Aaron C. Bohjanen

Determining Compatibility in 23 Countries for an Innovative Finnish Concrete Pile Cutter

Case Study: MotoCut Ltd

Thesis
Spring 2015
School of Business and Culture
Degree Program in International Business

Seinäjoen ammattikorkeakoulu
SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

Thesis Abstract

Faculty: School of Business and Culture

Degree program: International Business

Author: Aaron C. Bohjanen

Title of thesis: Determining Compatibility in 23 Countries for an Innovative Finnish Concrete Pile Cutter

Supervisor: Cory Isaacs

Year: 2015 Pages: 72 Number of appendices: 1

The purpose of this study was to develop a customized approach to international market selection (IMS) for the case company MotoCut Ltd. This was accomplished by studying various IMS models and concluding that the compatibility of products in the marketplace was under-emphasized and often ignored before investigating macro factors. Therefore, the author sought out supporting evidence for a suitable solution. Hence, the result is an IMS model that is practical to implement for small firms with limited resources.

The scope of the empirical study covered the determination of the compatibility of a product with 23 international markets through a questionnaire. The data derived from the survey were used to screen the markets on factors that determined readiness for MotoCut's innovative concrete pile cutter. The results of the screening were successful in pointing to countries that warrant deeper research. However, the developed IMS model as a whole remains untested. Consequently, future research is required to prove the model.

This paper documents the development of the new IMS model and the implementation of its first screening stage. Moreover, a foundation for further research was built. By using the prescribed IMS model in a future study, a researcher can seek to prove its validity. Furthermore, the theoretical concepts of IMS discussed within this document can serve as a benchmark for the development of an even different model. Nevertheless, this study has added a new perspective to the IMS literature.

Keywords: international market selection (IMS), systematic market screening, product compatibility, concrete pile cutter, piling industry,

TABLE OF CONTENTS

Tables and figures

Abbreviations

BBA	Bachelor of Business Administration
B2B	Business-to-Business
CEO	Chief Executive Officer
FES	Fuzzy Expert System
GNP	Gross National Product
IMS	International Market Selection
IP	Internationalization Process
R&D	Research and Development
REBAR	Reinforcing Bar (steel reinforcement in concrete piles)
SME	Small and Medium-sized Enterprise
UK	United Kingdom
US	United States

1 INTRODUCTION

International Market Selection (IMS) is an important decision for firms that are expanding beyond the borders of their home market. Before this decision is reached, many factors regarding the firm, target market and entry barriers need be take into account to ensure success (Musso & Francioni 2012, 46). While all of these are important, the author contends that compatibility of the product should take precedence before considering the other factors when screening countries. Therefore, the focus of this study is in finding compatible markets for a new innovation from MotoCut Ltd, a Finnish company that is seeking international markets.

1.1 Background of MotoCut Ltd

MotoCut Ltd is a Finnish company, located in the town of Kerava. Head designer Teppei Morimoto and Chief Executive Officer (CEO) Antti Mäkelä have developed an innovative way to cut concrete piles (Päiviö, [ref. 20 April 2015]). [unofficial translation] Concrete piles are used in construction to create a deep foundation that will bear the weight of the building project (Concrete Piles, [ref. 20 April 2015]). Long, slender columns, made of steel reinforced concrete, are hammered into the ground to a stopping point or certain resistance determined by geotechnical engineers. Consequently, the piles protrude from the ground at different heights and need to be cut to a common height determined by the architectural specifications of the project. A single job can call for hundreds of piles that need to be cut. The common method of performing this task in Finland has been a worker at the base of the pile with a hand-held gasoline powered concrete saw. Consequently, workers are subjected to fatigue in a dangerous environment which includes slipping, falling pile cut-offs and saw kick-backs. Both Morimoto and Mäkelä have experienced the dangers of manual cutting. Therefore, their MotoCut cutting head, which mounts on an excavator, was derived from the practical need for a safer, more efficient means of performing the hazardous, labor intensive task. Rather than a worker cutting at the base of the pile, the MotoCut cutter allows an operator to control the cutting process from a distance in an

enclosed cab. Hence, safely removing the worker from the possibility of being struck by a falling pile cut-off or being injured by the kick-back of the saw. Another benefit of controlling the whole process from an enclosed cab is the ability to complete the job in any kind of weather conditions. In addition to safety and all-weather capability, speed is another advantage. There are two blades on the cutter that cut two sides of the pile at once; thereby making it a faster method than single-blade manual cutting. Another feature is the grapple claw, which grasps the pile while cutting and allows the excavator to lift and stack the cut-off pieces. The cutter, designed and tested in Finland, is based on the characteristics of the Finnish construction market. However, the cutter can be applied to any market that uses precast concrete piles. In 2012, MotoCut was awarded the International Quality Award for Innovation. In addition to sales in Finland, MotoCut has sold units in Sweden. Also, negotiations with buyers in Norway and Russia are ongoing. MotoCut is now looking for opportunities in other international markets. The following study is based on the search for those international markets.

1.2 Background of the study

Late in the summer of 2014, through an internship at Xport in Seinäjoki, the author was assigned to a partner search for MotoCut in the United Kingdom (UK). The goal was to create a list of suitable distributors for the MotoCut pile cutter. MotoCut would then vet the list, based on factors of company size, turnover, outstanding debt and overall trustworthiness, to narrow the list of candidates. A list of 75 contacts, that included piling industry organizations, piling contractors, ground works companies and equipment distributors, was compiled. Initially, equipment rental and sales companies were contacted by email, informing of a distributor search with supporting product information. There was no response to this first means of contact. The next step was telephone calls to the organizations that had received the email; some agreed to more information, but follow-up with those provided no results. There were a few that seemed interested in the product, but didn’t know what the market would be for it in the UK. Attention then shifted to the pile driving contractors, who indicated they didn’t cut the piles; suggesting the ground works companies should be contacted. Upon contacting the ground works

companies, it was found that they used hydraulic croppers to cut their piles. These croppers crushed the pile at their cut-off point, and also left the internal reinforcing steel (rebar) exposed; something the MotoCut pile cutter wasn't currently able to do. After 28 emails and 41 phone calls, it was determined that the UK was not a good market for MotoCut to enter at the present time. This decision was not made on the fact that there were no precast driven concrete piles used; but rather the specifications of the cut were not compatible with the present capabilities of the MotoCut cutter. In Finland the clean cut was valued, due to a tolerance of cracks and chips only 5 mm below the cut line. In the UK, the clean cut didn't seem to be as important as the exposing of the steel rebar. Even if the MotoCut cutter could be positioned as safer, the initial needs of the contractors, based on specifications, could not be met. In order for MotoCut to enter the UK successfully, they would need to make changes to their design in order to meet the needs of the current specifications; or an agent of change would need to address the incompatibility at the source, the job specifications (Rogers 1995, 238, 335). If the engineers of the building projects would specify clean cuts and less exposed rebar, MotoCut would have a place in the marketplace. The time and resources to bring about this change would not be in MotoCut's best interest. The alternative to bringing favorable change to market conditions is creating a solution through Research and Development (R&D) to meet existing market standards with a modified product (op. cit. 238,335). MotoCut is doing just that. They are developing a model that will leave the rebar exposed. For this reason, it was decided to stop the partner search in the UK and continue at a later date; when a model that meets market needs is ready.

After failing to enter the UK market, the author presented MotoCut with a proposal to conduct a survey of international markets to determine where the current model of the cutter would be most compatible. In addition, the same survey could gather information on global market conditions and support the development the new model. Nevertheless, the main goal of the research would be to find markets that are currently ready for the existing model of the MotoCut cutter. For example, a market that uses driven concrete piles and values a clean cut.

The amount of time required to determine the UK was not ready for the MotoCut cutter is hypothesized by the author to be too long. It was estimated that over 50 hours were spent on the project. Granted, some of the research and contacts may be useful at a later date, but it seems that the same results could have been achieved with much less effort. The assumption that things there were done the same as in Finland led the research down a path that was inefficient, essentially talking to the wrong people first. The equipment sales and rental companies, which were targeted first, did not understand the specifications of pile cutting in the UK. Those that were interested in the cutter were impressed by the look, quality and video demonstration of the machine in action; not realizing it wasn't compatible with what the UK construction industry demanded. The lessons learned from the UK partner search form the reasoning behind this thesis project, which analyzes 23 countries on their immediate compatibility with the current capabilities of the MotoCut cutter. The idea is to identify the international markets that use precast concrete piles and cut them flush. No other market considerations, such as size or proximity, will be given at this time. After suitable countries have been identified, MotoCut will determine the country or countries they would like to proceed in with deeper market research and a partner search.

1.3 Choice of research context

The case company, MotoCut, and the author's internship company, Xport. Are working together to find distribution partners for the MotoCut pile cutter. As the project coordinator for this search, the author has chosen to incorporate an international market analysis into a thesis study. The work involved will bring MotoCut closer to finding international distribution partners. Thus, benefiting Xport by creating future market research contracts, or other sources of revenue, while working to boost MotoCut's international presence. The conclusions of the study will be useful to MotoCut in future international expansion, as well as to Xport for a benchmark against other similar projects. A successful study will also benefit the author; not only as a finished requirement for a Bachelor of Business Administration degree (BBA), but as a possibility to continue this work upon completion of the degree.

1.4 Purpose of the thesis

The purpose of the thesis is to gain an insight into the use and cutting methods of precast concrete piles from a list of countries chosen by MotoCut. Moreover, the information will be used by the company to strategically plan the next step of their international marketing campaign. Furthermore, the International Market Selection (IMS) model developed for MotoCut can add to the models already developed. The main goal of the IMS is to find markets that are currently ready for the MotoCut cutter. Other data gained from the study will be useful for R&D and future market entry considerations.

1.5 Structure of the thesis

In section 1, after the introduction of the topic and familiarization with MotoCut, a review of literature related to IMS will be dissected. Section 2 includes background theory on the need for marketing research, the research process, diffusion of Innovation, cultural and language barriers, as well as the application of theory from the literature review to MotoCut's IMS model. Section 3 begins the empirical study with attention given to the research approach and design, along with creation and implementation of the questionnaire. Also, results of the survey are presented. Section 3 closes by examining the theoretical support for the empirical study. Next, conclusions are drawn in section 4, while section 5 gives suggestions for further research. Finally, an example of the questionnaire is added as an appendix.

1.6 Review of literature

Previous research in the specific industry of concrete piling and cutting methods was not found. An internet search, along with a library database search, through Seinäjoki University of Applied Sciences' Plari search engine, was conducted. Next, an extensive search through the library's Nelli-portal, a search engine for professional and scholarly industry journals, yielded no comparative studies in the piling industry. Construction, engineering, geotechnical and marketing journals were searched with the keywords: piling, pile cutting, and concrete piles. The most

general keyword, piling, returned varying degrees of results. General construction journals often returned nothing; while industry specific journals, such as geotechnical engineering, returned hundreds of results that needed to be reduced. The results that were found ranged from reports on single projects to technical engineering articles. After defining the search more specifically; the scanning of headlines and in-text results revealed nothing to use as a comparison. However, a number of articles were bookmarked which were deemed as useful for supporting information for future use.

Another search, through the ‘resources’ links on various industry websites, was also unfruitful. Examples of websites checked are: Pile Buck Magazine, Pile Driving Contractors Association, Pile Driver Magazine, Aggregate Technologies, Deep Foundations Magazine, American Society of Civil Engineers, International Society for Soil Mechanics and Geotechnical Engineering, and numerous others. The lack of studies and information about specifically the pile driving industry is supported by an article written by Steven J. Hall (2013), Executive Director of the Pile Driving Contractors Association, where he acknowledges the shortcomings of industry literature resources and encourages contractors to support or initiate studies in order to promote pile driving over other choices of piling methods.

Due to the absence of literature directly related to concrete piles, studies related to the broader area of IMS will be explored. More specifically the initial screening process of potential markets. Concepts that are related to this study have been sought out and will be discussed here. The literature will be evaluated based on relevance to the study, age of the information and credibility of the authors. The evaluated material will be either discarded or used to structure a theoretical background for the implementation of a market selection process for MotoCut. The sources used are marketing research texts along with scholarly journals that relate closely to IMS and market screening. The specificty and detail of these sources range from general sections in marketing text books to complete studies on the screening process of foreign markets. The following is a list of the literature that will be reviewed:

- Principles of Marketing: Fifth European Edition. (Kotler, Armstrong, Wong & Saunders 2008, 952–953)

- International Market Analysis: Theories and Methods. (Kuada 2008, 62–66)
- International Marketing. (Ogenyi 2009, 139–147)
- "How Do Smaller Firms Select Foreign Markets?" (Musso & Francioni 2012, 44–53)
- "International market selection for small firms: a fuzzy-based decision process" (Marchi, Vignola, Facchinetti & Mastro 2014, 2198–2212)

From the text book ‘Principles of Marketing’, Kotler et al. (2008, 952–953) give an uncomplicated, clear description of international market selection. They start by suggesting the firm defines its international marketing objectives and policies. Next, set a target for the amount of foreign sales. A plan for expansion should be made, noting how many markets to enter and how quickly. The type of country should be taken into account regarding the attractiveness of the market based on the firm’s product, geographical distance, wealth of the country, size of the market, and stability of institutions. A list of countries should be generated from the previous factors. Now, a screening process can be done to narrow the list. A ranking system should be developed based on such things as economic statistics, cost of doing business, competitive advantage and risk factors. The aim of this ranking system is to derive indicators that point to suitable markets. The final step of the screening process is to choose markets that are projected to provide the best opportunity for long-term returns on the needed investment of resources.

Kuada (2008, 62–66) distinguishes two methods used to choose international markets; the opportunistic approach and the systematic approach. The concept of actively evaluating markets is known as a systematic approach to market selection (Bradley 1995, according to Kuada 2008, 62). This method is in contrast to what is known as the opportunistic approach. Opportunistic identification of markets happen when a firm is alerted to favorable market conditions from outside sources. This alert may take the form of a potential customer or distributor contacting the firm. Also, news or tips of a prime market serve as a means to get the attention of the company. It could be observed that the opportunistic identification of markets is purely passive, but some firms put themselves in the position of receiving opportunities through networking and monitoring of international market reports. In

any event, to increase the likelihood of opportunities, active effort and resources need to be applied.

The systematic approach to market selection is characterized by the gathering and analysis of primary or secondary data to identify suitable markets to target (Kuada 2008, 63). The approach can be seen as an active, one-off project that may or may not demand greater resources than the opportunistic approach. The opportunistic approach can be applied with very little resources, however, it may produce equally small results. Whereas, the systematic approach demands at least some resources for a short time, with a good probability of satisfactory results. The main difference between the two is the speed at which the results are needed. For some firms, it is essential to find new markets quickly; for others, expansion to new markets is not immediately critical.

When a company undertakes the task of systematic selection they can choose one of two sub-approaches, expansive or screening (Albaum, Duerr & Strandskov 2005, according to Kuada 2008, 63). The expansive approach embodies first targeting countries that are psychologically close. In other words, culturally or geographically similar. Psychologically close markets give decision makers a perception of familiarity and a reduction in uncertainty. The expansive approach is typically used by Small and Medium-sized Enterprises (SMEs) that want to go international on a slower scale, thereby using less resources than targeting distant markets. The drawback to the expansive approach is that lucrative distant markets may be overlooked or reached too late, giving competition a chance to dominate those markets. By using the screening approach, a company can find those lucrative markets faster and gain a foothold of the market share. The screening approach begins with a list of all countries and then narrows the list through a process starting with corporate objectives (Figure 1). The reduced list is subjected to further screening with variables that characterize each country. These variables include: social, economic, legal, technological and political. Countries that do not measure-up to the chosen variables are dropped from the list, thereby leaving the best markets for deeper market research. This last set of countries is screened by variables that are mainly comprised of cost of doing business indicators and

market forecasts. The final result is a few remaining prime candidates for market entry.

Greater resources are needed for the screening approach because it involves so many steps in a large pool of markets, whereas the expansive approach only deals with a small number of countries at a time that are thought to be relatively easy to do business in (Kuada 2008, 63). The approach a company takes depends on the product, resources available and a short or long term oriented strategy.

