2011). Recognizing this, businesses tend to use renewable energy and develop technologies that are safe and more environmentally sustainable. These technologies reduce greenhouse emissions and minimize future environmental damage (Keijzers, 2002; Baños et al., 2011). Governments are also active in introducing regulations encouraging environmental protection and cleaner technological advances (Citelli et al., 2014). A key objective is to achieve economic savings through waste minimization in business and the economy, in general (O’Rourke, 2009). As a result of these developments, the share of renewable energy sources – e.g. electricity supply – has soared in countries such as Germany, Denmark, China, and Finland (Wüstenhagen and Menichetti, 2012; Zakeri et al., 2015). This evolution has led to a looming need for exploring the potential
demand and profitability of renewable energy resources in the global market (Kolk, 2015; Ellabban et al., 2014). Overall, the high rates of investment in the renewable energy sector also indicate the significance and rapid growth potential of the segment in the global energy market (Usher, 2008; Bürer and Wüstenhagen, 2009).

Nevertheless, research on the evolution and role of renewable energy in firms’ IB activities is scant (Kolk, 2015). This lack of research is even more pronounced for SMEs active in this industry. One reason this sphere of research is limited lies in the fact that most SMEs operating in the renewable energy sector are in their early stages of development. Nevertheless, they usually seek resources from foreign markets owing to at least two main reasons. First, these SMEs are dependent on natural resources such as wind, solar energy and ocean tides. However, not all SMEs have access to these resources in their home market; therefore, they seek them abroad. Second, in contrast to conventional natural resources, such as fossil fuels and timber, SMEs need to possess advanced technologies to use renewable energy resources (Bjørgum et al., 2013). To access these technological resources, collaboration in international markets, involvement in international networks and partnerships are common practice (Manesh and Rialp-Criado, 2017). For example, Lovdal and Moen (2013) studied three high-tech firms active in wave and tidal energy industry, showing that they were willing to accentuate their presence in international markets to access resources. Tan and Mathews (2015), by studying two Chinese wind turbine manufacturers, also argued that they were rapidly internationalizing since 2010, even though their presence in the global market was marginal beforehand.

There are several features associated with SMEs operating in the renewable energy industry that distinguishes them from SMEs in other industries. For example, these SMEs encounter high regulatory uncertainty, mainly because of the lack of precise environmental regulations stemming from governmental policies (Kolk and Mulder, 2011). This could also be a barrier to their internationalization. In addition, they tend to experience technological barriers because some renewable energy/sustainable technologies are complex in nature and may require trained workforce, firm experience and proper infrastructure (Luthra et al., 2015). According to Baños et al. (2011), renewable energy technologies are less competitive than traditional energy technologies because of their high intermittency and high setup and maintenance costs. Faced with these barriers, the SMEs operating in the renewable energy sector need to develop distinct business models based on climate change mitigation and energy-efficiency improvements (Engelken et al., 2016). Generally, for these SMEs, doing business is distinct, as the clean technologies and the solutions they offer are affected by climate change policies and energy-related regulations (Kolk and Mulder, 2011; Kolk and Pinkse, 2008). In addition, the managers of these SMEs are encouraged by unique personal values. For example, in their multiple case study, Manesh and Rialp-Criado (2018) showed that managers of small firms active in the renewable energy industry pursue values driven by non-financial motives and possess a global vision that is not limited to a specific border. To these managers, addressing social challenges arising from global warming and environmental degradation is an essential source of motivation (Anil, 2011).

Regardless of these distinctions, it is certain that once the SMEs in the renewable energy sector are established, they would have access to a promising global market with vast growth opportunities. On a global scale, there is an urgent need for renewable energy products that reduce costs and are more environment friendly, such as hydro and solar photovoltaic products (Keijzers, 2002; Ellabban et al., 2014). However, having established the possibilities and challenges of renewable energy firms, the vital task is to identify what motivates these SMEs, active in the renewable energy industry, to internationalize. Scholars have discussed the investors’ risk-return perceptions and path dependency as antecedents of
renewable energy investments, in general (Wüstenhagen and Menichetti, 2012). However, little is yet known about why and how the SMEs in this industry internationalize and realize international opportunities and what the antecedents to their internationalization are.

**Research methodology**

**Methodological approach**

In this study, five cases are explored to identify the antecedents to SMEs’ internationalization in renewable energy markets. Whereas prior literature has discussed the antecedents to SMEs’ internationalization in general (Kuivalainen et al., 2012a), the renewable energy market serves as an unexplored context in which the antecedents are expected to deviate from the ones possibly found to be crucial in an earlier historical time context. In other words, the renewable energy market (as pointed out earlier) is, in many ways, a rising and distinct context for researching international expansion. Consequently, using a qualitative design (Yin, 1994), this study sets out to investigate the unexplained theoretical links by elaborating on existing theories (Lee, 1999). A multiple case study was considered to be an appropriate methodological approach, known for enabling theoretical testability and generalization (Eisenhardt, 1989; Eisenhardt and Graebner, 2007).

Furthermore, taking a multiple case study approach was also useful for providing a yardstick against which the similarities and differences between the cases and the related phenomena are examined, giving a primary level of reasoning for the obtained results (Dubois and Gadde, 2002). In particular, seeking to enhance the reliability and robustness of the findings, the chosen method allowed for consistent and systematic iteration (Berkowitz, 1997; Welch et al., 2011), through data revisiting as additional questions and connections emerged, as well as for predicting similar and contrasting results. In sum, the iterative process deepened and enriched the authors’ understanding of the conceptualizations, investigation and findings with theory.

**Empirical context and case selection**

Prior to delving into more detail regarding the case firms and data collection, the context is first described briefly. The renewable energy industry is part of a broader phenomenon known as “cleantech” entrepreneurship. Cleantech (or clean technology) is as an umbrella term (targeted at an extensive array of projects, technologies, products and services), which refers to technology that develops non-fossil energy sources. Cleantech improves efficiencies by conserving resources and replacing existing (conventional) firm processes and technologies, with alternatives that pollute less, encourage efficient and effective recycling of waste and thus improve the environment (Pernick and Wilder, 2007). Thus, clean technology firms across many industries (e.g. health care, agriculture, biogas and technology) aim at providing superior performance and lowering costs than existing processes and products (Kachan and Fugere, 2013).

Cleantech symbolizes a new wave of entrepreneurial activities that can foster entire, environmentally sustainable industrial systems (O’Rourke, 2009), part of which includes the renewable energy market. Studies predicted that the global cleantech market is estimated to be over US$250bn in 2017 with expectations of exponential growth that is up to five times greater than this estimate in the near future (Anil, 2011; Cleantech Finland, 2015).

Moreover, the Finnish context is significant and promising enough to warrant a closer look from IB scholars in the renewable energy market context as well. For exploring cleantech, Finland is a particularly appropriate setting because the Finnish government has been developing policies for promoting a decarbonized economy (Liimatainen et al., 2014) with an ambitious plan to expand the share of renewable energy in its final energy...
consumption to 38 per cent by 2020 (IEA, 2013b). Consequently, the government has made
substantial investments to support the growth of cleantech firms, including those operating
in the renewable energy sector, and the growth in this sector is projected to continue in the
years to come (Cleantech Finland, 2015). The government also aims to double the cleantech
market to €20bn by 2020 (Ministry of Employment and the Economy, 2015). More generally,
Finland is among the top ten countries in terms of the environmental performance index,
which measures how close countries are to established environmental policy goals
(Environmental Performance Index [Epi], 2018).

Stemming from the above context, many Finnish SMEs operating in the renewable
energy sector have taken advantage of these arising opportunities (Cleantech Finland, 2015).
In sum, the choice of cleantech as a context further ensures that the case firms analyzed in
the study are representatives of SMEs operating in the renewable energy sector. To select
the case firms, a purposeful sampling approach was followed (Yin, 2003). Moreover, such an
approach suits the purpose of studying underexplored phenomena (Eisenhardt and
Graebner, 2007). Accordingly, the case samples (firms) were chosen based on four criteria.
First, to fulfill the EU SME classification, the case firms had to have fewer than 250
employees (OECD, 2009) – a threshold commonly found in the literature (Vanninen
et al., 2017). Second, the chosen firms had to operate in the renewable energy industry. Third,
accessibility criteria were applied in selecting the firms according to their willingness to
participate in the research and share information. Fourth, the firms had internationalization
intentions and/or operations. The internationalization intentions were known owing to their
prior participation in a larger research project. Using these criteria, five Finnish SMEs were
chosen, which were in different phases of the internationalization process. Details of these
case firms are shown in Table I.

Data collection and analysis
To elicit rich empirical data about an uncommon phenomenon using an efficient and
expedient method (Eisenhardt and Graebner, 2007), semi-structured interviews were
conducted. The interviews involved the chief executive officers (CEOs), marketing
representative, sales managers and chief financial officers (CFOs) from the chosen case firms
(see Table II for the role of informants). These informants were knowledgeable about the
renewable energy sector and their own firms’ internationalization operations. The
description of the data sources and participant information can be found in Table II.
One interview per case company was conducted, and each interview lasted approximately
one hour. The interviews were digitally recorded, transcribed and summarized. To ensure
validity and reliability, the interview questions were designed to avoid discredit any
respondent and unnecessary ambiguity. Non-disclosure agreements and the anonymity of
the respondents were ensured to foster mutual trust between the respondents and
researchers, thus encouraging more credible responses (Saunders et al., 2009). A sample of
interview questions can be found in Appendix.

