

LAPPEENRANTA UNIVERSITY OF TECHNOLOGY  
School of Business  
Master in International Technology and Innovation Management

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*Anna Kunttu*

**ENTREPRENEURSHIP, SERVICE INNOVATION, INTERNATIONAL  
EXPANSION AND PERFORMANCE IN SMES: EMPIRICAL EVIDENCE  
FROM FINNISH ICT INDUSTRY**

1<sup>st</sup> Supervisor/Examiner: Professor Liisa-Maija Sainio

2<sup>nd</sup> Supervisor/Examiner: Professor Tatyana Gavrilova

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## ABSTRACT

<b>Author:</b>	Kunttu, Anna Maija
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**Keywords:** degree of internationalization, performance, service innovation, entrepreneurial orientation, human capital, SMEs

The thesis aims to clarify the mixed results of prior literature regarding the performance impacts of entrepreneurship and human capital through service innovation and international expansion. The thesis examines the factors affecting degree of internationalization (DOI) and performance in ICT SMEs. These factors are entrepreneurial orientation (EO), human capital and service innovation (SI). The data was collected via questionnaire from Finnish ICT SMEs. The results suggest that EO consist of three dimensions that have different impact in DOI and SI. Also DOI has inverted U-shaped relationship with international performance, whereas DOI-profitability relationship is linear. The results of the study suggest that SMEs should not blindly increase their DOI, and that strategic focus is important.

## РЕЗЮМЕ

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**Ключевые слова:** степень интернационализации, производительности, инновационные услуги, предпринимательская ориентация, человеческий капитал, малые и средние предприятие

Диссертационная работа посвящена уточнению и развитию результатов предшествующих исследований по изучению влияния предпринимательства и человеческого капитала на производительность и эффективность через инновационные услуги и международную экспансию. Диссертация работа рассматривает факторы, влияющие на степень интернационализации (DOI) и производительность в малых и средних предприятий (МСП) в области ИКТ. Эти факторы предпринимательской ориентации (EO), человеческий капитал и инновационные услуги (SI). Данные были собраны с помощью анкетирования финских малых и средних предприятий в области ИКТ. Результаты показывают, что ЭО включает три вектора измерений, которые имеют различные влияния на DOI и СИ. Также DOI имеет форму перевернутой U-образной зависимости с международной производительностью, в то время как рентабельность DOI-отношений является линейной. Результаты исследования свидетельствуют о том, что МСП не должны слепо увеличить DOI, что является весомым аргументом при формировании стратегии предприятия.

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## TABLE OF CONTENTS

<b>1 INTRODUCTION .....</b>	<b>1</b>
1.1 Key Definitions .....	3
1.2 Research Objectives and Problems .....	5
1.3 Literature Review .....	7
1.3.1 Entrepreneurial Orientation.....	8
1.3.2 Human Capital.....	10
1.3.3 Service Innovations .....	12
1.3.4 Degree of Internationalization .....	15
1.4 Theoretical Framework.....	17
1.5 Methodology .....	19
1.6 Delimitations .....	21
1.7 The Structure of the Thesis .....	22
<b>2 THE ANTECEDENTS OF INTERNATIONAL EXPANSION .....</b>	<b>24</b>
2.1 Entrepreneurial Orientation and Its Dimensions .....	25
2.2 Human Capital as a Construct.....	26
2.3 Service Innovation and Its Dimensions.....	28
2.3.1 Four-Dimensional Model of Service Innovation .....	30
2.3.2 The Role of Technology in Service Innovation .....	34
2.4 The Degree of Internationalization as a Construct.....	36
2.5 The Relationship between Entrepreneurial Orientation and the Degree of Internationalization .....	38
2.6 The Impact of Entrepreneurial Orientation on Service Innovation.....	40
2.7 The Relationship between Human Capital and Degree of Internationalization .....	41
2.8 The Effect of Human Capital to Service Innovation .....	43
<b>3 THE PERFORMANCE IMPACT OF INTERNATIONAL EXPANSION     AND SERVICE INNOVATION .....</b>	<b>46</b>
3.1 The Relationship between Service Innovation and Performance.....	46

3.2 The Impact of the Degree of Internationalization on Performance .....	48
3.3 The Role of Service Innovations in Internationalization .....	52
<b>4 EMPIRICAL RESULTS .....</b>	<b>55</b>
4.1 Measures .....	55
4.1.1 Independent variables.....	56
4.1.2 Dependent variables .....	58
4.2 Data and Data Collection .....	61
4.3 Analysis Method.....	63
4.3.1 Factor Analysis .....	63
4.3.2 Regression Analysis .....	64
4.3.3 Structural Equation Modeling .....	66
4.4 Analysis and Results.....	69
4.4.1 Data Description .....	70
4.4.2 Factor Development .....	70
4.4.3 Hypotheses Testing .....	77
4.4.4 Model Testing .....	88
<b>5 DISCUSSION .....</b>	<b>93</b>
5.1 Managerial implications.....	98
<b>6 CONCLUSIONS .....</b>	<b>101</b>
6.1 Limitations.....	104
6.2 Further research.....	104
<b>REFERENCES .....</b>	<b>106</b>
<b>APPENDICES</b>	
Appendix 1	
Appendix 2	
Appendix 3	
Appendix 4	
Appendix 5	

## 1 INTRODUCTION

During the last economic boom between 2004 and 2006, small- and medium-sized enterprises (SMEs) were the main driver of economic growth in non-financial business economy and their importance during recent recessions is greater than before (Ecorys 2012, 14; Schmiemann 2009). In European Union, SMEs account for 99.8 percent of non-financial enterprises, from which 92.2 percent were micro-enterprises in 2012. SMEs are also important employers; 67.4 percent of jobs in non-financial business economy were generated by SMEs, and they account for more than half of the total value added created in the non-financial business society. (Ecorys 2012, 9) SMEs are more exposed to competition as result of globalization, and this pushes these entrepreneurial companies towards internationalization. For start-up firms, internationalization is the only way to survive and grow in the market, and the development of SMEs is essentially influenced by innovation and internationalization. (Hollensen 2007, 74-75; Louart & Martin 2012) During the past few years, we have seen start-up companies to grow rapidly through internationalization, which was enabled by innovative products and services, such as SuperCell and Spotify.

The ICT industry is one of the most innovative sectors in the EU, and the key in innovations in ICT are personnel's skills and formal education. Most ICT firms are micro-companies, and thus the way for these companies to grow is through internationalization. (Wiig Aslesen 2008) It should be noted, though technology has brought tremendous opportunities, it is not enough by itself. It needs to be coupled with service industry, and with this combination value chains can be transformed to improve Europe's competitiveness. (Europe Innova 2011) Finland is among the leading countries globally in terms of ICT industry (Dutta & Bilbao-Osorio 2012, 12). The ICT industry has been the locomotive for the economic development in Finland, though during recent years the industry has

changed as big operators like Nokia, are facing difficulties, and the focus has shifted towards services and applications from manufacturing (Hernesniemi 2010, 49; Valtionvarainministeriö 2012). Given the significant and broad impact of these trends, the attention paid to service innovation has been small compared with the attention given to technological innovation (van der Have et al. 2008).

The relationship between entrepreneurial orientation (EO) and business performance has been widely studied in literature (e.g. Covin & Slevin 1988; Lumpkin & Dess 1996; Soininen et al. 2012). Prior literature and their findings in EO (e.g. Lumpkin & Dess 1996; Miller 1983; Covin & Slevin 1989), human capital (e.g. BarNir 2012; de Brentani 2001; Ruzzier et al. 2007), service innovations (SI) (e.g. den Hertog 2000, 2010; Kuusisto & Meyer 2003) and degree of internationalization (DOI) (e.g. Ramaswamy 1992; Sullivan 1994a,1996) are mixed. There is strong evidence that EO enhances business performance, but the relationship is context-specific and indirect (Lumpkin & Dess 1996). Radulovich (2008) suggests that EO and human capital both have positive relationship with SI and DOI, which, in turn, have positive relationship with business performance in professional service companies in India.

However, the relationship between EO and internationalization process has been recognized as area for future research (Slevin & Terjesen 2011; Jantunen et al. 2005). The need to recognize mediators between antecedents and outcomes of DOI has been suggested by Hitt et al. (2006b). There is no agreement among the prior literature about the shape and direction of the relationship between DOI and performance (e.g. Capar & Kotabe 2003; Lu & Beamish 2001, 2004; Thomas & Eden 2004). Additionally, DOI-performance relationship has been mainly studied in manufacturing context (Capar & Kotabe 2003) and measured with a single ratio of foreign sales to total sales (Sullivan 1994a). EO has been mainly studied as unidimensional, though Miller (2011) suggested studying EO as multidimensional, or combining the both ways in one research. In addition,



the findings regarding the impact of intangible resources in performance are limited in literature (Radulovich 2008, 1). Also Edwards et al. (2005) have suggested that innovation in SMEs needs more research, and service innovation process at the company-level is not well understood (Toivonen 2010, 247). The relationship between EO, DOI and SI is complex. There is limited evidence about an impact of EO dimensions has in SI and DOI (e.g. Frishammar & Andersson 2009; Kuivalainen et al. 2007; Pèrez-Luño et al. 2011). The growing role of service in economies and SMEs, current economic situation in the EU, and the turbulence in Finnish ICT sector have highlighted the relevance of this study. The thesis will contribute to existing literature by applying the model to Finland and ICT sector, as well as including the moderator role of SI on DOI-performance relationship.

## 1.1 Key Definitions

The following part introduces the key concepts and their definitions, which are applied in the thesis. Those concepts include service innovation, DOI, EO and human capital.

### **Service innovation:**

Several definitions for SI can be found from the literature. SI is seen as an evolutionary process of dynamically combining and recombining diverse element to meet a customer's needs. (Chae 2011) SI is a completely new or significantly renewed service that generates benefits to its developer and can be replicated with numerous customers. (Toivonen & Tuominen 2009) For example, service production, the customer benefit or customer encounter can relate to the novelty of SI. (Jaakkola et al. 2009, 4) In this thesis, we use the definition of SI created by den Hertog (2010, 19). *“A service innovation is a new service experience or service solution in one or several of the following dimensions:”* new service concept, the client interface, new delivery system/organization and technological options.

### **Degree of internationalization:**

DOI of a company has been described in literature with several concepts, including international diversity, export intensity, geographic diversity, multinationality, scale and scope of internationalization, international business intensity and degree of internationalization (Cavusgil & Zou 1994; George et al. 2005; Li 2007; Lu & Beamish 2001, 2004; Pla-Barber & Escriba-Esteve 2006; Saarenketo et al. 2004; Sullivan 1994a; Zahra & Garvis 2002; Zahra et al. 2000). DOI is the degree of a company's operations outside the home country (Letto-Gillies 2009). It describes a company's geographical growth to different countries and regions, which crosses the borders of its home country (Capar & Kotabe 2003; Hitt et al. 1997). DOI consists of three dimensions: operational performance, operational structure and attitudinal attributes (Hitt et al. 2006b; Li 2007; Sullivan 1994a). Attitudinal attributes have been criticized of not having content validity (Ramaswamy et al. 1996). Ramaswamy (1992) have suggested similar measures of DOI that is multidimensional consisting of three parts.

### **Entrepreneurial orientation**

The definition of EO has been under debate, which mainly focuses on EO as managerial behavior or attitude, or combination of both (Miller 2011). Most scholars have agreed that EO consists of three dimensions that are innovativeness, proactive actions and risk-taking (e.g. Covin & Slevin 1990; Miller 1983; Stam & Elfrig 2008; Wiklund 1999). EO includes the decision-making operations, processes and practices that result in an expansion in terms of markets or products/services, or both (Lumpkin & Dess 1996). On the other hand, EO is a company's strategic orientation that reflects specific entrepreneurial facets of firm-level outcomes, decision-making styles, methods, and practices as well as behavior, beliefs and preferences showed among the management (Covin et al. 2006; Lumpkin and Dess, 1996).

EO reflects the degree of top management's willingness to take risks in business, pursue change and innovation to respond actively to competition and sustain competitive advantage (Covin & Slevin 1990). Moreover, entrepreneurial propensities toward proactiveness, risk-taking and innovativeness are characteristics, through which EO can be examined (Runyan et al. 2008). In this research, EO is seen three-dimensional, managerial behavior at the company level, which consists of innovativeness, proactiveness and risk-taking (Covin et al. 2006; Lumpkin & Dess 1996; Miller 1983; Naman & Slevin 1993).

### **Human capital:**

Human capital consists of individuals' knowledge that they possess and take with when going home from work. Skills, experiences, abilities and knowledge of people constitute human capital, such as innovation capacity, creativity, formal training and education. (Marr et al. 2004) According to Barney (1991), human capital also includes resources of a company's managers' and workers' relationships, intelligence, judgment and insight. At individual level, human capital is the combination of a person's "*genetic inheritance, education, experience and attitudes about life and business*" (Hudson 1993).

## **1.2 Research Objectives and Problems**

This resource centers on examining how degree of internationalization and service innovation affect a company's performance, and how degree of internationalization and service innovation are impacted by human capital and entrepreneurial orientation. In addition, the relationship between service innovations and degree of internationalization is examined. The thesis aims at providing empirical evidence in order to clarify the mixed results in prior literature, and particularly the results regarding the composition of EO and the relationship between DOI and performance. As mentioned earlier, it has been recently suggested that EO is

multidimensional (Miller 2011), though it has been mainly studied as one-dimensional. Moreover, some scholars have provided evidence that each of the dimensions of EO has different impact, for example, in SI and internationalization (Frishammar & Andersson 2009; Harms et al. 2010; Kuivalainen et al. 2007). DOI has been mainly measured with a single item of foreign sales to total sales, which has impacted the generated results (Sullivan 1994b). Researchers have found evidence of different shaped relationship between DOI and performance, ranging from linear to U-shaped and S-shaped (e.g. Bloodgood et al. 1996; Capar & Kotabe 2003; Contractor et al. 2003; Lu & Beamish 2001, 2004; Riahi-Belkaoui 1998; Ruigrok et al. 2007; Ruigrok & Wagner 2003; Qian & Li 2003). The thesis attempts to motivate Finnish ICT SMEs to realize the importance of EO and human capital as a basis for business performance, as well as to encourage internationalization and innovation among Finnish companies.

As mentioned earlier, internationalization and innovation enable survival and growth of SMEs (Hollensen 2007, 74-75; Louart & Martin 2012). Resource-based view suggests that the resources, including knowledge and know-how, possessed by a company can be used to shape competitive strategies and build competitive advantage, if the resources are heterogeneous and non-transferrable (Barney 1991; Grant 1996; Rivaldy et al. 2006). Human capital has been suggested to be important resource for SMEs, though the value and opportunity created by experts' knowledge is recognized by entrepreneur (Alvarez & Busenitz 2001). SMEs have limited resources, which highlights the role of human capital, because it is the way for SMEs to develop unique assets and benefit from emerging opportunities (Barney 1991; Davidsson & Honig 2003; Grant 1996; Radulovich 2008; Ruzzier et al. 2007; Westhead et al. 2001). An entrepreneur's ability to coordinate resources and recognize opportunities, and the possessed knowledge can be considered as a resource (Alvarez & Busenitz 2001). Additionally, entrepreneurially-oriented founder/owner has an essential role in building a successful and innovative company through risk-taking, proactiveness and innovativeness (Covin & Slevin

1989; Lumpkin & Dess 1996; Miller 1983). Based on these issues and literature review presented in the next subchapter, the following research problems (Table 1) were derived.

**Table 1:** Research question and subquestions

<p><b>1. What are the performance implications of human capital and entrepreneurial orientation through service innovations and degree of internationalization in SMEs?</b></p>
<p><b>1.1.</b> How do entrepreneurial orientation and human capital impact the degree of internationalization in SMEs?</p> <p><b>1.2.</b> How do entrepreneurial orientation and human capital affect service innovations in SMEs?</p> <p><b>1.3.</b> How do the degree of internationalization and service innovation impact business performance in SMEs?</p> <p><b>1.4.</b> What is the relationship between degree of internationalization and service innovation in SMEs?</p>

### 1.3 Literature Review

Internationalization of SMEs and entrepreneurial orientation have been under literary focus for decades, though they have been studied as separate phenomenon. As mentioned before, Slevin and Trejesen (2011) pointed out the need for combining these two research areas. Moreover, there is limited evidence about a relationship between innovations and internationalization, and the results are mixed. Radulovich (2008) studied factors that affected the internationalization of professional service SMEs. In her model, human capital, EO and SI were antecedents for DOI. Furthermore, EO and human capital were antecedents for SI. Both SI and DOI affected business performance at the company-level. According to the findings, SI had positive relationship with DOI. Moreover, both human capital and EO had positive relationships with both SI and DOI. SI and

DOI had positive relationship with performance and the antecedents of performance had positive relationship with each other.

### **1.3.1 Entrepreneurial Orientation**

Entrepreneurial orientation has been widely studied in different contexts, and there is strong evidence that it affects both DOI and innovations. Despite the literary interest in the subject, most scholars still use the conceptualization from 1980s', and little improvement has been made since (Covin & Lumpkin 2011). In addition, majority of literature has used the scale developed by Miller (1983), and Covin and Slevin (1989), and EO has been mainly studied through quantitative modeling (Miller 2011). EO has been defined to consist of three dimensions; innovativeness, proactive actions and risk-taking (Covin & Slevin 1989; Miller 1983). Some scholars have added two dimensions into EO and proposed that EO consists of five dimensions; autonomy, innovativeness, risk taking, proactiveness and competitive aggressiveness (Lumpkin & Dess 1996), though majority of literature has used the three-dimensional model, and there is consensus about three-dimensional EO (McDougall & Oviatt 2000; Radulovich 2008; Soininen et al. 2012).

The three dimensions of EO are typically intercorrelated with each other, and business performance is equally explained by innovativeness, proactiveness and risk-taking, which supports the unidimensional factor of EO. This explains the popularity of unidimensional factor of EO in literature. (Bhuian et al. 2005; Lee et al. 2001; Naman & Slevin 1993; Rauch et al. 2009; Tan & Tan 2005; Walter et al. 2006; Wiklund & Shepherd 2003) In addition, the variance in results of EO literature has not been caused by the chosen EO scale, whether it has been Covin and Slevin (1989) instrument or its variation (Rauch et al. 2009). Some scholars have suggested the use of multidimensional EO, because it could provide more insight about the relationship between EO and business performance (e.g. Cadogan 2012; Frishammar & Andersson 2009; Kreiser & Davis 2010;

Lumpkin & Dess 1996; Miller 2011; Naman & Slevin, 1993). Researches with the multidimensional EO have included both two and (e.g. Richard et al. 2004) and three dimensions (e.g. Frishammar & Andersson 2009; Kreiser et al. 2002). Sundqvist et al. (2012) examined exploitation (Kirznerian) and exploration (Shumpeterian) as entrepreneurial-oriented behavior, and their findings suggested that the ability to create new combinations had positive relationship with export performance, when market dynamism was high.

EO and its relations to a company's performance have been widely studied with varying results. Evidence generated by prior literature (e.g. Lumpkin & Dess 1996; Miller & Friesen 1983; Soininen et al. 2012; Su et al. 2011) indicates that there is a positive relationship between EO and performance. Miller and Friesen (1983) surveyed 50 large Canadian companies, whereas Soininen et al. (2012) generated their findings by studying 194 Finnish SMEs, and Su et al. (2011) studied 223 Chinese companies. On the other hand, the effect of EO on performance depends on a context and firm-type (Lumpkin & Dess 1996; Su et al. 2011). Tang et al. (2008) suggested that the relationship between EO and business performance was curvilinear instead of linear in China.

The relationship between EO and innovations has been under literary focus, and there is evidence that the relationship between EO and innovations is positive (Pèrez-Luño et al. 2011; Rhee et al. 2010). Higher risk-taking and proactiveness have been consistently found to increase innovations in different contexts. In a study of 400 Spanish companies in innovative industries, the results show that proactiveness and risk-taking enhanced internal development and creation of innovations. (Pèrez-Luño et al. 2011) Different variables seem to have mediating effect on the relationship between EO and innovation (E.g. Covin & Slevin 1988; Lumpkin & Dess 1996; Rhee et al. 2010; Zahra & Covin 1995; Zahra & Garvis 2000). The findings also have implied that EO enhances radical innovations. On the other hand, Harms et al. (2010) found in a study of

165 fast growth technology-based ventures in Germany that innovation partially mediated the relationship between EO and performance. Hult et al. (2004) argue that the key driver of innovativeness and performance was EO.

The relationship between EO and internationalization has been under literary focus more recently. McDougall and Oviatt (2000) defined international entrepreneurship as “*a combination of innovative, proactive and risk-seeking behavior that crosses national borders and is intended to create value in organizations*”. International entrepreneurial orientation (IEO) has been studied in the context of 185 small Finnish exporting companies. The findings of the study revealed that only competitive aggressiveness affected positively a company’s degree of born-globalness. (Kuivalainen et al. 2007) EO has a positive relationship with DOI and number of foreign countries a company has entered (Javalgi & Todd 2011; Ripollès-Melià et al. 2007). Wiklund et al. (2009) stated that small business growth was positively affected by EO, whereas Frishammar and Andersson (2009) found that proactiveness impacted international performance in a study of 188 small Swedish manufacturing companies. In addition, findings of Javalgi and Todd (2011) in a study of 150 Indian SMEs showed that market turbulence moderated the relationship between EO and DOI.