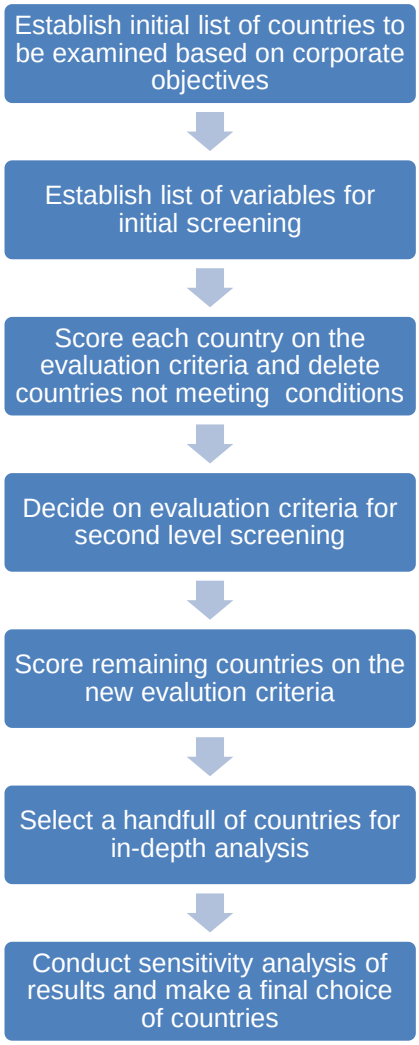

Figure 1. Screening approach model (Kuada 2008, 63; Microsoft Word 2015).

In another book, ‘International Marketing’, Ogenyi (2009, 139–147) suggests two approaches to market selection. The first is by choosing a number of countries that show market potential and are familiar to the firm from previous experience or

knowledge. Without elaborating more on the first, Ogenyi introduces the next method, called ‘contractible’ and gives nearly seven pages of attention to it. A contractible approach takes all markets into account at the beginning and screens them according to factors which deem them unfit for further investigation, thereby reducing the list to a manageable number (Keegan 1999; Albaum & Durr 2005, 192, according to Ogenyi 2009, 140). A correlation of the two aforementioned methods can be made with the two subapproaches to systematic market selection, expansive and screening; which were discussed earlier. Although Ogenyi does not use these terms, his first method of choosing ’familiar’ markets corresponds with the pshycologically close description used by Kuada. Furthermore, the ’contractible’ approach suggested by Ogenyi matches the screening approach laid out by Kuada. Albaum & Durr confirm this connection by using the terms ’contractible’ and ’screening’ in their description. Nevertheless, Ogenyi gives a very detailed account of the factors used to determine the filtering of markets as suitable or unsuitable. Without detailing each factor, the list is as follows:

- common sense
- size of population
- state of development
- regulatory considerations
- economic considerations
- social and business structures
- living standards
- market accessibility

In the text, the previous list goes into more detail than the literature reviewed up to this point. Therefore it serves as a compliment to the other methods, which vaguely suggested using evaluation criteria in the screening process.

In an article from the International Journal of Marketing Studies, Musso and Francioni (2012, 44–53) analyze the internationalization of small and medium-sized enterprises (SMEs) in relation to IMS. Their study revolves around the influences on SMEs’ decisions when using the systematic approach to evaluate and select foreign markets. Furthermore, a correlation between use of the systematic method and traits of the firm were examined. It was found that most

SMEs do not use a systematic approach in IMS. However, when a systematic method is used, factors related to the firm and target market are considered before challenges such as location and cultural differences.

Just as in previous reviewed literature (Kuada 2008, 62–66; Ogenyi 2009, 139–147), Musso and Francioni continue the trend and mention two methods of IMS: systematic and non-systematic (Andersen & Buvik 2002, according to Musso & Francioni 2012, 44). The systematic approach, also following the lead of the previous literature, is given a detailed description. This emphasis is an indication of the support of research findings on the value of the systematic approach, by which many models showing the IMS process have been developed (Douglas, Craig & Keegan 1982; Johansson 1997; Root 1998; Mühlbacher, Leihs & Dahringer 1999; Rahman 2003, according to Musso & Francioni 2012, 45). Musco and Francioni chose to focus on, what they referred to as ”two of the most well known models”: Root’s (1998) and Johansson’s (1997).

Root’s model, is a three step process which first utilizes quantitative factors to quickly and inexpensiverly arrive at a reduced number of countries to be reviewed in the second step. The second step looks at the market potential of each remaining country. Finally, the best prospects, in terms of market potential, are screened with variables that relate to market forcast. In other words, the last two steps take markets with potential and frame them in the context of what the firm can realistically acheive in those markets.

Johansson’s model, in contrast to Root’s three step model, is based on four stages (Figure 2). The first two stages, country identification and preliminary screening, essentially embody Root’s first step. While Johansson’s third step, in-depth screening, relates to Root’s second step. The final step of both can been seen as similar. However, Johansson’s model is said to be unique in that it allows pshycic distance variables, like geography and cultural similarity, to be evaluated (Musso & Francioni 2012).

By studying the two models, Musso and Francioni were enlightened to the fact that firms consider a variety factors when they screen systematically. “These factors

may be divided into three primary categories: firm-specific factors, host country factors and entry barriers" (op. cit. 2012). Table 1, dervived from multiple IMS models and related literature, shows the most important factors firms evaluate in the IMS process (Douglas et al. 1982; Johansson 1997; Root 1998; Mühlbacher et al. 1999; Bradley 1995; Reid 1983; Czinkota 1985; Papadopoulos & Denis 1988; Gomes-Casseres 1989; Calof 1993; Barkema, Bell & Pennings 1996; O'Grady & Lane 1996; Yadong 1999; Andersen & Buvik 2002; Ito & Rose 2002; Gaba, Pan & Ungson 2002; Chetty & Campbell-Hunt 2003).

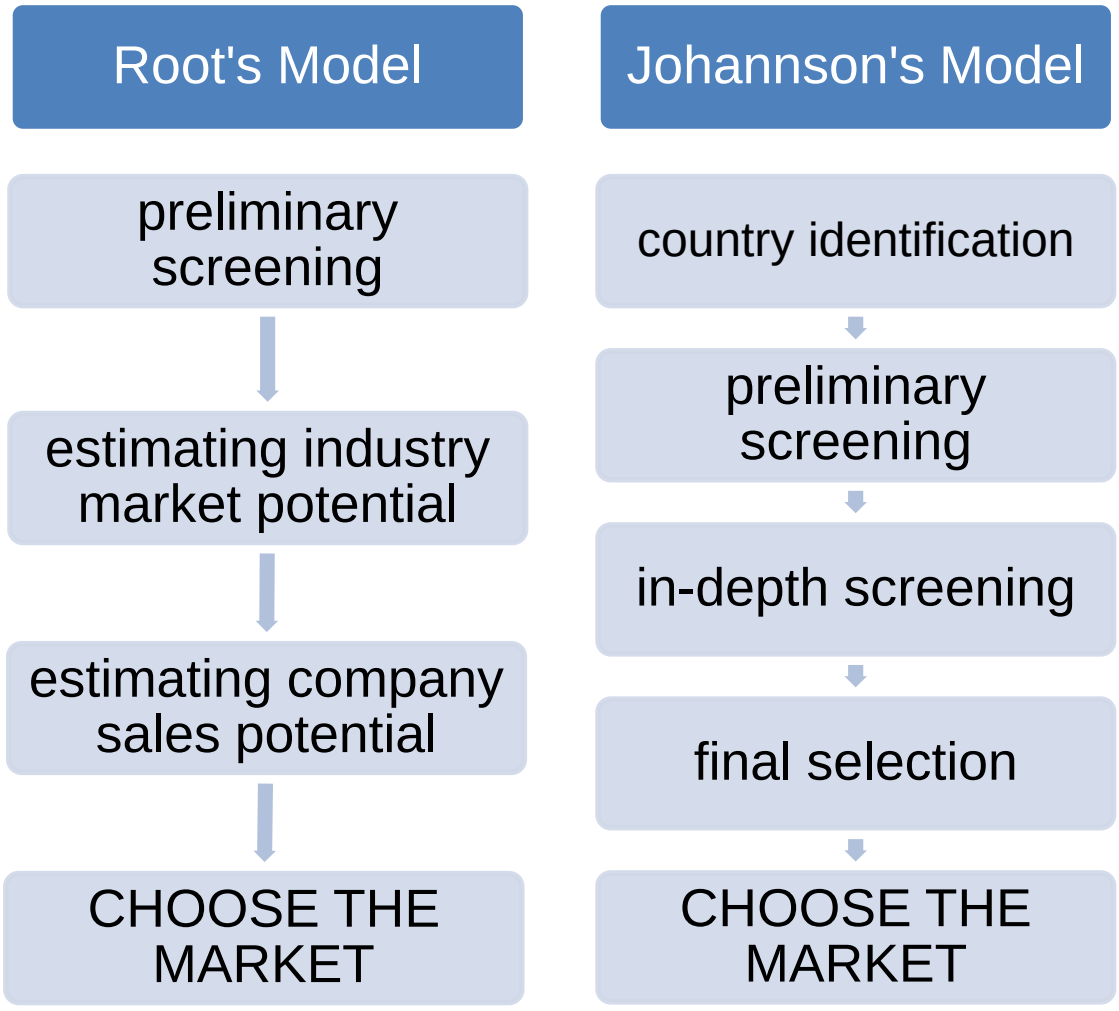

Figure 2. Root's model compared to Johannson's model for selecting foreign markets (Root 1987; Johannson 1997; Microsoft Word 2015).

Also included in Table 1 is the mean response for each factor, calculated from a survey conducted in Italy among SMEs that export. The researchers used firms in the manufacturing sector with at least six employees to form the sample group numbering 221. Upon initial screening of this group, based on their use of

systematic or non-systematic IMS selection methods, it was found that only 55, or 25%, used a systematic approach (Musso & Francioni 2012, 50). Therefore, the data in Table 1 is representative of those 55 firms.

Table 1. Factors influencing international market selection (Musso & Francioni 2012, 48; Microsoft Word 2015).

	factor	**mean response***
Firm-specific factors	type of product	3.85
	management	3.40
	firm size	3.38
	international experience	2.74
Host country factors	market attractiveness	4.15
	country attractiveness	3.79
	marketing infrastructures	3.28
	competition	3.21
Entry barriers	country risk	2.53
	tariff barriers	2.25
	psychic distance	2.02
	non-tariff barriers	1.98
	geographic distance	1.98
*Mid-point on Likert scale= 2.5. Hence, > 2.5: influenced; < 2.5: not		

The mean response in Table 1 is derived from averaging respondents' scores on each factor, which used a 0–5 Likert scale. A high score of 5 means the respondent finds that specific factor influential in making IMS decisions, while a zero indicates the factor is not considered at all. Since 2.5 is the median score, it can be said that anything above this means the factor is deemed as influential. Conversely, any score below 2.5 is non-influential. Market and country attractiveness, as well as type of product, stand out as the most influential factors. While psychic distance and geographic distance, which are usually used to make

decisions with the non-systematic approach, are ranked at the bottom. Contrarily, a number of studies have shown psychic distance to be important in IMS (Davidson 1980; Phillips Doole & Lowe 1995; Barkema et al. 1996; O'Grady & Lane 1996; Swift 1999; Yadong 1999; Evans & Mavondo 2002). It should be taken into account, though, the cost and ease of doing business globally has diminished in recent years (Musso & Francioni 2012, 49). Thereby lessening the importance of geographical location in IMS. Also, the unimportance of psychic distance may be attributed to the fact that most of the firms surveyed used an indirect export mode. Therefore, perceiving cultural bridging as something to be handled by their partners, which deal directly with the native population.

A study by Marchi, Vignola, Facchinetti & Mastro (2014, 2198–2212) entitled "International market selection for small firms: a fuzzy-based decision process" constructs yet another model for IMS. The focus of their study is on developing an IMS model for small firms that typically avoid risk when selecting new foreign markets. A main contention of theirs is that cognitive bias plays a role when avoiding this risk, which is consistent with behavioral based, or non-systematic methods. To limit this bias, they have combined a systematic approach that also takes into account non-systemic elements, such as the firm's prior experiences. The result is a model that considers the objectives of the firm, limits bad decisions based on too few variables and provides flexibility in decision making, which traditional systematic models tend to lack.

Through their research of many IMS models, Marchi et al. (2014) chose two that represent each end of the IMS spectrum in the context of systematic versus non-systematic approaches (Brouthers & Nakos 2005; Alexander, Rhodes & Myers 2007; Gripsrud & Benito 2005): the rational market selection approach and the Internationalization Process (IP)-based approach. The highly structured and systematic rational market selection approach involves numerous stages that utilize secondary market data to arrive at the optimal choice, based on rational choices (Cavusgil 1985; Papadopoulos, Chen & Thomas 2002). On the other hand, the IP-based approach starts with the decision maker using heuristics, or educated guesses, to select a cluster of countries for further consideration. The final choice is driven by avoiding risk, which usually results in choosing a market

that is psychologically or geographically close to the home market (Johanson & Vahlne 2009, according to Marchi et al. 2014). Thereby overlooking other markets that may have a greater potential.

Marchi et al. (2014) used, as a unit of analysis, a small manufacturing firm exploring international markets for the first time. To arrive at the ideal markets for selection, a three step filtering process was implemented; which produced a list of desirable countries, ranked and scored on 21 variables. The first step was to select relevant countries from the nearly 200 possibilities by establishing a threshold of per capita Gross National Product (GNP) equal to or above the host country of Italy. Thereby justifying the export of the same product sold in the home market; high priced paper notebooks, which require countries with a high level of disposable income.

The second stage of screening took the resulting 43 countries from step one and put them through a screening of 21 input variables (Figure 3) derived from research as being key decision points of IMS. The variables were a combination of objective data from secondary sources and perceptual data from the firm's decision makers' perspective. An expert system was used, which is a "computer-supported evaluating system that reproduces the decision rules of a human expert" (Turban & Aronson 2002, according to Marchi et al. 2014, 2199). More specifically, a Fuzzy Expert System (FES) software program was utilized to capture the "fuzziness", or vagueness, of the decision makers' perceptual input variables (Von Altrock 1997, according to Marchi et al. 2014, 2199). All the objective and perceptual variables aggregated together gave the firm a personalized ranking of suitable international markets from which they could choose. In addition, modular intermediate scores, which showed the path to the ranking, were easily obtained from the model; thereby adding flexibility to the usually rigid rational market selection approach (Marchi et al. 2014, 2208). Furthermore, the rationalization of "gut feeling" decisions, typical of the IP-based method, were supported with objective facts.

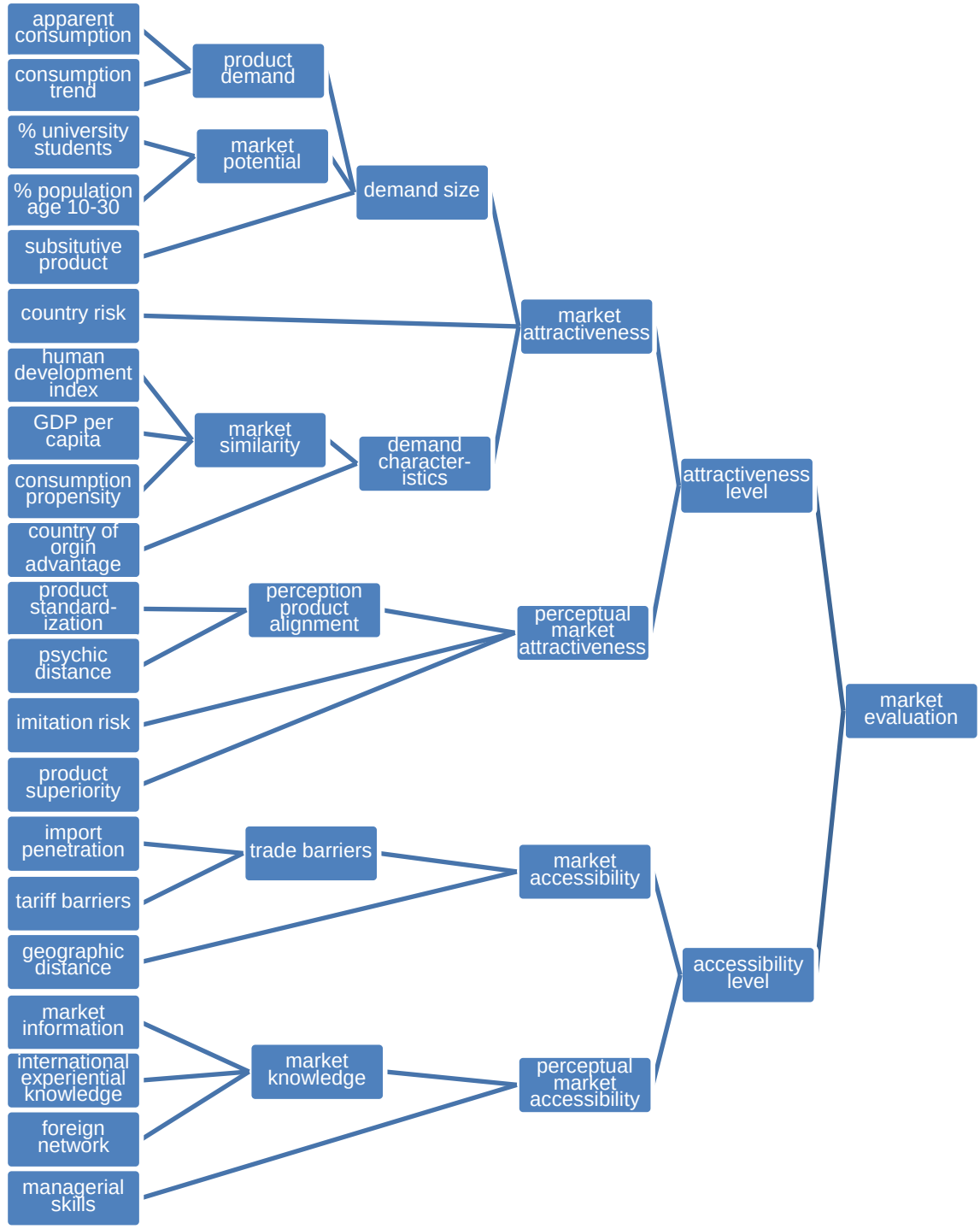

Figure 3. International market selection model using a Fuzzy Expert System (Marchi et al. 2014, 2203; Microsoft Word 2015).