In addition to the interview data, secondary firm data (i.e. annual reports and other
internal reports, company pamphlets and other archival documents) were also used. These
secondary sources were produced in “real time” to mitigate the impact of retrospective
sense-making and the interviewees’ potential memory bias (Leonard-Barton, 1990), thereby
enabling further triangulation of data and ensuring reliability and validity (Golafshani,
2003; Andersen and Skates, 2002). Finally, an intermittent evaluation of the research
questions and inputs and a discussion of the results with team members were performed to
reduce the study’s overall potential bias with respect to the interviews, the evaluation of
responses and the reporting of results.
<table>
<thead>
<tr>
<th>Company</th>
<th>Convertech</th>
<th>Biosoln</th>
<th>Lumtech</th>
<th>IoTech</th>
<th>Newaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products, services, and technology</td>
<td>Hybrid and fully electric vehicle solutions</td>
<td>Biogas construction, customization and consultancy</td>
<td>Energy-efficient LED luminaire</td>
<td>Heat transfer management</td>
<td>Wave technology</td>
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<td>Cleantech category</td>
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<td>Renewable energy/energy storage efficiency</td>
<td>Energy storage/energy storage efficiency</td>
<td>Clean industry/energy storage/energy storage efficiency</td>
<td>Clean/renewable energy/energy storage/energy storage efficiency</td>
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<td>Credentials</td>
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<td>ISO 9001 and 14001, SGS-GS certificate for PRO-wave</td>
<td>–</td>
<td>Fitness for purpose certification</td>
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<tr>
<td>Turnover in euros (2015)</td>
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<td>8,000,000</td>
<td>5,000,000</td>
<td>4,000,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Number of employees</td>
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<td>20</td>
<td>25</td>
<td>30</td>
<td>20</td>
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<td>Method of foreign market operation</td>
<td>Licensing, exports, cooperation with value-added distributors or resellers</td>
<td>Personal contacts, collaboration with partners and agents</td>
<td>Exporting and via international distributors</td>
<td>Intended operations via international partners</td>
<td>Own demonstration projects and via integrators</td>
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<td>International markets and regions served</td>
<td>Europe and China</td>
<td>Poland, Greece, Indonesia, Mexico, Southeast Asia</td>
<td>Sweden, Baltics, Germany, Benelux countries, South America, Spain, Switzerland, Germany, Norway, Denmark, Baltic countries</td>
<td>Sweden</td>
<td>Reference project: Portugal</td>
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<td>Southeast Asia, South Africa</td>
<td>Sweden, Scandinavia and Baltic countries</td>
<td>Western coastline, Japan, Chile, South Africa, Australia</td>
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<tr>
<td>Company</td>
<td>Informants (role in the company)</td>
<td>Background and international experience</td>
<td>Duration of interview (min)</td>
<td>Secondary data</td>
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<tr>
<td>Convertech</td>
<td>Marketing representative (one participant)</td>
<td>Master’s degree in international marketing. Work experience in export coordination and as a summer trainee. International experience accumulated through involvements in export coordination to China, international education and language proficiency.</td>
<td>50</td>
<td>Web page, pamphlets, news articles and reports. Other interview transcripts</td>
<td></td>
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<tr>
<td>IoTech</td>
<td>Chief executive officer and sales executive (two participants)</td>
<td>CEO: university graduate with 19 years of work experience in sales; marketing career in Finland and Russia. His most extended international expertise is in exporting to Russia and Central Europe, and business travels to abroad: to Russia and Beijing in China</td>
<td>61</td>
<td>Web page, news articles and reports, email correspondence, follow-up discussions, other interview transcripts</td>
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<tr>
<td>Newaves</td>
<td>Chief financial officer and head of the business development (one participant)</td>
<td>Sales executive of the company, a business school graduate and has previous work and international experience working various positions in sales, marketing ICT and IT security in Sweden, Nordic and Baltic area.</td>
<td>90</td>
<td>Web pages, pamphlets, news articles and reports, email correspondence, follow-up discussions, other interview transcripts</td>
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<tr>
<td>Biosoln</td>
<td>Chief executive officer (one participant)</td>
<td>The informant manages projects and negotiations within the company. He has an educational background in finance and previous work experiences in banking sectors, as well as various SMEs and multinational firms. His international experience was accumulated through his work experience, birthplace, travels, education and foreign language competence.</td>
<td>59</td>
<td>Web page, Voitto database, news articles, follow-up discussions, other interview transcripts</td>
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<tr>
<td>Luntech</td>
<td>Director of sales (one participant)</td>
<td>Working with an international distribution network and our international sales with a BSc in Commerce and practical experience as a mobile technology engineer. He had over 19 years of experience in multinational companies functioning in project management, R&amp;D and key account management roles. He mentions having vast international experience and the capability of leading multiple business locations simultaneously.</td>
<td>44</td>
<td>Web page, Voitto database pamphlets, news articles; follow-up discussions. other interview transcripts</td>
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</table>
For analysis purposes, the data were organized and arranged based on key themes relevant to the study elements (see Figure 2 for the representation of the thematic setup). As in most qualitative research studies (Ahi et al., 2017), the analysis was conducted through a cycle of inductive and deductive reasoning. Early stages of the research examined the extant literature on the antecedents to SMEs’ internationalization. A model was developed using Microsoft Excel to guide the operation of the analytical process. After organizing the transcribed transcripts, the extracted responses were summarized, extracted and matched with the research questions. This was done to expedite the data analysis and ensure that meaning was not lost, and data validity and credibility were retained. Following the procedures recommended by Strauss and Corbin (1998) and Miles and Huberman (1994), the data were then compared with a model emerging from the literature review. Hence, following replication logic, each of the cases served as an individual discrete experiment (Eisenhardt and Graebner, 2007; Yin, 2003), assisting in the comparison, evaluation and identification (of the themes) of the antecedents to internationalization that emerged from the responses of the case firms’ representatives.

A cross-case analysis was also conducted to mobilize knowledge from the individual cases and have a holistic view of the key findings. The created themes and the summary of findings were organized in accordance with literature. Subsequently, the data were revisited to generate meaning and theoretically interpret and substantiate the findings. The researchers also engaged in triangulation by drawing from secondary data (Saunders et al., 2009). Secondary materials were used to aid in organizing and verifying the data to minimize the inaccuracies that may have existed in single data sources, thereby ensuring the robustness and validity of interviewees’ statements (Golafshani, 2003). Data analysis also mirrored an iterative approach because the data collection and analytical process allowed for a revisiting of the data, connecting them with emerging insights that progressively led toward a refined focus and understanding (Srivastava and Hopwood, 2009). Overall, in addition to understanding the antecedents, the above-described analytical procedure enabled the identification of the differences and similarities of such firms in comparison with other conventional SMEs (theoretically).

### Antecedents based on literature (Key themes)

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<th>Antecedents on managerial level</th>
<th>Thematic grouping of interview questions</th>
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<td>Experience</td>
<td>Motivations to internationalize</td>
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<td>Entrepreneurial orientation</td>
<td>Educational background</td>
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<td>Role of entrepreneur</td>
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<td>Internationalization decisions and future plans</td>
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<td>Antecedents on firm level</td>
<td>Products and services</td>
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<td>Resources</td>
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<td>Knowledge and capabilities</td>
<td>Resources and capabilities</td>
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<td>Strategic orientations</td>
<td>Market knowledge, innovations and learning</td>
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<td>Networks</td>
<td>Networks and partner relationship</td>
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<td>Strategic orientation</td>
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<td>Antecedents on environmental level</td>
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<td>Industry factors</td>
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<td>Technology and competitive advantage</td>
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<td>Reaction different market environments</td>
<td>Cleantech sector and collaborations</td>
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<td></td>
<td>Technology and competitive advantage</td>
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<td>Internationalization challenges</td>
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</table>

**Figure 2.**
Presentation of the thematic setup and data organization

Summary and organization of the individual responses
Findings
The findings are drawn through an exploration of Finnish cleantech SMEs. The point of departure of the analysis was the identification of the antecedents to the internationalization of the SMEs operating in the renewable energy market. Therefore, this section first provides a brief introduction to the cases analyzed. Then, the findings across the cases are presented based on three levels found in the existing literature – managerial, firm and environmental – which are explained in more depth in the latter part of this section. Furthermore, as the context is valuable for understanding the motivations behind the internationalization of operations and decisions (Zahra et al., 2014), the case companies were also asked: “What does cleantech mean to you?” A snapshot of some of their answers is also provided in this section prior to the introduction of the case firms.

Case companies
Convertech
With our systems and our products that we sell, we can give our customers high efficiency, and if you think of cleantech, we can decrease the emission level, really highly (Marketing representative, Convertech).