### **1.3.2 Human Capital**

Higher performance in carrying out relevant responsibilities can be reached by individuals who possess larger amount and higher-quality human capital according to the human capital theory. The theory also states that investments in human capital related to that specific task will increase the time spent on the task. (Becker 1964, 51-52; 100-102; Youndt & Snell 2004) Human capital contributes to business performance through structural and relationship capital that are also dimensions of intellectual capital (Bollen et al. 2005; Bontis 1998; Seleim et al. 2007). In



a study of German pharmaceutical industry, the results showed that human capital had a positive impact on business performance through intellectual property (Bollen et al. 2005). There is also evidence that human capital is positively related to internationalization and DOI (Bloodgood et al. 1996; Delgado-Gomez et al. 2004; Javalgi & Todd 2011; Reuber & Fischer 1997; Ruzzier et al. 2007). On the other hand, some dimensions of human capital were found to be more beneficial to internationalization than others in a study of 284 U.S. SMEs (Manolova et al. 2002). Furthermore, in a study of West German companies, the findings suggest that lack of human capital could be a barrier for internationalization (Dichtl et al. 1990). Knowledge has impact in internationalization according to both the Uppsala model and born-global model. In born-global model, developing specific type of knowledge enhances early internationalization through capability development, whereas in Uppsala model, a company will increase its commitment to a foreign market as it gains more knowledge about the market. (Johanson & Vahlne 1977; Knight & Cavusgil 2004)

There is evidence that human capital has a positive relationship with innovations (de Brentani 2001; Martin & Horne 1995; Oke 2007). Human capital was important to innovations and performance in service companies in a study of 115 Canadian service companies. The findings also showed that the importance of skilled and trained personnel was equal in both incremental and radical innovations. (de Brentani 2001) In a study of 101 senior managers in UK service companies Oke (2007) found that human resource management activities had a positive relationship with radical service innovations. In high-technology SME context, there is some evidence about the relationship between human capital and innovations; SME employees were more innovative and human capital had positive impact in innovations (E.g. Acs 1999; Qian & Li 2003; Thornhill 2006; Wu et al. 2008). Moreover, in a study of SMEs in Switzerland, the most important drivers of internationalization among high-tech and knowledge-intensive SMEs were human capital and R&D

expenditure through innovation capabilities, which the two drivers generated. (Hollenstein 2005) In addition, there was partial support that human capital had positive relationship with EO in a study 87 open source software companies in the Netherlands (Stam & Elfring 2008).

### **1.3.3 Service Innovations**

There has been shift of focus in literature regarding services, and new school of thought, service-dominant logic, has emerged. Instead of focusing on the differences between services and goods, service-dominant logic examines the experienced customer value created by both goods and services (Edvardsson et al. 2012; Vargo & Lusch 2004) In addition, literature has recognized several types of service innovations (Alam 2006; Avlonitis et al. 2001; Berry & Lampo 2000; Berry et al. 2006; Debackere et al. 1998; Gadrey et al. 1995; Paswan et al. 2009). In a study of 108 U.S. and 93 Australian financial service companies, Alam (2006) found six new service strategies or types. The typology suggested by Berry et al. (2006) has been empirically tested in Taiwan through 179 service companies (Cheng et al. 2012).

Most of the typologies do not base on service-dominant logic, but rather on the view that services differ from products (Paswan et al. 2009). Despite the number of service innovation types, scholars seem to agree on the multidimensionality of service innovations (e.g. Bloch et al. 2008, 15; den Hertog 2000; Miles 2008). Four-dimensional model of SI suggested by den Hertog (2000) has been later extended into six-dimensional model, which includes new business partner and new revenue model as additional dimensions (den Hertog 2010, 18-19; den Hertog et al. 2010). At the core of six-dimensional model is the central goal that is the development of new service experiences and service solutions (den Hertog 2010, 19). Similar to the new business partner-dimension is new network and value chain configuration, which is one part

of the five- dimensional model suggested by Kuusisto (Bloch et al. 2008, 15). Moreover, innovations can be classified depending on their degree of radicalness. Radical innovations are completely new process, products or services that contain significant modification or create new markets, whereas incremental innovations include minor improvements to existing products, processes or services (Mohr et al. 2010, 25).

Innovations have positive impact in business performance in service firms (Cainelli et al. 2004, 2006; Freel & Robson 2004; Matear et al. 2002), though the relationship between innovation and business performance may be more complex and two-way (Cainelli et al. 2006). In a study of 1347 SMEs from Scotland and Northern England, the findings suggested that there was a positive relationship between incremental process innovation, and growing sales and productivity in service SMEs (Freel & Robson 2004). In a study of Australian service SMEs, incremental and radical innovation had different effect on a company's performance depending on the size of a company (McDermott & Prajogo 2012). In addition, Qian and Li (2003) stated in their study of 67 U.S. biotechnology SMEs that an innovator position had positive effect on business profitability. In a study of 100 large U.S. service companies, Kotabe et al. (1998) found that innovation in core and supplementary services had positive relationship with strategic market performance, but innovation did not have significant relations with financial market performance. On the other hand, innovation has been seen as mediator between strategic orientations, EO and market orientation, and business performance (Agarwal et al. 2003; Hult et al 2004). In a study of 181 U.S. companies, the findings showed that business performance could be predicted through innovativeness (Hult et al. 2004). More recently, Hsieh et al. (2012) have suggested framework for value creation and appropriation in service clusters.

Sustained competitive advantage is built through the relationship between DOI and innovation (Hoskisson & Hitt 1994, 85; 147). It has been argued

that competitive advantage is supported through innovation in international companies (Hitt et al. 1994; Porter (1990). In a study of world leading companies in selected industries, the results imply that R&D invests are in a key role in building competitive advantage, because the subsequent relative growth in global corporate sales was enhanced by R&D investment as percentage of total sales (Franko 1989). Moreover, the only way to sustain competitive advantage, when it is created through innovation, is to keep innovating (Porter 1990). Innovations have positive impact in DOI (Bell et al. 2004; Radulovich 2008), though Hitt et al. (1994) have suggested that international expansion enhances innovation. The amount of R&D investments could be overcome by entering several foreign markets to increase returns on innovations (Hitt et al. 1994; Oviatt & McDougall 1994). Distinctive contribution of new product factors and product adaption affected a tendency to export and export performance (Atuahene-Gima 1995; Cavusgil & Zou 1994). Bell et al. (2004) suggested in their qualitative study of 30 internationalizing UK SMEs that knowledge-intensive companies focused on creating products that could be commercialized internationally. Moreover, in a study of 239 U.S and 305 South Korean large manufacturing companies the findings showed that product adaptation had a positive effect on export profitability, and it was also the most important factor impacting export performance and profitability (Calantone et al. 2004).

The findings of Kotabe et al. (1998) suggested that there was positive correlation between the availability of core services externally and foreign sourcing of supplementary services. Exporting as an innovative behavior has been studied by Samiee et al. (1994), and their findings showed that high innovators generated significantly larger part of their revenues from exporting than low innovators. High innovators also had regular exporting activities. In the context of high-tech SMEs, first mover advantage was sustained through innovative strategy, and international performance was improved through it (Qian & Li 2003). Kotabe et al. (2002) and Hitt et al. (1994) have argued that innovation moderates the relationship between

DOI and business performance. On the other hand, negative relationship between innovation and internationalization has been proposed, though scholars have not proved significant relationship (Bloodgood et al. 1996). Furthermore, some scholars (e.g. Frenz et al. 2005; Frenz & Ietto-Gillies 2007; Zahra et al. 2000) have found evidence that internationalization had positive impact in innovations. Higher DOI increased learning and acquisition of different types of knowledge, which had positive impact in innovation (Frenz & Ietto-Gillies 2009; Zahra et al. 2000).

### **1.3.4 Degree of Internationalization**

Degree of internationalization has been under literary focus since 1976, when the first evidence about the positive relationship between potential returns and international expansion were presented in a study of companies' foreign direct investments (Hitt et al. 2006b; Hymer 1976, 64; 95). It was showed in this early study that the likelihood of increased potential returns was generated by increasing international scope of operations. Moreover, companies had to balance between benefits and costs in international environment. Control was gained by building monopoly position through acquisition and utilizing production advantages in foreign markets. (Hymer 1976, 11; 64; 95; 25-26) The empirical findings regarding the relationship between DOI and business performance have been inconsistent and conflicting (Annavaarjula & Beldona 2000; Lu & Beamish 2004). There is no consensus among literature whether the relationship is linear (Delios & Beamish 1999), U-shaped (Capar & Kotabe 2003; Contractor et al. 2003; Ruigrok & Wagner 2003), inverted U-shaped (Hitt et al. 1994; Hitt et al. 1997; Ramirez-Aleson & Espitia-Escuer 2001), or S-shaped (Contractor et al. 2003; Lu & Beamish 2001, 2004; Riahi-Belkaoui 1998; Ruigrok et al. 2007; Thomas & Eden 2004). The evidence of S-shaped curve has been found in the context of SMEs and multinational companies (Contractor et al. 2003; Lu & Beamish 2001, 2004). In two studies of Japanese SMEs, the results showed S-shaped

relationship between DOI and performance. Increase in DOI generated a positive performance impact in low levels of DOI, but with high levels of DOI, the performance impact turned negative. (Lu & Beamish 2001, 2004) This was caused by increasing transaction and coordination costs (Jones & Hill 1988). The linear relationship was suggested in a study of 399 Japanese manufacturing MNEs (Delios & Beamish 1999). Qian and Li (2002) found in their study of 125 large US companies found a curvilinear relationship between profitability and DOI.

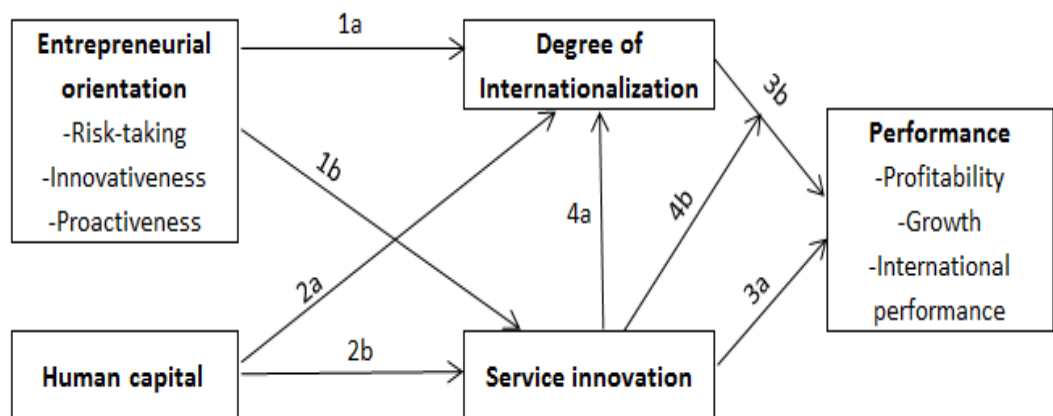
Some scholars (E.g. Delios & Beamish 1999; Errunza & Senbet 1984) have showed a positive relationship, whereas others (e.g. Denis et al. 2002; Geringer et al. 2000) have found empirical evidence that higher DOI decreased business performance. The positive relationship has also been moderated, for example by marketing, R&D operations, and product diversification (Hitt et al. 1997; Kotabe et al. 2002). The shape of the relationship curve has been modified by the size and the type of a company as well as knowledge-intensity (Capar & Kotabe 2003; Contractor et al. 2003; Lu & Beamish 2001). For example, in a study of 81 large German service companies in retail, utility, IT service and tourism industry, the shape of relationship between DOI and business performance changed between service- or manufacturing-oriented companies (Capar & Kotabe 2003).

DOI has been measured in three different ways; single item/single dimension, multi-item/single dimension, and single index/multiple dimensions (Annavarjula & Beldona 2000). Single item measure of foreign sales to total sales has been used most in the literature, though this measure does not capture DOI to full degree (Li 2007). A multi-item measure describes the heterogeneity of internationalization better than single item measures, which indicates that the multi-item measures should be used in research (Sullivan 1994a). There has been also discussion concerning the content of the measure (Hitt et al. 2006b). Ramaswamy et al. (1996) have argued that DOI is more complex than proposed by

Sullivan (1994a), and that the methodology used in Sullivan's research was not appropriate. Ramaswamy (1992) proposed multi-item DOI conceptualization, which consisted of scope, depth and dispersion, whereas some scholars (Kenelly & Lewis 2002; Sullivan 1994a, 1996) have argued that DOI is single index consisting of multiple items. There are similarities between the two DOI structures; sales, assets, subsidiaries. Another construct for DOI has been suggested by Ietto-Gilles (2009), who defined DOI to consist of degree of intensity, geographic extensity and geographic concentration.

#### 1.4 Theoretical Framework

The theoretical framework of the study bases on the literature discussed in the theoretical part of the thesis. The theoretical framework suggests that dimensions of EO and human capital have positive relationship with DOI and SI, which in turn have positive effect on performance. Moreover, we propose that SI and DOI have positive relationship, and that SI enhances the positive performance impact of DOI. The framework is presented below in Figure 1.



**Figure 1:** Theoretical Framework (Partially adopted from Radulovich 2008)

The framework for the thesis was chosen based on its fit to the SME context. Moreover, the framework consists of the most important factors for SMEs' growth and performance as suggested by prior literature (e.g. Hollensen 2007, 74-75; Louart & Martin 2012; Lumpkin & Dess 1996; Oviatt & McDougall 1994; Wiklund et al. 2009). The theoretical framework considers the antecedents and outcome of DOI and combines several streams of research. In a research of antecedents of DOI, studies (e.g. Delgado-Gomez et al. 2004; Hitt et al. 2006a; Nachum & Zaheer 2005) have found a relationship between DOI and intangible resources. An important motivation to internationalize and increase DOI is to find intangible resources in knowledge-intensive industries (Nachum & Zaheer 2005).

Majority of the companies in ICT sector can be classified as knowledge-intensive, highlighting the role of knowledge (Bell et al. 2004). A relationship between DOI and performance has been popular subject in prior literature, though scholars have not yet found consensus (Capar & Kotabe 2003; Hitt et al. 2006b). Instead, researchers have suggested considering which variables generate the performance (Hitt et al. 2006b). Furthermore, companies in small economies, such as Finland, have been seen to face hindrances to domestic growth opportunities due to the limited size of the domestic economy, which has pushed companies to internationalize (Luostarinen 1980, 27; 70-71). EO has been suggested to be important in the small business context due to the central role of owner/manager (Lumpkin & Dess 1996; Oviatt & McDougall 1994; Wiklund et al. 2009). In addition, as mentioned earlier for SMEs internationalization and innovation are the only ways to grow and survive (Hollensen 2007, 74-75; Kyläheiko et al. 2011; Louart & Martin 2012). Different resources, such as organizational, financial, physical, social and human resources, are needed in small companies in order to generate different combinations of business growth and innovation rate ranging from high to low (Greene & Brown 1997).



## 1.5 Methodology

ICT industry and SMEs were chosen to be the context of this study, because the role of human capital has been recognized to be important in both of them (Bloodgood et al. 1996; Delgado-Gomez et al. 2004; Javalgi & Todd 2011; Manolova et al. 2002; Reuber & Fischer 1997; Ruzzier et al. 2007; Wiig Aslesen 2008). The role of ICT industry in economic development of Finland has been recognized to be significant, and it is considered to be one of the most innovative industries in the EU (Wiig Aslesen 2008). Moreover, internationalization plays an important role in both ICT industry and SMEs (Cefis & Marsili 2006; Hollensen 2007, 74-75; Louart & Martin 2012; Saarenketo et al. 2004). Majority of companies in Finnish ICT industry are small- and medium-sized, and the industry itself has been characterized as innovative in global scale; between 2004 and 2009, the percentage of ICT-related patents from national total was the second highest in the world (OECD 2012; TiVi 2011) ICT industry has been characterized as global and global standards for example in telecommunications are emerging, which pushes companies to internationalize early on in order to avoid falling behind competitors (Saarenketo et al. 2004). Additionally, innovating in a high-tech sector is requirement for increased survival probability (Cefis & Marsili 2006). Thus specialization, high up-front R&D costs and utilizing opportunities fully push companies towards internationalization in order to grow. (Saarenketo et al. 2004)

This research is a deductive study attempting to get support for the hypotheses developed based on prior literature (Cooper & Emory 1995, 28-29). The quantitative study method was chosen, because it allows testing the existence of causal relationships. The hypotheses were developed based on the conducted literature review about EO, human capital, SI, DOI and performance. They were tested by using quantitative analyses methods that were factor and regression analysis, and structural equation modeling. The analysis methods are described in more detail in

the fourth chapter. The data was collected via questionnaire. Questionnaire was chosen as data collection method, because people, such as company executives, are difficult to get involved in studies by using other methods (Cooper & Emory 1995, 282). Additionally questionnaires allow collecting large amount of data in an efficient way, and by using questionnaires we can target a homogenous group of respondents anonymously. Due to time constraints cross-sectional primary data was collected, although the literature has suggested the use of longitudinal data. The population of the research consisted of Finnish ICT SMEs and we used convenience sampling as sampling method due to the availability of email addresses, and due to time and financial limitations of data collection. The email addresses of appropriate respondents were checked online if the data from the Amadeus database did not contain direct email address.

Some control variables regarding the companies were included in the questionnaire in order to minimize sampling error. The questionnaire consisted mainly of closed-ended questions, which were in a form of statements. Six open-ended questions were also included in the questionnaire, though due to the limited amount of answers we only included the open-ended questions regarding the year of establishment and internationalization to the data description. These items are measured mainly in interval scale. Summated scale was chosen for measuring the items of the questionnaire, because EO, human capital and service innovations are hard to measure with absolute values. Favorable or unfavorable attitudes towards a subject or an object in question are communicated via statements, which form the summated scale. Each response is expressed through numerical score that reflects the degree of a respondent's favorable attitude. The most commonly used summated scale is Likert scale, which is also used in this research. (Cooper & Emory 1995, 179) The questionnaire is presented in the Appendix 2.

## 1.6 Delimitations

Firstly, the thesis focuses only on DOI and it does not include the internationalization theories, because internationalization is examined from outcome-perspective, whereas internationalization theories focus on the process of internationalization. Additionally, scale of internationalization was the focus of DOI measure, which was chosen following the suggested DOI measure of Sullivan (1994a) with some alterations due to the context of the research. Secondly, this thesis does not include the five recognized dimensions of EO, because of the amount of evidence regarding the three-dimensional model in the literature (Rauch et al. 2009). This popularity of three-dimensional EO also supports the chosen items to measure EO, because there is evidence about the validity and reliability of the used measures. Thirdly, the thesis does not consider the radicalness of service innovations, because we focus on the performance outcome of service innovations. The four-dimensional model of service innovation was chosen instead of the six-dimensional model by den Hertog (2010), because of the fit to the chosen empirical context. In the center of the four-dimensional model is technology, which is an important factor to ICT companies. Lastly, we consciously tested only the linear relationships between DOI and performance with SEM, because it is used for confirmatory analysis to test the models that were developed based on theory, and due to the limited amount of data.

The thesis focuses on SMEs in ICT sector, including manufacturing, trade and services, in which appropriate companies for the research were identified following the European Commission classification of ICT sector and SMEs. Finland and its ICT sector have been recognized as one of the most innovative in global scale (Dutta 2012, 8; 14; OECD 2012). Moreover, the role of ICT industry in the Finnish economy is important (Hernesniemi 2010, 49). This may impact the results and applicability of the research in other national contexts. In addition, it should be kept in mind that the chosen sampling method impacts the generalizability of the

results (Bryman & Bell 2003, 105). The results may be valid in the context of high-technology SMEs in the Scandinavian countries and in other small economies, which are similar to Finland. Moreover, the results might be valid to knowledge-intensive SMEs making decision about international expansion as well as in the context of start-ups, who are innovative and planning to internationalize.

## 1.7 The Structure of the Thesis

The thesis consists of two major parts, theoretical and empirical. The theoretical part includes three chapters and the empirical part includes two chapters. Table 2 summarizes the research subquestion and in which chapters the theoretical and empirical answers for the questions are provided.

**Table 2:** Structure of the thesis

Research subquestion	Theoretical part	Empirical part
1. How do entrepreneurial orientation and human capital impact the degree of internationalization in SMEs?	2.5 & 2.6	4.4.3
2. How do entrepreneurial orientation and human capital affect service innovations in SMEs?	2.7 & 2.8	4.4.3
3. How do the degree of internationalization and service innovation impact business performance in SMEs?	3.1 & 3.2	4.4.3
4. What is the relationship between degree of internationalization and service innovation in SMEs?	3.3	4.4.3

The first chapter introduces the reader into the research setting and discusses about the relevant prior literature in the area of EO, human capital, SI and DOI. The second chapter focuses on the antecedents, human capital and EO, of DOI and SI, and relationships between these

variables. Performance impacts of SI and DOI as well as the relationship between the later variables are discussed in the third chapter. Hypotheses are derived in both the second and the third chapter. The fourth chapter includes analysis methods, data collection, and analysis and results. The fifth chapter discusses about the findings based on analysis results and their general and managerial implications. Lastly, the sixth chapter summarizes the findings of the study, points out limitations and suggests future research areas.

## 2 THE ANTECEDENTS OF INTERNATIONAL EXPANSION

Companies consist of bundles of capabilities and resources. A company's resources are way to build sustainable competitive advantage, when they are unique, immobile, valuable, inimitable and non-substitutable. (Barney 1991) Long-term sustainable competitive advantage can be maintained by companies, when they are capable of creating, transferring and managing rare, valuable and non-substitutable knowledge in international environment (Saarenketo et al. 2004). Motivation for international diversification is created by a company's unique internal capabilities, which provide economies of scale and scope, increase organizational learning and rationalize extensive market bases when applied across national borders (Kogut 1985; Hitt et al. 1997) The lack of appropriate knowledge and skills possessed by employees can be a barrier for new service development process (de Jong & Vermeulen 2003).