Results of the study indicate that the FES method can reliably produce, in a structured manner, the ideal IMS choice based on the firm's initial vague perception of what they were looking for in a an international market (Marchi et al. 2014, 2207). While all countries in the top 10 ranking (Table 2) could be potential markets, second place Switzerland was chosen by the firm over top ranking Netherlands. The choice was based on Switzerland's better market accessibility score, which suited the small firm's risk avoidance tendency, thereby demonstrating the flexibility of the FES model.

Table 2. Top 10 countries by final market evaluation score (Marchi et al. 2014, 2207; Microsoft Word 2015).

Country	Market access.	Perceptual market access.	Access. level	Market attractive.	Perceptual market attractive.	Attractive. level	Market evaluation
The Netherlands.	0.844	1.000	0.896	0.595	0.800	0.726	76.778
Switzerland	1.000	0.960	0.965	0.609	0.750	0.707	76.532
Finland	0.642	1.000	0.761	0.761	0.850	0.802	74.140
Norway	0.680	0.960	0.787	0.730	0.850	0.802	74.124
Iceland	0.422	0.880	0.561	0.667	0.950	0.840	73.040
Belgium	0.885	0.950	0.881	0.618	0.700	0.670	72.832
Sweden	0.681	1.000	0.788	0.747	0.800	0.785	72.794
Austria	0.975	0.800	0.879	0.682	0.650	0.676	72.296
New Zealand	0.500	0.867	0.625	0.754	0.850	0.804	71.780
France	0.899	0.767	0.833	0.611	0.688	0.670	70.688

2 THEORETICAL BACKGROUND

2.1 Reasons for exporting

Exporting is essential to a company that wants to grow but is based in a small economy which can quickly become or has become saturated (Pope 2002, 24; Ogenyi, 2009, 12). This necessity is even more profound when the product in question is a niche product that will only appeal to limited buyers in a business-to-business (B2B) marketplace. This requires the manufacturer to face internationalization sooner than a comparable domestic company that produces everyday goods to the native population. The need to internationalize so soon can be a daunting task for the start-up that is still trying to build a revenue stream. The added expense and resources to find new markets must be critically evaluated to provide the best possible chance of return on the cost of the search (Ogenyi 2009, 139). Market research reports may be available, but usually not in the case of niche products. Likewise, the company could commission a research firm to carry out the work, but this may not fit into the budget. Another option, which is least expensive, but most exhaustive of the firm's personnel resources, is to carry out the research in-house. With regard to an international context, this may not be feasible due to lack of foreign language skills. With these challenges in mind, the firm needs to evaluate whether investing in international marketing research is the right move.

2.2 Determining the need for marketing research

The process of marketing research demands resources, in the form of capital and time, from the firm. When to carry out this research, lies in the need versus the cost of the results (Shiu, Hair, Bush & Ortinau 2009, 50). A marketing research project carried out with the wrong goals or no specific goal can be costly. To maximize the benefits of the gained information, a determination of the need to undertake the marketing research process should first be considered by the decision makers of the firm.

A company that is in the early stages of exporting needs to determine what countries to target. In the case of SMEs, resources are usually limited and a full global expansion is not realistic. How, then, does a firm decide where to concentrate their marketing efforts? First and foremost is to determine where there is a demand for the product or service being offered. It would make no sense for a snowmobile manufacturer to direct any resources to marketing efforts in African countries that are covered by the Sahara Desert. In reality, most cases are not this obvious and take either evaluation of secondary data or brief market research to determine the potential for sales. In any case, Ogenyi (2009, 141) showed, by using the work conducted by Chee and Harris (1998), a narrowed down list of potential countries can be made with common sense and limited resources. In addition to common sense, the literature lists other factors that should be considered to deem a market unsuitable: size of population, state of development, regulatory considerations, economic considerations, social and business structures, living standards, and market accessibility.

Before the decision makers of the firm consult a researcher, two questions should be asked (Shiu, et al. 2009, 48). First, can subjective information be used by management to effectively address the situation at hand? In other words, the knowledge and experience of the management should be sufficient to make a decision, judgment or assumption that can confidently be accepted. If this is the case, the research process does not need to be initiated. If it is determined that subjective information is not enough to address the situation, the management should look closely at the decision that needs to be made and conclude if it is of strategic or tactical relevance. If it is not, the resources needed to carry out the marketing research would not be worth the results. If the decision is strategically or tactically important, a researcher should be consulted to determine the need and degree of research. The management of the firm and the researcher should work together through the situations outlined in the next paragraph. Figure 4 goes through the process of determining the need to undertake the research process. Red (stop) and green (go) are used to indicate whether the firm should move forward with the process.

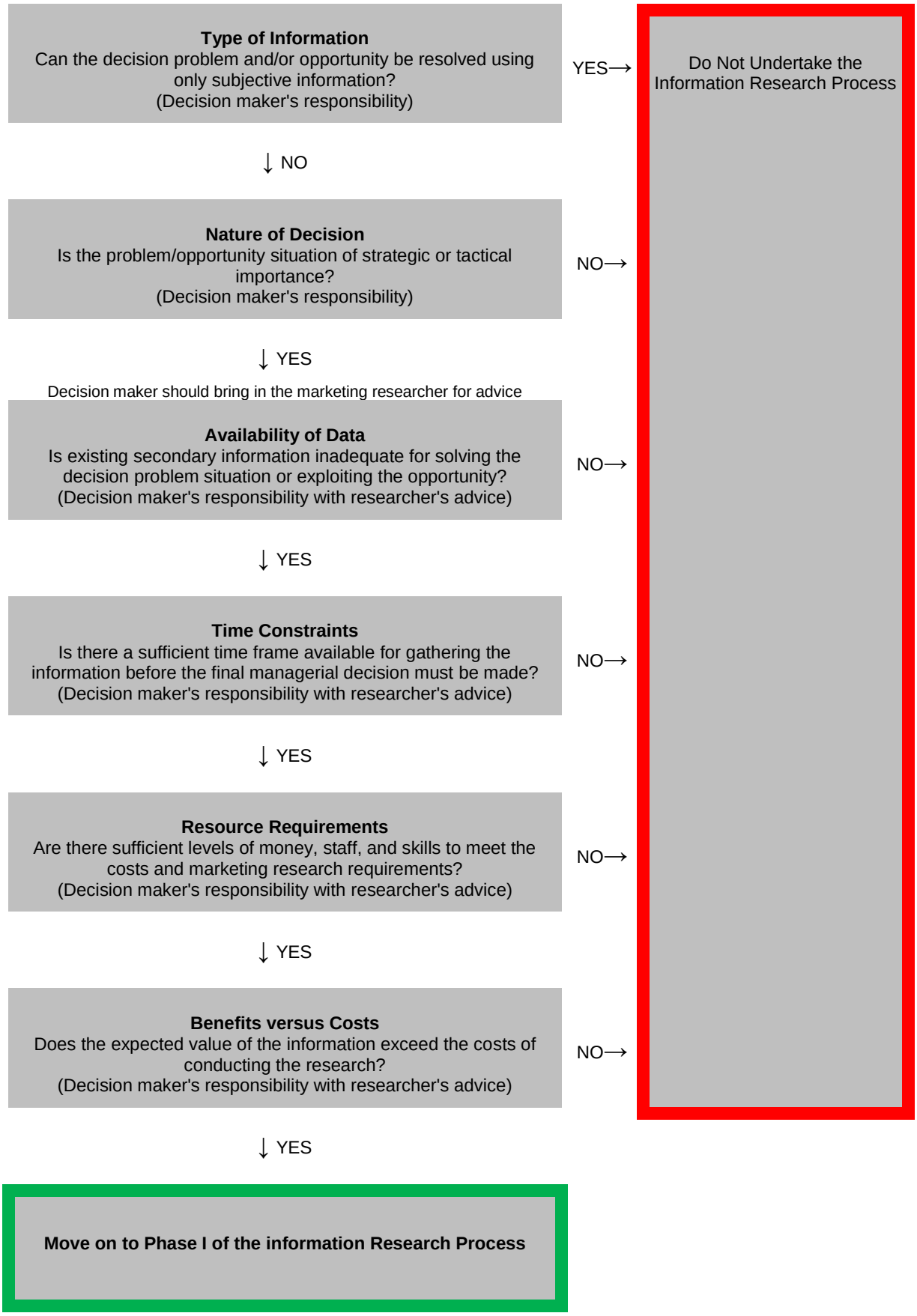

Figure 4. Determining when to undertake the marketing research process (Shiu et al. 2009, 49; Microsoft Word 2015).

There are four situations that should be scrutinized, according to Shiu et al. (2009, 48), when the need for marking research is in question. The first is when the firm can obtain the needed knowledge from a ready source. Enough pre-existing data may be available, even within the firm, for management to make a decision. Sometimes this information only needs retrieving and organizing. The second situation is when time does not allow for the process of marketing research. If the problem at hand needs a quick decision, the results of marketing research will follow too late. Nevertheless, quick decisions often arise that must be addressed without the aid of marketing research. The third situation is when the firm does not have the means to commission the research project, or conduct it internally. A lack of financing, human resources or proper tools can place proper marketing research out of the question. Finally, the fourth situation sees little need for marketing research if the cost to carry it out is greater than the benefit received.

The previous four situations all are solid advice. However, the author suggests an innovative compromise should be made if resources are the reason a firm would overlook marketing research. The scope of the research could be reduced or implemented in phases. Depending on the situation, only a portion of the information may be needed by the decision makers to move on to the next step of their marketing plan. Another solution is for the firm to commission a research project as a topic for a student thesis. This gives a marketing student a chance to implement a real marketing study, with the results benefiting the commissioning firm at a low cost.

2.3 The four phases of the marketing research process

When the need for marketing research is determined by the firm after following the flow chart in Figure 4, the first of a four-phase process begins. The phases are described, by Shiu et al. (2009, 50–51), to be unique but dependent on each other to complete the process. The previous authors, as well as Kotler et al. (2008, 333) suggest the four phases are: (1) identify the problem and objectives, (2) choose a research method for gathering data, (3) carry out the developed research method, and (4) convey the results. Both groups of authors provided a similar chart, which

is reproduced in Figure 5, showing the four phases of the marketing research process. Each phase will be described in the following subsections.

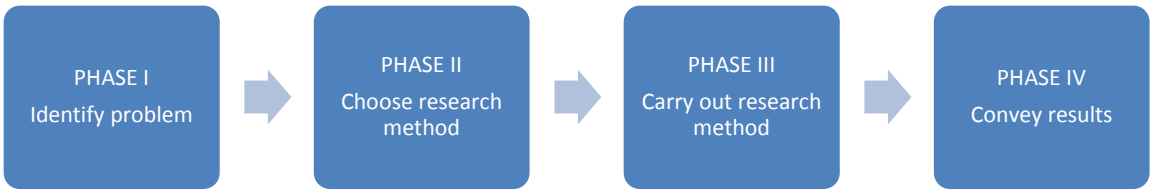

Figure 5. The four phases of the marketing research process (Kotler et al. 2008, 333; Shiu et al. 2009, 51; Microsoft Word 2015).

2.3.1 Phase I – Identify the problem or opportunity

Decisions need to be made every day in business; decisions to solve problems and seize opportunities. Decisions lead to both good and bad consequences. Therefore, the definition of what the problem or opportunity is needs to be succinct. By identifying the correct target in the research process, the management minimizes the risk of making a bad decision that could financially hurt the company and maximize the return on the resources that were spent on the research process.

The first step of the research process is often the most difficult, in that the management senses there is a problem or opportunity, but doesn't know where to start looking for the root of the issue. Management must interact with the researcher to arrive at a well thought out definition of the problem or opportunity at hand. In addition to the definition of the research problem in phase one, Kotler et al. (2008, 333) suggest the research objectives, or desired information, need to also be defined in this phase. Whereas, Shiu et al. (2009, 61) include this step in phase two. Nevertheless, it can be concluded that this step comes at the juncture of two phases; ending the first phase or beginning the second phase.

One of three types of research objectives should be chosen for the research process: exploratory, descriptive or casual. (Kotler et al. 2008, 333; Shiu et al. 2009, 61). Exploratory research forms a base of knowledge that aids in definition of the problem and assists in making an educated decision. Descriptive research

tells what things are like, such as consumer opinion, buying habits, and the amount of a certain demographic in a market. Casual research examines assumptions about the consequences derived from actions, or cause-and-effect.

2.3.2 Phase II – Choose the research method

The research method is a plan built upon and formed by the research objectives (Kotler et al. 2008, 334; Shiu, et al., 2009, 61). It guides the researcher in finding the appropriate data needed to provide information which will aid the firm's management in making a decision on the problem set forth in phase one. The research plan should begin with a review of secondary, or readily available, data (Kotler et al. 2008, 334,335). Next, the methods that will be used to gather primary, or original, data need to be outlined. Primary data comes from a sample demographic that is chosen by the researcher to produce the best results within the confines of available resources and time. The choice of the way the demographic will be contacted and the tools needed are related to the amount of time and resources needed. If a questionnaire will be used as a tool, this stage is a good place to pretest it for any ambiguities and biases that may skew the data. A well-thought-out plan produces trustworthy results, as well as an efficient use of resources.

2.3.3 Phase III - Carry out the research method

This phase is where interaction with the chosen demographic takes place using the chosen methods and tools that are applicable to the research case. Three distinct steps are followed (Kotler, et al., 2008, 345–347; Shiu et al. 2009, 65–67): data collection, analysis of data and transformation of data into information. Data collection involves implementing surveys or conducting interviews; basically the researcher is asking individuals of the sample group to answer questions. In some scenarios there may be no interaction, but rather only observations of the demographic and marketplace recorded by the researcher. The former gives a greater depth to the type of data obtainable; enabling an insight into why the

demographic behaves a certain way, whereas observation only gives an insight into what is happening (Shiu et al. 2009, 65). Depending on the goals of the research method, observation may be enough; but this is dictated by the desired outcome of data type. It may, for example, not be necessary to know why things are done. In other words, what is being done in the marketplace may satisfy the needs of the research problem.

Once the data have been collected, the researcher must organize it in a way that it can be analyzed. For some complicated studies, this means using databases to process the data into meaningful results that can be understood by the researcher. Small scale projects, which produce a small amount of quantitative data can be analyzed by the researcher without the aid of tools. Likewise, any qualitative data also need to be manually processed due to the unquantifiable nature of written text and spoken language. (Kotler et al. 2008, 347, 348; Shiu et al. 2009, 66–67)

The last step of phase three is to interpret the analyzed data into information that is understood and usable by the management of the commissioning firm. The information should be prepared in a way that does not simply tell the results, but observations should be made from different perspectives as to how the data relates to the research problem. (Kotler et al. 2008, 347, 348; Shiu et al. 2009, 67)

2.3.4 Phase IV - Convey results to the commissioning firm

The final step in the marketing research process is conveying the results to the commissioning firm (Kotler et al. 2008, 347, 348; Shiu et al. 2009, 67). A written report is usually standard procedure, which may also include an oral presentation. Shiu et al. (2009, 67) say the report should include an executive summary, introduction, problem definition and objectives, methodology, results, findings and limitations of the study. The researcher should consult with the firm before the report is written to clarify if any of these parts should be expanded or omitted. Also, there may be other sections the firm would like added, such as advice for continued research or actions that should be taken. It is not the researcher’s job to make a final decision for the company, ultimately that lies with management.

However, by doing the work and being immersed in the topic, the researcher is in a good position to make a credible recommendation.