Convertech is a technology company that specializes in the manufacturing of high-efficiency hybrid and fully electric vehicle solutions. The company applies cutting-edge technology to provide hybrid solutions that lower power and fuel consumption and meet emission standards of various countries. Their focus “is on the system selling.” The company was a university start-up, and it’s core and competitive advantages are based on “the possession of their in-house software knowledge in system building and very strong engineering background and specialized [Research and Development] R&D Professionals.” The internationalization of the firm was quick – the company has doubled its turnover on an annual basis since its inception. For them to have achieved such growth, it was essential to begin internationalization from the day the firm was established. According to the informant from Convertech:

[...] internationalization was not something that we consider would be nice and would have potential, but it’s just something we have no other options than do as best as we can. The top management makes internationalization decisions on where and what to focus on and how to run internationalization operations. [...] internationalization decisions are further reinforced from information, which comes from face to face discussion with the client or during exhibitions. [...] Information flow for internationalization comes from everywhere, and some of the important sources of information for internationalization come from the market, competitors’ products, customer requests, and information regarding changes in policies and regulations, especially those centered on environmental issues. (Marketing representative, Convertech)

Lumtech
Cleantech, it is about pollution minimization, but always it is about being as efficient in your use of any substance, as possible. It is absolutely marketing. For example, in ice halls, we are up to 70 to 75 per cent in power savings when you change from the mercury light to LED. With our luminaires. (Manager, Lumtech)

Lumtech is a manufacturer and designer of light-emitting diode (LED) luminaires for street, office, retail and industrial lighting. This firm’s goals are to gain international recognition through innovative and reliable high-quality LED lighting solutions. The company’s mission is to design, manufacture and deliver safe, high-quality, improved life cycle and cost-optimized products. The company has a significant competitive advantage in the
thermal management of the product, its slim design and its optical performance. Lumtech began making internationalization efforts via distributors not long after the foundation of the firm. Some of the core motives behind the company’s internationalization activities are its desire to increase business opportunities, gain first-mover advantage and capitalize on the innovation and novelty of their technology. Lumtech operates internationally via foreign distributors who handle sales and work in close contact with customers, local contacts and partners. The company provides training and support about the technical aspects of their products and services, but marketing is outsourced to distributors. The company has strong and growing operations in Sweden, Baltic countries and Switzerland. However, Lumtech is presently focused on trying to grow in Northern Europe, especially in Germany. Their main driver to enter the German market is the market size and the high cost of electricity because LED offers less power consumption. Additionally, the small size of the domestic market and growth potential from the international market are the crucial drivers for internationalization decisions:

In Finland, you have a certain size of the market and a certain group of players and, if you want to grow, you need to go somewhere. […] The main competence of Lumtech in their internationalization strides is their knowledge of the LED business. (Manager, Lumtech)

However, the company seemed to be aware that it is imperative to gain the local understanding when making internationalization decisions – such as local habits, local market procedures and language competences – to effectively penetrate new markets.

**Biosoln**

For us, Cleantech focuses on waste treatment. We receive and treat waste in the way that renewable energy is generated simultaneously, also recycling the nutrients back to the agricultural fields, from where the agricultural waste originated. (CEO, Biosoln)

Biosoln is a technology company with a background in industrial wastewater treatment. The company, through R&D, refocused its vision toward organic waste processing and providing bio-waste treatments. The company was initially founded in 2003 as a one-person consultant company. However, the firm has grown organically since then and has attracted domestic investors, who have been instrumental in its product and technology development. The company’s main competencies are developing biological systems and providing closed loops for biogas systems. Biosoln does not have a one gadget product; instead, they specialize in constructing the so-called biorefineries and providing customized product and technology solutions to suit their clients’ needs and specifications. As an internationalization strategy, the company began exploring projects (building factories for treating waste) in 2006, owing to the declining attractiveness of the domestic market, and it began seeking different markets abroad.

Biosoln has extensive internationalization experience in several countries. The main motivations for internationalization were making profits and seeking new market opportunities in reaction to the declining potential of the domestic market. Over the years, the company carried out extensive market research and made efforts to exploit international markets using several means, e.g. university (student) studies and participation in multiple fairs in different countries and regions such as France, Germany and Southeast Asia. However, to internationalize, Biosoln adopted various operational approaches to suit the specifically intended internationalization markets, noting that they “have different approaches to different places” (CEO, Biosoln).
Newaves

Generating clean electricity is one of the cores for the company for being a categorized cleantech firm (CFO, Newaves).

Newaves operates in the wave energy industry. Their core competencies are the patent of their product design, power take-off and their rare accreditation certificate. Their wave product is the first device to use ocean energy, also known as the surge phenomenon, to generate electricity. The CFO of Newaves mentioned that:

We have a very strong operational team so people who have worked in the ocean and have been diving in the sea, so they understand the practical side....]Therefore, I see that our team has a unique setup for capabilities, and in this way, we can progress fast and deliver good quality products. (CFO, Newaves)

Although their product has not been fully commercialized and is still in the development and testing phase, the company has undertaken some successful demonstration projects in Portugal, Ireland, UK, France and a new project in Mexico. The current business model is based on collaboration with integrators as a result of inadequate finances and resources for pushing through significant demonstration projects. The company receives financial backing from the EU and other stakeholders to show the proof of concept for its technology. The company also conducts some activities outside of Europe, e.g. in the USA, Mexico, Chile, India, Sri Lanka and Indonesia.

The company has viewed internationalization as imperative since its inception. This is because of its unique product and technology, which is best suited to specific locations and terrains worldwide. According to the interviewed company respondent, Newaves’ core motivation for internationalization is market opportunity. The company does not see a lot of feasible business potential in the domestic market. No specific person or group of people influence the company’s foreign market selection decision. Their internationalization decisions are made based on the analysis of countries in which a positive market potential is perceived in terms of resources and business opportunities. One of the internationalization aspects that is critical for Newaves is entering markets in which their product and technology would be relevant or regions in which ocean waves are abundant. Consequently, the company seeks to enter markets where the natural resource potential (tidal waves) is high.

IoTech

Cleantech means Green-tech and Sustainability. The key value of being a cleantech company is the energy cost savings [...]. any company can be a member of Cleantech. There are no rules for what kind of company can join that Cleantech (organization) as you know there are many different kinds of companies. (CEO, IoTech)

IoTech is a service company that studies and analyzes the state of heat transfer processes and provides optimized solutions based on their findings. The company has a peculiar process: they collaborate with their partners to carry out building renovations and standardized maintenance of heating and cooling systems – and it takes them several years to complete the building renovations. They carry out building analysis and are interested in big buildings, shopping malls, hospitals and offices. They start by analyzing the buildings’ heating and cooling situation. They also carry out process design calculations, service process consultation, maintenance, economic analysis and budget preparation for clients. Thus, their business method also involves constant reporting, feedback and future recommendations. Their competitive advantage is that they have the theoretical and practical knowledge of heat transfer, as well as competencies in R&D, concerning heat
transfer and other related phenomena. IoTech allocates about 5 per cent of its annual revenue to research and development. The Swedish market is a potential market area because the economy is growing, and many building projects are being carried out. The company presently has some clients in Sweden and has already completed some projects there. The CEO of IoTech mentioned, “It is logical to enter the Swedish market; that’s a natural step because we can utilize the contacts there to get new customers.” In addition, the market similarity and market proximity to Finland are the enabling factors: “It takes only 45 minutes flight from Helsinki to Stockholm. [...] we can also go to other countries, where we have a similar climate and structure as in Finland.” Potential countries for future market entry include Russia and Canada because of the similarity in their weather conditions to those of the domestic market.

The company mostly focuses its business operations on the domestic market. However, the company has recently been striving to intensify its internationalization efforts. The countries of international interest for IoTech were Sweden, Baltic countries and other European markets. According to the CEO, one of their main internationalization motives is the collective effort by Finnish entrepreneurs to provide support to the declining Finnish economy by fostering international trade. In the case of IoTech, they aim to do so by exporting their services to new markets. The respondents thought that they could gain enormous market opportunities in small regions, like Stockholm, and even in the domestic market. They plan to achieve success in foreign markets through collaboration with local partners who have an interest in their business line. The founder makes major internationalization decisions for the entire company.

Internationalization antecedents of small- and medium-sized enterprises operating in the renewable energy market
Useful quotations are provided to give an overall impression of the antecedents influencing the internationalization of SMEs in the renewable energy market. Table III provides illustrative quotes and shows the findings of this study at the managerial, firm and environmental levels.

Managerial-level antecedents
The first main finding from the data is that, even though the case firms also operate in the domestic market, their managers have a global mindset toward facilitating operations in international markets. Existing studies on SMEs’ internationalization show that certain characteristics of SMEs’ managers, such as an international orientation and a global mindset, affect early internationalization processes of companies (Crespo et al., 2015; Nummela et al., 2005). Additionally, managers within the case firms have extensive international experience, as reflected in their foreign language competencies, work experiences and international travels or studies, the importance of which is highlighted by the previous literature (Bloodgood et al., 1996; Acedo and Jones, 2007).