A company's sustainable competitive advantage in international context is highly impacted by an entrepreneur, whose task is to integrate external and internal knowledge in a new way (Saarenketo et al. 2004). An entrepreneur identifies opportunities and value generated through experts' knowledge (Alvarez & Busenitz 2001). Entrepreneurial orientation, which describes managerial behavior at the company-level, is important driver of internationalization and innovation (Lumpkin & Dess 1996). Entrepreneurial orientation contributes to building competitive advantage through early recognition of emerging opportunities from internal and external environment. (Lumpkin & Dess 1996; Wiklund & Shepherd 2003)

Knowledge has been suggested to be a company's key asset in building competitive advantage, and human capital holds majority of a company's knowledge (Grant 1996). The capability of human capital to build competitive advantage or core competence of a company, determines the value of human capital. Selection, improvement and utilization of human capital are ways for companies to create value. (Lepak & Snell 1999) The

emerging importance of ICT and human resources are part of the change to intangible from tangible investments. It has been suggested that intangible investments have specific role in services. (Evangelista 2000)

## **2.1 Entrepreneurial Orientation and Its Dimensions**

EO is a strategic orientation that includes large resource commitments, and as a result, resources are essential to the performance implication of EO (Covin & Slevin 1991; Su et al. 2011; Tang et al. 2008). As mentioned earlier EO consists of three dimensions; innovativeness, proactive actions and risk-taking (Miller 1983; Stam & Elfrig 2008; Wiklund 1999). Innovativeness depicts a company's propensity to introduce new ideas, products and services, abandon existing practices, and invest in new processes through creativity and experimentation (Jantunen et al. 2005; Lumpkin & Dess 1996, 2001). Developing further new ideas and inventions with unclear future benefits are included in innovativeness. Although innovativeness has considerable benefits, it also has pitfalls as a form of lost investments. (Dess & Lumpkin 2005) Characteristics of proactiveness include a launch of new products and services before competition, and demand expectations, which are described as future-oriented and opportunity-seeking (Lumpkin & Dess 2001; Rauch et al. 2009). It has been suggested that ability to recognize and understand weak signals and utilize them through entrepreneurial investment behavior resembles proactiveness. Entrepreneurial investment behavior occurs through dynamic capabilities. (Soininen et al. 2012; Teece 2007) Building competitive advantage through proactiveness creates a situation, in which competitors have to react to the proactive company's initiatives (Dess & Lumpkin 2005).

Risk-taking describes the nature of easily venturing into the unknown, borrowing heavily, and/or committing remarkable resources to ventures in uncertain environments (Lumpkin & Dess, 2001; Miller & Friesen 1978;

Rauch et al. 2009). It generally depicts the degree of organization's willingness to abandon routines, existing practices and operations, and move towards investing in projects with unknown outcomes (Wiklund & Shephard 2003). A company usually faces three types of risks: business, financial and personal risk. Business risk-taking relates to uncertain outcomes of a venture and it usually concerns market entries without market testing and adopting technologies that are not proven. Financial risk-taking is about the risk/return tradeoff, when investment returns are uncertain. Personal risk-taking includes the risk taken by an executive in the behalf of a certain cause. Companies often have to face situations, in which there is uncertainty about the outcomes of one's actions. (Dess and Lumpkin 2005) Entrepreneurially-oriented companies have higher propensity to pay more consideration and effort into opportunities (Wiklund & Shephard 2003).

## **2.2 Human Capital as a Construct**

Human capital is characterized by tacit knowledge, because the essence of human capital is human intellect (Bontis 1998). Tacit knowledge is context-specific and deeply linked to action. It comprises of know-how, mental models, beliefs, and perspectives that are difficult to communicate. (Nonaka 1991) The extent of tacit knowledge has a positive impact in innovation capability, which in turn positively affects innovation performance at the company-level regardless of a company's size (Cavusgil et al. 2003). The opposite of tacit knowledge is explicit knowledge that is easily communicated and transformed due to its formal and organized nature (Nonaka 1991). Innovating, learning, changing, and generating the creative push characterize all the human elements in an organization. These characteristics of organizational human elements enhance the sustainable growth of the motivated organization. (Bontis 1999) Knowledge-related resources and capabilities that a company possesses can initiate a spark for internationalization or change in



operations (Kuivalainen et al. 2010). As one of the core elements of intellectual capital, the role of human capital is significant in several industries including management consulting, financial services and software development (Seleim et al. 2007). Human capital is seen to be more important to service-oriented companies than product-oriented companies due to the labor-intensity and real-time knowledge work (Bontis et al. 1999; Kianto et al. 2010).

In an organization, human capital forms a network of nodes and ties, among which information flows (Bontis 1998). A node includes a work, decision-making, improvisation, and innovative creativity, which an individual or group performs individually as a part of creative process without interacting with others (Bontis 1998; Crossan et al. 1996). Human capital exists in the minds of employees, which means that it is located and limited to a node. A tie describes information or product flow from a given node to another. Every node is source of at least one tie. When a node is a source of several ties, the job performed at a node is a decision regarding the direction of the following information flow. (Bontis 1998)

Human capital is seen as an umbrella concept that includes three different types of human capital; firm-specific, industry-specific and general (Huang 2003; Neal 1995). Company-specific, unique abilities and skills to perform activities in a particular company or task are included in firm-specific human capital. In addition, the impact of firm-specific human capital in innovative activity level can be limited due to non-transferability of firm-specific skills, which, in turn, restrict the amount of inter-firm communication and response (Grant 1996). Industry-specific human capital includes skills related to a certain profession within an industry or an occupational category. This type of human capital can be relocated to different companies within an industry. General human capital relates to an individual's learning of expertise and skills, knowledge acquisition and transfer across businesses and industries. (BarNir 2012) Types of human capital have a distinct impact in strategic factors at the company-level in

small and young companies (e.g. Cliff et al. 2006; Marvel and Lumpkin 2007; Newbert et al. 2007). General quality and transferability of knowledge are factors that separate different types of knowledge in practice. General human capital is transferable and applicable within and across industries, whereas company- and industry-specific human capital is about general level of expertise and skills as well as depth of knowledge. (BarNir 2012)

### **2.3 Service Innovation and Its Dimensions**

Services have four distinctive characteristics; intangibility, heterogeneity, simultaneous production and consumption, and perishability (Avlonitis et al. 2001; Buckley et al. 1992; De Brentani 1991; Ennew et al. 1992; John & Storey 1998; Parasuraman et al 1985; Zeithaml et al. 2009, 20-23). Intangibility and interactivity are the two features of services and service innovations, which separate them from goods-based innovations. Intangibility is reflected in the form of service innovations. Service innovations are usually novel ideas or combination of existing elements, which customers cannot easily perceive. Interactivity refers to the role of a customer, which is significant due to the simultaneous production and consumption, in production of services. (Miles 2008) Usually companies engage different external parties, such as customers, to the new service development process (Alam & Perry 2002; den Hertog 2010, 15; Kristensson et al. 2008; Kuusisto & Riepula 2011; Magnusson 2003; Miles 2008). Service innovations are faced with particular challenges and possibilities as a result of customer involvement (Alam 2002; den Hertog 2010, 16-17; Magnusson et al. 2003; Mattingham et al. 2004; Parasuraman et al. 1985; Zeithmal et al. 2009). However, customer involvement is limited among technology-based service companies, because usually their services can be classified as hard services (Eramilli & Rao 1990; Kristensson et al. 2008). In hard services, the interactivity

does not cause problems, because production and consumption are separated (Eramilli & Rao 1990).

Centralized R&D activities are not the essential base of a service innovation process, and often business units outside the R&D function are the places, in which several essential service innovation activities occur (de Jong et al. 2003; den Hertog 2010, 11; 13). Furthermore, focusing on R&D, companies face the risk of developing service innovations that do not fit the customer needs (den Hertog 2010, 17). Company's productivity and competitiveness are affected by creation of service innovations (Toivonen & Tuominen 2009). Service innovations are recognized to require distinct concepts, frameworks and tools, and service innovations cannot be managed and supported by using models and frameworks developed for technological innovations in manufacturing (Hertog 2010, 13; Edvarsson et al. 2007 den). As will be seen in the following subchapter, service innovations consist of several dimensions, from which only one is technology. Moreover, the new service development process is said to be non-linear and cross-departmental, and it often involves people outside an organization. Service innovations require cross-departmental participation and creativity when developed and launched to the market due to their multidimensional nature. (den Hertog 2010, 11; 13) Value is created differently through service innovations, and the role of customer in value creation is important (Edvarsson et al. 2007). There is limited evidence how to systemically develop, design and model service-driven innovation process and which type of supportive operations are needed (den Hertog 2012, 13-14; Edvarsson et al. 2007, 180; Ganz 200, 226).

A new service has to have particular characteristics to be considered as service innovation. Firstly, a new service, comprising of a novel service, a novel service portfolio and/or a novel service delivery system, can be defined as SI if it generates value for a customer, and the customer is included in value creation. (den Hertog 2010, 19) Secondly, a service provider has to be able to replicate the new service in some form, and

there has to be systematic and conscious efforts to develop and market whether the new service was “accident” or intentionally developed (den Hertog 2010, 20; Toivonen & Tuominen 2009). On the other hand, SI is seen as continual recombination and reconfiguration process of several elements that a service contains (Drejer 2004; Gallouj & Weinstein 1997; Voss & Hsuan 2009). This implies that the amount of service elements determines the amount of service reconfigurations that are possible to form (Chae 2011). Thirdly, in order a novel idea to be considered as SI, it has to be new to the firm at least in some degree, though the level of newness can vary from new-to-firm service to new-to-the world service. In addition, SIs are said to be mainly incremental innovations, and radical service innovations are more rare (Berry et al. 2006). Lastly, a new service has to be commercialized in order to be classified as SI. It has to be launched to and distributed in a market with some level of success. (den Hertog 2010, 20)

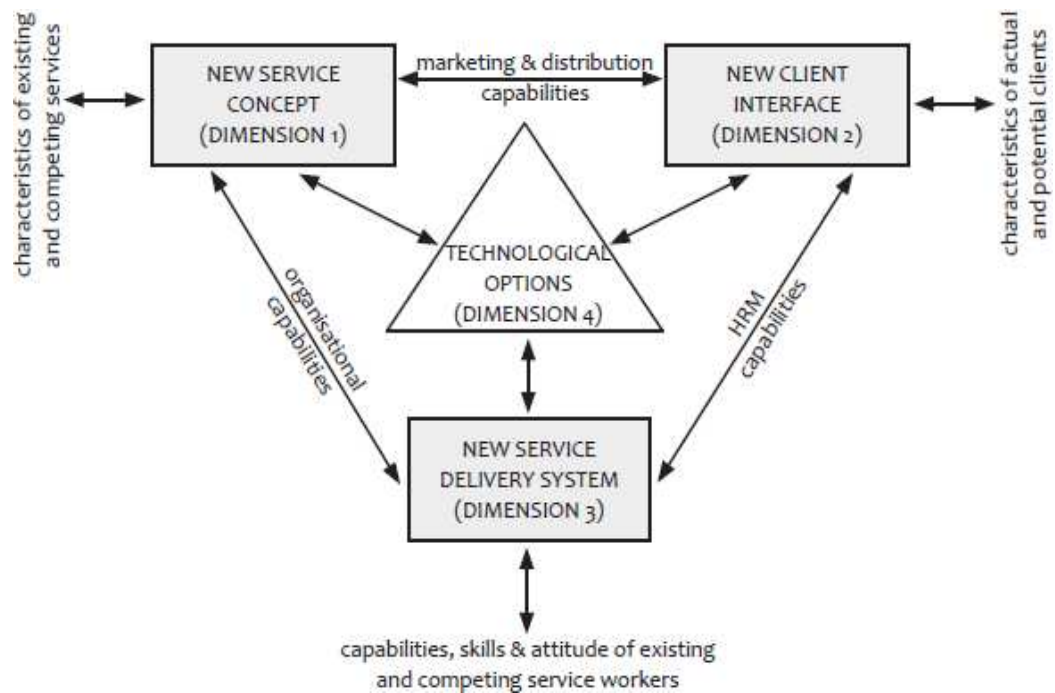
Service innovations are not limited to service companies, and manufacturing companies are developing service innovations in increasing degree (den Hertog 2010, 17). Integration of manufactured goods into service solutions or the other way around, which is called encapsulation, to create service solutions or functionality is increasing among companies. Understanding the importance of encapsulated innovation to manufacturing and service companies will increase competitiveness and the odds for success. (Howells 2001, 61-66) On the contrary to suggestion of de Jong and Vermeulen (2003) and Martin and Horne (1993), service innovations in manufacturing companies often involve both innovation champion and sponsor (Ettlie & Rosenthal 2012).

### **2.3.1 Four-Dimensional Model of Service Innovation**

Service innovations have four key dimensions that characterize them according to the four-dimensional model created by den Hertog (2000):

new service concept, new client interface, new service delivery system and technological options (See Figure 2). SI, that includes a change in only one dimension, may generate the need for alteration in other dimensions. Thus, usually combination of the four dimensions is involved in service innovations. (den Hertog et al. 2010; Miles 2008) The combination of the four dimensions is enabled by connections between these dimensions. These connections are organizational, human resource management (HRM), and marketing and distribution capabilities. These connections are essential to implementing the changes. The weight of each dimension, relevance of the different connections, and the resources necessary for connections between dimensions are service-, company- and innovation-specific. Radical innovations usually require bigger change in needed resources than incremental innovations, and developing a certain type of service innovation requires distinct resources. For example, a new service concept is associated with marketing resources more than new client interface. Organizational knowledge is important to developing service innovations. This may create a need for change as new resources are required to develop service innovation. In addition, the degree of formalization in search and selection process affects the required resources. (den Hertog 2000)

The first dimension of service innovation is service concept, which is the intangible part of SI (Avlonitis et al. 2001; Cook et al. 1999; den Hertog 2000). It is a novel idea of how to solve an existing customer problem. A service concept has to be new in its application in a specific market, though it can exist in other markets. (den Hertog 2000) Sometimes a service concept can create a new market by combining existing elements to create a new service concept (Berry et al. 2006). Examples of service concepts include a clothing chain developing stores with particular style that accompanies the brand, and new bank account types. (den Hertog 2000)



**Figure 2:** Four-dimensional service innovation model (den Hertog 2000)

The second dimension is client interface, which is about changing the means of customer engagement in service design, production and consumption (e.g. den Hertog 2000). The client interface has been more recently called as customer interaction dimension in order to highlight the role of customer (den Hertog 2010; 18; den Hertog et al. 2010). Innovation can result simply from the way the interaction between a service provider and a customer occurs (den Hertog 2000). The most important factor in new service development process and in success of SI is interaction with customers, because service provider achieves competitiveness and creates new value for customers through systemic interaction (Kuusisto et al. 2010; Martin & Horne 1995). The change in client interface includes, for example, increasing the degree of customer self-service (den Hertog 2000).

The service delivery system/organization relates to the connection between a service provider and a customer. It is about changes in ways how services are delivered, and these changes are executed by altering

service workers' performance. (Avlonitis et al. 2001; den Hertog 2000; Gadrey et al. 1995) Change in service workers' performance can be executed through, for example, empowerment (den Hertog 2000). The change in other dimensions of service innovation usually causes the need for service delivery system/organization to adapt. The significance of service delivery/organizational innovations is high to a company despite of its invisibility as an innovation. (Kuusisto et al. 2010) This dimension is similar to a process innovation, which is defined as the changes in organizational processes inside a company to enable production and delivery of an offering to a customer (Tidd & Bessant 2009, 21). Service delivery system/organization is a specific interaction type in the customer interface, though it is about organizational arrangements within an organization in a way that SI can be developed (den Hertog 2000). Moreover, change in the service delivery system can create a new market as customer's access to the core benefit is completely transformed (Berry et al. 2006). Example of service delivery systems/organization includes introduction of e-commerce and the changes needed within an organization as a result. Though several innovations in service delivery dimension relate to electronic delivery, there are also other forms, such as packaging and transportation. (den Hertog 2000)

Technological options are not prerequisite for service innovation, though, in practice, the relationship between SI and technology takes several forms depending on whether technology is enabler or facilitator for SI. Information technology is seen as important factor enabling SI due to its ability to increase information processing efficiency and effectiveness. (den Hertog 2000; Miles 2008) Innovative technological option becomes sufficient and is able to solve customer problems, when it is merged with services (Kuusisto et al. 2010). Tracking and tracing systems in logistics and transportation services are examples of technological innovations (den Hertog 2000; Miles 2008). More recently, the dimension of technological options was renamed to new delivery system: technology

(den Hertog 2010, 18). The role of technology will be discussed in more detail below.

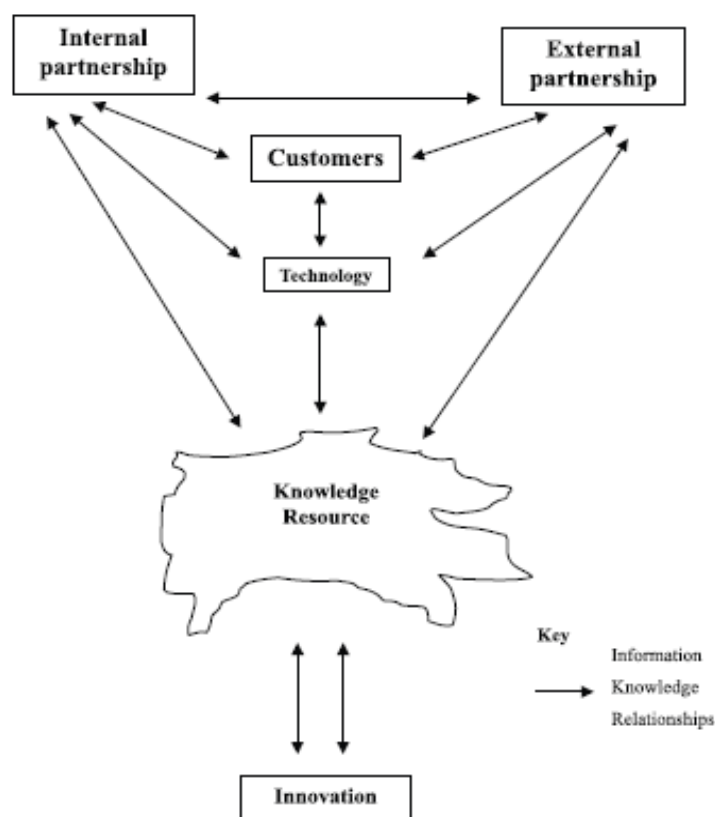
### **2.3.2 The Role of Technology in Service Innovation**

Various traditional services are being replaced by information technology-based services, and new types of services are created through emerging technologies, though technological innovation is not requirement for SI (de Jong & Vermeulen 2003; Gadrey et al. 1995; Fitzsimmons & Fitzsimmons 2011, 96-97; 104-105). On the other hand, the growth in several service industries has been gained through information technology, which has been recognized as a precondition for growth (Kuusisto & Meyer 2003, 12). Technology and SI are intertwined with varying relations, though ICT has been recognized as a key driver for financial performance in service companies and essential to innovation process, because it can increase information intensity through data processing (Cainelli et al. 2004; Hipp & Grupp 2005; Rai & Sambamurthy 2006). Service innovations in a form of product and process innovation can be developed and traded through a technological platform or infrastructure, which ICT constitutes (Barras 1986).

Technology-push is the key driver of product innovations in the early stage of product life cycle, whereas demand-pull generated by technology and product users drives incremental innovation during later stages among users industries. Product life cycle model describes the four stages of product life cycle from introduction to decline through growth and maturity, whereas the reverse product life cycle model suggests that technology user in services start from growth and then go through maturity, transition, and introduction. Following the reversed product life cycle model, user industries of technology, including service industries, apply new technology in innovation generation in order to improve first delivery efficiency in existing services, then to improve the quality of existing



services, and lastly to create new or transformed services (Barras 1986). A creation of new process, service or product occurs through a combination of hardware and/or software assets, and business competencies characterize information technology-enabled innovation (Mahnke et al. 2006). ICT has especially important role among knowledge intensive business service companies, because flexibility to create customized services requires substantial information processing. As a result, knowledge intensive business service companies tend to invest in ICT more than other service companies. (Tether & Hipp 2002) Knowledge exploration and exploitation mechanisms are constructed by technology, which is not considered as an innovative element as such (Sebastiani & Paiola 2010). Service companies shape their relationship networks globally and expand core capacity through technology (See Figure 3), which has no equivalent as a tool in this context (Kandampully 2002).



**Figure 3:** The role of technology in services (Kandampully 2002)

Internal and external partnerships are utilized through exploitation of technology, which, in turn, is way to generate core competence. Core competence depicts a company's knowledge base. New knowledge is sought through creation and maintenance of relationship networks, which are enabled by technology. (Kandampully 2002) Technology-based service innovations are produced by companies in specialized technology suppliers, science-based and production-intensive sectors (Miozzo & Soete 2001; Pavitt 1984). In the model by den Hertog (2000) presented in Figure 2, technology is in the center of service innovation, though it is not enough by itself (Sebastiani & Paiola 2010).