2.4 Diffusion of innovation

Diffusion of innovation is the rise in awareness throughout a society of a new idea through a relaying of information (Rogers 1995, 5). The speed at which an innovation, or new idea, is adopted by individuals in a society is called the rate of adoption (Rogers 1995, 209; Kotler et al. 2008, 272). Diffusion encompasses a whole social group learning about an innovation, whereas adoption is at the individual level of that group (Chomley 2013;). It is usually in a firm's best interest to find a way to speed this diffusion process. Acceptance of a new idea by the public is often slow and takes effort to speed the process. Even though the idea makes sense to the creator, others may not immediately see the value. Or, if the idea is received well domestically, foreign markets may not see the value. When an idea is invented by an individual, they must convince others of its value. Likewise, if an idea is created in and accepted by the domestic market, other markets will need to be convinced of its value. Rogers (1995, 209) suggests the way individuals perceive a new idea, not the way it is presented to them, is what drives the rate of acceptance. In other words, improving the diffusion process focuses on reducing the uncertainty of the receiver of the idea. Therefore, by understanding the five attributes of innovations (Rogers 1995, 208; Kotler et al. 2008, 274): (1) relative advantage, (2) compatibility, (3) complexity, (4) divisibility and (5) observability, the presenter of the attributes can focus on how the receiver may be understanding the new idea. In the following sections, the attributes of innovations and their perceptions will be examined.

2.4.1 Relative advantage of an innovation

Relative advantage is the perception of a new idea as having superior benefits when compared to the old method (Rogers 1995, 212; Kotler et al. 2008, 274). Perceived benefits such as profitability, low cost, reduced discomfort, prestige,

efficiency, and speed of visible results are good indicators of how the innovation will be accepted and communicated throughout the social group (Rogers 1995, 216). Profitability is often the most sought after benefit when a firm is faced with a decision on whether to adopt an innovation or not. With this in mind, low cost may be appealing; but will the low initial cost produce results that are profitable? In other words; would a higher priced product that does a better job result in better profit? From the perspective of investing in something that reduces discomfort or inconvenience, the justification of the monetary cost may not be readily seen, but this may be recovered through better production by improved attitude or work attendance. From another perspective, a firm buying something for prestige may seem like a misappropriation of funds. However, in the public eye, the purchase may position them as being trustworthy, credible or forward-thinking. Finally, the speed at which visible results or rewards are obtained appeal to decision makers. This, reasons Rogers (1995, 217), is why innovations that don't produce timely or visible results are slow to diffuse. Preventative innovations are typical of this nature; where the distant reward or return on investment is out-of-sight to the decision maker. The faster relative advantage can be understood and realized from an innovation, the faster the rate of adoption will be.

2.4.2 Compatibility of an innovation

The way those exposed to a new idea see it in relation to held beliefs, previous encounters and current requirements define compatibility (Rogers 1995, 224; Kotler et al. 2008, 274). An innovation that is seen as compatible to the potential adopter seems less uncertain and therefore speeds the rate of adoption. Conversely, an innovation that is perceived as unfamiliar, or incompatible, will slow the diffusion process. New ideas are benchmarked against previous knowledge. In other words, old ideas govern the way new ideas are evaluated (Rogers 1995, 225). Therefore, this past-perspective mindset poses an acceptance problem for innovations that are technologically advanced and have little in common with anything introduced previously.

2.4.3 Complexity of an innovation

Complexity refers to the level of difficulty in comprehending and applying a new idea (Kotler et al. 2008, 274). Rogers (1995, 242) states that “the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption.” If something is difficult to learn or implement, the rate of diffusion will be slowed. Initial adopters of a complex innovation have the skills, or the patience to fruitfully employ it to its potential. However, the average user would be intimidated by the complexity and would require a learning process. Therefore, innovations that are easily learned diffuse quicker.

2.4.4 Divisibility of an innovation

Divisibility, or degree of personal encounter, refers to the opportunity a prospective adopter has to experience the innovation (Kotler et al. 2008, 274). Rogers (1995, 243) uses the term “trialability” to describe this concept. When something new can be seen, touched, or observed in person, the rate of adoption increases (Rogers 1995, 243). Personal experience gives a sense of meaning and therefore a greater confidence in the new idea is attained. This hands-on familiarization with the innovation can take the form of samples, demonstrations and trial periods. The early adopters are the ones that need this familiarization due to no previous experience with the innovation. Whereas, the later adopters are able to see the innovation around them in their peer groups. The divisibility for the later adopters comes in the form of experiencing the innovation through those that have already adopted it.

2.4.5 Observability of an innovation

Observability refers to whether the consequences of the innovation are easily seen (Kotler et al. 2008, 274). Rogers (1995, 244) states “The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.” An idea that is manifested in a physical object is much easier for people to grasp and spread to their peers. Whereas a concept, or information that

is not visible, is more difficult to grasp and explain to others. For example, in farming, the innovation of the tractor was easily observable, but innovative farming methods that conserve soil or increase crop yield are not easy to see. Rogers (1995, 244) likens this to computers, which have hardware and software components. Indeed, just like the tractor, a computer with its input and output devices are visible, whereas the farming methods, which are not visible, are like the software. Therefore, the nature of the innovation, hardware dominant or software dominant, determines its observability.

2.5 Applying attributes of innovations to the MotoCut cutter

As the goal of MotoCut is to distribute their pile cutter into the international marketplace, diffusion of innovation concepts should be examined in this quest. Adoption of the cutter, and how quickly it diffuses through the market is a prerequisite to growth and profitability of the company. Therefore, understanding how their offering fits the 5 attributes of innovations will enable better communication to potential adopters.

Relative advantage (Rogers 1995, 212; Kotler et al. 2008, 274) of the MotoCut cutter can be expressed in a number of categories. The first is improved production, which encompasses efficiency and fast visible results. The MotoCut cutter has two blades cutting at once versus the single blade of a hand-held saw. Therefore, doubling the efficiency and contributing to greater profit, along with better project time schedules. The second relative advantage lies in safety and ergonomics. Previously, a worker would have to hold a saw for many hours, contributing to fatigue and repetitive-use injuries. Moreover, the fatigue contributed to a chance of injury while working in a hazardous area, where slips, saw kick-backs, and falling pile cut-offs were a threat. Hence, the removal of the worker from the danger zone into the comfort of an excavator cab greatly improves safety. In addition, the worker cutting the pile no longer has to grip a saw all day, since all cutting is orchestrated from the controls in the cab. The third relative advantage of the MotoCut cutter is quality results. Compared to methods which use pneumatic or hydraulic pressure to break the pile, the MotoCut cutter delivers superior results

in cut evenness and crack tolerance. In summary, the overall relative advantage seems obvious in the context of MotoCut's experience in the Finnish market. However, the way other markets perceive this relative advantage in their own market will be a factor in adoption and diffusion.

The second attribute of an innovation is compatibility (Rogers 1995, 224; Kotler et al. 2008, 274). The main contention of this thesis project is that compatibility between product and market should be considered before all other things. Logically, without a product that fits into the market there is no need to consider the other attributes of it for that market. However, in the case of market research for product development, all attributes should be considered when tailoring a product to that market. In the case of MotoCut, for the scope of this study, three key compatibility factors are explored. First the use of precast concrete piles. Without the use of this type of pile, there is no market for MotoCut. Second, the type of cut primarily used in the market determines compatibility. Since the focus of this study is to find ready markets for the first generation cutter, the flush cut method needs to be used in order to satisfy compatibility. However, since a model that leaves rebar exposed is in development, data from this study will serve as a compatibility indicator for that model. The third factor, pile diameter, determines the compatibility of the cutter. Since 350 mm is the maximum size pile the original cutter is capable of handling, markets that use this size or under will be considered compatible. However, just as with the previous factor, useful R&D data can be obtained to make a compatible model for the other markets. In summary, individual market compatibility will be sought for MotoCut's existing model, but information gained from the research will be useful in developing market specific models.

Complexity is the third attribute of innovations (Rogers 1995, 242; Kotler et al. 2008, 274). The complexity of the MotoCut cutter lies in the technology of creating it and making it user friendly. The end-user benefits from this technology by being able to operate the cutter via a control panel. No deep knowledge is needed of how this technology integrates to produce results. Therefore, any equipment operator can learn how to use the cutter efficiently in a short period of time, usually

during the course of one working day. Therefore, complexity is not an issue in the diffusion process of the cutter.

Divisibility (Rogers 1995, 243; Kotler et al. 2008, 274) in terms of the MotoCut cutter refers to how easily it can be experienced by potential end-users. Due to the fact that it is an expensive, technological piece of equipment that weighs 300 kg, end-user experience before purchase is not an easy task. The weight of the machine makes it costly to deliver on a trial-only basis, especially in a global marketplace. Also, the high value of the product prevents a mass scale distribution for demonstration. At present, the best way to see or operate a MotoCut cutter is to visit the factory in Kerava. For interested parties in distant countries, this is not practical. In order to allow prospective buyers the opportunity to experience the MotoCut cutter, it could be demonstrated at trade shows in markets that prove compatibility. Also, in these markets a partner can be found that is willing show the cutter and serve as a link between the foreign market and MotoCut. Until then, those unwilling to travel to Finland will only be able to watch a video demonstration. Therefore, at the moment, divisibility is a weak point for MotoCut in international diffusion.

Finally, observability (Rogers 1995, 244; Kotler et al. 2008, 274) of the MotoCut pile cutter is made easy by its physical nature and ability to produce noticeable results. The machine has an attractive design which includes a brand identifying logo and paint scheme. However, looking at the cutter by itself does not entirely convey how it operates or what it is capable of. Therefore, seeing the cutter perform, if even by video, is the observability that lends to diffusion. Eventually, the look of the cutter and its branding traits will be associated with its performance.

2.6 Cultural implications

Culture is a multifaceted phenomenon that can be described in various ways, subject to the context and perspective it is framed in (Moisander & Valtonen 2006, 8). The context used in this study concerns methods of justification whereby

individuals understand their surroundings. This understanding comes from an environment that allows, or disallows, the ability to express opinions. It also encompasses the meaningful daily routines that produce physical products and facilitate communication and the use of power. Hofstede (Hofstede, [ref. 2 May 2015]) sums it up eloquently by calling it: “the collective programming of the mind distinguishing the members of one group or category of people from others”. From the perspective of different mindsets, culture plays a big role in the way an individual perceives an innovation. This is derived from the learned concept of what makes sense. The social system and institutions that govern the cultural group form the perceptions that serve as benchmarks for new ideas. By understanding the values and mindset of a culture, a determination can be made if an innovation is compatible (Rogers 1995, 47; Ogenyi 2009, 151).

Certain innovations may be rejected on grounds of government regulations or religious beliefs (Ogenyi 2009, 141). Even if these don’t limit the acceptance of an innovation, the “way-of-doing-things” will be a challenge that must be overcome to promote diffusion. Pouring resources into a market that has low potential makes little sense. However, it is possible in some cases to use change agents to influence the way an innovation is received. A change agent is someone who brings about a change of thinking in an organization or social system through education, counseling and negotiating with governing institutions (Rogers 1995, 27). Investment in a change agent requires commitment to a market that may take years to become profitable. Thus, thorough market research should be conducted to justify the likelihood of change and the potential of the market if this change comes about.

Language is a cultural trait that makes it difficult for an outsider, who does not speak or understand the language, to learn about the inner workings of that culture. The habits and beliefs of individuals, along with the rules and regulations of institutions are impossible to interpret without the commonality of a communication method. Secondary data that is published only in the native language of that market needs to be gathered by someone who can understand the language. Primary data, from a native-language-only speaking population, needs to be gathered in the local language. In both cases, some form of

translation between the researcher and the data source must be undertaken (Kotler et al. 2008, 350). In addition to the challenge and extra resources required to translate the language, interpretation of the meaning, based on cultural values, poses a challenge to the validity of the results (Xian 2008, 240). A common language between the researcher and other culture would eliminate the need for translation, however, differences in cultural norms would still need attention.

2.7 Theoretical framework for MotoCut's IMS model

The literature has given different perspectives and methods for building IMS models. The systematic and non-systematic categorization of IMS is consistent with all examples from the literature (Kotler et al. 2008, 952–953; Kuada 2008, 62–66; Ogenyi 2009 139–147; Musso & Francioni 2012, 44–53; Marchi et al. 2014, 2198–2212), even if the exact terms are not used consistently. Systematic approach methods are given the most attention by all sources, except Marchi et al., which present a hybrid model of the two methods. Remember, the systematic approach is regarded to be more rational, but also the most detailed and resource intensive. Therefore, small firms naturally favor non-systematic approaches, which are less expensive, quicker, and accommodating to the typical small firm's risk aversion bias. However, the literature gives more weight to the systematic method due to its complexity. The non-systematic, or behavioral-based, approaches are dictated by a firm's own experiences and perceptions, thereby making each case unique and difficult to model.

In keeping with the goal of determining compatibility for the MotoCut cutter among 23 countries, a systematic approach is clearly needed. Since compatibility relies on factual data, there can be no room for behavioral based 'gut-feeling' assumptions. Systematic models use structured variables to screen and filter a list of markets to arrive at the single best, or a ranking order of the most attractive options. However, since different variables are used by different models at different stages of the IMS process, models must be evaluated in the context of the parameters and goals of this study.

These different approaches can be seen from the reviewed literature. For example, a systematic screening process according to Kotler et al. (2008, 952–953) and Kuada (2008, 62–66) should see a firm define their international marketing objectives to initially screen countries. However, other IMS models reviewed do not stress this (Ogenyi 2009 139–147; Musso & Francioni 2012, 44–53; Marchi et al. 2014, 2198–2212). The author, in the case of MotoCut, does not find relevance in initially defining a clear international marketing plan before demand for the product is gauged. Therefore, the initial step suggested by the previous literature will be considered as a final step in MotoCut's model.

Other early screening variables presented by some of the literature do not match the vision of the author's approach to an IMS model for MotoCut. For example, Kotler et al. (2008, 952–953), Ogenyi (2009, 139–147) and Kuada (2008, 62–66) list secondary data screening variables, such as social, economic, legal, technological and political, to be used in early filtering stages. The author argues, based on the research by Musso and Francioni (2012, 44–53), that the most important screening factors are product and market attractiveness. Therefore, the other screening factors should be applied at the end of the model, after a fit for the product and, thereby, market attractiveness are determined. To that end, the author proposes an IMS model for MotoCut that starts with a list of countries and filters them according to the compatibility of their product.

Marchi et al. (2014, 2198–2212) developed a hybrid IMS model, called FES, which combined systematic and non-systematic approaches, thereby reducing cognitive bias in the decision making process. The model is convincingly appropriate for small firms, which typically use less than rational decision making in IMS. Therefore, this model could be used for MotoCut's IMS case with satisfactory results. However, the complexity of the implementation, involving a special software program, does not fit the resources of the company at this time. Consequently, a behavioral based non-systematic approach will be taken by MotoCut to produce a list of countries they would like to be filtered by product compatibility. This approach will also be a hybrid IMS model, but simpler and cheaper to implement, albeit subject to cognitive bias, than the FES method.

Cognitive bias is the result of deviating from rational thinking and using personal perception to make decisions (Das & Teng 1999, 760, according to Marchi et al. 2014, 2199; Cherry, [ref. 1 May 2015]). Often, quick decisions are needed which rely on heuristics, or educated guesses, to satisfy the problem at hand and not necessarily the optimum solution (Baker & Saren 2010, 132). This heuristic approach needed to be taken by MotoCut when compiling a list of countries for the researcher. In order for the researcher to maintain the project schedule, MotoCut was given 4 weeks to submit a list. Therefore, there was little time to do any in-depth research. Consequently, the resulting list from MotoCut was based on casual internet research and not any specific variables (Morimoto, [ref. 1 May 2015]). The resulting cognative bias of the hastily prepared list may result in an overlooked market that may have had great potential. Nevertheless, the limited time and resources of this study required intuitive judgements, which will still produce quality market information. A future study on another group of countries can be implemented if the new model shows merit.

Drawing from the study conducted by Musso and Francioni (2012), which used studies by Johansson (1997) and Root (1998), product and market attractiveness will be the variables used to form an IMS model for MotoCut. Market attractiveness is the aggregated sum of variables that a firm uses to determine if there is profit potential (Market Attractiveness, [ref. 2 May 2015]). These variables include: demographics, economic indicators, cost of doing business, political climate, government support, infrastructure and anything the firm sees as an effect on its profit potential in that market. Most importantly, the product, and whether it will fit into the market, is the first priority. For without a compatible product to the market, there is no need to use resources on analyzing other variables. Therefore, the second step in Motocut's IMS model will be screening countries based on compatability with the product.

The third and fouth steps of the model, which will be outlined in the recommendations for further study, will not be implemented at this time due to limitations of time and resources. However, the results of the current study will provide a base for further research by presenting MotoCut with pre-screened markets, on the basis of product compatibility, which are ready for deeper

analysis. The deeper analysis factors in step three will screen by market potential, therby leading to step four. Step four of MotoCut's IMS model will be the final before market selection. The final screening will use factors related to ease of doing business such as: social, economic, legal, technological and political.