Notably, the data suggest that the novelty of the renewable energy sector limits the choice of foreign target markets for internationalization. However, the managerial orientation toward internationalization for some of the firms seemed to mirror risk aversion as managers preferred incrementally internationalize and gradually expand the internationalization activities through market sensing and learning about the markets (Kolk, 2015; Giudici et al., 2019). In other words, based on the analysis conducted for this study, it is noted that the perceptions of a managers’ internationalization decisions were closely associated with the need to capitalize on resources and learning about customers’ reactions to products. Hence, the resulting knowledge gathered can be utilized across other
<table>
<thead>
<tr>
<th>Level of analysis</th>
<th>Antecedents</th>
<th>Illustrative quotations from case companies</th>
</tr>
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<tbody>
<tr>
<td>Managerial Mindset</td>
<td>Convertech: Internationalization is not something that we consider would be nice and would have potential, but it is just something we have no other options than to do as best as we can. ... We are interested in learning about new markets and getting involved in business operations internationally and ... market opportunities globally.</td>
<td>Newaves: We saw very (big) potential in the business (international business) ... we also, got validation of the idea (business) through getting financing, and a product that is close to commercialization. Lumtech: ... We are interested in working with new technologies, in new environments with new people. We already have long experience in international business. That helps. ... still, when it comes to everyday business (internationally) we need to access to real contracts and real projects. You need somebody locally.</td>
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<tr>
<td>Work and international experience</td>
<td>Convertech: I have experience in exporting from Russia, and some contacts, mostly partners in Central Europe, mostly Germany. ... our company has been operating (internationally for) seven years.</td>
<td>Newaves: ... I have been exposed to very different business environments and cultures. our company has demonstration projects in several countries. Lumtech: ... I have long work experience in diverse multinational companies and heading international teams. our company actively uses distributors to sell around the world.</td>
</tr>
<tr>
<td>Psychic distance</td>
<td>Convertech: We target markets that are providing the biggest growth potential for us ... location is not relevant for us but the market potential and what we can offer customers.</td>
<td>IoTech: We focus on the domestic market with a specific interest in the Swedish market. ... Our subsequent interest in markets with similar characteristics is in the Scandinavian and Baltic countries.</td>
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<tr>
<td>Firm Network</td>
<td>Convertech: We are using partners and agents, generally, so that we can have better entry to the market. ... our strategy has been using these local partners and agents, to get the first references from the market, so that we can show that we have done something there. Biosoln: Being a part of the network is also considered an avenue for new market knowledge, clients, and getting access to contacts who can be beneficial for business.</td>
<td>Newaves: ... we tend to use local partners. But more recently, we have opened up, more to using international partners, ... because of the scale of the technology increased, we try to find companies (partners) that are best in the field or experts in this kind of, some specific bit or questions technical issues. Lumtech: We need our distributors due to our size. Our distributors provide us with information and their own knowledge of the market local habits of customers and contacts (to work with). IoTech: We are not hiring people to our company, rather we try to find very innovative partners and other cleantech companies ... we enlarge and grow our business in foreign markets depends on how we can find the partners over there [a foreign market].</td>
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Table III.

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<thead>
<tr>
<th>Level of analysis</th>
<th>Antecedents</th>
<th>Illustrative quotations from case companies</th>
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<tbody>
<tr>
<td>Innovative technology</td>
<td><strong>Convertech</strong>: Our systems are amongst the best high-tech and cleantech products. We give our customers high efficiency with reduced emission levels, and if you think of cleantech, we can decrease the emission compared to previous technology what they gained with our products.</td>
<td><strong>Newaves</strong>: Looking at our budget, majority of our funds are spent on technology development. …we are fairly small team so, the activities are being targeted to key resources, and other resources will be taken from partners if it's not in-house.</td>
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<td><strong>IoTech</strong>: There is a big potential in modernizing our product and service offerings by capitalizing on the “internet of things and digitalization” in the near future.</td>
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<tr>
<td>Knowledge intensity and learning</td>
<td><strong>Convertech</strong>: …Market information from competitors, products, out there, customer needs and requests, changes in laws and regulations, especially considering environmental issues, is very vital for us (operations).</td>
<td><strong>Lumtech</strong>: …Efforts towards internationalization and sources of information have mainly been through market studies, tours to find new clients, trade shows, networking, and with the help of the chambers of commerce. …“We also review our processes now and then. …do things, we see how people around us are reacting on them and, things are not going in the direction we want we will fine-tune our way. And all the time collect data and, the lessons learned in good and bad”</td>
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<td><strong>Biosoln</strong>: …The skill set is missing, of course, a local knowledge. Maybe some languages …when it comes to the skills, it’s localization, local habits, local market procedures, and of course local ways of doing work.</td>
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<td><strong>Newaves</strong>: …we have a very technical and, PhD, people with a very advanced analytical and computational skills and then we have people with big experience in, mechanics and building ships</td>
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<td><strong>IoTech</strong>: …Our service is too narrow. That is why we have just started to investigate how to get the total offer, concerning cooking and automation and so on. …We have, let’s say, exploited differently, or sought and researched different markets with different means. Sometimes we have used students, for example, to do market study in (England).</td>
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<tr>
<td>Capabilities</td>
<td><strong>Newaves</strong>: I see that our team has quite a unique setup for capabilities and in this way, we are able to progress fast and deliver good quality (products). …we also have a very strong operational team, so people who have actually worked in the ocean and have been diving in the sea, they actually understand the practical side.</td>
<td><strong>Biosoln</strong>: we are good in what we are doing is that we have experience in operation of these plants, so we know how they work and we also have some educational background to understand the processes inside the system. The combination of this is actually quite rare.</td>
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<td></td>
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<td><strong>IoTech</strong>: …we have theoretical and practical knowledge about heat transfer. …We have a lot of experience and solutions to heat transfer problems exist in buildings. …we conduct research and development concerning heat transfer.</td>
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<tr>
<td>Strategic orientation</td>
<td><strong>Newaves</strong>: …We need to have a list of opportunities and …have good reasons why it is worth going there (foreign markets). …We are following the markets where we see there is customer interest, and there is funding for the projects. So in this way we are talking, we are not trying to push to new markets where we would have to build the market from scratch, let’s say establish a new push to get the new legislation or attract reluctant customers.</td>
<td>(continued)</td>
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<tr>
<td>Level of analysis</td>
<td>Antecedents</td>
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| Environmental     | Domestic market situation | Biosoln: ... internationalization decisions can be in-house or indirectly because partners and agents ... our partnerships are based on trust, also with agreements. We have a joint vision (with partners) or strategy on how to move forward, what are the important milestones for us.  
IoTech: ... Our strategy is to go first to the closest place, and after that, to maybe to find some other roadmaps with those other partners, international partners.  
Convertech: ... Of course visibility, we do cleantech, (+) technology because it is something that is, everybody is talking about at the moment, so of course we can highlight and use that in our marketing and sales.  
Newaves: In cleantech, there are different subcategories, but we are in renewable energy, which I think is the core or one of the first subcategories within cleantech. ... we gain the marketing benefits (as a part of cleantech association), we are basically communicating with the different stakeholders around the world, and other companies and organizations and countries are approaching them to get contacts to the Finnish cleantech sector. We are also using a technology certification ... I think it’s not a standard, but it’s an approach for qualifying new technologies for offshore environments.  
Biosoln ... certifications (9001) influence our procedures and reputation abroad. It also makes working culture more efficient. ... We work alongside other cleantech firms or in other cases we are competing with them, so ... In Finland, for example, we have a network of companies who are working for us. ... for example we partner with construction companies, automation systems engineers, and other suppliers.  
Lumtech: In Finland, you have a certain size of the market and a certain group of players and, if you want to grow, you need to go somewhere.  
Convertech: The market is really specified where we’re aiming, the market (share) the domestic market is not enough for us. We need to go abroad so we can reach more customers. ... Domestic market has future growth potential, but it is still a bit slow for the change. Market ... our customers and the market potential are mainly abroad.  
IoTech: ... Old fashioned structures and processes, which are still in use. While the Swedish market seems to be more welcoming and interested in new innovations.  
Newaves: A bit hard in our context to explain because we don’t have domestic market decisions or anything. Everything is related to project opportunities abroad (and technology) development.  
Newaves: Broadly, renewable energy is getting different types of support schemes in different countries we grant plus funding to, for example, Horizon 2020.  
Lumtech: ... Capital investors also have high importance, and they guide how the company is (lead); the board of the company actually decides which segments we are moving towards, and also, this internationalization process.  
IoTech: ... our internationalization (to Sweden) was partly financed by Finpro. They also conducted a market study, and evaluated several countries; we got a lot of support from the Finpro office in Stockholm as well. They provided us with contacts. |
| Legitimacy and visibility | | Biosoln: ... internationalization decisions can be in-house or indirectly because partners and agents ... our partnerships are based on trust, also with agreements. We have a joint vision (with partners) or strategy on how to move forward, what are the important milestones for us.  
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<th>Level of analysis</th>
<th>Antecedents</th>
<th>Illustrative quotations from case companies</th>
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<td><strong>Geographic distance</strong></td>
<td><em>Boson</em>: We have been looking for different markets in the environmental sector abroad. We started from the US, and then we tried Russia, and sometimes we have been in China, (more or less) all around the world.</td>
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<td><strong>Nature of the product</strong></td>
<td><em>IoTech</em>: We are strong, growing in Sweden and Baltic countries, and trying to grow in Northern Europe and Germany. Of course, Switzerland is one of our good markets.</td>
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<td><strong>Market demand</strong></td>
<td><em>Newaves</em>: We can invest in distant markets (such as Africa or China) if it is realistic opportunity. Another reason is that the Chinese are investing heavily in Africa. They have a big foot between the door and high-level connections. Also the based on international experience African market seems to patronize Chinese product regardless of price.</td>
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<td><strong>Regulations and policies</strong></td>
<td><em>IoTech</em>: ... other companies who can carry out daily maintenance, and sell cleaning and washing agents but no one else (company) provides this type of holistic process.</td>
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towards using more Finnish subcontractors than we would ideally want to. But because of the setting or the rules of the funding we were forced to.
Biosoln: ... primarily, the directive in the European Union is called End of Waste. ... but Even inside European Union, every country has still their own regulations. There is a continuous debate concerning the waste and how it can be utilized. For example in here (locally) it is a debate if treated waste can be used or called fertilizer. Thus there are debates on the legal status of waste. Environmental legislation about wastes and minimizing pollution of the environment is the main driving force that supports our operations but this is not just legislation it’s also policy.
IoTech: Now we are working only, and trying to get the business running only in Sweden, and those regulations in Finland and Sweden are quite similar. And also in other countries in Scandinavia.
Lumtech: All the green policy activities, all the power consumption reduction. All the... let’s say, agreements, decisions, and legislation which is targeting to have all the devices’ lifetimes being longer, they are helping us. And of course, our ability to cut the cost.

