

TABLES

Table 1. *Description of the case firms*

Company	Convertech	Biosoln	Lumtech	IoTech	Newaves
Foundation of company	2009	2003	2006	1990	2002
Start of internationalization	2009	2006	2011	-	2002
<i>Products, Services, and Technology</i>	Hybrid and fully electric vehicle solutions	Bio-gas construction, customization, and consultancy	Energy-efficient LED luminaire	Heat transfer management	Wave Technology
	Product: Electric and power train systems	Product: Biorefinery	Product: Industrial, street, sport, and retail lighting	Product: Detergents and anti-freeze	Product: Wavers and power take-off
<i>Cleantech category</i>	Energy storage/ transportation/ efficiency	Renewable energy/energy storage efficiency	Energy storage /Efficiency	Clean Industry/energy storage/efficiency	Clean/renewable energy/Efficiency
<i>Credentials</i>	ISO Certified	ISO 9001	ISO 9001 and 14001, SGS-GS certificate for PRO-wave	-	Fitness for purpose certification
<i>Turnover in euros (2015)</i>	<i>3,000,000</i>	<i>8,000,000</i>	<i>5,000,000</i>	<i>4,000,000</i>	<i>200,000</i>
<i>Number of employees</i>	<i>30–40</i>	<i>20</i>	<i>25</i>	<i>30</i>	<i>20</i>
Method of foreign market operation	<i>Licensing, exports, cooperation with value added distributors or resellers</i>	<i>Personal contacts, collaboration with partners and agents</i>	<i>Exporting and via international distributors</i>	<i>Intended operations via International partners</i>	Own demonstration projects and via Integrators
International markets and regions served	<i>Europe and China</i>	<i>Poland, Greece, Indonesia, Mexico, South East Asia</i>	<i>Sweden, Baltics, Germany, Benelux countries, South America, Spain, Switzerland,</i>	<i>Sweden</i>	<i>Reference project: Portugal.</i>
Regions and Countries of interest	<i>Flexible to the global market opportunities</i>	<i>Southeast Asia, South Africa.</i>	<i>Germany, Norway, Denmark, Baltic countries</i>	<i>Sweden, Scandinavia and Baltic countries</i>	<i>Western coastline, Japan Chile South Africa, Australia</i>

Table 2: Data sources and participant information

Company	Informants (role in the company)	Background and international experience	Duration of interview	Secondary data
<i>Convertech</i>	Marketing representative (1 participant)	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.	50 mins	Web page, Pamphlets, News articles, and reports. Other interview transcripts
<i>IoTech</i>	Chief executive officer & Sales executive (2 participants)	<i>CEO:</i> University graduate of with 19 years of work experience in sales, marketing career in Finland <i>and Russia.</i> His most extended international expertise is in exporting to Russia and central Europe, and Business travels to abroad to Russia, and Beijing in China. <i>Sales Exec:</i> 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	61 mins	Web page, News articles, and reports, email correspondence, Follow up discussions. Other interview transcripts
<i>Newaves</i>	Chief financial officer and Head of the business development (1 participant)	The informant manages projects and negotiations within the company. He has an educational background in finance and with 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.	90 mins	Web pages, Pamphlets, News articles and reports, email correspondence Follow up discussions. Other interview transcripts
<i>Biosoln</i>	Chief executive officer (1 participant)	Interviews type: Face to face Informant is the CEO of the company. He has education in environmental technology up to Ph.D. level. Extensive work experience in consulting and in the environmental sector. He mentioned that his International experience arises from business operations in foreign countries example. US, Russia, China, and parts of Europe.	59 mins	Web page, Voitto database, News articles, follow up discussions. other interview transcripts
<i>Lumtech</i>	Director of sales (1 participant)	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&D, and key account management (KAM) roles. He mentions having vast international experience and the capability of leading multiple business locations simultaneously.	44 mins	Web page, Voitto database Pamphlets, News articles; follow up discussions. other interview transcripts

Table 3. Antecedents of SMEs' internationalization operating in renewable energy market

Level of analysis	Antecedents	Illustrative quotations from case companies
Managerial	Mindset	<i>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.</i>
		<i>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.</i>
		<i>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!</i>
	Work and International experience	<i>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.</i>
		<i>Newaves: [...] I have been exposed to very different business environments and cultures. our company has demonstration projects in several countries</i>
		<i>Lumtech: I have long work experience in diverse multinational companies and heading international teams. our company actively uses distributors to sell around the world</i>
		<i>IoTech: Personal experience in multinational companies and vast international experience and the capability of leading multiple business locations simultaneously. [...] experience in the Nordic and Baltic area is also a key reason for doing various businesses in the Nordic and Baltic area.</i>
	Psychic distance	<i>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.</i>
		<i>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.</i>
Firm	Network	<i>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.</i>
		<i>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.</i>
		<i>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.</i>
		<i>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).</i>