In order to understand and read markets or incorporate knowledge of the supply chains, an innovation should consists of inventive use of technology, but not focus on technology adoption (Tether & Metcalfe 2003). Companies' innovation activities and performance are essentially influenced by use and development of ICT among services that are characterized as intangible and information-based (Evangelista 2000). Achieving increased competitiveness through ICT requires targeted investments, through which a company's efficiency of pivotal processes is improved and added value is increased by differentiating its offerings. In addition, the core assets of a company are comprised of particular assets that managers and entrepreneurs should possess in order to realize the full potential of technology. (Sebastiani & Paiola 2010)

## **2.4 The Degree of Internationalization as a Construct**

The degree of internationalization describes the scale and scope of international operations a company has outside its home country (Capar & Kotabe 2003; Hitt et al. 1997; Ietto-Gillies 2009). As suggested earlier, DOI consists of three parts that are operational performance, operational structure and attitudinal attributes (Hitt et al. 2006b; Li 2007; Sullivan 1994a). Operational performance describes a situation outside a

company's home country, whereas operational structure depicts international assets (Sullivan 1994a). Attitudinal attributes represents top management's orientation towards internationalization (Perlmutter 1969). A company's international operations are measured most accurately by degree and scope of internationalization (Sullivan 1994a, 1996). A percentage of foreign turnover (degree of internationalization) and geographic diversification (scope of internationalization) determine a company's commitment in foreign markets, and international commitment, in turn, enhances degree and scope of internationalization (Ripolles-Melia et al. 2007). Increased organizational learning, flexibility and opportunities are enabled by growing international expansion (Kenelly & Lewis 2002).

Competitive advantage is pursued more and more by companies through increasing the degree of internationalization (Porter 1990). Participating in internationalization and expanding geographic scope is associated with costs and benefits (Geringer et al. 1989; Tallman & Li 1996). The net performance benefits generated by internationalization can be misunderstood if these costs and benefits are not clearly defined and operations of a company become too complex (Hitt et al. 1997; Sullivan 1994a). The ratio of costs and benefits changes along with the different stages of internationalization, which generates varying performance impact (Kumar & Singh 2008).

Internationalization arises three barriers that complicate transferring competitive advantage across countries: institutional and cultural differences, and factor costs differences, such as materials, wages and capital costs (Kogut 1985). Companies can build advantage through possibilities of internalizing scattered knowledge-related assets through process of investing abroad, which expanded geographic scope enables. Exploitation of existing and newly acquired assets motivates companies to increase DOI and enter new geographic markets, which are ways to extend companies assets into new markets. (Delios & Beamish 1999)

## **2.5 The Relationship between Entrepreneurial Orientation and the Degree of Internationalization**

The extent of international activities relates to the international experience of top management in a company (Bloodgood et al. 1996). The top management team has been suggested to be an intangible resource base for new ventures due to the team's significant role in determining the direction of the company (Andersson 2000; Bloodgood et al. 1996; Feeser & Willard 1990; Oviatt & McDougall 1994; Patterson & Cicic 1995). Entrepreneurially-oriented activities and internationalization are dual processes that companies integrate in practice (Fletcher 2004). Internationalization of SMEs has been interpreted as an act of EO; it is an expansion strategy to enter new markets by searching opportunities for a company to grow and increase profitability (Lu & Beamish 2001; Lumpkin & Dess 1996; Ripollès-Melià et al. 2007; Zahra et al. 1999). Innovativeness and proactiveness are requirements for international expansion into new markets (Fletcher 2004; Knight & Cavusgill 2004). Moreover, the combination of willingness to take risks and innovativeness is as essential feature of value creation in global markets. These features are seen as being part of EO, and indicating that international operations are entrepreneurial. (Fletcher 2004)

A company's ability to identify and utilize opportunities in foreign markets is higher in companies with an innovative culture and capabilities (Jantunen et al. 2005; Lazonick 2005). Equally, international dimension can be found in all entrepreneurial operations, because the odds of internationalization are high, when acting entrepreneurially (Fletcher 2004). There is evidence that the relationship between EO and DOI is positive in SME context in India (Javalgi & Todd 2011) and in a context of Spanish companies (Ripollès-Melià et al. 2007). It should be noted that these studies used the unidimensional EO. The three-dimensional EO, which consists of innovativeness, risk-taking and proactiveness, is an important internal determinant of a company's performance in an

international environment (Jantunen et al. 2005), though there is only limited evidence about the dimensions of EO and internationalization. Proactiveness impacted in international performance, though other two dimensions did not in a case of Swedish manufacturing SMEs (Frishammar & Andersson 2009).

EO increases a company's intent to internationalize, and the likelihood of further internationalization is higher among companies with high EO than low EO companies. Risk-taking and innovative attitude or proactive expansion to new markets may partially determine a company's international success and significant presence in foreign markets. (De Clercq et al. 2005) For SMEs in emerging economies, EO can be seen as firm-level motivator for internationalization, because it may push companies to overcome their lack of key resources and utilize available intangible resources instead (Yamakawa et al. 2008) Global mindset, which includes part of IEO, has positive relationship with a company's DOI in a context of Finnish small companies in ICT industry (Nummela et al. 2004). Moreover, international sales growth in entrepreneurial companies in Finnish electronic sector was generated by earlier age of internationalization (Autio et al. 2000). Ability and willingness of international opportunities' pursuit is increased by developing an entrepreneurial culture early in companies (Autio et al. 2000; Zucchella et al. 2007).

Internationalization is seen as entrepreneurial and the dimensions of EO seem to have impact in DOI. Based on the literature above about internationalization of entrepreneurial companies, the relationship between EO and dimensions of DOI is hypothesized as followed:

**Hypothesis 1a:** A SME's innovativeness, proactiveness, and risk-taking are positively, though with different degrees, related to the firm's degree of internationalization.

## **2.6 The Impact of Entrepreneurial Orientation on Service Innovation**

Innovativeness and innovative activities, which an individual or an organization can generate originally, are driven by EO in the company-level (Hult et al. 2004; Lumpkin & Dess 1996; Naman & Slevin 1993). Engagement towards creating innovations that are new to the market, and willingness to undertake ventures with considerable risk are characteristics of an entrepreneurial company (Miller 1983). Also active seeking of opportunities to come up with new technology, products, and services describes entrepreneurial companies, which engage in both innovation generation and adaptation (Damanpour & Wischnevsky 2006). A company's capacity to generate innovations is related to its innovativeness, which is one of the dimensions of EO (Hult et al. 2004). Entrepreneurial companies often benefit from the first-mover advantage as they regularly generate operations and launch innovations before competition. A company's ability to recognize development opportunities for products and markets is suggested to be affected by EO. (Covin & Slevin 1991) Furthermore, the performance impact of EO is generated through innovations. Innovative companies are able to utilize emerging opportunities through monitoring changes in the environment and customer loyalty. (Zahra & Covin 1995)

There is empirical evidence about the positive relationship between EO and innovations. In a study conducted in China, EO had a positive and significant relationship with both technology- and market-based innovations (Zhou et al. 2005). More recently, EO had a positive relationship with innovation among German companies (Harms et al. 2010). Also, the role of EO in a company's tendency towards innovations was significant among old service- and product-oriented companies regardless of their size (Hult et al. 2003). Product innovativeness is influenced by EO through acquisition of innovative information in the new product development process (Brockman & Morgan 2003).

The focus on innovations is one of the fundamentals of EO, though proactiveness and risk-taking are also important (Harms et al. 2010). There is some evidence how each dimension of EO influence innovations. Higher levels of proactiveness and risk-taking relate to greater innovation. In addition, proactiveness and risk-taking have positive impact in innovation generations, and they strongly attract companies to prefer innovation generation over adaptation. (Pèrez-Luño et al. 2011) As mentioned earlier, a company's propensity towards committing and maintaining experimentation, idea generation and creativity, which can ultimately turn into technology, product and service innovations, characterize innovativeness-dimension of EO (Lumpkin & Dess 1996). A company's willingness to abandon current practices and technologies, and go beyond existing standards is reflected in innovativeness (Kimberly 1981).

EO seems to be a driver of innovations, and based on the literature above the relationship between EO and dimensions of DOI, the following hypotheses are proposed:

**Hypothesis 1b:** A SME's innovativeness, proactiveness, and risk-taking are positively, though with different degrees, related to the firm's service innovations.

## **2.7 The Relationship between Human Capital and Degree of Internationalization**

Internationalization of a company is significantly influenced by knowledge and learning according to the knowledge-based view of internationalization (Autio et al. 2000; Saarenketo et al. 2004). In addition, a company increases its commitment to a foreign market and expands to other markets as it gains more knowledge about markets through knowledge development and learning according to the Uppsala model (Johanson &

Vahlne 1977). The key in a company's internationalization process is considered to be knowledge (Autio et al. 2000; Johanson & Vahlne 2003; Luostarinen 1980, 125; Oviatt & McDougall 1995). In addition, it has been suggested that the speed of utilizing an entrepreneurial opportunity through internationalization is moderated by knowledge and learning (Oviatt & McDougall 2005). Knowledge-intensity increases the tendency to internationalize among new ventures with inimitable resources, and there is a positive relationship between knowledge-intensity and growth in international sales, in foreign sales as a percentage of total sales, and in total sales among Finnish entrepreneurial companies in electronic industry (Autio et al. 2000; Bloodgood et al. 1996).

On the other hand, lack of comprehensive information about markets, products and services can be considered as a barrier to internationalization (Westhead et al. 2001). There is empirical evidence that the relationship between human capital and internationalization of SMEs is positive (Bloodgood et al. 1996; Delgado-Gomez et al. 2004; Javalgi & Todd 2011; Manolova et al. 2002; Reuber & Fischer 1997; Ruzzier et al. 2007). This indicates the importance of human resources to SMEs; they compensate the lack of other resources with human capital (Radulovich 2008; Westhead et al. 2001). The likelihood of entrepreneurial companies to export is increased by human capital resources, which entrepreneurial managers provide. In addition, industry-specific human capital predicts a company's subsequent exporting. (Westhead et al. 2001)

Increased DOI is generated through internationally experienced management teams, which can be seen a resource in software SMEs (Reuber & Fischer 1997). Managerial skills and environmental perceptions are the most important dimensions of human capital (Manolova et al. 2002). Prior international experience and positive foreign market perception of owner/founder increases the likelihood of internationalization and further growth, because the odds of owner/founder to rely on their



international experience, competencies and skills when internationalizing is high (Manolova et al. 2002; Ruzzier et al. 2007). Furthermore, the essential factor behind a company's internationalization strategies and behavior is the entrepreneur (Andersson 2000). Individuals with higher level of human capital should better recognize and utilize emerging profitable opportunities in the internationalization process, when they engage in one. (Davidsson & Honig 2003; Ruzzier et al. 2007).

Human capital seems to play important role in internationalization of a company, and especially in case of SMEs the role of knowledge is important. Based on the above it can be concluded that human capital impacts DOI, and their relationship is suggested as followed:

**Hypothesis 2a:** A SME's human capital is positively related to the firm's degree of internationalization.

## **2.8 The Effect of Human Capital to Service Innovation**

A company's employees are a key in the innovation process, because they are idea generators for new or improved services that are turned into successful innovations (de Jong & Vermeulen 2003; Van de Ven, 1986). Opportunity recognition for innovation and unsatisfied customer needs are usually identified and understood by frontline employees, and including frontline employees increases the likelihood of success in implementing service innovations (de Brentani 2001; de Jong & Vermeulen 2003). In order to find a solution to an existing innovation challenge, innovative service companies need to possess knowledge, skills, and other similar resources, which form the service innovator's capabilities (Kuusisto et al. 2011). Highly skilled and trained personnel in both frontline and production activities are used by successful companies in creation of new services and delivering them (de Brentani 2001).

In an effective service development project, the role of three groups of individuals is highlighted; the development and the customer interface staff, and customers (Johne & Storey 1998). Furthermore, degree of service customization and user-friendliness need to match the customer needs and be high enough to differentiate the service from competitors' offerings. This can be outlined by utilizing knowledge of frontline employees. (Martin & Horne 1995) Although product champions have been recognized to be crucial to new product development, this does not necessarily apply to service companies (de Jong & Vermeulen 2003; Martin & Horne 1993). On the other hand, cross-functional project teams and product champions are commonly utilized in service companies (Johne & Storey 1998). Service champions exist in successful service companies more often than in non-successful, though involvement of champions in service innovation process occurred often or not at all among the majority of successful companies (Martin & Horne 1993).

Human resources, which consist of interpersonal and business skills, are positively related to the company's innovation strategy among small firms (Edelman et al. 2005). Long-term customer interaction, creative employees, and solid technical and marketing skills are required from companies with innovation strategy (Chandler & Hanks 1994). There is evidence about the positive relationship between human capital and SI (e.g. Damanpour 1991; Martin & Horne 1995). Companies with successful service innovations had higher overall internal participation in the innovation process compared their failed service innovations (Martin & Horne 1995). Professional knowledge possessed by a company's employees positively correlates with innovations, and it bases on education and experience (Damanpour 1991). In addition, there is evidence that investing in human capital has impact in innovations. Innovations are positively affected by in-service training. (Ballot et al. 2001; Gallie & Legros 2012)

Innovating companies have greater knowledge assets and more training compared to non-innovating firms (Thornhill 2006). The presence of new technology increases the knowledge requirements for users of technology (Miles 2005). Formal education, depth of experience and technology knowledge impact most the level of radicalness in innovations among technology entrepreneurs (Marvel & Lumpkin 2007). Human capital is positively related to creation of a sustained competitive advantage (Ordeñez de Pablos 2004). Achieving sustained competitive advantage in international companies is built through integration of knowledge-based resources from different units, which, in turn, describes the organization's capacity to innovate (Ordeñez de Pablos 2006). When ideas for innovations are generated by combining collaboration with network partners and tacit knowledge in existing technology, the role of industry-specific knowledge is especially important (Dakhli & De Clercq 2003). Entrepreneurs' prior knowledge impacts the opportunity recognition and capability to deliver innovative offerings suggesting that companies should look for opportunities in the sectors familiar to them (Shane 2000). SME' employees in high-tech companies tend to be more innovative compared to employees in large companies, because of the clear property rights (Acs & Yeung 1999; Qian & Li 2003). Knowledge assets have a positive relationship with innovation among high-technology manufacturing SMEs in Canada (Thornhill 2006). Furthermore, a firm's resources, including specialized expertise and prior experience, have positive impact in the firm's competitiveness that includes innovation speed among Taiwanese high-technology SMEs (Wu et al. 2008).

Knowledge that is possessed by people in an organization is the key in creating innovations. This suggests that human capital has impact in SI. Based on the literature discussed above, the relationship between human capital and SI is suggested as follows:

**Hypothesis 2b:** A SME's human capital is positively related to the firm's service innovation.

### **3 THE PERFORMANCE IMPACT OF INTERNATIONAL EXPANSION AND SERVICE INNOVATION**

SI and internationalization have been seen as the main ways for SMEs to grow and survive in competition due to their limited resources, as mentioned earlier (Hollensen 2007, 74-75; Louart & Martin 2012; Lu & Beamish 2001). Company's productivity and competitiveness are affected by the creation of service innovations (Toivonen & Tuominen 2009). Significant advantages that exceed greater financial performance can be generated through innovative internationalization of operations (Zahra & George 2002, 262). In a recent study, based on empirical evidence it was suggested that combining internationalization with a codified innovation generates the highest potential for overall growth performance among SMEs (Lecerf 2012). It has been suggested in the literature that a prerequisite for internationalization is development of a new product/service (Bell et al. 2004).

Business performance is a part of the organizational effectiveness, and it reflects perception of strategic management. Business performance consists of financial and operational performance of a company. Financial performance describes the achievement of a company's financial goals, and is measured by using outcome-oriented indicators, such as sales growth, profitability and earnings per share. Operational performance is measured by using non-financial indicators, such as market share, new product introduction, and product quality. (Venkatraman & Ramanujam 1986)

#### **3.1 The Relationship between Service Innovation and Performance**

Improvements in efficiency, effectiveness of operations and performance are generated by responding to internal and external changes in

companies. These improvement possibilities and changes are seen as motivators for companies to adopt innovations. (Damanpour et al. 2009) There are two main reasons behind the positive relationship between innovations and performance: first-mover advantage and performance gap (Damanpour et al. 2009; Ettlie 1983; Lieberman & Montgomery 1988; Roberts & Amit 2003). Superior performance is achieved through first-mover advantage, which in turn is created through innovations (Roberts & Amit 2003) Performance gap is created by the change in the environment, to which a company adapts by innovating (Ettlie 1983). There is evidence that the external environment moderates the relationship between innovations and a company's financial performance. Moreover, radical innovations increase financial performance in dynamic environments, whereas in competitive environments incremental innovations improve financial performance (Jensen et al. 2006). Companies that absorb novel knowledge, are more conscious about the most recent developments, and increase the likelihood of utilizing benefits generated by innovation activities in the long run, when they build first-mover position through innovation activities (Cohen & Levinthal, 1990; Roberts & Amit, 2003).

There is empirical evidence about the positive relationship between innovations and performance (Cainelli et al. 2004, 2006; Damanpour et al. 2009; Freel & Robson 2004; Hult et al. 2004; Matear et al. 2002). A company's capacity to pursue innovation has positive impact in profitability, growth in sales, market share and general performance (Hult et al 2004). Increased company performance was achieved through innovation adaptation regardless of the combination of particular innovation types among the UK public services. The results of the study imply that service companies should not focus on adopting particular type of innovation, but instead find a balance among different types, which leads to the highest performance benefit. (Damanpour et al. 2009) A company's performance is also influenced by innovations in global markets (Hitt et al. 1998).

In the context of SMEs, there is also empirical evidence about the effect of innovations on performance. Innovator position had positive influence in company's performance, which consisted of return on assets, return on equity, return on sales, and sales growth, among technology-based SMEs (Qian & Li 2003). On the other hand, the findings of a study among the UK SMEs suggest that the performance improvement effect of innovations existed more strongly among manufacturing companies than in service companies, though there was positive relationship between incremental process innovation and increased productivity among service SMEs (Freel & Robson 2004). Among small and young companies, there is partial evidence that innovation relates positively to sales growth (Bloodgood et al. 1996). The empirical evidence showed that a company's economic performance was highly dependent on process and service innovations as the innovation activities had positive relationship with productivity during the three year period. The increased productivity for the most part related to the level of innovation investments in ICTs. In addition, technology-focused service sectors, which are software, technical consultancy, R&D, engineering, post, and telecommunication, were more innovative compared to other service sectors (Cainelli et al. 2004, 2006).

SI produces organizational change that aims for growth and improved performance. Based on the literature discussed above, the relationship between SI and performance can be suggested as follows:

**Hypothesis 3a** A SME's service innovation is positively related to the firm's performance.

### **3.2 The Impact of the Degree of Internationalization on Performance**

Exploration and exploitation benefits are associated with geographic expansion, as companies take advantage of learning, economies of scale

and scope (Kogut 1985; Lu & Beamish 2004). Moreover, companies can benefit from cost differences through internationalization, as well as minimize their costs by benefiting from local expertise (Ghoshal 1987; Kogut 1985; Thomas & Eden 2004). Companies can gain flexibility through higher DOI, because they can better adapt to environmental changes (Kogut 1985). Although some of the benefits can be constraints to SMEs, improved performance is likely to be achieved through increased DOI (Loth & Parks 2002; Pangarkar 2008). Furthermore, it has been suggested that SMEs could benefit more from increased DOI than large companies (Loth & Parks 2002). SMEs can increase their sales through internationalization, because increased DOI helps companies to gain additional volume, which is beneficial for reaching towards economies of scale. SMEs can improve their profit potential and revenues by making the use of similarities in niche market across countries (Luostarinen 1980, 71; 92; 114). In addition, increased DOI will enable SMEs to minimize their costs by avoiding tariffs. (Pangarkar 2008) To summarize, theoretically there is support for the hypothesis that higher DOI is beneficial to a company's performance. Expanding internationally lowers the risk of bankruptcy, and increases revenues. Higher DOI also improves the cumulative value of a company in the long run. (Annavarjula & Beldona 2000)

There is also empirical evidence regarding the relationship between DOI and performance. The positive relationship between DOI and performance has been studied in different contexts; for example in manufacturing and service, MNEs, new ventures and high-technology SMEs (e.g. Bloodgood et al. 1996; Delios & Beamish 1999; Grant 1987; Hitt et al. 1997; Pangarkar 2008; Qian & Li 2003; Qian et al. 2003; Radulovich 2008; Zahra et al. 2000). Among MNEs, DOI has positive impact in performance, when it is measured with return on assets, equity and sales, or combination of the three items (Deliosh & Beamish 1999; Hitt et al. 1997). The positive relationship between DOI and performance exists also in SME context, although the literature (e.g. Lu & Beamish 2001; Oviatt &

McDougall 1994) has concluded that SMEs differ from large companies in terms of resources, ownership, management systems and organizational structure, and they are not just miniatures of traditional enterprises.

Higher levels of internationalization was partially related to subsequent income after two years, and geographic sales distribution had positive relations with sales growth among new ventures (Bloodgood et al. 1996; Zahra et al. 2000). Significant proportion of revenues was likely to be generated from foreign sales in high growth high-technology companies (Feesser & Willard 1990). DOI had positive impact in return on sales, assets and equity, and sales growth in small high-technology companies (Qian & Li 2003). In addition, increased foreign involvement improves profitability, and SMEs with high DOI outperform domestic as well as low and medium DOI counterparts. (Qian et al. 2003) More recently, higher DOI improves company performance, when it is measured by return on sales and assets, sales growth, foreign profits, profits growth, and experience and knowledge obtained from foreign operations (Pangarkar 2008).