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international markets. For example, IoTech benefitted from location advantage and established customer relationships by entering the Swedish market. According to IoTech’s CEO, “Operating in Sweden for us is a natural step so that we can utilize the contacts.” This respondent also suggested that Sweden is a potential market area because its economy is growing, and a lot of building projects are being carried out. Furthermore, the market similarity and market proximity are enabling factors: “It’s only a 45 minute-flight from Helsinki to Stockholm […] and, compared to other countries, we have similar climate and structures.” Similarly, Lumtech manager mentioned that:

In Finland, you have a certain size of the market and a certain group of players and, if you want to grow, you need to go somewhere. […] Step by step, in the areas where our products have some kind of leading-edge. That’s the only, intelligent way to do it. We do not go to markets (e.g., Eastern Europe or Africa) where […] our competitors […] Meaning, go there where your products still have some leading edge. (Manager Lumtech)

This finding suggests that venturing into nearby markets, specifically EU, was particularly beneficial for Lumtech because their product did not need to be further modified to meet foreign market requirements. Therefore, they preferred to enter incrementally into more homogenous markets with similar market demand before considering more markets that are distant. Additionally, the decision for entering markets of close proximity seemed to be aimed at managing resources and observing if the products thrived in the domestic markets and nearby countries before venturing into more distant or risky geographical markets.

Based on these findings, it can be concluded that the rationale for internationalizing to nearby counties lies in managing the company’s resources and observing whether the products thrive in the domestic markets and nearby country markets before venturing into more distant or risky geographical markets. For example, Biosoln was ready to serve markets interested in their biogas plants worldwide, whereas IoTech preferred to internationalize to Sweden because of its proximity to the home country (location advantage) and their existing customer relationships in Sweden. Newaves used demonstration projects to test market potential and to attract potential investors to preferred markets of entry – they prioritized internationalization to places with abundant natural resource (ocean waves) for their product to function. Lumtech prioritized the German market because their product did not need to be modified in homogenous markets. Thus, internationalization decisions for the company was incremental and/or location-specific before considering more geographically distant markets. Moreover, the Lumtech informant also mentioned that geographically distant and emerging markets were not yet ready for their technology. Therefore, it can be surmised that reasons for entering markets, although varied, are largely dependent on proximity, with the companies aiming to manage resources and observe whether the products thrive in the domestic markets and nearby country markets before venturing into more distant or risky geographical markets. This action, in theory, can be attributed to the notion of psychic distance, where internationalization activities and decisions are made based on the proximity and the perceived similarities in the characteristics of the domestic markets and that of a foreign country (Johanson and Vahlne, 1977). Furthermore, the data also show that the more internationally experienced the managers of the firms were, the higher the propensity for the firm to make efforts toward internationalization. Hence, internationalization decisions seem to largely result from a combination of international experiences and recommendations by social networks (partners, distributors and agents). This corresponds to theoretical assumptions that the managerial characteristics of a company determine the extent of a company’s strategic decision-making. In other words, the extent of international managerial experience is
proportionate to the extent of managerial receptiveness to international markets (Madsen and Servais, 1997).

**Firm-level antecedents**

Based on the evaluation of the findings, networks are found to be an important antecedent for internationalization at the firm level, as all respondents emphasized the role that strategic partnerships and alliances played in their international market selection, operation and decision-making processes. For example, Lumtech’s manager highlighted that “being a part of the network is also considered an avenue for new market knowledge, clients, and getting access to contacts who can be beneficial for business.” Hence, this finding is in line with extant research that has repeatedly found that networks improve the speed of the internationalization process by providing a firm with access to critical external resources, capabilities, relevant information, knowledge, and opportunities (Oviatt and McDougall, 1994; Madsen and Servais, 1997; Freeman et al., 2006). Within the renewable energy market, more specifically, recent research shows that having access to networks is also an important antecedent to the internationalization of small firms (Manesh and Rialp-Criado, 2018).

The reaction to opportunities seems to be reinforced by network recommendations for market entry and through product development efforts. These contacts are the principal medium through which a firm enters a new market. As the CEO of Biosoln pointed out:

> They have been introduced and approached by potential partners, and we are approaching them, so you never know. These partners also assist in looking for projects and deals in nearby locations.

Thus, the findings confirm that networking relationships support the explanation of early and accelerated internationalization processes (Zucchella et al., 2007). A variety of reasons could explain why networking is so important. For one, the case firms exhibited a lack of familiarity with international markets and suggested that resource limitations were a profound reason behind using networks to internationalize. The CEO of IoTech noted, “The way they enlarge and grow their business in foreign markets depends on how they can find the partners over there.” These responses correspond to the proposition that network relationships provide access to resources, knowledge and capabilities required by a firm to compete internationally or enter markets of interest (Chetty and Wilson, 2003).

Virtually, all the case firms also possess unique products, services and innovative technologies in comparison with conventional offerings. As research shows, firms with unique combinations of resources that are rare, non-imitable and non-substitutable tend to possess a high international orientation (Barney, 1991; Wernerfelt, 1984). Resource and capability constraints seem to be a moderating factor in the internationalization process of the case companies. For example, the company manager of Newaves mentioned that, although the company benefits from its vast network of distributors who carry out sales internationally, the company has limited human resources to effectively execute internationalization operations independently. However, it is also mentioned that the company is making active efforts toward improving potential resources and capabilities to amplify and strengthen their internationalization undertakings. In another example, the Biosoln CEO mentioned:

> [...] Due to the small size of the company and limited revenue, the internationalization strategy of the company in the interim is to focus on project development and optimize firm resources and capabilities for market entry and to meet international market demands. [...] we have a realistic approach based on their available internal resources and capabilities to manage projects at hand.
Therefore, the company thinks that if they “persevere and team up with big players, they will have the opportunity to penetrate conveniently international markets in the end” (CEO, Biosoln). Moreover, all the case firms were relatively small and had insufficient human capital as their key characteristics. The small size puts pressure on them and marginalizes their internationalization efforts. As the CEO of Biosoln put it:

The problem is that we have 20 people in the company, so we do not have that many personnel or human resources, and these things they take a lot of time.

The respondents also emphasized the importance of knowledge in product and service development, gained from market research, R&D or through feedback from partners. This echoes the studies that indicate that the knowledge and technological capabilities of firms can have a positive relationship with their internationalization and performance (Autio et al., 2000; Zou et al., 2010). Additionally, the Finnish cleantech SMEs seem to be strategically oriented. For example, the strategic orientation of Newaves capitalized on the natural resources’ (high wave energy) potential or new markets. In addition, strategic decisions, according to Lumtech’s manager:

[... ] were made based on the nature of our product (220v) suitable for European countries and [... ] growth is step by step on the focused markets and areas for that reason, we go where our products still have some leading edge.

In other words, the resources available to and the knowledge capacity of a firm determine its strategic decisions and actions (Cohen and Levinthal, 1990; Wiklund and Shepherd, 2003).