	<p><i>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].</i></p>
Innovative technology	<p><i>Convertech: 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.</i></p> <p><i>Newaves: 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.</i></p> <p><i>IoTech: 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.</i></p>
knowledge intensity and learning	<p><i>Convertech: [...] 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).</i></p> <p><i>Lumtech [...] 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."</i></p> <p><i>Biosoln: [...]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.</i></p> <p><i>Newaves: [...] we have a very technical and, Ph.D., people with a very advanced analytical and computational skills and then we have people with big experience in, mechanics and building ships.</i></p> <p><i>IoTech: [...]Our service is too narrow. That is why we have just started to investigate how to get the total offer, concerning cooling 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).</i></p>
Capabilities	<p><i>Newaves: 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.</i></p> <p><i>Biosoln: 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</i></p> <p><i>IoTech: [...]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.</i></p>
Strategic orientation	<p><i>Newaves: [...]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</i></p>

		<p><i>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.</i></p> <p><i>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.</i></p> <p><i>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.</i></p>
	Legitimacy and visibility	<p><i>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.</i></p> <p><i>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.</i></p> <p><i>Biosln[...]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.</i></p>
Environmental	Domestic market situation	<p><i>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.</i></p> <p><i>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.</i></p> <p><i>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</i></p> <p><i>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.</i></p>
	Investment capital	<p><i>Newaves: Broadly, renewable energy is getting different types of support schemes in different countries we grant plus funding to, for example, Horizon 2020.</i></p> <p><i>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.</i></p> <p><i>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 for us and arranged customer meetings and meeting potential partners. [...] partner relationships, agents, and university collaborations are important and helpful in providing funding and consulting for</i></p>

		<i>internationalization operation.[...]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 and, arrange meetings, with potential partners and customers.</i>
Geographic distance	<i>Biosoln:</i>	<i>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.</i>
	<i>Iotech:</i>	<i>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.</i>
	<i>Newaves:</i>	<i>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.</i>
Nature of the product	<i>Biosoln:</i>	<i>We are receiving, and treating waste in the way that we also producing renewable energy.</i>
	<i>Newaves:</i>	<i>So we have technology that is certified by (Lloyd's) Register, and there is no other wave energy technology that is that advanced with the (technology) certification. The performance of (our product) is superior to anything else we have seen in wave energy.</i>
	<i>IoTech:</i>	<i>[...] 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.</i>
Market demand	<i>Lumtech:</i>	<i>Grow, step by step on the focused markets and areas. Meaning, go there where your products still have some leading edge.</i>
	<i>Newaves:</i>	<i>Embassies of different countries approach us. They have people who are looking for interesting products and technologies in different countries or specifically about renewable energy, so we have been approached by embassies of different countries to introduce technology to their local governments and national-level governments.</i>
	<i>Biosoln:</i>	<i>We also have to educate potential customers by educating people about waste treatment and how it works [...] the definition of interesting markets is if the culture is ready and advanced enough so that they have cost for disposal of waste or the [country] has rules for disposal of waste, or any kinds of supporting parameters.</i>
Regulations and policies	<i>Convertech:</i>	<i>There was this Paris environmental agreement. [...] guiding the direction of emission regulations and so processes are getting tighter. So we aim to reduce the emissions for our customers [...]that also supports our goal for the future</i>
	<i>Newaves:</i>	<i>[...]some of the Finnish government, policies, in a way have influenced, in a sense that there can be a funding scheme that supports technology development or some project activities, but then they might have a preference to where the money is spent so that the money is spent in Finland. In this sense it can be, there has been this kind of situation where it was driving us 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.</i>
	<i>Biosoln:</i>	<i>[...]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</i>

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.

Table 4. *Distinctions between Renewable Energy SMEs and SMEs in other industries*

Antecedents	Renewable SME internationalization	SME internationalization in other industries
<i>Managerial-Level</i>	<ul style="list-style-type: none"> - Highly experienced and educated in the field - Passion and trend-driven for sustainability for the future generations. 	<ul style="list-style-type: none"> - Mostly profit-driven - May not be highly educated or experienced
<i>Firm-Level</i>	<ul style="list-style-type: none"> - Highly innovative - Knowledge intensisty extensive investment in R&D - Unique resources and capabilities. - Heavy reliance on networks and strategic partnerships. 	<ul style="list-style-type: none"> - May possess resources and capabilities that are not necessarily unique and innovative. - Firms may thrive without strategic partnerships and network links.
<i>Environmental-Level</i>	<ul style="list-style-type: none"> - Novel/ sustainable technology, product, and service offering. - Capitalization on new and evolving sustainable trends regulations and policies. - Adhering product technology to climate change initiatives. - Niche position renewable energy - Increasing investments in the sector - Psychic distance is location and industry-specific. (depends on the nature of products and/or services) 	<ul style="list-style-type: none"> - Familiar/conventional with product and technology - SMEs may be threatened by changing regulations and policies. - Slow response of product technology to climate change initiatives - Psychic distance (low)