There is evidence about the curvilinear relationship between DOI and performance. The shape of the relationship curve between DOI and performance is affected by several factors, including knowledge-intensity, and a company size and type (Capar & Kotabe 2003; Contractor et al. 2003; Lu & Beamish 2001). Service companies have seemed to be able to benefit from an increasing degree of internationalization faster than manufacturing companies (Contractor et al. 2007). In addition, the type of a company, whether it is service- or manufacturing-oriented, impacts the shape of the relationship between DOI and business performance (Capar & Kotabe 2003). When high geographic scope was coupled with medium geographic scale, performance was at the highest level among the large U.S. companies. On the other hand, medium geographic scope generated the highest performance regardless of the level of the geographic scale. (Qian & Li 2002)



The relationship between the degree of internationalization and performance is linear in short run, whereas in long run the relationship takes a U-shape (Thomas & Eden 2004). The U-shaped relationship has been supported in the literature (e.g. Capar & Kotabe 2003; Contractor et al. 2003; Ruigrok & Wagner 2003). This suggests that the rising costs of internationalization exceed the initial benefits, but as the time goes by the relationship between the degree of internationalization and performance turns positive again (Thomas & Eden 2004). These costs emerge due to managerial and resource constraints, because the need for coordination and communication increases as DOI increases (Qian 2002). When DOI was measured with foreign sales to total sales -ratio, it had positive linear relationship with performance among Indian service companies. Performance was measured in terms of return on assets, equity and sales (Contractor et al. 2007). Other stream of the DOI-performance literature has suggested the S-shaped curve to depict the relationship between DOI and performance (e.g. Contractor et al. 2003; Lu & Beamish 2001, 2004; Riahi-Belkaoui 1998; Ruigrok et al. 2007; Thomas & Eden 2004). The S-curve has also been found in the context of SMEs (e.g. Contractor et al. 2003; Lu & Beamish 2001, 2004).

Degree of internationalization is an important factor affecting performance in SMEs. As it can be seen from the literature above, DOI-performance relationship is complicated and to a certain degree context-specific. Based on the literature, the following relationship between degree of internationalization and performance in SMEs is suggested as followed:

**Hypothesis 3b:** The relationship between degree of internationalization and performance is curvilinear in a SME.

### **3.3 The Role of Service Innovations in Internationalization**

Competitive advantage is built and supported through innovation and internationalization (Hitt et al. 1994; Hoskisson & Hitt 1994, 85; 147; Porter 1990). Innovation helps companies to overcome local disadvantages, when expanding internationally (Porter 1990; Hoskisson & Hitt 1994, 17). Global focus and tendency to internationalize fast are characteristics of small innovation-oriented companies in Nordic countries (Boter & Holmquist 1996). Highly innovative companies generate bigger part of their sales through exports compared to low-innovative companies (Samiee et al. 1993). Increased returns on innovation can be achieved by spreading the R&D investments across foreign markets through multiple entries to foreign markets (Hitt et al. 1994; Oviatt & McDougall 1994). A company's tendency to export and export performance are impacted by new product factors and new product adaptation (Atuahene-Gima 1995; Calantone et al. 2004; Cavusgil & Zou 1994). Successful companies design their products to the world market from the beginning of a new product development process (Kleinschmidt & Cooper 1988).

In the context of SMEs, the focus of new product development process in knowledge-intensive companies was likely to be in products that could be sold internationally. Furthermore, internationalization of a company was stimulated by product or process innovation. (Bell et al. 2004) First-mover advantage and international performance can be enhanced through innovative strategy in high-technology SMEs (Qian & Li 2003). It has been empirically supported that service innovations have positive relationship with DOI in SMEs (Radulovich 2008). Small companies following innovative differentiation strategy reached higher export performance (Namiki 1988). Global start-ups were able to overcome their limitations by providing differentiated products or service and gaining first-mover position. Offering a unique product or service to the lead markets of the industry was way for successful new ventures to start internationalization

and increase DOI. Advantage over competitors was retained through continuous innovation in global competition. (Oviatt & McDougall 1995)

SMEs in ICT industry are facing increased global competition, which pushes them to innovate. Based on the literature above, the relationship between SI and DOI is suggested as followed:

**Hypothesis 4a:** An ICT SME's service innovation is positively related to the firm's degree of internationalization

As proposed by the literature, the relationship between DOI and performance is not straightforward (e.g. Capar & Kotabe 2003; Contractor et al. 2003, 2007; Kotabe et al. 2002; Lu & Beamish 2001). Internal company-specific factors determine the effect DOI has on company's performance (Kotabe et al. 2002). Increased performance has been suggested to be achieved through innovation in companies that had international operations in several countries (Hitt et al. 1994). Competitive advantage and organizational efficiencies can be generated via innovation (Grant et al. 1988; Hitt et al. 1994; Porter 1985, 169). Furthermore, in order to compete with local operators, internationalized companies may need to develop new technology or innovation (Hitt et al. 1994). Empirical findings have shown that R&D investment, measured as relative to revenues, had positive impact in relative international sales growth through increasing the global market share among international, large companies. The findings also suggest that exports and foreign direct investment were predominantly determined by R&D, and that sales growth enhancements relative to competitors could be indicated through R&D investments in companies with high DOI. (Franko 1989) More recently, there is empirical evidence that higher R&D intensity strengthened the positive relationship between DOI and the firm's performance (Kotabe et al. 2002).

Based on the literature and existing empirical findings, it has been suggested that innovations positively moderate the relationship between DOI and performance, which means that innovations strengthen the positive relationship between DOI and performance (Hitt et al. 1994). More recently, there is empirical evidence that product innovation positively moderated the relationship between exports and productivity among SMEs (Cassiman & Golovko 2011). R&D investments had positively moderated the relationship between DOI and performance among Japanese SMEs (Lu & Beamish 2004). Furthermore, product and/or process innovation have been proposed to moderate the relationship between DOI and performance, and that the combination of these two types of innovations could generate the strongest effect. This is because international competitiveness can be enhanced through process innovation, which can decrease costs or improve quality. (Hitt et al. 1994)

Based on the literature above, the following relationship between service innovation, degree of internationalization and performance is suggested:

**Hypothesis 4b:** A SMEs service innovation strengthens the relationship between degree of internationalization and performance.

## **4 EMPIRICAL RESULTS**

The empirical part of the research contains the following parts; measures, data and data collection, analysis methods, and the results. In the results subchapter we will start with descriptive analysis of the data, then we move on to hypotheses testing and finally testing the full model. It should be kept in mind that for some analysis, the sample size of our data is too small and it will have impact in interpreting the results of analyses.

### **4.1 Measures**

The questionnaire consisted of seven parts, which contained mainly subjective measures. EO, human capital, SI and performance were measured by the use of Likert-scale measures ranging from one to seven. DOI was measured by using subjective scale from one to six. In addition, four absolute items were used to measure the performance. All the measures have been used in previous studies and their validity has been tested in prior literature (See Table 3). There were also several measures, which describe the demographics of the company and respondents.

Several control variables were included in the questionnaire. The company size was controlled in terms of total sales and amount of full-time employees. Both of these items were measured by using scale measures, although only the size in terms of employees was used in analyses (See Appendix 2). In addition, primary sector of operations was asked in order to see the difference between manufacturing and service companies. Due to the characteristics of data, this comparison was not possible. Traditionally the factors that could impact a company's internationalization are sector and company size (Pla-Barber & Escriba-Esteve 2006). Two of the variables regarding the company's size and the main sector for operations were included for two reasons; to control that the companies are within the sample frame and to use them as control variables in

analyses. Industry and size were re-coded in order to make a distinction between industry sectors (manufacturing, retail and service) and company's size. We also controlled the age of companies, which has been suggested to impact performance and international sales as young companies are more flexible than older companies that lag behind attaining international sales (Reuber & Fischer 1997; Zahra 2003). International experience and industry experience were controlled due to their impact on internationalization and innovating (Andersson 2000; BarNir 2012; Huang 2003; Manolova et al. 2002; Neal, 1995; Reuber & Fischer 1997; Ruzzier et al. 2007).

#### **4.1.1 Independent variables**

The measure for EO consisted of nine items, which were adopted from the research of Jantunen et al. (2004). These measures were used in a study, which was targeted to Finnish companies in ICT industry. The scale was adapted from the original scale of Miller (1983), and Covin and Slevin (1989). This scale and its variations have been commonly used in EO literature, and it has been suggested that the variance in results of EO literature has not been generated by the use of certain EO scale. (Rauch et al. 2009) The 9-item scale of EO was used in the questionnaire, because it allows formation of three-dimensional EO, which usage has been suggested in the literature (e.g. Cadogan 2012; Frishammar & Andersson 2009; Kreiser & Davis 2010; Lumpkin & Dess 1996; Miller 2011; Naman & Slevin 1993). The first three items measured innovativeness, whereas the following three measured proactiveness. The last three items were used for measuring a company's risk-taking. The sixth item (See Appendix 2) was reversed in order to avoid response bias.

**Table 3:** Questionnaire measures and their composition (Partially adopted from Radulovich 2008, 113)

<b>Number of items</b>	<b>Authors</b>
<b>Entrepreneurial orientation</b> 9 items	Jantunen et al. (2004); Miller (1983); Covin & Slevin (1989)
<b>Human capital</b> 6 items	Radulovich (2008); Reed et al. (2006); Subramaniam & Youndt (2005); Wang & Chang (2005); Youndt et al. (2004)
<b>Degree of internationalization</b> 4 items	Autio et al. (2000); Cavusgil & Zou (1994); George et al. (2005); Kuivalainen et al. (2010); Preece et al. (1999); Ruigock & Wagner (2003); Saarenketo et al. (2004); Kumar & Singh (2008)
<b>Service innovation</b> 6 items	Atuahene-Gima (1995); Atuaheme-Gima & Ko (2001); Calantone & Cooper (1981); Cooper & Kleinschmidt (1987); Langerak et al. (2004); Radulovich (2008); Song & Perry (1991)
<b>Performance</b> 13 items	Autio et al. (2000); Cavusgil & Zou (1994); Chandler & Hanks (1993); Chandler & Jansen (1992); Dobbs & Hamilton (2007); Kotabe et al. (2002); Lu & Beamish (2001); Murphy et al. (1996); Ruigock & Wagner (2003); Wiklund et al. (2009); Zahra & Garvis (2000)

The measure for human capital consisted of six items (See Appendix 2), from which five were duplicated from Youndt et al. (2004), and Subramaniam and Youndt (2005). These items describe employees' knowledge, skills and capabilities in a company (Radulovich 2008, 115). The scale was based on human capital and strategic human resource management literature (Subramaniam and Youndt 2005). These five items

were chosen because they have been used in research, which covered more than 100 industries (Youndt et al. 2004). This indicated that the measures could work across industries. Moreover, validity of the five-item scale was tested by Subramaniam and Youndt (2005) with confirmatory maximum likelihood factor analysis, and the results showed that the scale exceeds the recommended levels for confirmatory factor analysis and also for the factor loadings. This indicated that the scale has strong convergent and discriminant validity, and the measures used are internally consistent and valid. The sixth item was adopted from Wang and Chang (2005). This item was added to include the formal education in the structure of human capital, because it has been recognized as a part of human capital.

#### **4.1.2 Dependent variables**

The measure for DOI included four items, which were adopted from the literature. The multi-item measure of DOI has been suggested by Sullivan (1994a). The scholar argues that using a single measure predisposes goodness of results to uncommon variations caused by certain circumstances that affect the measure. Based on this suggestion and the findings of Sullivan (1994a), the four-item measure for DOI was chosen, which consisted of foreign sales to total sales, foreign profit to total profit, foreign customers from total customers, and foreign employees to total employees. Foreign sales to total sales and foreign subsidiaries to totals subsidiaries are part of the measure suggested by Sullivan (1994a). We used foreign employees to total employees -item instead of foreign subsidiaries to totals subsidiaries, because the study of Sullivan (1994a) was conducted in the context of MNEs, whereas the foreign employees to total employees -item has been usually used in SME context (e.g. Kuivalainen et al. 2010). Furthermore, foreign sales to total sales -ratio has been a constantly used as a measure of DOI (Kumar & Singh 2008; Li 2007; Radulovich 2008, 113; Ruigock & Wagner 2003; Sullivan 1994a). Foreign customers to total customers -ratio has been previously used by



Saarenketo et al. (2004) in a context of Finnish ICT SME. The foreign profit to total profit measure was adopted from George et al. (2005).

The measure for SI consisted of six items, from which four were adopted mainly from Radulovich (2008), though we included two additional items to generate a broader view of SI. The additional items were adopted from the same measures, on which the four original measures based (e.g. Atuahene-Gima & Ko 2001; Calantone & Cooper 1981; Langerak et al. 2004, Song & Perry 1999). The item “new-to-the-industry technology in service” was adopted from Song and Perry (1999) and the item “new solution provided by service” from Cooper and Kleinschmidt (1987). The first item was added in order to include the technology dimension into the SI measure. Technology has a central role in ICT industry and in the chosen view on SI. The second item, “new solution provided by service”, is a combination of two items of Cooper and Kleinschmidt (1987). The item was added to include the unique solutions to SI measure due to the intangible nature of service, because customers can evaluate only the difference between expectations and perception of service, and how it answers to their problem or need (Zeithaml et al. 2009, 33; 51).

The performance measure was built to include three dimensions; profitability, growth and international performance. Multidimensionality of performance has been suggested in the literature (Murphy et al. 1996; Venkatraman & Ramanujaman 1986), though we limited the number on dimensions to three in order not to overwhelm the respondents. Most of the measures are subjective, though four absolute measures of total sales and international sales were included. We received only limited amount of answers to these questions, and as a result absolute measure were not included in the analysis part. The shortcomings of subjective performance measures are recognized (Rauch et al. 2009), but due to the limited availability of the data in secondary sources and the sensitive nature of absolute measures, subjective measures were chosen. The measures for profitability, which are return on sales, assets, and equity, were adopted

from the literature (e.g. Lu & Beamish 2001; Riahi-Belkaoui 1998; Ruigcock & Wagner 2003) due to their vast usage. The measures of international performance, which included international sales growth, international profitability growth, and creation of new foreign markets, were adopted from the literature (e.g. Autio et al. 2000; Cavusgil & Zou 1994; Knight 2001; Zahra & Garvis 2000). The measure of new foreign market creation was included to the international performance measure, because service innovations sometimes create new markets when they are radical, new-to-the-world innovations (e.g. Berry et al. 2006; Tidd & Bessant 2009, 38). Moreover, important opportunities for growth and value creation are generated through entering new foreign markets (Lu & Beamish 2001). We recognize that measures of DOI and international performance are partially overlapping as the factors are positively correlated (See Appendix 5).

The measures for growth, including sales growth, growth in amount of employees, and growth in market share, are adopted from Dobbs and Hamilton (2007) and Chandler and Hanks (1993). Profitability is a key to measuring competitive success, because it is essential to survival (Buckley et al. 1998). This is why we had profitability as a separate measure as well as international profitability. Growth has been suggested to be especially relevant dimension of performance in the context of young and small companies (Chandler & Jansen 1992). Growth in sales and employment are the most commonly existing measures in the literature (Dobbs & Hamilton 2007; Wiklund et al. 2009). It has been suggested that market share is impacted by the willingness to take risks by top management (Gupta & Govindarajan 1984), which in our research would be reflected through DOI and SI. The performance measures were changed in order to capture the business performance as suggested in literature (e.g. Venkatraman & Ramanujam 1986).

## 4.2 Data and Data Collection

The data was gathered by identifying suitable companies in the Amadeus database first and, the sending an electronic cover letter and a survey link to companies. The companies contacted were identified to be suitable for the purpose of the research by using the European Commission classification of SMEs and ICT sector (See Appendix 1). The online questionnaire (See Appendix 2) was created partially based on the questionnaire in Radulovich (2008), though several changes were made based on prior literature as described above.

The questionnaire was pretested with two managers in different fields, and some alterations to the wordings of the questions were made based on their suggestions. Answering to the questionnaire took approximately 15 minutes. The questionnaire was sent to companies in two parts, and the non-respondents were contacted with three reminder emails. The questionnaire was sent to 1050 companies representing service, trade and manufacturing ICT sectors. Four companies were excluded from the sample, because they did not have international operations. Moreover, 34 companies had blocked the online service, which was used to send the survey invitation, and sent emails bounced back from eight companies. The final sample was 1004 companies. We received 104 filled questionnaires during the two months of data collection. This gives us the response rate of 10.46 %. 75 questionnaires were fully answered. The relatively low response rate could be caused by the questions regarding the profitability, because SMEs usually see that kind of a data as sensitive information (Autio et al. 2000). The online surveys used to host the questionnaire automatically removed three responses that included only answers to EO. After examination of the responses one company was dropped due to not having international operations.

Majority of companies (87.2 %) involved in the research were small-sized, as they had less than 50 employees (See Table 4). Out of the small companies 63.2% were micro enterprises. Moreover, 79.7 % of the companies had turnover under five million Euros. Small companies in ICT service sectors formed the biggest group in this research. The average age of companies was 13 years, and the internationalization of the companies started on average in 2005. Majority of the respondents (76.6%) was in CEO position, and had been 11 to 15 years in the industry. Half of the respondents had eight or more years of international experience and 34.6% had more than 15 years of international experience. 42 % of respondents have been employed by their current employer for two to four years, and 24.3 % 11 or more years.

**Table 4:** Respondent demographics

M = manufacturing, W = wholesale, S=service, Internationalization = Year of internationalization, Industry exp. = Industry experience, and Intern.exp. = International experience

		<b>Small</b>	<b>Medium</b>	<b>Missing</b>
Amount		68	10	22
<b><u>Industry</u></b>	M	11	0	
	W	3	0	
	S	55	9	
Turnover (M€)		0.5-0.99	10-24.9	22
Size		1.5	4.8	23
Age		13	18	24
Internationalization		2005	2003	36
Industry exp. (years)		11-15	11-15	23
Intern. exp. (years)		8-10	11/15	24

### 4.3 Analysis Method

The hypothesized relationships suggested were tested empirically by using three statistical analysis; factor and regression analysis, as well as structural equation modeling (SEM). The thesis includes both simple and multiple regression analysis. For regression analysis, we chose to use ordinary least squares (OLS). These analyses were selected, because they are widely used and accepted in the literature (e.g. Calantone et al. 2004; Capar & Kotabe 2003; Radulovich 2008; Torkkeli et al. 2012). The analyses were conducted by using R, which is open source statistical software that contains several statistical and graphical techniques. It can be extended by adding R packages to the interface. Several researchers are involved with the content development of R packages. (R 2013) Because R has a Unix interface, we selected a graphical user interface and Rcmdr –package, which are built-in packages in R.

#### 4.3.1 Factor Analysis

Factor analysis is an interdependence technique, which aims at summarization, data reduction and unveiling any latent variable causing the covariation of the manifest variables (Costello & Osborne 2005; Hair et al. 1998, 90). Factor analysis is appropriate when partial correlation, which refers to the correlations between variables when the effect of other variables are taken into account and controlled for, is small. Partial correlations are the base of Kaiser's measure for sampling adequacy (MSA), which should get a value above 0.5 to be in good level. (Hair et al. 1998, 99) Varimax rotation is a common rotation method, which aims at simplifying the data structure and to create uncorrelated factors. (Costello&Osborne, 2005)

If the data can be defined as “strong”, a smaller sample size is acceptable. “Strong data” refers to uniformly high communalities without cross

loadings, and several variables loading strongly on each factor. Item communalities can be thought as high if they are all 0.8 or greater and low if they are less than 0.4. (Costello&Osborne, 2005) Communalities are estimates of variance in each variable. In other words, communalities show to what degree the variance in an item is explained by the generated factors. (Cooper & Emory 1995, 539) The correlation of a factor and each item is depict in factor loadings, with which each variable's role in determining a factor is evaluated (Hair et al. 1998, 106). The reliability of factor analysis is measured by Cronbach's alpha, which measures the internal variability within the factor. The cutoff value for Cronbach's alpha is between 0.6 and 0.7 (Hair et al. 1998, 88; 118).

We conducted the factor analysis by using the *Rcmdr*'s built-in functions. Additionally we used R packages called *psy* and *psych*. The *psy* –package contains function for the calculation of Cronbach's alpha, and the *psych* – package includes KMO function, from which MSA value can be calculated. Example of the functions for Cronbach's alpha and MSA values is presented in Appendix 3.

#### **4.3.2 Regression Analysis**

Regression analysis is used for analyzing the relationship between dependent variable and multiple independent variables, which are used to predict the selected dependent variable. Simple regression analysis includes a single independent variable, whereas multiple regression analysis consists of several independent variables. In the regression equation, the estimated change in the dependent variable, when the independent variable changes one unit, is represented by intercept and coefficient. Intercept, which is the constant term in regression equation, shows the value on the Y axis, in which the line defined by regression model gets value zero on the X axis. In multiple regression analysis, the relative contribution to the overall prediction is indicated by the weight of

each independent variable. Regression variate, which is formed by combining independent variables linearly to optimally estimate the dependent variable, contains weights that ensure maximal prediction from the group of independent variables. (Hair et al. 1998, 144-145; 148-149; 153) Ordinary least squares or least squares regression find the best or the optimal model by minimizing the sum of squared residuals that represent the difference between the predicted values and the actual values (Jank 2011, 48-49). Coefficient of determination ( $R^2$ ) is a measure for the fit between the data and estimated regression equation, which is calculated by dividing explained variance by total variance (Anderson et al. 2005, 567; Bowerman et al. 2005, 156). The quadric regression model is linear model, although it contains the squared term, but the value of dependent variable is described as a linear function of the regression parameters (Bowerman et al 2005, 168).

A moderator effect describes a situation, in which a relationship between an independent and a dependent variable is affected or changed by another independent variable. This is called quasi or bilinear moderator, which is the most often used moderator effect in multiple regression. The moderator term in multiple regression is formed by multiplying the independent variables, and this new term is added into the regression equation. The significance of moderator effect is evaluated by comparing the estimates of original regression equation and to the moderator effect regression equation. A statistically significant difference in  $R^2$  confirms the existence of moderator effect. (Hair et al. 1998, 170-171).