Moreover, the nature of renewable energy resources seemed to be location-specific. Put differently; renewable energy firms may use unique raw materials or specified technologies or services that are location-specific in terms of where the product is commercialized. For example, Newaves developed their technology in Finland, but the commercialization of the product was more favorable in Portugal where the ocean waves were in abundance, and the production potential could be sufficiently demonstrated to other prospective clients. Lumtech on the other-hand focused their technology on 220v LEDs which was suitable to be sold mainly in European markets. Thus, unlike SMEs from other industries producing generic products, renewable energy firms’ tend to make more tailored to specific target customers. As a result, market choices and decisions significantly affect the degree and speed of internationalization, as well as the performance and survival of renewable SMEs (Bloodgood et al., 1996; Knight, 2000). Studies could further investigate the role of boundaryless resources (e.g., water, wind, solar) or other novel technologies of firms operating in other renewable energy sectors to identify how such resources or capabilities may affect their internationalization operations.

The case companies also adopted niche strategies and capitalized on their legitimacy, as an important avenue through which they can speed up their internationalization processes and reduce the impact of global competitors (Bloodgood et al., 1996; Madsen and Servais, 1997; Knight and Cavusgil, 2004). For example, the CEO of Biosoln mentioned that, owing to the high level of competition globally, sustaining a strict Intellectual Property Right is not imperative to them. Instead, their professional expertise, the feasibility of their product and their in-house expertise are considered competitive advantages. Thus, their approach to the international market is a strategic antecedent to improve the performance of the company in the international frontiers (Knight and Cavusgil, 2004).
Environmental-level antecedents

The small size of the country and the maturity of the domestic market in terms of adoption of some of the renewable technologies seem to influence the internationalization of the case companies. The responses showed that the small size of the domestic market affects a firm’s ability to remain consistently profitable. For example, Biosoln and Lumtech were pushed into foreign markets because of declining sales and limited market opportunities in the domestic market. Thus, internationalization was triggered because the case firms had satisfied the domestic market demands extensively. Additionally, the diminishing demand for products made the firms seek alternative ways to make profits. In some cases, the product category was not adequately suited to the domestic market; therefore, internationalization was a natural initial step. For example, Newaves does not make many domestic market decisions because most of the company’s projects are related to available opportunities and technology development abroad. These responses show that the case companies are concerned about the long-term feasibility of their products and service offerings.

Some other challenging factors seem to have been pushing internationalization, such as insufficient investment capital in energy-saving reforms and lack of funds owing to the decline of the Finnish economy, since 2015. For example, one manager mentioned that internationalization was triggered owing to the slow growth of the domestic market. As a result, the local market response to some of the product and service offerings was slightly negative in comparison with the receptiveness of the target countries. The CEO of IoTech mentioned:

Their innovation is not really supported by the old-fashioned structures and processes that are still in use. However, the Swedish market seems to be more welcoming and interested in innovations.

However, it is interesting to note that the case firms had varying perceptions about the geographic distance of the target markets. For example, the CEO of Biosoln was of the opinion that because “[…] waste management is a global phenomenon, they have an unlimited market opportunity: the whole world is the market because you have anywhere we have people we have waste.” Perception toward the geographically distant markets is low because the company’s immediate interest is in companies that are geographically closer to its domestic market. The respondent stated that despite the need to focus on other markets, the company is limiting itself to specific regions because of resource and capability constraints:

We are currently skipping out after the first stage in some countries, and just focusing on Indonesia, Vietnam, and Mexico, owing to the small size of the firm and its lack of resources, as there is no team left even to handle the project in the South African market. (CEO of Biosoln)

In another example, based on his international experience and experience as a sales director, the manager of Lumtech manager reported that Europe was their key market for internationalization because their product specification is best suited for the European market. Other geographical markets, such as Africa or USA, were not of immediate interest for the company because the product liability and legislation governing such countries seemed to pose a challenge for smooth international market entry. Additionally the manager of Lumtech reported that the challenge encountered when entering distant market seemed to be as a result of difficulties that exist owing to cumbersome bureaucracy and international competitors activities:
CPOIB

[... we export mainly around Europe products for 220 volts, via our network. Therefore, the US is out today. Also, maybe good because of the product liability legislations in the US is not so easy, to be honest. [... we know that the Chinese are investing heavily in Africa. They have their big foot between the door, and it seems to be that you need [...] to be dealing with a top government official, else, you will lose! [... in my experience, I had done a couple of projects, or the quotations to Africa but, whatever you do, they eventually buy Chinese[...], regardless of price. (Manger Lumtech)

This finding leads to the notion that managerial perceptions of a market may be because of the accumulation of previous events or past international and personal experiences, which may influence his or her response internal to external environments (Bolzani and Der Foo, 2018). Thus, international managerial experience may influence how they perceive, recognize and capitalize on new international opportunities (Weerawardena et al., 2007). Furthermore, other factors, such as psychic distance, nature of the product and market demand, affect firms’ motivation to internationalize. Based on an assessment of findings, the interest in internationalization in IoTech and Lumtech, for instance, was mostly incremental and targeted toward nearby countries or customers within Europe, whereas the other case companies made quick leaps into foreign markets. In other cases, such as Newaves and Convertech, the international market demand for products and services was the driving force behind internationalization. Thus, these companies had widespread operations globally. In this vein, the CEO of Biosoln highlighted that they “were attracted to international markets with high potential, though the perception of the feasibility of the geographically distant market was low due to insufficient resources and human capital”.

Regulations and public policies are among other antecedents to internationalization in the case companies that participated in this study. Various research findings confirm that the internationalization of SMEs is propagated by general global changes, legislative demands, public policies, economic situations and changing trends in technology (Kuivalainen et al., 2015; Mandl and Esser, 2015). Although most regulations and policies appeared to be supportive, the respondents generally agreed that the regulations tend to influence their internationalization decisions. These regulations vary because of the different categories of the firms operating within the cleantech industry. For example, the CFO of Newaves mentioned that they “were facing varying policies and regulations within the different markets in which it operates,” although the IoTech CEO and Sales Executive added that “the company’s domestic markets and markets of interest had similar regulations and policies”.

Discussion
SMEs take considerable risks in pursuit of international market opportunities (Zahra et al., 2014; Reuber et al., 2018). Thus, understanding the drivers that influence the success of internationalizing firms across national borders is of the essence in IE research.

This study shows that a broad range of antecedents at the managerial, firm and environmental levels affect the internationalization of firms in the renewable energy market.

At the managerial level, the prominent antecedent is the managerial mindset, as mentioned by most of the informants. The results of the case studies highlight that managerial mindsets may affect the geographic perception of international engagements, thereby influencing the market selection, execution and decision-making in international marketing operations (Zahra et al., 2005). Critical internationalization driving factors strongly motivate SMEs for operating internationally and receptiveness toward international markets. This is in line with the previous research, which asserts that the global mindset of managers motivates SMEs’ internationalization (Nummela et al., 2005).
Experience is another essential antecedent of internationalization. Overall, the informants from all case companies encouraged internationalization efforts as a driver for the growth of their firms. However, previous international experiences and functional expertise of the informants seem to shape the perception of their choice for geographical expansion. Previous research also asserts that an essential antecedent of SMEs’ internationalization is managerial experience (Zahra et al., 2005; Acedo and Jones, 2007). Finally, the data analysis shows that the psychic distance is another antecedent that affects internationalization. The psychic distance refers to a manager’s perceived extent of similarity or difference (mind’s processing) of cultural and business variants in the home market in comparison with a given foreign market (Evans and Mavondo, 2002; Johanson and Vahlne, 1977). For example, the novelty of the renewable energy industry seems to affect the case companies’ choice of international markets. The entrepreneurs’ interest in entering markets with proximity is associated with learning about customer reactions to products, which can be replicated across other markets. This finding raises deliberations on the notion of psychic distance, which is subject to future research. Consequently, this leads to the question of whether the novelty of the cleantech sector makes entrepreneurs take precautionary measures regarding target market selection, thus entering into similar markets and avoiding less risky ones. Therefore, the psychic distance is a managerial antecedent and, as expected, it noticeably affects the case companies’ internationalization in various ways, as shown in the study’s findings. It is also noted that the firms simultaneously learn when they choose a market that is close by. This coincides with previous research (Zahra et al., 2014), which indicates that SMEs may leverage their learning innovation and adaptation as they expand to new markets, unlike their larger counterparts.

At the firm level, networks are observed to be the critical driver of internationalization. There was a consensus within the case firms about the importance of having a strong network for internationalization. Network relationships are an important avenue through which the case firms are internationalized. All the case firms were a part of some coalition, with various actors, and had strong ties through which they shared knowledge and resources to compensate for their size, resource, and capability constraints. Irrespective of the cleantech category, the case firms were actively searching for appropriate partners, suppliers or agents internationally. It is also noticeable that networks (agents, distributors or partnerships) positively influenced the firms’ pace of internationalization. This finding bolsters the notion that the strength of a network is based on trust and is essential for successful internationalization of Finnish cleantech SMEs (Kuivalainen et al., 2015).

Innovative technology is another important antecedent of internationalization within the case studies. For example, R&D was mentioned to be a fundamental prerequisite for monitoring performance and product development. Correspondingly, all the case firms showed the need to continually gain knowledge and improve their level of product and technology innovation. This comes as no surprise because the renewable energy market is associated with high-tech products and services. Most managers also asserted that the knowledge of the industry, products and services of both domestic and foreign markets affects internationalization.