All of the screening factors used in the design of MotoCut's IMS model are derived from the examples given in the literature. However, the order of implementation differs from Kotler et al. (2008), Kuada (2008), and Ogenyi (2009) which suggest using easily obtainable secondary data factors as a fast and inexpensive way to screen the initial list of countries. Contrary to this methodology the author condends, that even though their justification makes sense in terms of minimizing resources, it greatly increases the chance of overlooking a market that may be compatible with the product. With this in mind, the author leans toward the study by Musso and Francioni (2012) to support the structure of the IMS model developed for MotoCut. In that study, type of product and market attractiveness factors superceded ease of doing business factors. Therefore, product compatibility will be condered first and ease of doing business last (Figure 6).

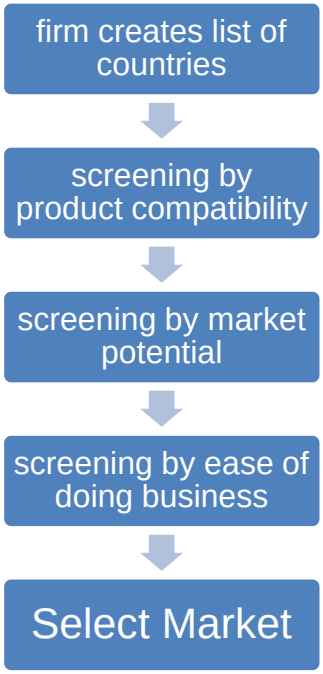

Figure 6. Proposed IMS model for MotoCut (Microsoft Word 2015).

3 EMPIRICAL STUDY

“Empirical research is based on observed and measured phenomena and derives knowledge from actual experience rather than from theory or belief (Empirical Research 2013).” There are some key characteristics that define research as being empirical:

- indication of methods used
- research problems or opportunities
- representative sample group
- way sample group will be measured
- controlled and replicable

Malhotra and Birks (2006, 136), Sobh and Perry (2006, 1196), as well as Hunt (2014, 365) cite empiricism, or experiential learning, as a favored view of market researchers’ approach to the evolution of theory. More specifically positivism, similar to scientific method, is embraced as a means to explain and forecast the intangible characteristics of marketing. Positivism relies on the same type of investigative measures used in natural sciences to produce controlled and replicable results. In other words, data that is dependable due to the structured and stringent process of gathering it. For this reason, positivism has its critics when it is applied to less structured behavioral based sciences such as marketing (Sobh & Perry 2006, 1196; Linn & Kenning 2014, 23; Hunt 2014, 365). Nevertheless, the positivistic approach to empirical research will be used, as it is the most widely used and taught in business schools (Sobh & Perry 2006, 1197). The following sections will detail the empirical research techniques used in this study.

3.1 Research approach, design and method of the study

The research approach was built upon the problem of finding international markets that currently employ deep foundation and earth stabilization methods that would fit the usage parameters of the MotoCut concrete pile cutter. In other words,

identifying where precast concrete piles are used and the methods used to cut them. An identification process indicates the research will be of a systematic nature. A screening approach will be used to eliminate countries that are not good choices for further research. The screening began within the management of MotoCut and resulted in a list of 23 countries to be used in this research study. An electronic questionnaire, written in English and administered by way of a link in an email, serves as the tool for gathering primary data. This method was chosen over other forms of contact, such as mail, telephone, and personal interview, due to the physical distance of the respondents and the low cost of implementing the survey (Kotler et al. 2008, 338; Ogenyi, 2009, 83–84; Shiu et al. 2009, 237–252). Moreover, the electronic method was given favor for its ease of creation, implementation and analysis of results.

3.1.1 Approach

Research used in this study is descriptive and quantitative in nature. Information interpreted from the data is not meant to be correlated across markets. Rather, each market will be assessed by its own data. However, casual analysis may be made between markets to explain cultural or geographic similarities.

The required data needed to derive information, which is relevant to MotoCut for decision making, is difficult to find from secondary sources. This scarcity stems from the fact that the specific nature of the subject being studied is a subcategory of the construction industry that most countries do not statistically report. Also, many countries don’t keep a wide array of statistics (Kotler et al. 2008, 350). Even in countries that keep good statistics, often the information needed is grouped into broader categories that do not give an accurate view of the market practices. For example, in the United States concrete light poles are included in the same manufacturing category as concrete piles. Thereby rendering these statistics undependable for use as market indicators of the piling industry. Considering the difficulty of finding secondary data, it is necessary to contact industry professionals to gauge the use and cutting methods of concrete piles.

As mentioned earlier, a major challenge of international market research lies in the language barrier. Even if the information sought is readily available, most likely it will be in the local language. Therefore, a researcher is faced with a dilemma of how to implement an effective and efficient extraction of data. Should native speakers be sought to investigate each market? This requires great resources, not only in remuneration of the native speakers, but in seeking them out. This route is only practical if the need for research is deep and the commissioning firm justifies the cost. A somewhat less costly alternative is to have questionnaires translated to each language. Nevertheless, this is still resource intensive; adding to the cost and timeframe of the study. Ideally, if English can be used to communicate with industry professionals, added costs of bringing in language experts can be deferred.

3.1.2 Factors required of the sample group

The following factors are needed for the target group to complete the study: knowledge of the piling industry in their respective countries and an ability to communicate in English. Therefore, industry professionals that have higher education degrees will be the main focus. It can be assumed, from secondary internet information, that geotechnical engineers would be the best choice of industry representatives that speak English. A large number of these engineers have studied outside of their home country. While, many hold positions on international geotechnical boards and even teach engineering in English. Contact information for these professionals can often be found on University and Professional Engineering Group web-pages. Email will be the main point of contact, however, any published telephone numbers will be recorded in case follow-up is needed.

3.1.3 Sample group consisting of 23 countries

Twenty-three countries constitute the sample group for this study (Appendix 1). However, the size of the sample group, in terms of individual respondents, is not

predetermined, as the goal is to provide only representative information of each country. Wherein, it is assumed that the position of respondents chosen and their professional knowledge of the industry will lend to the confidence that their answers are factual representations of the piling industry. One quality survey response from an industry professional in each country is enough to serve as a compass for determination of a potential market. Therefore, only 5 to 10 quality contacts will initially be chosen from each country.

3.1.4 Questionnaire

A questionnaire is: “a formalized set of questions for obtaining information from respondents” (Malhotra & Birks 2006, 326; Shiu et al. 2009, 329). Kotler et al. (2008, 344) cite questionnaires as being the most used of the two choices for researchers of primary data; the other being mechanical devices. Questionnaires are flexible, meaning they can be conducted face-to-face, on the telephone or through the internet. A good questionnaire serves as a communication tool between individuals in the sample group and the researcher. Whereas, a poorly designed questionnaire can distort the communication and lead to false or irrelevant data. In order to facilitate good communication that produces reliable results, the researcher should focus on three issues: (1) Formulate questions that respondents can easily answer in order to reveal the desired data, (2) Maximize participation rate by connecting the significance of the survey with the importance of the respondent’s answers, and (3) Minimize data errors due to ambiguous questions or answers that are difficult to understand or analyze (Malhotra & Birks 2006, 326; Kotler et al. 2008, 344; Shiu et al. 2009, 329–350). Reliable data stems from the researcher’s ability to structure a questionnaire that will be answered willingly and without confusion.

The creation of questions should always be based on how the respondent perceives the question and what an answer means to the validity of the data and usefulness to the study. First and foremost, only questions that contribute to the study should be asked (Malhotra & Birks 2006, 331–332). An exception to this would be questions that filter the respondents. For example, asking a question that

would prove the respondent is not qualified to produce reliable answers. While these questions do not relate directly to the data needed for the study, they serve as a quality control measure that ensures reliable results. These types of qualifying questions should be asked early in the survey and direct the respondent to submit the survey without completing it. Since the remaining answers from the filtered respondent would not be useful, respect for their time in completing the survey is honored.

Survey response rate is related to the ease the respondent has in answering the questionnaire (Malhotra & Birks 2006, 393,394; Shiu et al. 2009, 328). If a survey asks questions that the respondents find hard to answer, chances are they will abort the survey. This is especially true if information needs to be looked up by the respondent. Most people are busy and are already taking time out of their schedule to look at the survey. Therefore, if questions demand more of their time than an immediate answer, they may just abandon the questionnaire and forget about it. To minimize the chance of abandonment due to questions that might require some searching by the respondent, the researcher could create multiple choice (or in the case of numerical figures, ranges) to make it easier for the respondent to instantly answer. The drawback to this practice is limited specificity of the answer, but the benefit is more surveys returned. A trade-off for the specific type of information attained and a better response rate is sometimes necessary.

An understanding of the exchange of values between respondents and the researcher helps to ensure a good participation rate, as well as quality answers (Malhotra & Birks 2006, 326). Just as the researcher is seeking value from the respondents, the respondents also want to know what value they can derive from participation (Figure 7). Depending on the population sample and the subject of the study, personal incentives or a psychological connection to the topic are values respondents may want to get for their answers. A respondents feeling of being an important part of the survey is critical to the return rate. This relationship extends to feeling qualified to answer the survey. If a respondent feels there is a feeling of not being knowledgeable on the subject, it would be best for the reliability of the survey results to not have this individual answer. However, it would be a missed opportunity to have a qualified respondent not feel the survey relates

to them. Therefore, the introduction of the survey should make a connection to the importance of the respondent's knowledge and how it is beneficial to the results of the survey. Also, if the knowledge of the respondent is valuable to the survey, the results of the survey often have a benefit or interest to that individual; this should also be made known in order to make a mental connection between the individual, the survey and the results.

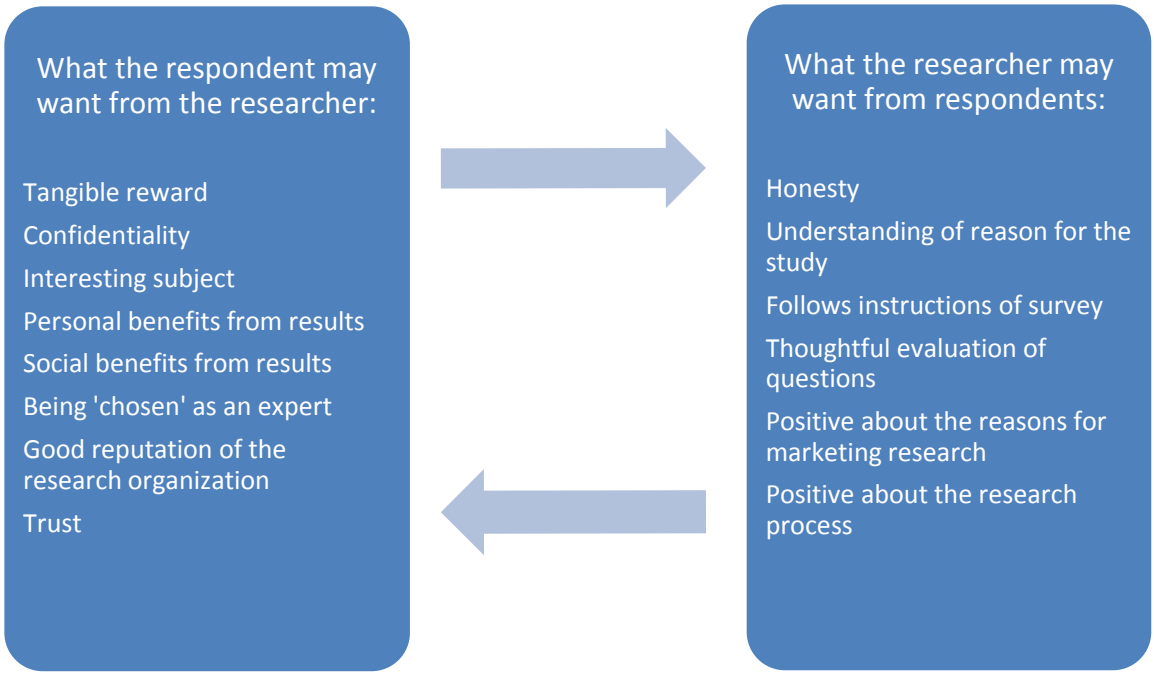

Figure 7. Exchange of values between marketing researchers and respondents (Malhotra & Birks 2006, 327; Microsoft Word 2015).

Dependability of the data received from a sample group is paramount to the information translated from it for decision making purposes. A number of issues can render the data invalid, which results in a weak foundation for decision making. Two broad categories define error in research design, random sampling error and non-sampling error (Malhotra & Birks 2006, 74). Random sampling error refers to targeting the wrong group of people to participate in the survey. Non-sampling error refers to dealing with an ideal sample group, but not structuring the research approach to properly gain the information needed. Non-sampling errors can be divided into response errors and non-response errors. Response errors are characterized as being a deviation from the actual data representing the sample. The cause of this difference is due to wrong or incomplete responses, incorrect

tabulation of answers, and data that is not interpreted correctly (op. cit. 75). All phases of the research design can potentially be affected by error. Therefore, steps to minimize this error should be taken when constructing the research design.

3.1.5 Creation of questions

Since the sample group is mainly comprised of geotechnical engineers, questions in the questionnaire should appeal to the intellect of these professionals (Malhotra & Birks 2006, 325). A reflection of industry terminology and methods is needed to engage participation and give credibility to the study (op. cit. 338). The researcher, in this case, will use knowledge gained from previous work with MotoCut. This knowledge will enable creation of questions that are understood by industry professionals. Thereby increasing the chance that respondents connect and respond to the survey.

The questionnaire (Appendix 1) consists of twelve questions. Seven of which are multiple choice and the remaining five open-ended. The only mandatory questions for submittal are the first three, which ask for country, organization type and if square precast piles are used in that country. Question one lists only the target countries of the study. Question two gives seven choices of piling related organizations and a choice of ‘other’ with a free-text space. Question three “Are square precast driven piles used in your country?” is the defining question of the survey. This question screens respondents early in the survey as either suitable to continue the survey or not. An answer of ‘no’ or ‘unsure’ nullifies the validity of any further answers in their survey. Subsequently, the respondent is asked to submit the survey. Hence, limiting unnecessary attention to material that will not be useful to the study. Respect for the time of the respondent, as well as the researcher is the ethos behind this element of the questionnaire (Malhotra & Birks 2006, 332).

Determination of whether a country uses driven precast piles is a qualifying factor that would indicate a possible market to target. However, to determine market readiness for the MotoCut pile cutter, three more questions need answers: (1) method of cutting, (2) ratio of flush-cuts to exposed rebar-cuts, and (3) tolerance

for cracks and chips below the cut-line. The current method of cutting is sought for the purpose of understanding how well the country will perceive MotoCut's machine as compatible. The ratio of the two different cuts serve as an indicator of where MotoCut's most immediate potential is. The two types of cuts, determined by job specification, require different techniques. Some specifications require the rebar to be exposed and serve as a bonding element to the material that will cover the pile. The other option is a flush cut, which severs the rebar at the same level as the concrete pile. MotoCut's first generation cutter only makes flush cuts. However, a prototype that leaves the rebar exposed is in development. Information gained on how frequently each method is used will help identify immediate compatible markets for the current cutter and potential markets for the prototype in development. Lastly, the tolerance for cracks and chips below the cutline is a characteristic that the MotoCut cutter was founded on. According to building standards in Finland, there should be no cracks or chips more than 5 mm below the cut-line. The ability of the MotoCut cutter to consistently deliver this quality is one of its main selling points. However, it is unknown what the required standards are in other countries. If there is already a demand for a clean, even surface of the pile, then the MotoCut cutter should be easily accepted. On the other hand, countries that do not have such strict standards for cut quality may not see the value in a machine that delivers it.

In addition to the data needed to screen and qualify the markets for current compatibility, questions for additional data, as requested by MotoCut, are integrated into the questionnaire. First, the amount of square precast piles used in the country during a year. Secondly, the width of the piles used. The amount of square precast piles used in a year proved difficult to find using secondary research. Therefore, this question was added to the questionnaire. A statistic such as this may require the respondent to look up the answer and put the completion of the survey at risk (Malhotra & Birks 2006, 332; Shiu et al. 2009, 331). Hence, the wording of the question begins with "if you know". This gives the respondent a way out of the question, thereby prompting them to continue the survey if they don't know. The question which asks for the width of the piles does not follow the same optional wording as the previous example. It is assumed that pile widths are standard numbers that should be known by professionals in the field. Various

widths are used, depending on project specifications. Therefore, three fields are provided asking for the most commonly used sizes to be entered first. The entry fields for the data requested in these two questions are open-ended and at risk of incompletion due to the respondent not having the answer readily available. However, while formulating the questions it was determined that multiple choice questions would prevent this risk, but the proper numerical range of answers were unknown to the researcher.

Before submission of the survey, respondents are asked to provide additional information about their country's piling industry. Also, there is an opportunity to request information on the product that is responsible for the study. The additional information question is a free-text space that asks the respondent to clarify any answers or provide additional insight into their market. A free-text space can reveal useful information to both the researcher and commissioning firm. The researcher may gain a perspective into the analysis of the survey or extra information could prove useful to MotoCut for marketing strategy.