The data is heteroskedastic when the residuals have changing variance, because the assumption behind regression analysis is constant variance. If the residuals are heteroskedastic, there might be problems with biased standard errors. This means that the significance of coefficients is biased as well, which indicates that the linear OLS is not the best linear unbiased estimator. The effect of heteroskedasticity of standard errors can be corrected by using a technique introduced by Newey and West (1987).

Multicollinearity occurs when any single independent variable is highly correlated with a group of other independent variables. Multicollinearity may cause problems when using multiple regression analysis. It impacts by reducing the predictive power of a single independent variable by the extent to which it is associated with the other independent variables. As multicollinearity increases, the unique variance explained by each independent variable decreases and the shared prediction percentage rises. (Hair et al. 1998, 143-144; 156-157) The cutoff value for multicollinearity depends on the context, though generally variables with highest correlations are analyzed more closely (Jank 2011, 106).

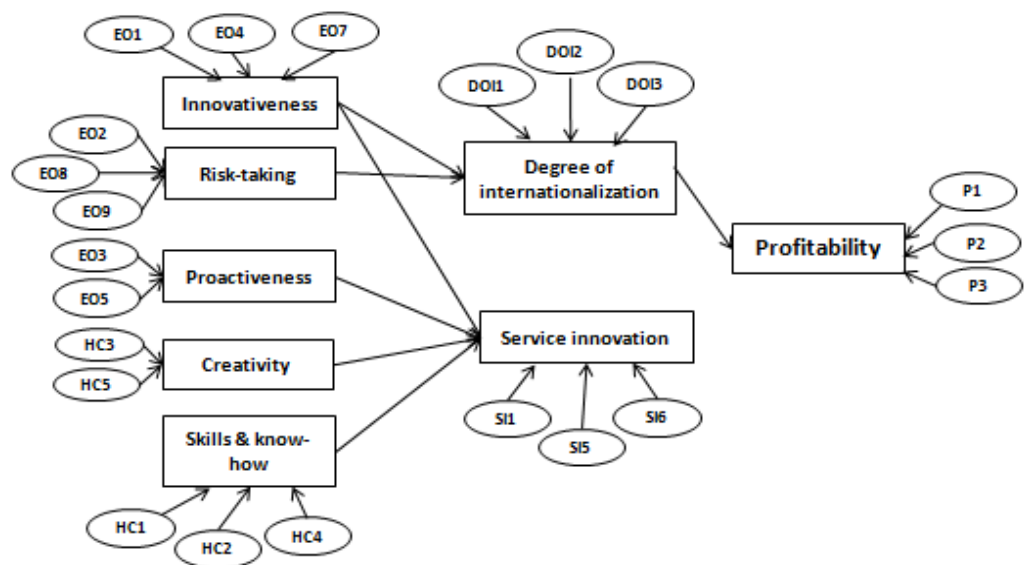
Regression analyses were conducted by using the *Rcmdr*'s built-in functions for OLS. Breusch-Pagan test for heteroskedasticity was conducted using *lmtest* package. In order to correct any existing heteroskedasticity in the regression residuals, the heteroskedasticity and autocorrelation robust Newey-West estimator was used from *sandwich* package of R. Additionally, R package called *QuantPsyc* was used to test the moderating effect hypothesis. (See Appendix 3 for function examples)

#### **4.3.3 Structural Equation Modeling**

Structural equation modeling (SEM) is a statistical modeling technique, which is either a combination of factor and regression or path analysis, or multiple simultaneous regression analyses model. By identifying structural model, which the statistical software uses, a group of interdependent, though separate, multiple regression equations are estimated by SEM. (Hair et al. 1998, 583-584) When using SEM, the model needs to be specified and determined before conducting the analysis (Hu & Bentler 1999). The relations of the observed measures to their posited underlying construct are identified by factor analysis, when the construct can intercorrelate without any constraints. This is followed by a confirmatory structural model, which recognizes the causal relationships between the



constructs suggested by a theory. (Anderson & Gerbing 1988) The most common estimations procedure is maximum likelihood estimation, which are used for small sample sizes of 50 and it has generated valid results, though the appropriate sample size is usually between 100 and 200. Furthermore, a research with smaller sample size should consider smaller significance level of 0.025 or 0.01 due to statistical characteristics of maximum likelihood estimation at smaller sample sizes. (Hair et al. 1998, 605; 613) The path model of profitability was created based on regression analysis results (See Figure 4).



**Figure 4:** Path model with profitability for structural equations modeling

SEM was conducted by using R package called *lavaan.survey*, which is a SEM model for survey data (See Appendix 3). This package is an extension of *lavaan* –package. It should be noted that this package is still a beta version. The assumptions behind SEM include independence of observations, random sampling of the respondents and linearity of all relationships (Hair et al. 1998, 601). Results can be biased as a result of normality (skewness and kurtosis), which creates a need to conduct data transformations (Hair et al. 1998, 601; Radulovich 2008, 125). Data normality can be tested with modified Kolmogorov-Smirnov test or

Shapiro-Wilks test (Hair et al. 1998, 73). Moreover, strong kurtosis in data will affect the goodness-of-fit statistics as well as standard errors (Shook et al. 2004).

The model fit in SEM can be evaluated by using three goodness-of-fit measures: absolute fit, incremental fit and parsimonious fit measures (Hair et al. 1998, 611; Hooper et al. 2008). The overall model fit measured by the Chi-Square statistic is an absolute fit measure, which indicates if the hypothesized model fits the actual data. The overall model fit shows whether statistical difference exists in covariance matrices between hypothesized model and the actual data at certain significance level suggesting that no significance is desired. Conclusions should not be made based on only the overall model fit, because the sample size impacts highly Chi-Squared value. Other overall fit measures should be added to evaluation. (Hair et al. 1998, 621-622; 654-655)

The additional measures include standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), a comparative fit index (CFI), and Tucker-Lewis Index (TLI). These measures should be evaluated together, because the cutoff values work best together in order to lower type 1 and type 2 errors. (Fan et al. 1999; Hu & Bentler 1999) Type 1 error describes the likelihood of rejecting true null hypothesis, whereas type 2 error depicts the probability of supporting false null hypothesis (Hu & Bentler 1999). It should be kept in mind that with small sample sizes most of these combinational measures and their cutoff values tend to overreject models. (Fan et al. 1999; Hu & Bentler 1999) GFI indicates the percent of observed covariances, which is explained by the covariance defined by the hypothesized model. The cutoff value for GFI is 0.95, but also 0.90 is acceptable (Hair et al. 1998, 657). SRMR is the standardized average difference between the components in estimated covariance matrix of measured variables and the observed covariance matrix of measured variables, and in order to be acceptable it should get values 0.08 or less (Hu & Bentler 1999; Stevens

2009, 567). In other words, SRMR can be used to identify misspecified models (Stevens 2009, 569). Errors of fit in the covariance matrix are considered in RMSEA, which indicates the model fit to populations' covariance matrix (Hair et al. 1998, 656). The cutoff value for RMSEA is 0.08, though it should not get values below 0.03, and it lowers the odds for errors at level 0.06 when the other measures are at given cutoff level (Hu & Bentler 1999). Comparison of model fit to null model can be done with CFI, which should get value of 0.95 or higher (Fan et al. 1999; Hu & Bentler 1999). This indicates a good fit between the model and actual data.

Incremental fit measures compare the model to a null model, in which measurement error does not exist (Fan et al. 1999). Two incremental measures are used: Tucker-Lewis Index (TLI) and the normed fit index (NFI) (Hooper et al. 2008). The cutoff value for incremental fit indices is 0.95 (Hu & Bentler 1999). Parsimony fit indices include the Akaike Information Criterion (AIC) and the Consistent Akaike Information Criterion (CAIC) (Bozdogan & Ramirez, 1988; Hair et al. 1998, 659). These statistics help researcher to choose a model that is the most parsimonious, meaning that for each estimated coefficient better model fit is reached (Hair et al. 1998, 611; Hooper et al. 2008). Although their use is recommended, it should be noted large sample size is required in order for these statistics to be reliable (Hooper et al. 2008).

#### **4.4 Analysis and Results**

This chapter is divided into four subchapters, which contain the results from analysis and their implications. First, we describe the data and point out possible abnormalities. Second, the survey items are transformed into factors by using factor analysis, and the created factors are used for hypotheses testing. The reliability and significance of each factor and analysis is tested. The outliers were not removed due to the limited

amount of data. Finally, SEM s presented and the whole model is tested in the fourth subchapter.

#### **4.4.1 Data Description**

The items of EO are in average level or little above it in the sample data, since the values of EO range from 4.3 to 5.2. Human capital items are above average, ranging from 5.0 to 6.2, and, on the contrary, DOI items are in low level among the SMEs in the sample. The answers of DOI ranged on average between 2.5 and 1.6. This should be kept in mind when interpreting the results of analyses. The values of SI range from 4.2 to 5.5 indicating that the level of SI is above the average in the sample. The levels of DOI and SI indicate that companies in the sample seem to put more effort in innovating than increasing internationalization. The values of performance dimensions range from 3.5 to 4.6. (See Appendix 4), indicating that the companies in the sample consider their performance to be in average level or above the average compared to other companies in the same industry<sup>1</sup>. Skewness and kurtosis of each item were tested (See Appendix 4). Some of the items are not normally distributed, but due to the nature of the data (survey data with Likert scale) any corrections were not made.

#### **4.4.2 Factor Development**

Several factor analyses were run to create ten factors from the items in the survey. Each of the factor analyses also includes the MSA values to ensure the appropriateness of items for factor analysis. All the factor analyses are reliable, since the Cronbach's alphas are above 0.7 (Hair et al. 1998, 88; 118). EO consists of three dimensions, which are innovativeness, risk-taking and proactiveness, as suggested by the

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<sup>1</sup> Companies were asked to compare their performance against other companies in the same industry (See Appendix 2).

literature (See Table 5). The first factor, innovativeness, and the second factor, risk-taking, have three items, whereas the third factor, proactiveness has only two items. The MSA values are in adequate level suggesting that the items are appropriate for factor analysis. Moreover, communalities are in sufficient level indicating that variance in each item is explained by the three factors of EO. The three factors explain 70.8% of the variance, and the Cronbach's alphas are above the cutoff value implying that the factor analysis is reliable, and that the factors are valid, because there is correlation within the factor.

**Table 5:** Factor analysis for entrepreneurial orientation

Var exp. = variance explained, Cum. var. = cumulative variance and Cron. alpha = Cronbach's alpha

<b>Rotated Factor Pattern – Entrepreneurial orientation</b>					
	Innovativeness	Risk-taking	Proactiveness	Comm.	MSA
EO1	0.568			0.560	0.88
EO4	0.843			0.764	0.85
EO7	0.562			0.595	0.90
EO2		0.682		0.591	0.83
EO8		0.654		0.503	0.87
EO9		0.526		0.512	0.88
EO3			0.640	0.700	0.88
EO5			0.605	0.511	0.91
Var exp.	0.222	0.195	0.174		
Cum. var.	0.222	0.418	0.592		
Cron. alpha	0.796	0.753	0.708		
H0 for 3 factors is sufficient		0.564			

Human capital includes two dimensions, which are skills and know-how, and creativity (See Table 6). The MSA measures are at good level (higher than 0.8), indicating that the items are appropriate for factor analysis. The two factors explain 71.7% of the variance, and the communalities are in accepted level, suggesting that the variance in each item is explained by

the two factors of human capital. Cronbach's alpha for both factors shows that the factor analysis is reliable, and that the factors are valid, because there is correlation within the factor. The results suggest that human capital has dimensional structure, and that the two dimensions seem to consist mainly of tacit knowledge.

**Table 6:** Factor analysis for human capital

Var exp. = variance explained, Cum. var. = cumulative variance and Cron. alpha = Cronbach's alpha

<b>Rotated Factor Pattern – Human capital</b>				
	Skills & know-how	Creativity	Communality	MSA
HC1	0.790		0.762	0.85
HC2	0.687		0.574	0.89
HC4	0.696		0.665	0.87
HC3		0.914	0.995	0.81
HC5		0.625	0.591	0.82
Var exp.	0.388	0.329		
Cum. var.	0.388	0.717		
Cron. alpha	0.839	0.848		
H0 for 2 factors is sufficient		0.362		

DOI items form a single factor, which includes three items. The fourth item of DOI, FETE, was dropped due to poor fit to the DOI factor. It had communality of 0.438, though MSA measures suggested that the four items are appropriate for factor analysis. The communalities are in appropriate level suggesting that the variance in each three items is explained by the factor of DOI. The factor explains 81.2 % of the variance and the Cronbach's alpha is at good level suggesting that the factor is valid, and the factor analysis conducted is reliable. (See Table 7) The test for amount of factor sufficiency could not be conducted due the amount of items in the factor analysis. The results of factor analysis support the

findings of Sullivan (1994) that the measure of DOI should include several items, not just one.

**Table 7:** Factor analysis for degree of internationalization

Var exp. = variance explained, Cum. var. = cumulative variance and Cron. alpha = Cronbach's alpha

<b>Rotated Factor Pattern – Degree of internationalization</b>			
	DOI	Communality	MSA
DOI1	0.957	0.916	0.67
DOI2	0.806	0.649	0.88
DOI3	0.933	0.870	0.69
Var exp.	0.812		
Cum. var.	0.812		
Cron. alpha	0.924		

Four SI items form a single SI factor, which explains 65.6% of variance (See Table 8). The second, third and fourth items of SI were dropped due to the poor fit to the factor. The third factor was reversed, and the possible unfit with the factor was expected. The second factor had communality of 0.48, which suggests that the variance in the item is not explained by the factor of SI. Although the communality is near the cutoff value of 0.5, it was removed to minimize the second item's impact on regression analysis. The MSA values and communalities are in adequate level, which indicates that the items are appropriate for factor analysis and the variance in each of three items is explained by the SI factor. The Cronbach's alpha of the factor is in high level suggesting that the factor is valid and the factor analysis is reliable. The test for amount of factor sufficiency could not be conducted due the amount of items in the factor analysis.

**Table 8:** Factor analysis for service innovation

Var exp. = variance explained, Cum. var. = cumulative variance and Cron. alpha = Cronbach's alpha

<b>Rotated Factor Pattern – Service innovation</b>			
	SI	Communality	MSA
SI1	0.875	0.765	0.68
SI5	0.795	0.632	0.73
SI6	0.756	0.571	0.76
Var exp.	0.656		
Cum. var.	0.656		
Cron. alpha	0.846		

The performance items formed three factors, which are profitability, growth, and international performance, as expected. The three factors were otherwise appropriate for the data, but the overall model fit was poor due to high degree of freedom, which could be caused by the limited amount of data. Due to this, three factors were formed in three separate factor analyses (See Table 9). In the first performance dimension, profitability, the MSA values are in appropriate level indicating that the items are appropriate for factor analysis. The variance of items is explained 88 % by the profitability factor. The variance in each of the items is explained by the single factor as the communalities are in adequate level. The formed factor is valid and the conducted analysis is reliable, as the Cronbach's alpha is in excellent level.



**Table 9:** Factor analyses for performance

Var exp. = variance explained, Cum. var. = cumulative variance and Cron. alpha = Cronbach's alpha, Int. perfor. = international performance

<b>Rotated Factor Pattern – Performance</b>			
	<b>Profitability</b>	Communality	MSA
P1	0.916	0.838	0.79
P2	0.980	0.961	0.68
P3	0.917	0.840	0.79
Var exp.	0.880		
Cum. var.	0.880		
Cron. alpha	0.956		
	<b>Int. perf.</b>	Communality	MSA
P7	0.974	0.948	0.71
P8	0.928	0.861	0.80
P9	0.927	0.859	0.80
Var exp.	0.889		
Cum. var.	0.889		
Cron. alpha	0.959		
	<b>Growth</b>	Communality	MSA
P4	0.818	0.669	0.73
P5	0.811	0.657	0.74
P6	0.957	0.916	0.63
Var exp.	0.748		
Cum. var.	0.748		
Cron. alpha	0.895		

The second dimension of performance is international performance, which explains 88.9 % of variance. The items in international performance factor are appropriate for factor analysis, as MSA values are in adequate level. The Cronback's alpha is in excellent level (0.959) suggesting that the factor is valid and the analysis is reliable. In addition, as suggested by communalities, the variance in each item is explained by the single factor. The third dimension of performance is growth, and the factor formed by three performance items explains 74.8 % of variance. Items are

appropriate for the factor analysis, as MSA values are above 0.5. Communalities in adequate level indicate that the variance in each three item is explained by the growth factor. The factor is valid and the analysis reliable, which indicated by the Cronbach's alpha that is in good level. The results of factors analysis support the suggestions in the literature regarding the multiple item and dimension performance (Murphy et al. 1996; Venkatraman & Ramanujaman 1986).

The factors generated above have mean value close to zero and standard deviation (std.) close to one as they should have (See Table 10). The factors HC1 and SI have negative and significant skewness, whereas DOI has significantly positive. This suggests that DOI has relatively few high values, which confirms the suggestion above regarding the low DOI. HC1 and SI, on the other hand, have relatively few smaller values indicating the higher level of skills and know-how, and service innovation among the sample. Moreover, HC1 and P2 have positive and significant kurtosis and HC 1 also has negative and significant skewness, which indicates that HC 1 has peak on the left, whereas P2 is rather flat. In addition, DOI is positively and SI negatively skewed, suggesting that DOI has peak on the right, and SI on the left. Other factors seem to be normally distributed. (See Table 10)

The descriptive analysis of each item, and factor and control variable correlations are in the Appendix 4 and 5. The highest correlations are between DOI and international performance (P2), and industry sector (sector) and the average age of companies. The positive correlation between DOI and international performance was expected. The negative correlation between industry sector and age could be due to characteristics of the data. Majority of the companies were in service sector, and the average age of companies was 16 years. There is no indication of multicollinearity since the highest correlation is 0.535, which is below the cutoff value of 0.7. (See Appendix 5) The formation of factors is presented in the next subchapter.

**Table 10:** Factor description

Std. = standard deviation

	Mean	Std.	Skewness	Kurtosis
EO1	0.033	0.860	-0.448	3.026
EO2	-0.015	0.766	-0.418	3.012
EO3	-0.206	0.864	-0.599	3.236
HC1	0.016	0.955	-1.100*	4.460*
HC2	0.096	0.877	-0.743	3.775
DOI	0.009	1.032	1.193*	3.056
SI	0.000	0.943	-0.921*	3.731
P1	-0.132	0.942	-0.312	2.594
P2	-0.047	1.044	-0.061	1.791*
P3	-0.046	1.071	-0.249	2.487

#### 4.4.3 Hypotheses Testing

The relationships between the variables in the research were tested by using linear regression analysis. We included several control variables for the analyses, which are company size measured by amount of employees, industry sector, company's age, the respondent's international and industry experience. In addition, we included the item about employees' education level in the factor analyses, in which the dimensions of human capital are tested to explain DOI and SI. The relationship between dimensions of EO and DOI were tested with linear regression analysis. We detected heteroskedasticity in the residuals of linear regression models ( $p < 0.05$ ), and as a result we used Newey-West to create a heteroskedasticity corrected covariance matrix to fix biased standard errors.

The variance in DOI is accounted for innovativeness, risk-taking and the control variables, except size, by 51.5 %. Risk-taking has positive and significant effect (0.474) on DOI, whereas innovativeness has negative

and significant impact (-0.224) in DOI. Proactiveness, on the contrary, does not have a significant effect on DOI. (See Table 11) These results provide partial support for hypothesis regarding the relationship between EO and DOI, because the relationship between innovativeness and DOI was hypothesized to be positive, though it is negative, and proactiveness is non-significant.

The relationship between dimensions of EO and SI were also tested with linear regression analysis. The variance in SI is accounted for innovativeness, proactiveness and risk-taking by 47.0 %. All the dimensions of EO have positive and significant relationship with SI, although risk-taking is significant only in the level of 0.1. This provides support for hypothesis regarding the connection between EO and SI. Additionally, none of the control variables has a significant impact in SI. The results indicate that innovativeness, proactiveness and risk-taking of top management in SMEs enhance creation and commercialization of SI regardless of the ICT sector, size and age of the company. Surprisingly, risk-taking is partially significant and explains SI only with limited degree. Combining the previous with the significance of proactiveness, the results suggest that service innovations are developed carefully and with a clear goal in mind. Risk-taking has limited role in generating service innovations.

We detected heteroskedasticity in residuals of the regression analysis between human capital and DOI ( $p < 0.05$ ), and as a result we used Newey-West function to correct the effect of heteroskedasticity on standard errors. The results show that the relationship between dimensions of human capital and DOI was non-significant (See Table 11). Instead, all the control variables were significant except company size. There is no support for hypothesis regarding human capital and DOI relationship. The variance in DOI is accounted for the four control variables by 41.8%. Industry, age and industry experience have negative impact in DOI, whereas international experience has positive impact.

Industry sector has the strongest negative (-0.533) relationship with DOI, which suggests that manufacturing and wholesale companies have higher DOI than service companies. Moreover, the results suggest that industry-specific and general knowledge are important among SMEs when internationalizing, as industry and international experience significantly impact DOI.

On the contrary to the human capital-DOI relationship, both dimensions of human capital have significant impact in SI, though creativity is significant only at level of 0.1. The variance in SI is accounted for the dimensions of human capital by 33.1 %. Employees' creativity, and skills and know-how have positive effect on SI, though the latter dimension's impact is stronger. Hypothesis related to the connection between human capital and service innovation is supported. These results indicate that the development and commercialization of service innovations are impacted by the general and industry-specific knowledge. Moreover, an employee's creativity is in minor role compared to his/her skills and know-how, when generating new service innovations. The employees' education level does not have significant influence in DOI or in SI. This contradicts with the findings of prior literature (e.g. Wang & Chang 2005), which proposed that education level is part of human capital.