Firm capabilities are found to be a significant antecedent for the internationalization of the case firms, regardless of their small size, because they possessed unique resources and capabilities. According to these findings, expert human capital, highly educated professionals, innovative products and services, a high level of technology and flexible organizational management are examples of the capabilities possessed by these firms. Additionally, all case firms were interested in gathering knowledge and improving their products and services through R&D and market research or collaborative research with...
universities. This is in line with recent studies that suggest that cleantech firms benefit from knowledge spillover from universities and other sources as a basis for creating and growing their ventures (Giudici et al., 2019). Also, considering the firms’ substantial investments into R&D and their corresponding limited resources and capabilities, it was challenging to decipher how the companies measured the potential sales and success of their current products and services. However, we surmised that there is a possibility that these actions, as mentioned earlier, were because of the market seeking and knowledge-intensity characteristic of renewable energy entrepreneurs—in response to changing global trends—such as sustainability, the effect of on firm activities and/or competitive advantage gain. This deliberation is supported from the theoretical standpoint, according to which the changing industry structures and trends in global businesses may lead to a restructuring of the business models of both smaller and larger firms to provide more sustainable products and services (Dean and McMullen, 2007; Kolk, 2015; O’Rourke, 2009). In sum, changing global trends may push cleantech companies, especially those in small economies, to internationalize to stay profitable.

At the environmental level, the small size of the domestic market and the newness of their industry are typical to all case study firms. The small size affected, both directly and indirectly, the extent to which these firms allocated their available resources and capabilities, which, in turn, influenced their internationalization decisions. This outcome is consistent with the findings of Kuivalainen et al. (2015), who described that the disadvantages associated with internationalizing Finnish SMEs included limited resources, the small size of the domestic market and the scarcity of financing opportunities. Managers in the case firms also mentioned the importance of the nature of the product, market demand, investment capital, geographic distance and regulations as factors affecting internationalization.

Based on the overall results, this paper also argues that, in addition to the small firm size, there are some other similarities among the SMEs operating in the renewable energy market and those in other industries. For example, they are similar in the ways they seek international opportunities and recognition. Network ties are also significant facilitators to internationalization for both types of SMEs, as they face the liability of smallness when deciding to internationalize. However, according to this study’s analysis, the antecedents to internationalization of SMEs in the renewable energy market differ distinctly from those of the SMEs in other industries at different levels of analysis. Table IV highlights these differences.

Relevance and particularities of renewable energy/cleantech small- and medium-sized enterprise’s internationalization

Research suggests that contextual exploration of SME internalization motivations provides explanations and clues about firm decisions and on how entrepreneurs perceive and construct their industries’ boundaries and opportunities in international markets (Zahra et al., 2005; Zahra et al., 2014). Thus, based on the interwoven antecedents obtained from the case firms (through the interview responses), it is concluded that the operations of cleantech SMEs emanate from the rise of sustainable practices that foster lean production and waste elimination, aiming to transition from a dominant logic toward achieving winning business operation outcomes (Pernick and Wilder, 2007; O’Rourke, 2009). In other words, clean technology entrepreneurs are more conscious of sustainability-related issues, the need to save costs and to develop optimized business processes and technology development. As a result, the SMEs operating in the renewable energy market are geared toward achieving the
highest level of productivity and efficiency, as opposed to SMEs in other industries with conventional offerings.

It is also evident that the overall growth of Finnish cleantech companies is an attractive investment category that the government is interested in supporting. For that reason, the entrepreneurs seem to be proactive about harnessing international opportunities to obtain substantial funding for their business operations from various support groups, investors and venture capital firms. This is in line with empirical evidence that highlights that increasing involvement, engagement and support of venture capitalist, private equity investors, public capital markets and investment banks as significant financiers of renewable energy markets have also led to mainstreaming and scaling up of manufacturing of renewable energy solutions (Usher, 2008; O’Rourke, 2010). Consequently, in alignment with academia and practice, the opportunity provided by the renewable energy sector (cleantech industries) has the potential to revolutionize the way business is carried out (Kachan and Fugere, 2013; Pernick and Wilder, 2007; O’Rourke, 2009; Giudici et al., 2019). Some of these revolutionary changes that renewable energy technologies promise include long-term improvement in environmental condition, cost reduction and optimization of conventional products, services and processes (Pernick and Wilder, 2007; Usher, 2008; SDGs, 2015; Kachan and Fugere, 2013).

Furthermore, changing trends, environmental regulations and policies are also increasingly giving rise to the demand for environmentally conscious and sustainable behavior in product, service and process development; hence, the relevance of renewable energy technologies is also growing (Nummela et al., 2004; SDGs, 2015; Zucchella et al., 2018; Giudici et al., 2019). Some of these regulations and policies create new market opportunities globally, facilitating the internationalization of renewable energy technologies. Overall, the findings illuminate that renewable energy SMEs shift our view of SMEs in general because
they move from “regular” business practices to more “conscious” ones (Cleantech Finland, 2015; Kachan and Fugere, 2013; O’Rourke, 2009).

Conclusion
This study sought to provide foundational knowledge on the phenomenon of entrepreneurial internationalization of renewable energy enterprises and its distinctive features in comparison with the internationalization of SMEs, in general. Renewable energy has an increasingly prominent role in IB research (Kolk, 2015) and has distinct requirements about how the companies in this sector should organize their operations (Engelken et al., 2016). However, the literature on the internationalization of such enterprises and SME enterprises, in particular, has been relatively scarce until now (Ruzzier et al., 2006; Ribau et al., 2016). To the best of the authors’ knowledge, the present study is one of the first exploratory forays aiming at incorporating the renewable energy context into the body of IB literature and, through its assessment of SMEs, into the body of research on IE, in general, and SMEs’ internationalization, in particular.

Theoretical contributions and managerial implications
The theoretical implications primarily build on distinct and limited research that addresses how global environmental challenges affect IB and IE. This especially applies to SMEs that aim to capture the international opportunities that those challenges offer, thereby potentially providing them with added benefits through their global presence. The results of this study satisfy this research gap and contribute to SMEs’ internationalization research. First, this study provides insights on the internationalization context of renewable energy enterprises. As global challenges, arising from climate change, result in changing global reforms and policies that influence businesses in general (Loock, 2012; Schönberger, 2013; Ellabban et al., 2014), examining the internationalization process of renewable energy, SMEs is thus both timely and increasingly relevant for IB research. Second, this study provides contextual contributions to IE research by exploring the antecedents to and motivation for the internationalization of renewable energy SMEs by identifying what cleantech SMEs prioritize and what drivers influence their choices in the international market selection and/or internationalization engagements. Third, the findings also show that the internationalization of SMEs can go beyond mainstream SMEs’ internationalization theories that developed in the time-sensitive context of the 1980s and 1990s (Rialp et al., 2005; Ruzzier et al., 2006). Hence, in line with recent IE studies, the emergence and internationalization of renewable energy SMEs reflect drivers such as knowledge intensity, international opportunity, learning, international networks and international experience to operations across national frontiers (Oviatt and McDougall, 2005; Reuber et al., 2018; Zucchella et al., 2018; Giudici et al., 2019).

Moreover, based on the study’s findings, it is noted that there remain notable differences between renewable energy SMEs and SMEs in general, even though some of the former’s internationalization process drivers are similar to those of the latter. The findings further highlight the importance of network relationships as necessary components of the internationalization of renewable energy SMEs. This is because of the sector’s novelty and the need to remain profitable and capitalize on the opportunities that the renewable energy market provides. Consequently, this study reinforces and extends the evidence found in the SMEs’ internationalization literature, which supports the view that collaborating with the right partners is instrumental for broadening a firm’s foothold in the international renewable market (Loock, 2012; Kuivalainen et al., 2015). Additionally, the findings support the view that market information, operational information and government support services
foster foreign market entry. Extant studies also strengthen the notion that these support services are helpful to firms that are in their early stages of internationalization (Kuivalainen et al., 2008, 2015). Thus, managers can capitalize on various coalitions and devise collaborative strategies with supporting organizations, such as chambers of commerce, consulting firms or funding institutions, to foster their internationalization efforts.

The study results elucidate that the entrepreneurial attitude of renewable energy SMEs toward internationalizing to distant countries is not very proactive. Additionally, incremental internationalization decisions seem to be common amongst the case firms, mainly because of the novelty of the industry (Kuivalainen et al., 2015). Consequently, managers appear to be leveraging their limited resources while learning about new markets and minimizing the risk of going to more distant countries, which may not be ready for cleantech products or technologies. Hence, in line with previous studies on SMEs’ internationalization, this attitude is not a result of these markets being devoid of opportunities but rather because the case firms exhibit a risk-averse approach (Mandl and Esser, 2015; Crespo et al., 2015; Kuivalainen et al., 2015). Hence, they prefer to internationalize to culturally close markets and countries (from developed to less developed countries) with less demand for firm resources. Overall, the researchers urge the managers to consider being more receptive to market opportunities regardless of location by internationalizing to developing countries, for example.