The last question gives respondents a chance to receive information about the MotoCut cutter by entering an email address. This is the first time respondents are introduced to the name MotoCut. The intention of this last-minute name occurrence is to minimize the perception that the survey is an advertising medium. Great care has been taken to structure the questionnaire in a manner that will be respected by industry professionals. Any early indication of a product or brand could diminish the desire to complete the survey. Even though all questions of the survey either support or discard the MotoCut cutter, the survey in itself is neutral to any brands and only inquires facts of the local market. By leading the respondent to the end of a nearly completed questionnaire, an opportunity is given to connect the concepts covered to the name MotoCut.

As the primary aim of this study is to generate quantitative data for screening purposes, all questions in this context are structured; that is, closed-ended or multiple choice. (Shiu et al. 2009, 330). The few questions that are unstructured, or open-ended, are primarily for R&D puposes and ask only for numerical figures; except for the free-text box, which allows respondents to elaborate on their country's market or clarify any answers.

Support for the quality of the questions discussed above comes from the theory on which they were built. This theory guided the researcher to construct questions that are necessary to extract the desired data, while keeping in mind the perspective of the respondant. Therefore, care is given to the wording, context and relevance of the questions in order to receive a satisfactory response rate that conveys accurate and useful information to this study.

In keeping with this diligence, a number of issues needed to be avoided. For example, ‘double-barrelled’ questions that combined two concepts, thereby making it difficult for the responder to differentiate, were avoided (Malhotra & Birks 2006, 331; Shiu, et al. 2009, 332). Also, consideration was given to the effort required on the part of the responder to recall or access numerical statistics (Malhotra & Birks 2006, 333) by providing an option to skip the question and move on, thereby decreasing the chance of survey abandonment due to frustration. In addition, scales (Malhotra & Birks 2006, 337), which gauge the degree of a topic, were not used due to the fact that specific factual information was sought and not vague representations of facts that are difficult to interpret. In keeping with these principles, along with a logical order, the questionnaire was confidently built to generate quality data and a good response rate.

3.1.6 Administration of questionnaire

The standardized questionnaire was created electronically using Webropol, a free service for students of higher education institutions in Finland. Webropol tracks results and has a number of analyzing tools available. The electronic survey works by sending a link in an email. When a respondent has clicked the submit button at the end of the survey, the Webropol service stores the data and provides a date and time of the submittal. The service also tracks if a survey was opened and not submitted. A link to the survey was sent by email to over 200 recipients. The link was not personal, in other words it was shareable, thereby increasing the chance of responses by colleagues of the initial contacts. Since the link was sharable, it is hard to determine exactly how many links of the survey were received in total.

3.2 Data from returned questionnaires

Returned questionnaires generated useful data for the study and also represented a reasonable return rate according to Cycyota and Harrison (2006). Of over 200 invitations to participate in the survey, the questionnaire link was opened 106 times and 19 questionnaires were submitted. A number of surveys were opened by administrators in the research process for reference. Therefore, if a figure of 100 is used for opened surveys by recipients, the response rate is 19%. To put this into perspective, a study of 231 different research projects, which used executives as the sample group, found that the median response rate was 32% (cit. op. 2006). This population group is closely related to the sample group of industry professionals which is used in the current piling industry study. The study also found that response rates were consistently declining throughout the period of 1992 to 2003. By following this trend, the average response rate would fall to 27% by 2010. This diminishing rate would bring the median even lower by 2015. It can be surmised that the 19% response rate of the piling industry experts is only slightly below the current expected median. In the Cycyota and Harrison study, the most common return rates among the 231 executive research sample groups were in the 15–19% range; confirming an acceptable response rate from the piling industry sample.

3.2.1 Country representation in returned surveys

Of the 20 countries initially given by MotoCut, 3 were added to the list by the researcher. These being Australia, United Kingdom, and Ireland. Australia was added due to receipt of the survey link by someone working in that market. They answered the survey and chose Canada as their country, explaining their country of origin in the free text at the end of the survey. The researcher adjusted this returned survey by adding Australia to the list and changing the respondent's answer from Canada to Australia. United Kingdom and Ireland were added to the list due to existing, readily available contact information the researcher had from the previous partner search, conducted on behalf of MotoCut. Figure 8 shows the complete list of countries, along with the number of responses from each.

Indonesia had the most responses of any country, with three. While a number of countries, despite follow-up calls and additional emails, failed to respond. These included: Belgium, Canada, China, Germany, India, Mexico, Poland, South Korea, United Arab Emirates, and Ireland. Of the 23 countries that were sent surveys, 12 responded. This means a 52% response rate from the group of countries as a whole.

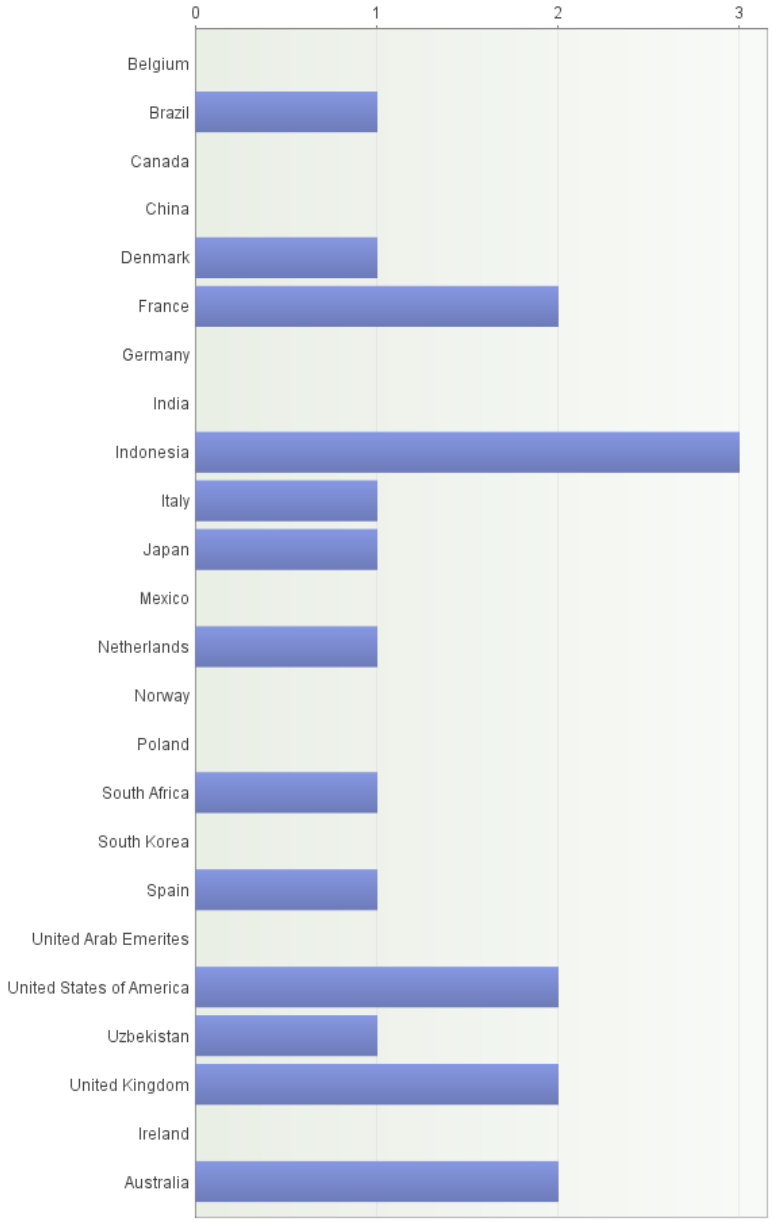

Figure 8. Responses by country (Webropol 2015).

3.2.2 Organizational representation in returned surveys

As stated earlier, the main target group of respondents were professional engineers in the geotechnical field. However, other professionals in the piling industry are just as, or more qualified than geotechnical engineers to answer the questionnaire. Remember, the reason for targeting geotechnical engineers was the fact that they would be the most knowledgeable group, across diverse language backgrounds, to speak English. Since the survey was being implemented in a number of English speaking countries, chances were good that the survey would be viewed by any organization type in the piling field. Therefore, foresight was taken to include these choices in the question of organizational type. Figure 9 shows the types of organizations and their representation in the survey. As can be seen, geotechnical engineers comprised over half of the respondent pool.

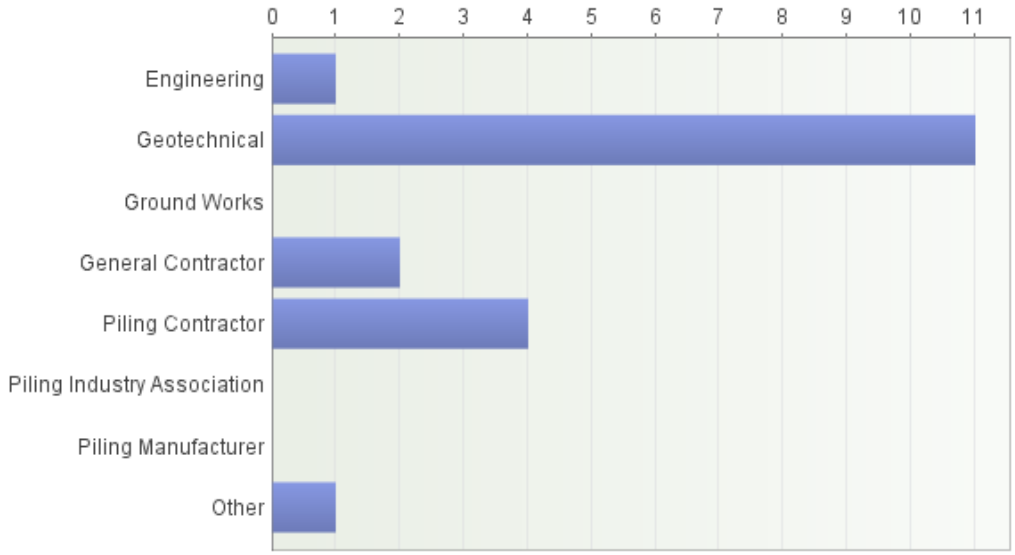

Figure 9. Responses by organization type (Webropol 2015).

3.2.3 Use of square driven precast concrete piles by country

Of the 19 respondents, 13 indicated square driven precast concrete piles are used in their country. Five respondents indicated that those type of piles are not used, while one respondent was unsure. Some of the respondents were from the same

country, so it is more practical to look at this data on the country level. Figure 10 shows the respondents by country that indicated use of square driven pre-cast in their market.

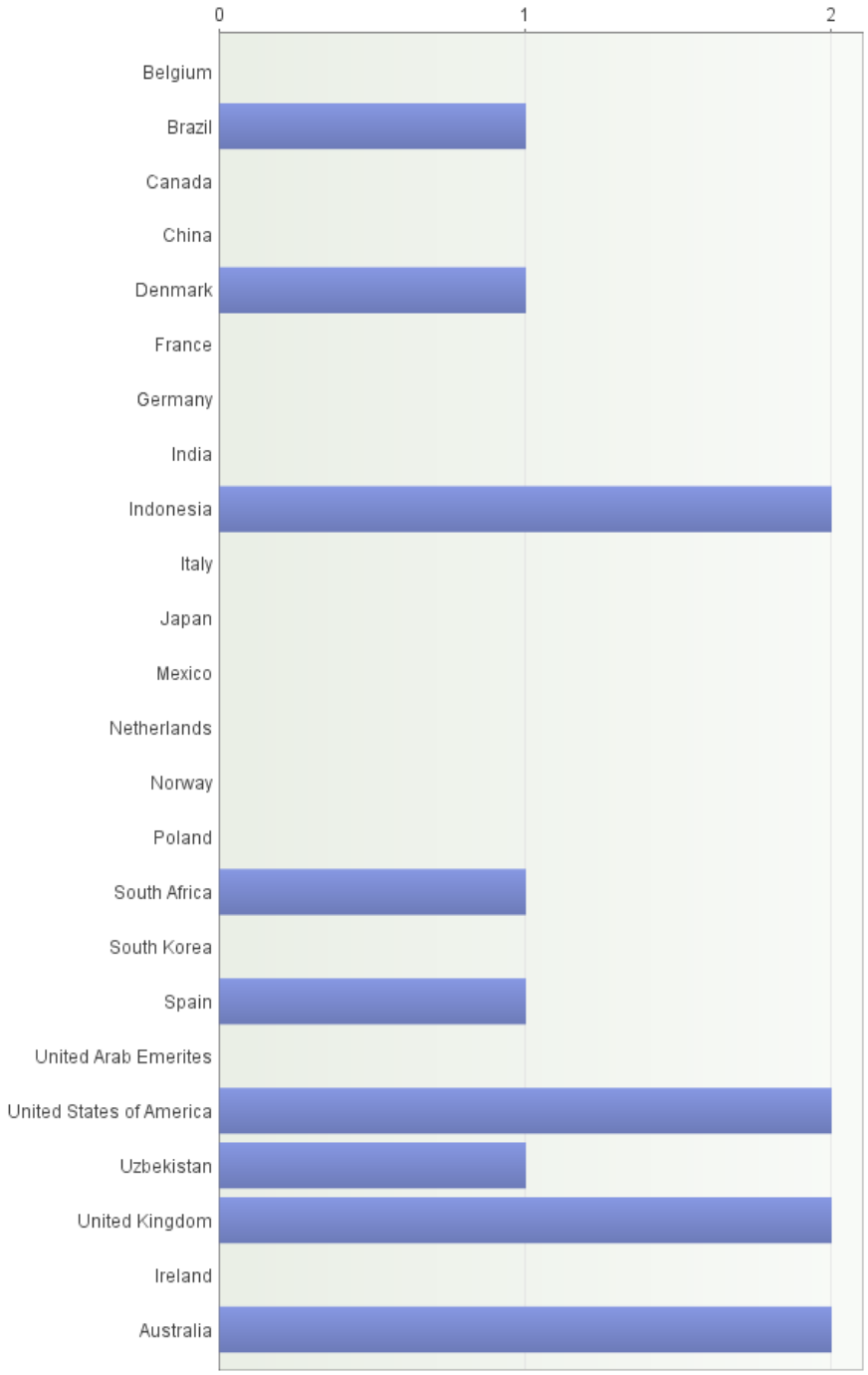

Figure 10. Respondents indicating market use of square driven pre-cast piles (Webropol 2015).

3.2.4 Pile statistics reported

The only country to answer the question inquiring the amount of square driven pre-cast piles was Australia. Which indicated 10 000 of these type of piles were driven last year, at a lineal estimation of 200 000 meters. The non-response of all other countries indicates this type of data is not readily known in the industry, nor is it easy to locate. Additional research, among piling contractors, is necessary to gauge a country's use of specific piling types. Additionally, piling manufacturers could be polled, but attention needs to be paid to export figures in order to understand the usage of that country.

3.2.5 Pile widths by country

Question number five of the survey asked respondents for the thickness, or width, of the piles. This data is useful to MotoCut in order to determine if the capability of their cutter is readily applicable to the current sizes of piles being used. The MotoCut cutter was developed in the Finnish market, which most commonly uses piles that are 350 mm thick or less. Therefore, the standard production machine is manufactured to this limit. A cutter with a greater capacity can be made on a special order basis. The data gained from the survey will help in identifying immediate market readiness for the standard production model and market demand for the modified version.

A total of 31 pile thicknesses were given by respondents. The range was 107mm–609mm. The most common given width was 400 mm. Figure 11 shows the range of widths and frequency of each as given by the respondents. More importantly, the number of responses which fell into the unmodified cutter's capability range of 350 mm or under was 18, which is 58% of the total answers given. Identification of which countries fall into this category are important for the purpose of this study. Figure 12 shows two groups of countries, those that use piles 350 mm and under and those that use piles larger than 350 mm. Some countries fall into both categories.