**Table 11:** Regression analyses for DOI and SI

Education level is HC6 item, which did not fit the factors. The size is measured by amount of employees. Standard errors are presented in parentheses. Statistical significance: \* $>0.05$  and \*\* $>0.01$ .

<b>Regression analyses</b>				
	<b>DOI</b>		<b>SI</b>	
Intercept	1.565** (0.532)	1.845* (0.710)	-1.118 (0.686)	-0.368 (0.851)
Innovativeness	-0.224* (0.106)		0.382** (0.100)	
Risk-taking	0.474** (0.120)		0.228 (0.134)	
Proactiveness	0.117 (0.180)		0.357** (0.130)	
Skills & know-how		0.099 (0.095)		0.400** (0.121)
Creativity		0.015 (0.077)		0.191 (0.102)
Education level		0.092 (0.061)		-0.051 (0.079)
<u>Control variables</u>				
Industry	-0.391** (0.132)	-0.533** (0.116)	0.225 (0.153)	0.162 (0.175)
Size	0.559 (0.396)	0.548 (0.415)	0.184 (0.308)	0.017 (0.348)
Age	-0.025** (0.007)	-0.025** (0.007)	-0.009 (0.009)	-0.015 (0.010)
Industry experience	-0.187** (0.070)	-0.286** (0.075)	0.126 (0.077)	0.030 (0.085)
International experience	0.196** (0.058)	0.226** (0.050)	0.014 (0.052)	0.072 (0.054)
R <sup>2</sup>	0.515	0.418	0.470	0.331
Adjusted R <sup>2</sup>	0.451	0.343	0.401	0.246
F	8.084**	5.573**	6.868**	3.889**
Breusch-Pagan test	25.265**	17.305*	12.208	6.437

All the control variables had highly significant effect on DOI. Industry, age and industry experience had negative impact in DOI. As expected, international experience of top management affected DOI positively and statistically significant. The strongest negative effect is generated by the industry. These results suggest that SMEs with top management that is more willing to take risks will pursue higher DOI in bigger manufacturing and wholesale companies with internationally experienced management. Companies with highly innovative top management will pursue lower DOI, though risk-taking affects DOI more strongly than innovativeness. On the contrary, proactiveness, which includes recognition of weak signals for emerging opportunities, was not significantly related to DOI. This could suggest that increasing internationalization is more of an act of risk-taking. Additionally, the results imply that small companies are confined to lower levels of DOI due to their limited resources. On the contrary, none of the control variables had significant impact in SI. (See Table 11)

The impact of SI and DOI on company's performance was first examined by running linear regression analyses. Three control variables, that are industry sector, size and age of a company, were included, because they are expected to have an impact. First, we start by examining the relationship between SI and performance. All the three control variables had to be removed, because of the poor fit to the model, and this was the case for all three linear regression analyses. SI does not have significant impact in profitability and growth. The only dimension of the performance factors that SI affects positively is international performance. Although the model is significant, the variance of international performance is accounted for SI by 11.9 %. The results regarding SI-performance relationship suggests that service innovations could improve international performance by building competitive advantage as suggested in literature (e.g. Hitt et al. 1994; Hoskisson & Hitt 1994, 85; 147; Porter 1990). As SMEs internationalize further, they should not forget innovating, as it can help them to overcome local disadvantages, as suggested by Porter (1990), and Hoskisson and Hitt (1994, 17). These results give only partial

support for the hypothesis regarding SI-performance relationship. (See Table 12)

The linear regression analyses between DOI and performance were tested to provide more evidence that the relationship is curvilinear instead of linear. In the regression analyses regarding DOI and performance all the control variables were included, though they had non-significant effect. DOI has a negative and significant relationship with profitability. The variance in profitability is accounted for DOI by 16.2 %, although the model is significant. The results are supported by the existing literature. As the degree of internationalization increases, the more complex the operations become and more costs are involved. This, in turn, has negative impact in profitability.

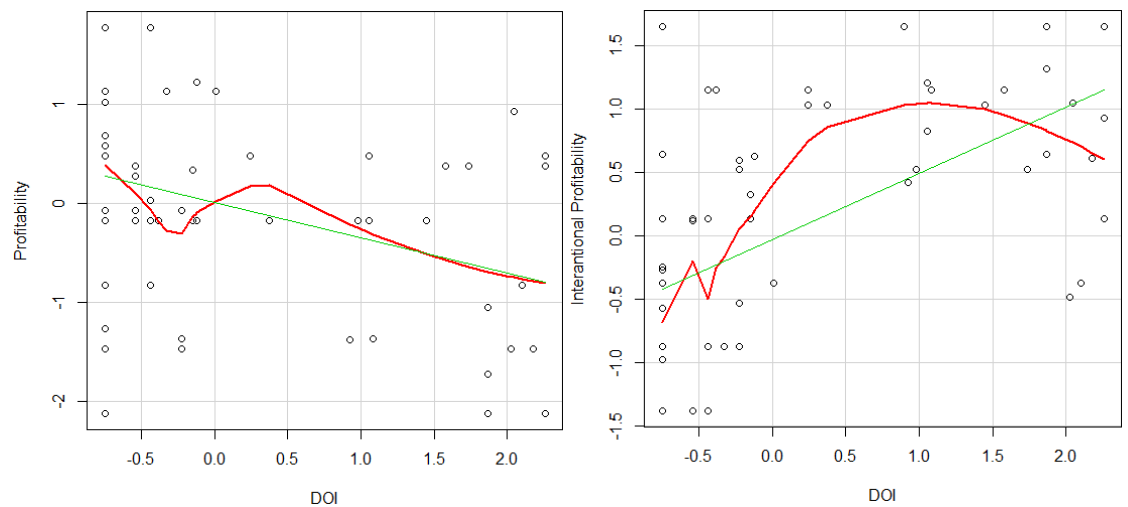
**Table 12:** Regression analyses for DOI, SI and performance

Standard errors are in brackets and in gray. BP test denotes Breusch-Pagan test. Statistical significance: \* $>0.05$  and \*\* $>0.01$

	<b>Profitability</b>		<b>International performance</b>		<b>Growth</b>	
Intercept	-0.685 (0.607)	0.030 (0.114)	0.267 (0.537)	-0.038 (0.107)	0.155 (0.626)	0.025 (0.109)
SI		-0.044 (0.126)		0.369** (0.118)		0.113 (0.121)
DOI	-0.309* (0.120)		0.531** (0.105)		-0.094 (0.123)	
<u>Control variables</u>						
Industry	0.238 (0.194)		-0.070 (0.318)		0.017 (0.200)	
Size	0.151 (0.362)		0.151 (0.318)		0.117 (0.374)	
Age	0.004 (0.012)		-0.007 (0.010)		-0.016 (0.012)	
R-square	0.162	0.002	0.332	0.119	0.046	0.012
Adjusted R <sup>2</sup>	0.111	-0.013	0.292	0.107	-0.010	-0.002
F	3.188*	0.121	8.330**	9.763**	0.827	0.866
BP test	1.576	0.100	5.280	0.061	2.674	0.057



The relationship between DOI and growth, and the model testing it, were non-significant. On the contrary, DOI has significant and positive impact on international performance. Additionally, the model is significant and the variance in international performance is accounted for DOI by 33.2 %. (See Table 11) In order to examine the shape of the relationship between DOI and profitability, and DOI and international performance, two figures were created. As seen below (Figure 5), DOI clearly has a curvilinear relationship with profitability and international performance. The figure suggests that the relationship between DOI and profitability is partially decreasing S-shaped. On the other hand, the relationship between DOI and international performance seems to be inverted U-shaped. This suggests that the curvilinear relationships should be examined despite of the partial support for linear relationship.



**Figure 5:** The relationship between DOI and profitability, and DOI and international performance

The relationship between DOI and profitability is linear according to the analyses. Although the model of curvilinear relationship between DOI and profitability is significant, there are not significant effects in the model. Additionally, the variance in profitability is explained by DOI with 13.8 %. There is no significant curvilinear relationship between DOI and growth. On the contrary, there is support for inverted U-shaped relationship

between DOI and international performance (See Table 12). To a certain point the increase in DOI has a positive impact in international performance, but beyond that point increase in DOI weakens international performance. The regression analysis supports the relationship suggested in Figure 5. In all three regression analyses regarding curvilinear relationships between DOI and dimensions of performance, control variables, which are size, age and sector, were non-significant. The results suggest that SMEs can improve their international performance by increasing DOI. But as it reaches the critical point, the complexity of operations will increase costs, which will overcome the benefits of increasing DOI, and have negative effect on international performance.

ANOVA test was conducted to examine which model describes the DOI-performance relationship better. The results indicate that the model with a linear relationship describes profitability and growth better than the curvilinear relationship. On the other hand, the curvilinear relationship between DOI and international performance is a significantly better model than the one with the linear relationship. (See Table 13) The results regarding the DOI-performance relationship imply that increasing DOI has negative impact in profitability as increasing internationalization increases costs more than it generates benefits. Surprisingly, we did not find significant relationship between DOI, SI and performance. This implies that growth is impacted by other factors than SI and DOI. On the other hand, this could suggest that the current economic situation impacts the profitability of companies, which is supported in literature (Geringer et al. 2000). Furthermore, these results suggest that DOI has a different impact in different dimensions of performance, and that performance should be measured by using several measures.

**Table 13:** Curvilinear relationships between DOI and performance, and linear relationship between SI and DOI

Model 1 is the model of the linear relationship between DOI and a performance dimension. Model 2 is the model of curvilinear relationship between DOI and a performance dimension. Standard errors are in brackets and in gray. BP test = Breusch-Pagan test. Statistical significance: \* $>0.05$  and \*\* $>0.01$ .

Model 1: Performance = DOI + size + sector + age

Model 2: Performance = DOI + DOI<sup>2</sup> (+ DOI<sup>3</sup>) + size + sector + age

<b><u>Regression analyses</u></b>				
	<b>Profitability</b>	<b>International performance</b>	<b>Growth</b>	<b>DOI</b>
Intercept	-0.047 (0.243)	0.413* (0.161)	0.138 (0.250)	-0.049 (0.097)
DOI	-0.378 (0.257)	1.021** (0.175)	0.061 (0.256)	
DOI <sup>2</sup>	0.073 (0.396)	-0.423** (0.128)	-0.159 (0.410)	
DOI <sup>3</sup>	-0.021 (0.194)		0.010 (0.200)	
<b><u>Control variables</u></b>				
Size	0.153 (0.369)	0.138 (0.300)	0.112 (0.377)	
Sector	0.236 (0.197)	-0.048 (0.162)	0.024 (0.202)	
Age	0.004 (0.012)	-0.011 (0.010)	-0.017 (0.012)	
<b>SI</b>				-0.035 (0.105)
R-square	0.138	0.394	0.0217	0.001
Adjusted R <sup>2</sup>	0.101	0.377	-0.020	-0.010
F	3.668*	23.05**	0.5248	0.114
BP test	2.259	8.358	3.822	0.995
<b><u>Model comparison between model 1 and model 2</u></b>				
F	0.01	9.39**	0.49	

The findings of our analysis regarding the relationship between DOI and international performance are supported by the literature. The inverted U-shaped relationship between DOI and performance has been identified in the literature (e.g. Hitt et al. 1994; Hitt et al. 1997; Ramirez-Aleson & Espitia-Escuer 2001). On the other hand, our results regarding DOI and profitability support the suggestion of Thomas and Eden (2004) that in the short-run, the relationship between DOI and performance is linear. Also our results, though non-significant, imply that the relationship between DOI and profitability could take S-shape, which is supported by the literature. The S-shaped has been found in different context in the prior literature (e.g. Contractor et al. 2003; Lu & Beamish 2001, 2004; Riahi-Belkaoui 1998; Ruigrok et al. 2007; Thomas & Eden 2004).

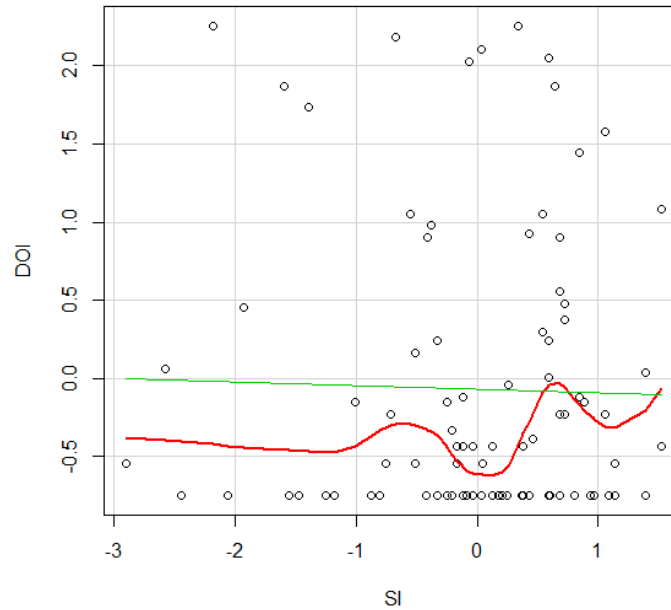
The relationship between SI and DOI is not significant and the model is non-significant (See Table 13), thus the hypothesis 3a is rejected. This suggests as hypothesized that the relationship between SI and DOI could be more complicated than suggested by the literature. Our findings indicate that SI does not moderate the relationship between profitability and DOI. Additionally, there is no significant moderating effect of SI on the relationship between DOI and international performance, although the model is significant and the variance explained by DOI and SI is in good level (See Table 14). Moreover, the model for growth, DOI and SI is significant, though again there is no significant moderating effect. These results imply that the relationship between SI and DOI is curvilinear or DOI is affected by other factors than SI.

**Table 14:** Moderating effects

Standard errors are in brackets and in gray. Statistical significance: \*=0.05 and \*\*=0.01

<b><u>Moderating effect</u></b>				
	<b>Intercept</b>	<b>DOI</b>	<b>SI</b>	<b>DOI x SI</b>
<b>Profitability</b>	0.024 (0.109)	-0.309* (0.111)	-0.059 (0.121)	0.023 (0.113)
R-square	0.110			
Adjusted R <sup>2</sup>	0.071			
F	2.805*			
<b>Growth</b>	0.005 (0.110)	-0.046 (0.112)	0.111 (0.122)	-0.075 (0.114)
R-square	0.019			
Adjusted R <sup>2</sup>	-0.023			
F	0.446			
<b>International performance</b>	-0.049 (0.089)	0.519** (0.090)	0.396** (0.098)	-0.028 (0.091)
R-square	0.416			
Adjusted R <sup>2</sup>	0.390			
F	16.360**			

Based on the results above, we did an ad hoc analysis of the relationship between SI and DOI, and the results (See Figure 6) indicate that there is a curvilinear relationship between SI and DOI. The relationship between SI and DOI is first linear and slightly decreasing, but then turns into S-shaped, though it seems to have increasing trend at the higher levels of SI. This suggests that with low levels of SI, DOI decreases as SI increases, whereas SI has positive effect on DOI at high levels of SI. The figure below implies that first limited resources unable the dual strategy of combining innovating and internationalization. But as the level of SI increases, the companies seem to be able to increase DOI. The shape of the relationship curve suggests that SMEs are able to benefit from the synergies of innovation operation and invest in internationalization.



**Figure 6:** Relationship between service innovation and degree of internationalization.

#### 4.4.4 Model Testing

Three SEM models were developed in order to test the theoretical model suggested in the thesis. In the first part of the model, human capital and EO are exogenous variables and SI and DOI are endogenous variables. In the second part of the model, SI and DOI are exogenous variables and performance dimensions are endogenous. The model was estimated using Maximum Likelihood method with robust standard errors. All variables were standardized during the estimation due to the impact of normality, skewness and kurtosis in results, and covariance matrix was determined by the software. When analyzing the results of the models, the amount of data should be kept in mind. The suggested sample size for SEM models is 200, though the sample size in the thesis is considerably lower (65-67 observations per model). Due to the limited size of the sample additional measures should be examined to make conclusions about the fit between the model and the data. It has been suggested that the model fit is highly impacted by the sample size (Hair et al. 1998, 605; Hooper et al. 2008).

The limited amount of data forced us to use the two-step model. Although the one-step model, in which both confirmatory factor analysis and regression analysis is performed simultaneously, is preferred, we had to choose the two-step model, which has been widely used by researchers (Hair et al. 1998, 600). First, we used exploratory factor analysis to specify the factors, and then the model was tested by bringing the factors created in factor analyses into SEM and testing the relationships suggested by literature. Furthermore, as suggested earlier, we should examine additional fit measures on top of the Chi-Square, which are CFI, RMSEA, TLI and SRMR measures, due to the limited amount of data.

The overall model fit is evaluated by Chi-square test statistics, which all are non-significant in all the models. This is supported by the ratio between Chi-square ( $\chi^2$ ) and degrees of freedom (df), which in two of the models is between 1 and 2 as suggested in the literature (Hair et al. 1998, 658-659). For international performance model, the ratio is 1.088 (19.585/18), and for growth model it is 1.277 (22.987/18), whereas for the profitability model the ratio is 0.835 (15.022/18). This suggests that there is not a significant correlation between the correlation matrices of the hypothesized model and the sampled data in the models of international performance and growth. As suggested above, due to the limited size of the sample, we should examine also the other fit measures as Chi-square is affected by the sample size (See Table 15, Diagnostics).

RMSEA values in all the models are below the recommended level of 0.08, suggesting that errors in the fit of the covariance matrix are reasonable, though a good error of approximation is indicated in the profitability model. SRMR values are below the recommended level of 0.08 in all the models indicating that the models are not misspecified. CFI values are above 0.95 in profitability and international performance model suggesting good fit between model and the sample data. Lastly, TLI is above the level of 0.95, as recommended, in profitability. This indicates that there is little possibility for measurement error, because the difference

between null model and the sampled model is small. On the other hand, there is some possibility for measurement error in the models of international performance and growth, because TLIs are below the suggested cutoff value.

All in all, all the fit measures (CFI 1.000, TLI 1.027, RMSEA 0.000, and SRMR 0.040) in the profitability model are in recommended level, which suggest that it seems that the model fits the data. Three out of four fit measures are in recommended level (CFI 0.961, TLI 0.931, RMSEA 0.060, and SRMR 0.041) in the international performance model suggesting that it seems that the model does not completely fit the data. In addition, because all the measures in profitability model are in recommended level, we checked whether the SRMR value is between 0.06 and 0.03, which lowers the odds for errors. This applies to the model above, suggesting that the errors are minimized. In the growth model, both TLI is below the suggested cutoff value of 0.95, though CFI, RMSEA and SRMR are in the recommended level, this suggests that it seems that the model does not completely fit the data. To conclude, it seems that the model of profitability shows good fit to the sample data.

In the profitability model, DOI is impacted positively and significantly by risk-taking. The negative effect of innovativeness on DOI is partially significant (at level of 0.1). SI is significantly and positively impacted by innovativeness, and proactiveness, as well as skills and know-how of the employees, though the two latter ones are only significant at level of 0.1. Furthermore, according to the model, only DOI has significantly negative relationship with profitability. In the growth model, neither DOI nor SI significantly impact growth, which was expected based on regression analysis. Unlike the two prior models, both SI and DOI have significant and positive impact on international performance, though DOI has a bigger effect (0.506). Unfortunately, we cannot fully support the suggestion that the model of international growth would fit the data.



**Table 15:** Structural Equation modeling with robust standard errors

RAMSEA signifies Root Mean Square Error of Approximation, and SRMR signifies Standardized Root Mean Square Residual. Standard errors are in brackets and in gray. Statistical significance: \*=0.05 and \*\*=0.01

	<b>Profitability</b>	<b>International performance</b>	<b>Growth</b>	
<b>DOI</b>				
EO1	-0.188* (0.092)	-0.234* (0.096)	-0.226* (0.098)	
EO2	0.289** (0.093)	0.307** (0.094)	0.315** (0.094)	
Sector	-0.145 (0.090)	-0.140 (0.090)	-0.119 (0.087)	
Industry exp.	-0.262** (0.095)	-0.208* (0.089)	-0.181* (0.085)	
International exp.	0.532** (0.096)	0.483** (0.091)	0.477** (0.091)	
Age	-0.245* (0.101)	-0.211* (0.102)	-0.217* (0.106)	
<b>SI</b>				
EO1	0.351** (0.130)	0.359** (0.127)	0.354** (0.126)	
EO2	0.064 (0.103)	0.065 (0.100)	0.062 (0.098)	
EO3	0.219' (0.128)	0.180 (0.177)	0.195 (0.127)	
HC1	0.248* (0.125)	0.258* (0.131)	0.252' (0.133)	
HC2	0.170 (0.140)	0.172 (0.143)	0.186 (0.142)	
<b>Performance</b>				
DOI	-0.330** (0.124)	0.529** (0.093)	-0.084 (0.070)	
SI		0.366** (0.082)		
<b>Diagnostics</b>				<b>Cutoff</b>
Min .func .test static	15.885	21.105	9.040	
Comparative Fit Index	1.000	0.961	0.972	0.95≤
Tucker-Lewis Index	1.027	0.931	0.925	0.95≤
RMSEA	0.000	0.060	0.065	0.08≥
SRMR	0.040	0.041	0.031	0.08≥

The results of SEM suggest that the best model in the thesis is the profitability model based on the fit between the model and the sample data. Moreover, literature has supported the linear negative relationship between DOI and performance (e.g. Denis et al. 2002; Geringer et al. 2000). Also, the DOI, SI, international performance and growth models have similar performance results as in the regression models. When comparing regression analysis results to the SEM results, the profitability model seems to be the most similar to the regression results. On the other hand, all the models support the EO, human capital, DOI and SI relationship, and the only difference between regression and SEM results is that the relationship between proactiveness and SI is significant only in the profitability model, and even in that model it is significant at the level of 0.1. This could be partially affected by the amount of items in the factors, because proactiveness consists of two items. Based on the results from SEM, we conclude that it seems that as whole, the best model to fit the data seems to be profitability.