Furthermore, internationalization provides alternative means or opportunities for firms, especially for SMEs, to be more profitable, grow beyond domestic market boundaries, intensify competitive strategies and foster innovation efforts (Hollensen, 2007). Therefore, through the lens of Finnish cleantech SMEs’ internationalization, including discussions on the renewable energy context, this study provides layered contributions to IE and SMEs’ internationalization research. It also elucidates that the internationalization of SMEs in renewable energy markets is a novel approach to entrepreneurial activity – in comparison with SMEs’ internationalization in general – involving the adoption of business models that combine innovation and technology-driven solutions to solve global environmental problems.

Additionally, compared with SMEs from other industries offering similar (conventional) products, cleantech is a highly diversified and growing renewable energy industry that is gaining growing attraction for future global investments and development (Usher, 2008). Increasing investment is because the opportunity and adoption of clean technology in global market space foster cost savings, efficiency and less waste (Pernick and Wilder, 2007). Also, changing consumer preferences for environment friendly products and services is a driver for companies to produce and satisfy changing market needs. Hence, entrepreneurs can potentially benefit from the boost in the renewable energy market because it provides a platform for marketing products and services, as well as for creating new job opportunities. Essentially, we identify that renewable energies are increasingly becoming a significant global macro-economic contributor leading to additional jobs, national revenue and investment opportunities in Finland. This is in congruence with studies (Usher, 2008; Kolk, 2015) that view climate change as a global phenomenon of interest, which is a critical antecedent to the growth of the renewable energy sector. Finally, internationalizing renewable energy SMEs also capitalizes on their market niche (unique and optimized processes) as a collaborative strategy with partners or co-creation with customers develops a thriving competition internationally with global market players (Pernick and Wilder, 2007; O’Rourke, 2009). This is in line with studies that suggest that network relationships could be valuable for managing the psychic distance and liability of foreignness during SMEs’ internationalization (Kalinic and Forza, 2012). Overall, it is surmised that the renewable
energy market provides a proven avenue that SMEs could leverage to keep up with changing global business trends and to boost profitability (Usher, 2008; Giudici et al., 2019).

Limitations and future research
Although a comprehensive study was carried out, some research limitations nevertheless exist that call for further investigation. First, one limitation, as well as a future research avenue, relates to the contextual setting of this study. The home country’s institutional environment for renewable energy firms, as well as the firms in the cleantech sector in general, is specifically acknowledged in this regard – because it can be distinct from other markets in many ways. This may limit the generalization of the obtained results across country contexts. For example, public policies related to renewable energy can influence private investment behavior (Bürer and Wüstenhagen, 2009), as well as technological innovation among renewable energy enterprises (Johnstone et al., 2010). Thus, the impact of energy and other public policies – as the driving force behind the Finnish renewable energy and cleantech companies – might not be similar across different country contexts and within distinct institutional environments and varying roles of national and supranational regulations (e.g. Russia). Aligning with this notion, future research could incorporate cross-national empirical settings through comparative internationalization studies of renewable energy enterprises from differing countries of origin. Second, the single-country context provides research expansion avenues for comparing Finnish renewable energy SMEs from similar or different industrial categories, which would also be insightful because the two types of companies may still compete with one another, either directly or indirectly.

Third, the study explores a developed market in the home country context, i.e. Finland. Additional studies could replicate this study in other country contexts – for example, some studies suggest that the internationalization and export behavior of SMEs originating from developing markets is, in many ways, are distinct from internationalization in developed market contexts (Crick et al., 2011; Pradhan and Das, 2015; Berko Obeng Damoah, 2018). Thus, future studies could look into expanding the analysis on the internationalization of renewable energy SMEs to include comparative studies from other contexts. Furthermore, this study does acknowledge that firm-level antecedents examined through quantitative methods can reveal effects on internationalization outcomes, such as the degree of internationalization or international performance, while noting that it is not, necessarily, the number of empirical cases that determines the influence of the results (Siggelkow, 2007). However, to gain more comprehensive knowledge of the internationalization motivations of firms, assessing a more extensive data set or sample size would be valuable for future research assessment.

The findings of this study also illuminate the role of sustainability and environmentally conscious behavior as attributes of Finnish renewable energy SMEs. Consequently, the renewable energy segment presents innovation opportunities for incorporating sustainability and environmentally conscious behavior business models of renewable energy SMEs (Richter, 2013). Hence, clarifying how business model innovations factor into the internationalization process of enterprises in the sector could yield further insights into their behavior from an IB point of view. Also, a follow-up study on the internationalization pathways adopted by renewable energy enterprises could help by providing a dynamic view of the reasons that drive their internationalization process in both the home and host countries.
Another possible avenue for future research is the incorporation of other, more established, theoretical constructs – such as sustainability – to better understand “cleantech” itself as a phenomenon. Deriving from the findings presented in this study, future research could aim to identify further and understand the role of sustainability in the internationalization process of cleantech SMEs and, particularly, of renewable energy SMEs.

Furthermore, the analysis presented here also reveals that the novelty of products in the case study firms causes them to internationalize to nearby markets first to see whether those markets are promising enough. This raises deliberations on the notion of the psychic distance that is subject to future research. Does the novelty of the industry make the SME managers take precautionary measures regarding target market selection, thus entering into similar markets and avoiding less risky ones? Future research could extrapolate based on the results of the present study by making the latter question its research question, driving further enquiry.

In exploring cleantech, it is identified here that the context and reasons why renewable energy firms are created represent responses to a more environmentally and ecologically sustainable future. However, this research also shows that some of the renewable energy firms’ motivations still mimic those of SMEs in general. In other words, it is still unclear whether cleantech firms simply leverage the available and spillover knowledge, private and public investments or even favorable and timely policies to sell their innovations and make profits. For that reason, more research and in-depth enquiry about entrepreneurial cognitions would be valuable for gaining insights into the motivations of these SMEs. Studies (Zahra et al., 2005, 2014) suggest that exploring the cognitive perspective can contribute to the future understanding of personal values in the international orientation of decision-makers and how they interact with antecedents (e.g. environment, experiences and networks) and/or other factors that impact their internationalization undertakings.

In sum, the results of this study indicate that many of the foundational aspects identified in the SMEs’ internationalization literature, such as the importance of network relationships, managerial experience, global mindset and the domestic market size, are significant drivers of the internationalization of SMEs in the renewable energy section as well. However, the results also point toward several notable distinctions that suggest that the internationalization of these enterprises constitutes a distinct phenomenon that should be examined further.

Note
1. Antecedents to internationalization are factors that precede the internationalization of firms. Extant research has used “antecedents” interchangeably with terms such as: “motivation,” “drivers,” “stimulus,” or “factors” (Hutchinson et al., 2007). Similarly, in this paper, these terms are used interchangeably.

References


Further reading


OECD (2012), “Entrepreneurship, SMEs and local development clean-tech clustering as an engine for local development: the Negev region, Israel”.


Appendix. A sample of questions asked during the interviews

- Could you briefly tell about your work history? What is your international experience (where, when, and duration)?
- Could you briefly tell about the company (when it was founded and the reason)? What are your products and service offerings? Do you have any competing products (in the industry)?
- Are you part of any networks or are there any benefit(s) to being a part of Cleantech Finland or any other associations? What is your relationship with other Cleantech firms?
- Can you briefly describe how the activities of other Cleantech firms affect your business operations or decisions? What are the countries of your current operations?
and countries of your immediate interest? How many countries have you exported to?

- How do you describe (your) the role of the owner(s) of the company? How has your role or position in the company affected the internationalization process?
- How are the internationalization decisions for your company made? Which other people play a role in internationalization decisions (if not already mentioned earlier) and how do they go about it?
- How does your background or skill set affect the company’s internationalization? (Asked if the interviewee is not the business owner)
- When did you start your internationalization activities? What motivated your internationalization efforts?
- Can you describe the situation of the market in Finland with regards to your business operations? What kind of challenges in Finland affects your business (manufacturing, customers and suppliers)?
- What kind of legislation or regulation supports your internationalization activities (home and abroad)?
- Can you describe the way you have previously entered new markets? If you need to enter a new market, will you use the same entry modes? What other methods will you consider using and why? (e.g., exporting and licensing)
- What kind of international customers/geographic markets do you think you would target first, and why?
- What kind of countries would you prefer to target first? What would you say are your company’s motivations about more distant countries (geographic markets)?
- What kinds of challenges do you face abroad/what challenges affect your internationalization operations? What are the roles of your agents or important partners in your company?
- How do you describe your relationship with these agents or partners? In what way do they assist you in your internationalization decisions and operations?
- What kinds of credentials or certifications are relevant for your company’s reputation and cross-border activities? Do the certifications impact your internationalization activities?
- Briefly, describe your internationalization plan. To what extent have you used it in your internationalization activities? Are you satisfied with it? What are the possible reasons to adjust the strategy if necessary?
- What is the general/entrepreneurial vision for the company? Can you give an overall summary of your internationalization strategy? Where do you see the company in the next 5-10 years?

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