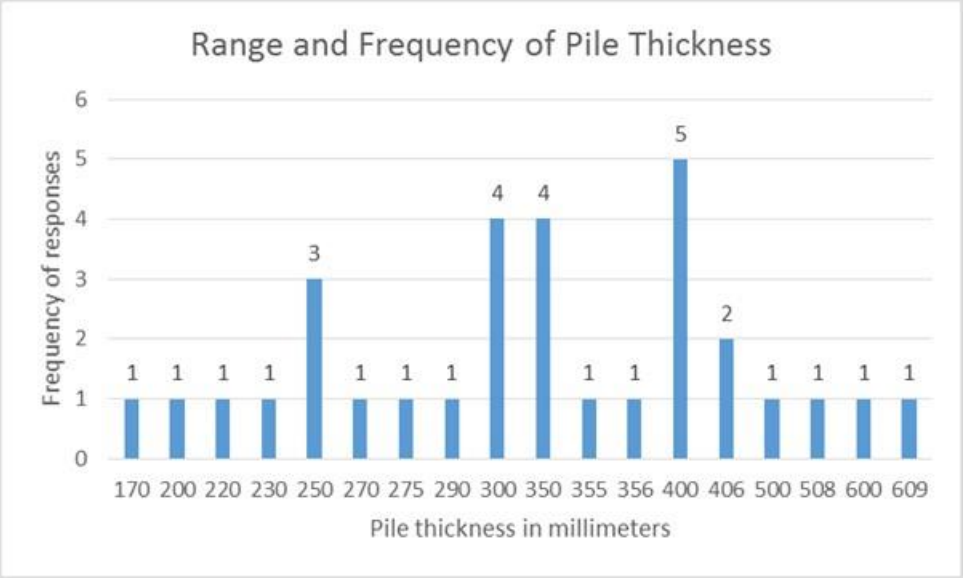

Figure 11. Range and frequency of pile thickness (Microsoft Excel 2015).

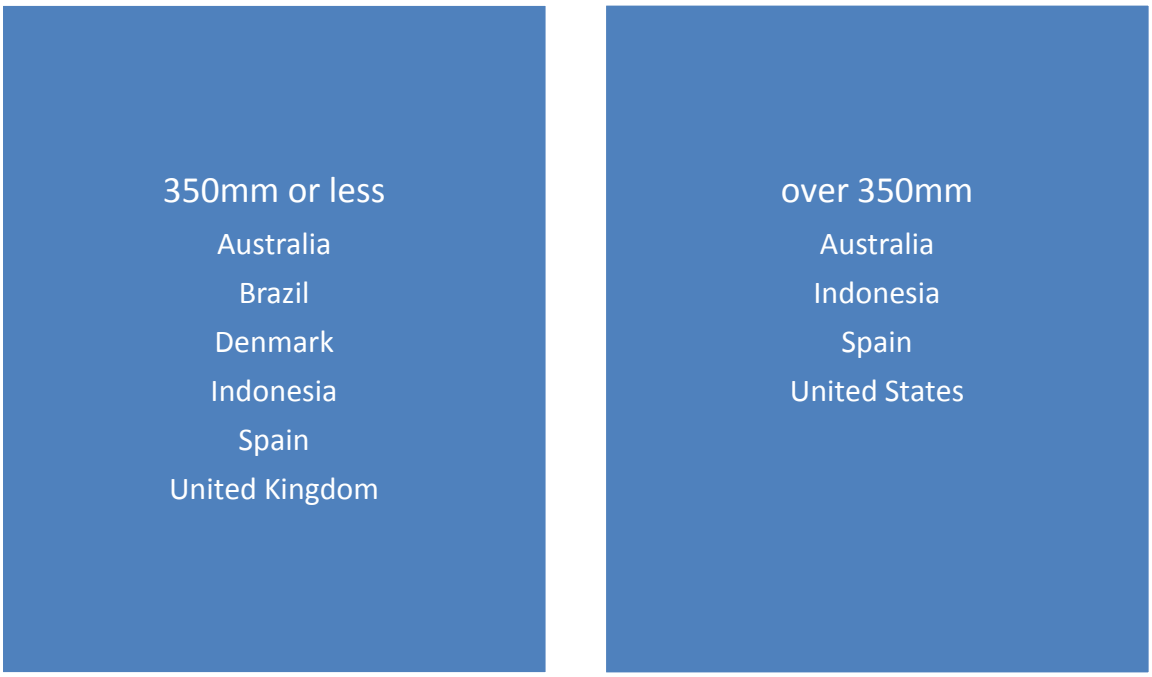

Figure 12. Countries that use piles 350mm or less compared to usage of piles over 350mm (Microsoft Word 2015).

3.2.6 Methods of cutting piles by country

Question number 6 of the survey asked respondents to indicate which pile cutting methods are used in their country. The respondent could choose all that applied. Five methods were listed, with a chance to choose ‘other’ if the respondent did not see one of their methods listed. Among the respondent pool all five methods were indicated as being used. No other methods were indicated in the ‘other’ choice. Table 3 lists the countries and the methods they use.

Table 3. Cutting methods by country (Microsoft Word 2015).

	CUTTING METHODS				
COUNTRY	manual hammer & chisel	pneumatic chisel	hydraulic cropper/ crusher	hand-held concrete saw	wheeled concrete saw
Brazil	X	X		X	X
Indonesia	X			X	
South Africa	X	X			
Spain	X	X	X		
United States		X	X		X
Uzbekistan	X				
United Kingdom		X	X		
Australia		X	X	X	

3.2.7 Flat cut vs. exposed-rebar cut ratio by country

Questions 7, 8 and 9 seek data on the commonality of two type of pile cuts, the flat cut and the exposed rebar cut. The flat cut leaves the reinforcing steel flush at the same level as the concrete cut. Whereas the exposed rebar cut allows the rebar to extend above the level of the concrete cut. The first question in this category asks if the rebar is required to protrude after the cut. Three choices are given as: yes (all the time), no, and sometimes. A ‘no’ answer directs the respondent to skip to question 10. Answers of ‘yes (all the time)’ and ‘sometimes’ are given a space to indicate the maximum length the rebar is required to extend. Questions 8 and 9 are for those respondents that answered ‘sometimes’. Thereby allowing an indication of how often each type of cut is used. Question 8 asks how often flush cuts are used by giving multiple choices of 10–90% in increments of 10. Question 9 asks how often exposed rebar cuts are required. The same multiple choices as in question 8 are given. The total of the two answers should equal 100%. By default, those that answer ‘no’ to question 7 use flush cuts 100% of the time. Also, those that answer ‘yes (all the time)’ require exposed rebar cuts 100% of the time.

The results from 12 respondents indicate 6 countries require rebar protrusion all the time. While only 1, the United States, indicated a mix of both cuts with two respondents confirming this. It is inconclusive which category Indonesia falls into. Of two respondents from Indonesia answering this question; one indicated 100% exposed rebar cuts, while the other indicated a 50/50 spilt between the two types of cuts. No country indicated an exclusive use of flat cuts. The greater practice of leaving exposed rebar is important to consider as MotoCut’s first generation cutter is designed to make only flat cuts. Currently a model is under development that will leave the rebar exposed. Therefore, the information from this portion of the survey will be useful to determine market compliance based on how common each type of pile cut is. Also, the data about maximum rebar protrusion will be useful in development of MotoCut’s new model. Figure 13 shows, by individual respondent, the percentage of flush cuts versus exposed rebar cuts. Also, the maximum extension of rebar from the pile is shown in the ‘exposed rebar cut’ field of each country.

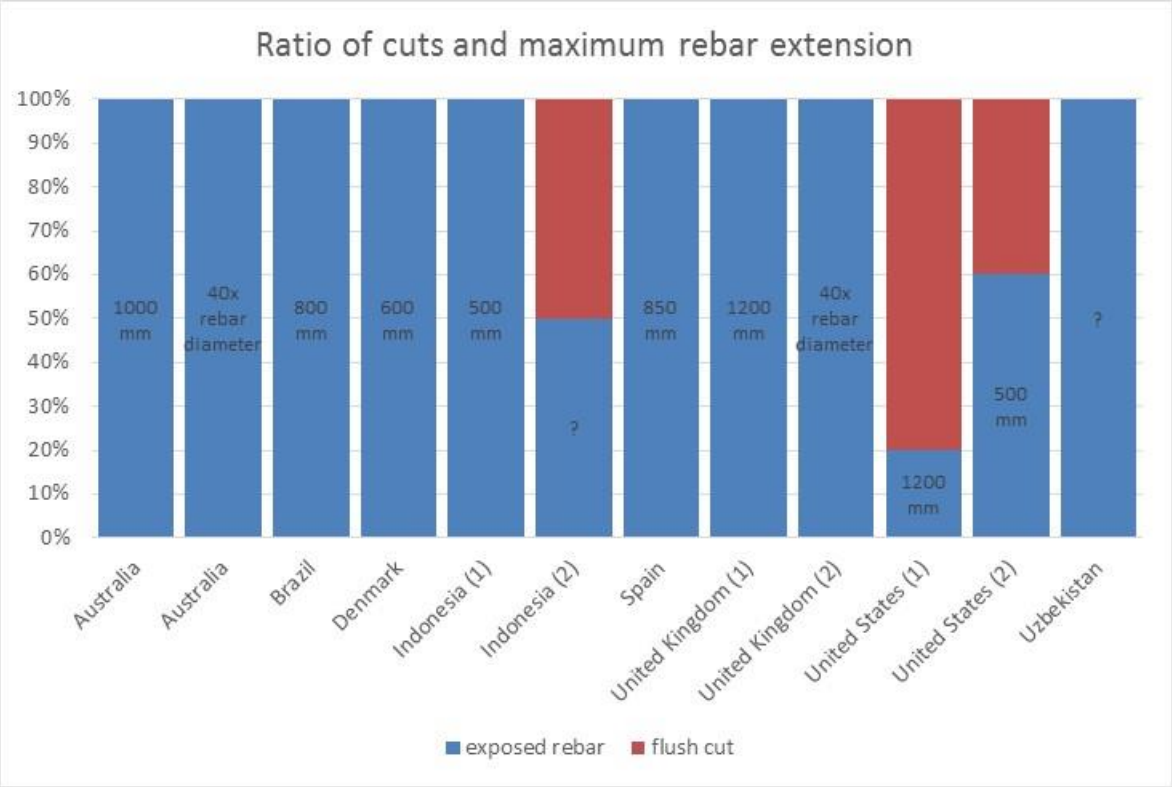

Figure 13. Ratio of cuts and maximum rebar extension (Microsoft Excel 2015).

3.2.8 Tolerance for cracks by country

Question 10 asks for the tolerance of cracks and chips below the cut-line. This number is important for quality control of the building process and long life of the pile. Engineers specify this number as an indication that there should be no damage to the pile below the given measurement, which is expressed in millimeters from the level of the cut. Certain pile cutting methods, such as cropping with a hydraulic crusher, do not deliver consistent quality with regard to clean cuts. However, this is an automated method that is most suitable for leaving rebar exposed, but not for a smooth cut. It is difficult to work around the extending rebar to get a flat surface. This can be done manually to a certain degree, but is slow and laborious.

Seven respondents, representing five countries, gave an answer to the ‘tolerance for cracks and chips below the cut-line’ question. Two countries, Australia and the United States, had two surveys returned from each which answered this question.

The two answers from Australia were quite different, nullifying the validity of each. The two from the United States, which were very close, can be considered valid. Figure 14 shows the answers given by respondents.

Figure 14. Tolerance of cracks and chips below the cut-line of concrete piles (as reported by respondents) (Microsoft Word 2015).

It is hypothesized by the author that building projects which require protrusion of rebar from their piles do not place a great value on the smoothness of the pile cut. Therefore, methods are used that are suitable to achieve this purpose in an efficient manner. Where tolerance of cracks is low, diamond saw cutting is usually required. Therefore, demand for rebar protrusion reduces the use of diamond-blade cutting methods. To test this hypothesis, a larger data pool would be needed. The low volume of data in this study can be easily analyzed and proves this hypothesis inconclusive. One respondent, from the US, indicated hydraulic cropping/crushing as the only cutting method, while indicating a zero tolerance for cracks below the cutline. This would disprove the hypothesis. On the other hand, there were answers that supported the hypothesis. According to the hypothesis, a high tolerance for cracks, as indicated by the respondent from the UK and one respondent from Australia, would favor the use of the hydraulic and pneumatic cutting methods. The UK respondent indicated use of the pneumatic method, while the Australian indicated the same in addition to the hydraulic method. It is possible

that recording error is to blame for these discrepancies. Therefore, a larger data group is needed to conclusively validate the hypothesis.

3.2.9 Free text responses returned in the survey

Seven respondents, representing Australia, Italy, Japan, South Africa, Spain and the United Kingdom, used the free text space at the end of the survey to give additional information. The United Kingdom answered twice. Australia's response, from a professional in the geotechnical field, indicated that precast piles are common in most parts of the country. There are a few large piling contractors that deal with normally reinforced precast piles, while some contractors drive pre-stressed octagonal piles with a 550 mm diameter. The Australian respondent also mentioned the space between piles is normally 3 times the diameter of the pile. Italy's respondent, a geotechnical professional, indicated that precast concrete piles are rarely used. Driven piles make up only about 10% of the Italian piling market. Of that small market portion, tubular closed-end steel or Franki type piles are most commonly used. Japan's response was represented by a geotechnical engineer who indicated driven concrete piles are not used because of the unpleasantness of noise and vibration. Rather, cast in-situ piles are used; which don't require cutting down. In South Africa, according to a geotechnical professional, precast driven piles are not common. When this type of pile is used, they are manufactured on site to job specifications. Therefore, there are no standard sizes to report. Spain used the free text space to indicate he/she was not an expert on precast piles. Although, by being a general contractor, they were able to complete the survey; which requires a knowledge of the industry. The United Kingdom had two respondents that provided additional information. The first, an engineer, indicated precast piles are not used a lot; due to the noise and vibration of the driving process. Also, the cost and environmental impact of transporting from the plant to the jobsite; along with the challenges of handling such bulky material, were cited as reasons for limited use. The second respondent from the UK, identified as a piling contractor, said it is unusual for a piling contractor to cut down the piles as this is usually done by the contractor constructing the piles caps.

3.3 Interpretation of data to be used as market screening factors

From the data presented, interpretation must be made to form factors of screening for the IMS model. The first, and foremost, factor is the use of square precast concrete piles. This is the most important variable, considering the featured product depends on this condition to have a place in the market. The second factor is the type of cut, rebar protruding or rebar flush. Since this study has focused on the first production model, which only makes flush cuts, the screening factor will reflect that. The third and final factor to be used as a screening variable will be the thickness, or diameter of the pile. Even though MotoCut can make a modified version to accommodate piles larger than 350 mm, markets that use piles under this size will be given priority to keep with the aim of finding markets compatible with the original model. Figure 15 shows the filtering of countries by the previous factors discussed.

The initial screening factors produce only one country, Indonesia, which meets all qualifications to warrant deeper analysis. However, the US, which missed the final qualification due to using piles over 350 mm, demands attention since MotoCut is capable of making a model that will accept larger piles. Nevertheless, the limitation of MotoCut's original design, which only makes flush cuts, greatly hinders their ability to be compatible with the majority of the countries in this study. Therefore, the full development and introduction of the rebar saving model will justify deeper analysis of any country that uses square precast concrete piles.

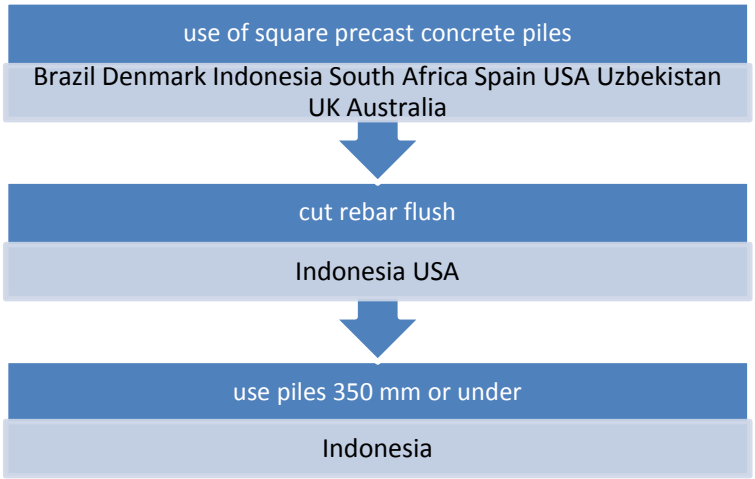

Figure 15. Filtering countries with factors of compatibility (Microsoft Word 2015).

3.4 Theoretical support of empirical study

The empirical study consisted of collecting primary data for the first screening stage of an IMS model created specifically for MotoCut by the researcher. A great deal of IMS theory was digested when building this model. Theory of the diffusion of innovation (Rogers 1995), along with the study showing product and market attractiveness were more important than macro factors (Marchi, et al. 2014), served as support for the argument that product compatibility should be considered first. However, the model as a whole remains untested and therefore so does the theoretical support for it.

The goal of this study was to find international markets that were compatible with MotoCut's concrete pile cutter. This goal was achieved by adhering to theory based on the research process, which guided the creation of an effective questionnaire (Shiu et al. 2009, 329–350; Malhotra & Birks 2006, 326; Kotler et al. 2008, 344). This theory gave great importance to structure, wording and administration, so as to foster the best response rate and quality of returned data. Considering the sample group was composed of primarily non-native English speakers, which poses a challenge in survey administration (Shiu, et al. 2009, 328), a reasonable response rate of 19% was achieved by the theoretically based survey process. A return rate of near 21% was reported by Cycyota and Harrison (2006) to be average among executives, which resemble the piling industry experts polled in this study. Therefore, research process theory supports the results of the empirical study.

The data obtained from this study serves as a compass that points to potential markets for MotoCut. Since each market is seen as an entity, correlation of data is of little use. Therefore, theory was not applied to any type of statistical correlations of the group of countries as a whole. Even on a single market basis, the data collected serves this study as a simple indicator of compatibility and not a source of comparable statistics. However, the data as whole does support the hypothesis that concrete piles are not used in every international market. Along with this simple fact and the differences in sizes and cutting methods, theory of cultural differences can be implied.

4 CONCLUSION

A systematic IMS process is important to consider for SMEs looking to export. The cost and resources needed to properly implement this is usually a deterrent for already cash-strapped SMEs, thereby resulting in IMS decisions that are made irrationally. Research has shown that SMEs that adopt a systematic IMS approach are more successful (March et al. 2208, according to Brouthers & Nakos, 2005). Therefore, a systematic IMS model that minimizes resources and efficiently presents a list of potential candidates is suited for SMEs with limited resources.

The study has drawn on aspects of various IMS models that generally use secondary data screening factors as indicators of a suitable market. However, these factors do not take into consideration the compatibility of the product being considered for export. Therefore, the IMS model constructed in this study places compatibility as the most important factor, thereby eliminating the need to investigate any other market factors if there is non-compatibility. Since market compatibility of the exported product in this study is not an attainable secondary data indicator, primary research needed to be conducted. Consequently, the language barrier became a main concern in communication with the various foreign markets. By sending a survey in English to well-educated industry professionals, data useful to compatibility determination was gathered from various foreign markets. Hence, the base of the created IMS model was formed.

This study has shown that a small firm can conduct a multi-country systematic international market investigation in a short time frame, with virtually no monetary resource required. The key factors to this efficiency are: limitation and prioritization of screening variables, use of the English language across all markets by surveying a demographic that is most likely to respond, and use of a student researcher. These factors can be used by any small firm, along with the developed IMS model, to internationalize in a fast and inexpensive manner.

5 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The limitations of this study open the door for future research on the topic of IMS for SMEs, more specifically a continuation of study on the IMS model created for MotoCut. As a first consideration, the next step of MotoCut's IMS model should be implemented by researching countries from this study which qualified as compatible. That research would involve gauging market potential through industry statistics. Given the difficulty of obtaining this information through secondary sources, piling contractors may have to be surveyed to provide a general feeling and estimate of the market. This brings up the language barrier issue again. Will it be possible to implement an English language survey in a demographic that is less educated than industry professionals, such as engineers? Nevertheless, a continuation and completion of the IMS process through the model created in this study is necessary to prove the model.

Remaining world markets should be screened; is the second suggestion for further research. Due to the limited time frame of this study, only 23 countries were selected for evaluation. Hence, a great many markets exist that may have great potential for MotoCut. The questionnaire used in this study could be used with little or no modification. However, a limitation in this study was non-response by some countries. This should be addressed in future research. By determining the compatibility in the rest of the world markets, MotoCut would have more options in choosing an ideal market.

Finally, further study in general could be done on the IMS model created in this study. Since it was not tested in full due to the limited scope of this study, another researcher could apply it to a different firm and test the results. Nevertheless, this study has added a new perspective to the IMS literature.

BIBLIOGRAPHY

Albaum, G., Duerr, E. & Strandskov, J. 2005. International Marketing and Export Management. 5th ed. England: Pearson Education Ltd.

Alexander, N., Rhodes, M. & Myers, H. 2007. “International market selection: measuring actions instead of intentions”. Journal of Services Marketing 21(6), 11.

Andersen, O. & Buvik, A. 2002. "Firms’ internationalization and alternative approaches to the international customer/market selection". International Business Review 11(3), 347–363.

Empirical Research. 2013. [Web page]. Penn State University Libraries. [Ref. 9 April 2015]. Available at: https://www.libraries.psu.edu/psul/researchguides/edupsych/empirical.html

Concrete Piles. [Web page]. The Concrete Society. [Ref. 20 April 2015]. Available at: http://www.concrete.org.uk/fingertips_nuggets.asp?cmd=display&id=348

Market Attractiveness. [Web page]. ChangingMinds.org [Ref. 2 May 2015]. Available at: http://changingminds.org/disciplines/marketing/understanding_markets/market_attractiveness.htm

Baker, M. J. & Saren, M. 2010. Marketing Theory: A Student Text. 2nd ed. London: Sage Publications Ltd.

Barkema, H. G., Bell, J. H. J. & Pennings, J. M. 1996. "Foreign Entry, Cultural Barriers, and Learning". Strategic Management Journal 17(2), 151–166.

Bradley, F. 1995. International Marketing Strategy. 2nd ed. New York: Prentice Hall.

Brouthers, L. E. & Nakos, G. 2005. “The role of systematic international market selection on small firms export performance”. Journal of Small Business Management 43(4), 363–381.

Calof, J. L. 1993. "The impact of size on internationalization". Journal of Small Business Management 31(4), 60–69.

Cavusgil, S. T. 1985. “Guidelines for export market research”. Business Horizons, 28, 27–33.

Chee, H. & Harris, R. 1998. Global Marketing Strategy. London: Financial Times Publishing.

Cherry, K. What is cognative bias?. [Web page]. About.com. [Ref. 1 May 2015]. Available at: http://psychology.about.com/od/cindex/fl/What-Is-a-Cognitive-Bias.htm

Chetty, S. & Campbell-Hunt, C. 2003. "Paths to internationalisation among small- to medium-sized firms: A global versus regional approach". European Journal of Marketing 37(5/6), 796–820.

Chomley, P. 2013. What's the difference between "Diffusion" and "Adoption" of innovation?. [Web page]. ReasearchGate.net. [Ref. 2 May 2015]. Available at: http://www.researchgate.net/post/Whats_the_difference_between_Diffusion_and_Adoption_of_innovation

Cycyota, C. S. & Harrison, D. A. 2006. "What (Not) to Expect When Surveying Executives: A Meta-Analysis of Top Manager Response Rates and Techniques Over Time". [Online article]. Organizational Research Methods 9(2), 133–160. [Ref. 10 April 2015]. Available in the ProQuest database. Registration required.

Czinkota, M. R. 1985. "Distribution of Consumer Products in Japan". International Marketing Review 2(3), 39–51.

Das, T. K. & Teng, B. -S. 1999. “Cognitive biases and strategic decision processes: an integrative perspective”. Journal of Management Studies 36(6), 757–778.

Davidson, W. H. 1980. "The Location of Foreign Direct Investment Activity: Country Characteristics and Experience Effects". Journal of International Business Studies 11(2), 9–22.

Douglas, S. P., Craig, C. S. & Keegan, W. J. 1982. "Approaches to Assessing International Marketing Opportunities for Small and Medium-Sized Companies". Columbia Journal of World Business 7(3), 26–32.

Evans, J. & Mavondo, F. T. 2002. "Psychic Distance and Organizational Performance: An Empirical Examination of International Retailing Operations". Journal of International Business Studies 33(3), 515-532.

Gaba, V., Pan, Y. & Ungson, G. R. 2002. "Timing of Entry in International Market: An Empirical Study of U.S. Fortune 500 Firms in China". Journal of International Business Studies 33(1), 39–55.

Gomes-Casseres, B. 1989. "Ownership structures of foreign subsidiaries: theory and evidence". Journal of Economic Behavior and Organization 11(3), 1–25.

Gripsrud, G. & Benito, G. R. G. 2005. “Internationalization in retailing: modelling the pattern of foreign market entry”. Journal of Business Research 58(12), 1672–1680.

Hall, S. J. 2013. "Advocating Knowledge: PDCA advises its members to get more involved in industry research initiatives". [Online publication]. Pile Driver Magazine 10(4), 39–40. [Ref. 5 March 2015]. Available at: http://www.piledrivers.org/files/a53e5cd4-081b-453a-a001-1f6514d5b808--11f97c19-791b-4c5e-a0f5-abf1a1014196/piledriver-q4-2013-lr.pdf.

Hofstede, G. National Culture. [Web page]. Geert-Hofstede.com. [Ref. 2 May 2015]. Available at: http://geert-hofstede.com/national-culture.html

Hunt, S. 2014. "Understanding marketing's philosophy debates". [Online article]. Journal of Historical Research in Marketing 6(3), 351–378. [Ref. 3 May 2015]. Available in the ProQuest database. Registration required.

Ito, K. & Rose, E. L. 2002. "Foreign Direct Investment Location Strategies in the Tire Industry". Journal of international Business Studies 33(3), 593–602.

Johanson, J. & Vahlne, J. E. 2009. “The Uppsala internationalization process model revisited: from liability of foreignness to liability of outsidership”. Journal of International Business Studies 40(9), 1411–1431.

Johansson, J. K. 1997. Global Marketing, Foreign Entry, Local Marketing and Global Management. Chicago: McGraw-Hill.

Keegan, W. J. 1999. Global Marketing Management. 7th ed. New York: Prentice Hall.

Kotler, P., Armstrong, G., Wong, V. & Saunders, J. 2008. Principles of Marketing. 5th European ed. Harlow: Pearson Education Limited.

Kuada, J. 2008. International Market Analysis: Theories and Methods. [E-book]. London: Adonis & Abbey Publishers Ltd. [Ref. 25 March 2015].

Linn, V. R. & Kenning, P. 2014. "Employer brand trust and affect: linking brand personality to employer brand attractiveness". [Online article]. European Journal of Marketing 48(1), 218–236. [Ref. 3 May 2015]. Available in the ProQuest database. Registration required.

Malhotra, N. K. & Birks, D. F. 2006. Marketing Research: An Applied Approach. 2nd European ed. Harlow: Pearson Education Limited.

Marchi, G., Vignola, M., Facchinetti, G. & Mastro, G. 2014. "International market selection for small firms: a fuzzy-based decision process". [Online article].

European Journal of Marketing 48(11/12), 2198–2212. [Ref. 17 April 2015]. Available in the Emerald Insight database. Registration required.

Moisander, J. & Valtonen, A. 2006. Qualitative Marketing Research: A Cultural Approach. London: SAGE Publications Ltd.

Morimoto, T. 2015. <xxx.xxx@xxx.fi> 26 April 2015. Response to questions. [Personal email]. Recipient: Bohjanen, A. [Ref. 1 may 2015].

Musso, F. & Francioni, B. 2012. "How Do Smaller Firms Select Foreign Markets?". [Online article]. International Journal of Marketing Studies 4(6), 44–53. [Ref. 19 April 2015]. Available in the ProQuest database. Registration required.

Mühlbacher, H., Leihs, H. & Dahringer, L. 1999. International Marketing: A Global Perspective. London: International Thomson Publishing Company.

O'Grady, S. & Lane, H. W. 1996. "The Psychic Distance Paradox". Journal of International Business Studies 27(2), 309–333.

Ogenyi, O. 2009. International Marketing. New York: Palgrave Macmillan.

Papadopoulos, N., Chen, H. & Thomas, D. R. 2002. "Toward a tradeoff model for international market selection". International Business Review 11(2), 165–192.

Papadopoulos, N. & Denis, J. E. 1988. "Inventory, taxonomy and assessment of methods for international market selection". International Marketing Review 5(3), 38–51.

Phillips, C., Doole, I. & Lowe, R. 1995. International Marketing Strategy Analysis, Development and Implementation. London and New York: Routledge.

Pope, R. A. 2002. "Why small firms export: Another look". [Online article]. Journal of Small Business Management 40(1), 17–26. [Ref. 6 May 2015]. Available in the ABI/INFORM Complete database. Registration required.

Päiviö, O. MotoCutilla betonipaalut poikki ja pinoon. [Online article]. KonePörssi.com [Ref. 20 April 2015]. Available at: http://www.koneporssi.com/uutiset/motocutiila-betonipaalut-poikki-ja-pinoon/

Rahman, S. H. 2003. "Modelling of international market selection process: a qualitative study of successful Australian international businesses". Qualitative Market Research: An International Journal 6(2), 119–132.

Reid, S. D. 1983. "Firm Internationalization, Transaction Costs and Strategic Choice". International Marketing Review 1(2), 44–56.

Rogers, E. M. 1995. Diffusion of Innovations. 4th ed. New York: The Free Press, a Division of Simon & Schuster Inc.

Root, F. R. 1998. Entry Strategies for International Markets. Revised and Expanded ed. San Francisco: John Wiley & Sons.

Shiu, E., Hair, J., Bush, R. & Ortinau, D. 2009. Marketing Research. London: McGraw-Hill Education.

Sobh, R. & Perry, C. 2006. "Research design and data analysis in realism research". [Online article]. European Journal of Marketing 4(11), 1194–1209. [Ref. 3 May 2015]. Available in the ProQuest database. Registration required.

Swift, J. S. 1999. "Cultural closeness as a facet of cultural affinity: A contribution to the theory of psychic distance". International Marketing Review 16(3), 182–201.

Turban, E. & Aronson, J. E. 2002. Decision Support Systems and Intelligent Systems. Upper Saddle River, NJ: Prentice-Hall.

Von Altrock, C. 1997. Fuzzy Logic and NeuroFuzzy Applications in Business and Finance. Upper Saddle River, NJ: Prentice-Hall.

Xian, H. 2008. "Lost in translation? Language, culture and the roles of translator in cross-cultural management research". [Online article]. Qualitative Research in Organizations and Management 3(3), 231–245. [Ref. 6 May 2015]. Available in the ABI/INFORM Complete database. Registration required.

Yadong, L. 1999. "Time-based experience and international expansion: The case of an emerging economy". Journal of Management Studies 36(4), 505–533.

APPENDICES

Appendix 1. Questionnaire

APPENDIX 1. Questionnaire

Seinäjoen ammattikorkeakoulu
SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

International Survey on Use and Cutting Methods of Concrete Piles

1. Please choose your country from the list. *

- ○ Belgium
- ○ Brazil
- ○ Canada
- ○ China
- ○ Denmark
- ○ France
- ○ Germany
- ○ India
- ○ Indonesia
- ○ Italy
- ○ Japan
- ○ Mexico
- ○ Netherlands
- ○ Norway
- ○ Poland
- ○ South Africa
- ○ South Korea
- ○ Spain
- ○ United Arab Emirates
- ○ United States of America
- ○ Uzbekistan
- ○ United Kingdom
- ○ Ireland
- ○ Australia

2. Choose your organization type. *

- ○ Engineering
- ○ Geotechnical
- ○ Ground Works
- ○ General Contractor
- ○ Piling Contractor
- ○ Piling Industry Association
- ○ Piling Manufacturer
- ○ Other

3. Are square precast driven piles used in your country? *

If your answer is "yes", please continue to question 4. If your answer is "no" or "unsure"; please scroll to the end and submit the survey.

- ◯ Yes
- ◯ No
- ◯ Unsure

4. If you know the approximate amount of precast concrete piles driven in your country last year, enter the amount below in either quantity (number) or total lineal meters.

Please fill in one box with a whole number. If you are unsure of these numbers, leave blank and continue to the next question.

Number of piles driven
Lineal meters of piles driven

5. What is the thickness of the piles?

Enter at least one value below. If more than one size is used, list first the size most used.

Square pile #1 (millimeters)
Square pile #2 (millimeters)
Square pile #3 (millimeters)

6. What methods are used to cut/break the piles?

Please choose all that apply.

- ☐ Manual hammer and chisel
- ☐ Pneumatic chisel
- ☐ Hydraulic cropper/crusher
- ☐ Hand-held concrete saw
- ☐ Wheeled concrete saw
- ☐ Other

7. Are the reinforcing steel bars required to protrude from the pile after it is cut?

- ◯ Yes - all the time (enter the maximum length, in mm, of exposed reinforcement)
- ◯ No - not ever
- ◯ Sometimes - depending on the specifications of the job (enter the maximum length, in mm, of exposed reinforcement)

If you answered "sometimes" to the last question, continue with question number 8. Otherwise, skip to number 10.

8. Of all the square piles cut in your country, approximately how many percent are cut flush (without reinforcement protruding)? (The answer to this question plus the next question should equal 100%)

- ◯ 10%
- ◯ 20%
- ◯ 30%
- ◯ 40%
- ◯ 50%
- ◯ 60%
- ◯ 70%
- ◯ 80%

- 90%

9. Of all the square piles cut in your country, approximately how many percent are cut leaving the reinforcing steel exposed? (The answer to this question plus the last question should equal 100%)

- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%

10. What is the tolerance for cracks and chips below the cutline?

Please enter in millimeters.

11. Use this space to clarify any of your answers or to provide additional information about precast concrete piles in your country.

12. The results of this survey will be used to determine your country's readiness for a new method of pile cutting that could improve production, safety and quality. Enter your email address below to receive information on the MotoCut concrete pile cutter.

Email

Thank you for your time!
Please click the submit button below.