## 5 DISCUSSION

The result of the thesis generated several implications and suggestions. The findings regarding EO suggest that EO is multidimensional, and instead of combining the measures into a single factor, dimensionality should be recognized. The findings of this study provide empirical evidence to the suggestion made by prior literature regarding the dimensionality of EO (e.g. Cadogan 2012; Frishammar & Andersson 2009; Kreiser & Davis 2010; Lumpkin & Dess 1996; Miller 2011; Naman & Slevin 1993). Moreover, different dimensions of EO have different impact in international performance as suggested by literature (e.g. Frishammar & Andersson 2009; Kreiser & Davis 2010; Lumpkin & Dess 2001). Both Frishammar and Andersson (2009), and Lumpkin and Dess (2001) have suggested that proactiveness affects international performance. The multidimensional structure of EO found in the thesis consist of innovativeness, proactiveness and risk-taking, as suggested by the literature (e.g. Covin & Slevin 1990; Kreiser et al. 2002; Miller 1983; Stam & Elfrig 2008; Wiklund 1999). The thesis also provides evidence about the different impacts of each EO dimension. Innovativeness has positive impact in SI, whereas the relationship between innovativeness and DOI is negative. The result regarding the positive effect of innovativeness on DOI contradicts with prior literature (e.g. Fletcher 2004; Knight & Cavusgill 2004). Our results suggest that innovativeness of top management decreases DOI, which could imply that innovative managers focus on developing and commercializing innovations, and allocate more resources to innovating. Due to the limited resources of SMEs, there are fewer resources left for internationalization.

Proactiveness has a positive relationship with SI, and risk-taking enhances DOI. Surprisingly, risk-taking does not influence SI. This indicates that unlike suggested by literature (de Jong et al. 2003; den Hertog 2010, 11; 13), service innovations are carefully planned and researched, as risk-taking of managers does not play role in SI. On the other hand, the lack of

significant relationship between proactiveness and DOI implies that international expansion is more an act of risk-taking rather than carefully observed and research opportunity recognition. These findings could be partially due to the characteristics of the sample data, which consisted mainly of small service companies in ICT industry. These companies had below average DOI. For small manager-centered companies internationalization is highly impacted by the willingness of manager to take risks. On the other hand, due to their limited resources, SMEs need to be more conscious about the risks related to failing in innovating, which highlights the role of proactiveness.

Human capital consisted of two dimensions, which were skills and know-how, and creativity. Human capital is suggested to consist of three types of human capital, which are firm-specific, industry-specific and general human capital (Huang 2003; Neal, 1995). This composition of human capital supports our findings. Both dimensions of human capital had a positive relationship with SI. This suggests that all three types of human capital are important in developing and commercializing service innovations. On the contrary, neither of the human capital dimension had significant relationship with DOI. Instead, international experience had a positive relationship with DOI and industry experience had a negative relationship with DOI. This suggests that the top management's international experience plays a more crucial role in internationalization than skills and capabilities of employees. On the other hand, the findings of human capital-DOI relationship suggest that the international knowledge and know-how should be included into the measure. The role of international experience is supported by prior literature (e.g. Manolova et al. 2002; Reuber & Fischer 1997; Ruzzier et al. 2007). On the contrary to results of Westhead et al. (2001) and Shane (2000), our findings provide evidence that industry experience has a negative impact in DOI. In addition, education level did not have a significant impact on SI and DOI. The education item did not even fit to the human capital factors, though this was expected as it was added to the original scale based on literature.

This contradicts with the findings of Wang and Chang (2005), who found that educational background is significant part of human capital factors. In addition, education did not significantly enhance service innovation unlike implied by Damanpour (1991), and Marvel and Lumpkin (2007).

The results from both factor and regression analysis regarding dimensions of EO provide empirical support for dimensionality of EO. Furthermore, our findings also imply that each of these three dimensions have different impact in service innovation and internationalization. Surprisingly, employees' creativity only partially influences SI. When combining the results regarding the effects of EO's dimensions and human capital on SI, the results suggest that innovativeness of top management has bigger impact in SI than creativity of employees, because the innovativeness dimension has highly significant and positive relationship with SI, whereas creativity has only partially significant and positive impact in SI. This could also imply that the service innovations in Finnish SMEs tend to be created and developed from top to down in the organization. In other words, top management comes up with new ideas, which are developed and commercialized together with employees.

The results of the analyses provided only partial support for the relationship between SI and performance. SI and international performance have positive significant relationship, though as mentioned the variance is not in good level. Based on this evidence, the hypothesis regarding SI and performance relationship is only partially supported. The non-significant relationship can be cause by the radicalness of service innovations. This has been suggested by McDermott and Prajogo (2012). The scholars found that neither radical nor incremental innovation as such have significant relationship with performance in the context of service SMEs. On the contrary, ambidextrous innovation, which balances the radicalness of innovations, had positive and significant impact on a company's performance. Moreover, their findings suggest that incremental innovations have positive performance impact in small service companies,

whereas negative effect on performance is generated by radical innovations.

The findings regarding DOI and performance are diverse. Firstly, the shape of relationship between DOI and international performance is curvilinear, whereas the relationship between DOI and profitability is linear. The relationship between DOI and international performance is inverted U-shaped. The shape suggests that to a certain point, increasing DOI has a positive impact in international performance, but beyond that point the effect turns negative. The shape of the relationship suggests that complexity of operations increases costs as DOI grows, and costs will overcome the benefits on increasing internationalization. This has been suggested by Geringer et al. (1989) and Sullivan (1994b). Similarly shaped relationship has been found in prior literature (e.g. Hitt et al. 1994; Hitt et al. 1997; Ramirez-Aleson & Espitia-Escuer 2001).

The linear relationship between DOI and performance in the short-run has been suggested by Thomas and Eden (2004). The scholar also suggested that the relationship between DOI and performance is U-shaped in the long run. Moreover, a negative linear relationship between DOI and performance has been found in prior literature (e.g. Geringer et al. 2000). The scholars found a negative relationship between DOI and return on sales in a study of Japanese multinationals during the period of 1977-1986 and 1986-1991. On the other hand, the finding of the thesis contradict with a study of Qian and Li (2003), who have suggested that DOI has positive impact in profitability (return on sales, assets and equity) and sales growth in small high-technology companies. In addition, as suggested by Thomas and Eden (2004), the relationship between DOI and profitability could turn positive in the long-run. Sullivan (1994b) found that at lower levels of DOI expanding internationally has a negative impact in return on sales and assets, whereas with higher DOI, there is a positive effect on return on sales and assets, when using multiple item measure for DOI. In the highest degrees of internationalization, the impact again turns negative.

This could be possible in the case of this research, because the DOI was considered to be in low level in the sample data.

There was no relationship between DOI and growth, although prior literature has suggested that for SMEs internationalization and innovation is a way to survive and grow (Hollensen 2007, 74-75; Louart & Martin 2012). The findings of the study could imply that Finnish ICT companies focus on profitability instead of growth. Our findings contradict partially with the findings of Lu and Beamish (2006), who found that exporting has positive impact in growth, but negative in profitability. Moreover, the scholars found a linear relationship between sales growth and number of countries a company has invested in. On the other hand, the current economic situation may affect the limited opportunities and interests towards growth. Additionally, it has been proposed by Sapienza et al. (2006) that the younger the companies are when internationalization begins, the more likely internationalization has positive impact in growth. The average age when internationalizing in the sample data was five years, though 17.2 % (11 out of 64) had more than ten years lag between beginning of internationalization and the establishment. This could partially explain the non-significant relationship between DOI and growth

The non-significant impact of SI on DOI as well as the non-significant moderating effect of DOI could indicate that the shape of the relationship is curvilinear, or that DOI impacts SI. The first suggestion is supported by the Figure 6, depicting the relationship. The latter suggestion, on the other hand, has been supported in prior literature (e.g. Hitt et al. 1994). The scholars have suggested that as increasing DOI helps companies to generate returns on innovations, increased internationalization also motivates companies to innovate more. Furthermore, the non-significant moderating effect and results from regression analysis regarding DOI, SI and performance imply that the SMEs should have a clear focus in their operations. This contradicts with the findings of Lecerf (2012). The scholar suggested that SMEs reach the best overall performance by using dual

strategy that combines innovation and internationalization. On the other hand, the curvilinear relationship between SI and DOI has an increasing trend with higher levels of service innovation. In addition, SI and DOI both have positive relationship with international performance. This implies that companies with clearly defined new service development process could benefit from international expansion. This notion has been supported in the literature as Bell et al. (2004) have suggested that internationalization is essentially influenced by development of a new product/service.

The theoretical model of the thesis was used as a base of the models created for SEM, though some changes were made based on the results of regression analyses. The purpose of the SEM was to test the model as a whole, and not to test the hypotheses as we recognized the limitations of small sample size. SEM revealed that the models suggested in the thesis do follow the results from regression analyses with small exceptions. Although the fit measures suggest that the first model seems to have good fit with the data, bigger sample is needed to confirm the results. As expected based on the results of regression analyses, the model with growth did not have good fit with data. All in all, the model of profitability seems to work as whole in the data.

## **5.1 Managerial implications**

The findings of the thesis have several managerial implications. Firstly, the role of human capital in development and commercialization of innovations is important. Both the top managers' and employees' human capital matters, though the creativity of employees is in a smaller role compared to their skills and know-how. This implies that companies should focus on a person's skills and know-how rather than his/her creativity and innovativeness when hiring. Moreover, international experience of top management is an essential factor in internationalization in SMEs. Companies should focus on hiring managers that have international



experience. On the other hand, this is also reflected in educational institutions, which should encourage students to get involved in international activities and go to study abroad as well as take international internships. Furthermore, the importance of international experience as well as skills and know-how in DOI and SI highlights the role of training and opportunities for international assignments. Moreover, the role of skills and international experience in companies' performance through SI and DOI should be noted in educational institutions also. Students should be encouraged to build their skills and know-how in ICT and in other areas, and to study abroad as well as apply for international training programs.

Secondly, unlike suggested in the prior literature, our findings do not support dual strategy, which combines innovation and internationalization. SMEs should focus on either innovating or internationalization first. On the other hand, it seems that as SMEs increase their level of innovating, they can also increase their DOI. This implies that SMEs should first focus on developing and commercializing unique services that can bring them competitive advantage, and then start increasing their DOI as their new service development process is more standardized and they have marketable services. Service innovations, especially in the context of ICT service industries, are considered to be easily transferable internationally, because most of them are "hard services", in which production and consumption can be separated.

Innovativeness sub-dimension of EO has negative impact on DOI, whereas positive impact on SI. This suggests that companies should have focus on their operations. Moreover, combining the importance of innovativeness and the partial significance of creativity of employees, the findings imply that small Finnish service companies in ICT industry tend to have top-down approach to service innovations. But when considering the role of skills and know-how in SI, this implies that companies are not taking advantage of the potential of employees or their creativity is not

considered to be beneficial. On the other hand, this could possibly suggest that employees are not sharing their ideas.

The findings regarding the DOI-performance relationship imply that SMEs should not aimlessly increase their DOI, and remember that increasing DOI also increases costs. An increase in DOI makes operations in a company more complex, as the amount of employees and operational locations increases. Increasing DOI to a certain point is beneficial, but beyond that point, it has negative effect on international performance. Additionally, the negative relationship between DOI and performance found in the research implies that there might be lag between increasing degree of internationalization and profitability in short-term, though based on prior literature managers should adopt a long-term perspective on firm performance.

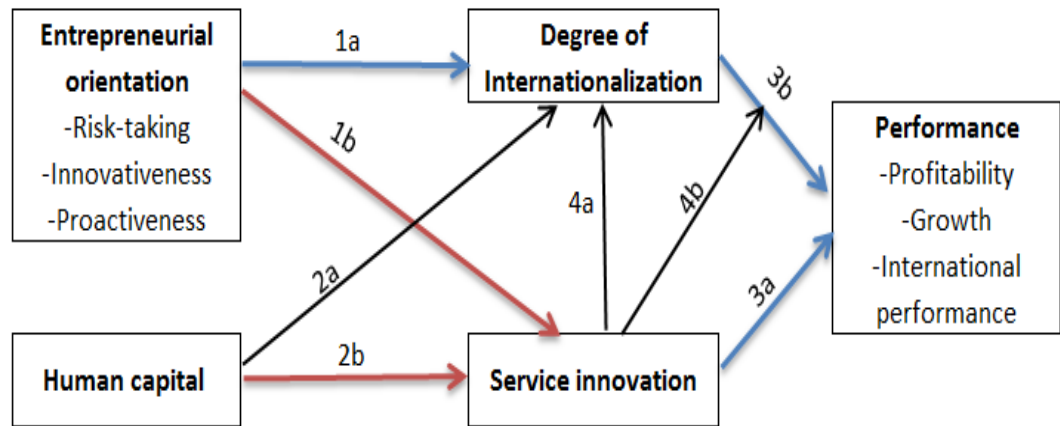
## 6 CONCLUSIONS

The thesis examined the antecedents of DOI and performance in Finnish ICT SMEs. This context was chosen due to the existing turbulence in the industry and due to its innovativeness as well as importance to Finland's future development. The Finnish ICT industry is facing a change due to the latest development of Nokia, which has been a major engine for the Finnish ICT industry. The factors of the theoretical model have been under literary focus for decades, but the results of prior literature are mixed suggesting a need for further research. It has been suggested that EO literature has not developed beyond the definition of EO, and the relationship between EO and internationalization should be examined. The results regarding the relationship between DOI and performance are mixed, and scholars have found support for both linear and nonlinear relationships. Also innovation literature, especially in a service context, has limited evidence in a company-level. Theoretically the thesis aimed at contributing to the mixed results of DOI and performance relationship as well as providing evidence about the dimensionality of EO and performance impact of SI and impacts of human capital on both DOI and SI.

The data was gathered via electronic questionnaire, which was created based on prior literature. The questionnaire consisted mainly of subjective questions, which are seen less sensitive form of asking financial information compared to absolute figures by SME managers/owners. The developed hypotheses were tested by using statistical program called R. Factor and regression analysis, and SEM were chosen as analysis methods.

The results of factor analysis provide support for the dimensionality of EO. Our results suggest that EO consists of innovativeness, risk-taking and proactiveness, which is supported by the prior EO literature. As expected, each sub-dimension of EO has different impact in DOI and SI.

Innovativeness has negative impact in DOI, and positive impact in SI. Moreover, risk-taking has positive effect on DO and partial positive effect on SII, whereas proactiveness affects SI positively. These results supported fully the hypothesis regarding EO-SI relationship and partially EO-DOI relationship hypothesis in the thesis (See Figure 7). Human capital formed two factors, which had a non-significant relationship with DOI and positive impact in SI. These results support hypothesis regarding the relationship between human capital and SI. We could not provide any support for neither the relationship between DOI and SI nor for the moderating effect of SI.



**Figure 7:** Results of hypotheses testing; the red arrows describe supported hypothesis, the blue arrows partially supported hypothesis and black arrows depict rejected hypotheses.

Performance consisted of three dimensions that were profitability, international performance and growth. The multidimensional structure provides support for suggestion that DOI has different impact in different dimensions of performance, and that performance should be measured with multiple dimensions. SI has positive relationship with international performance, but non-significant impact in other two performance dimension. This provides partial support for hypothesis 3a. Furthermore, the results regarding DOI and performance could only provide partially

support for hypothesis 3b. The relationship between DOI and international performance is inverted U-shaped, whereas the relationship between DOI and profitability is linear and negative. There was non-significant relationship between DOI and growth. The summary of the hypotheses is presented in Figure 7. Three models were created based on theoretical framework and results of regression analyses to test the appropriability of the full model. SEM results suggest that model of profitability seems have the best fit to the data, whereas the model with growth and international performance showed a poorer fit to the data.

The results of the study have several managerial implications, which include the effect of international experience of top management as well as skills and know-how of employees on DOI and SI. Firstly, SMEs should consider these when hiring new people. Moreover, the role of human capital in service innovations shows that SMEs should invest in human capital, and that trainings, which increase the amount of knowledge, have positive impact in service innovations, which in turn have positive effect on international performance. Secondly, SMEs should have focus in their operations and only try dual strategy combining innovation and internationalization, when the level of SI is high and new service development process is standardized. Third, the innovativeness of top management has different impact in DOI and SI, which managers should keep in mind. Fourth, increasing DOI comes with costs, though to a certain point increasing DOI is beneficial for international performance. Additionally, profitability is negatively affected by DOI, though it has been suggested by Thomas and Eden (2004) that in short-term DOI has negative impact on performance. Managers of SMEs should keep this in mind when internationalizing. Lastly, in the context of small service ICT SMEs, technology cannot be ignored. Although formal educational degree had a non-significant relationship with DOI and SI, human capital dimension of skills and know-how was significantly related to SI. This suggests that companies and educational institutions should include more

training regarding the use of ICT in order to create skillful employees to the society.

## **6.1 Limitations**

There are several limitations relating to the findings of the thesis. Firstly, this research focuses only on a single country and a single industry, which limits the generalizability of the results. The only way to see if the suggested model is valid in other contexts is to apply it there. Secondly, the sample data consisted mainly of small service companies in ICT industry. This might have affected the results of analyses. In addition, the sample size was small, which had its effect on fit measures as well as the generalizability of the results. The limited sample size, for example, prevented us from using single-step SEM. Lastly, the measures used in this study were mainly self-reported. This means that the results based on subjective evaluations of top managers in respondent companies.

## **6.2 Further research**

This research was limited to a single industry in a single country. In order to provide support for the model suggested, it should be applied across industries and countries. In addition, several studies regarding EO have included the environmental and cultural factors suggesting that cross-country study could provide more evidence about the applicability of the theoretical models. Conducting the research with bigger sample size and panel data would also provide more evidence about the model. Using panel data would also allow more detailed examination of DOI-performance relationships.

The significance of international experience and non-significance of human capital dimensions in human capital-DOI relationship suggest that different structure of human capital could provide more evidence about

relationship. Using the structure suggested by Huang (2003) and Neal (1995) could be more appropriate. Furthermore, including technological tacit and explicit knowledge in human capital measures instead of education level could provide different evidence about the effect of human capital on DOI, and SI. Social capital could be added to the framework as an antecedent of DOI and SI, because the role of relationships has been recognized to be important in contemporary internationalization and innovation literature (e.g Chesbrough 2011, 35; Johansson & Vahlne 2011). Moreover, service innovations often require collaboration between the service provider and customer or other external party (Alam & Perry 2002; den Hertog 2010, 15; Magnusson 2003; Kristensson et al. 2008; Miles 2008 Kuusisto & Riepula 2011).

The DOI did not include the breadth of operations and time passed between establishment and internationalization of a company, because we used the DOI structure suggested by Sullivan (1994) and adopted it to fit the context. Including the breath of operations and time difference between an establishment and internationalization of a company, would give wider picture of DOI and its performance impacts. In addition, adding absolute measure to the performance structure and trying different dimensions of performance, could provide wider picture of the performance impact of DOI and SI. The amount of non-financial performance measures could be increase, because this would provide different picture of performance at the company-level as companies would compare their performance against their goals.

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## APPENDICES

### APPENDIX 1: Classifications used in data sample

**Table 16:** SME definition (European Commission 2005)

Category	Employees	Turnover	OR	Balance sheet total
Micro	<10	≤ € 2 million		≤ € 2 million
Small	<50	≤ € 10 million		≤ € 10 million
Medium	<250	≤ € 50 million		≤ € 43 million

**Table 17:** ICT sector definition (Mas et al. 2012, 8)

(based on NACE Rev. 2)

#### ICT manufacturing industries

261	Manufacture of electronic components and boards
262	Manufacture of computers and peripheral equipment
263	Manufacture of communication equipment
264	Manufacture of consumer electronics
265	Manufacture of magnetic and optical media

#### ICT trade industries

4651	Wholesale of computers, computer peripheral equipment and software
4652	Wholesale of electronic and telecommunications equipment and parts

#### ICT services industries

582	Software publishing
6110	Wired telecommunications activities
6120	Wireless telecommunications activities
6130	Satellite telecommunications activities
6190	Other telecommunications activities
6201	Computer programming activities
6202	Computer consultancy activities
6203	Computer facilities management activities
6209	Other information technology and computer service activities
6311	Data processing, hosting and related activities
6312	Web portals
9511	Repair of computers and peripheral equipment
9512	Repair of communication equipment



## APPENDIX 2: Online questionnaire

### Part I – Entrepreneurial orientation (Jantunen et al. 2005)

Review each of the following statements and choose the number that approximates your response. The following statements pertain to the entrepreneurial strategic orientation of your firm. Entrepreneurial orientation describes your company's innovativeness, risk-taking and proactiveness.

1=You **strongly disagree** with the statement

7=You **strongly agree** with the statement

4=Neutrality

#### Strongly Disagree / Strongly Agree

We are among the first ones to implement progressive and innovative production processes and practices.	1 2 3 4 5 6 7
---	---------------

The management of our company supports the projects that are associated with risks and expectations for returns higher than average.	1 2 3 4 5 6 7
--	---------------

We actively observe and adopt the best practices in our sector.	1 2 3 4 5 6 7
---	---------------

We actively observe the new practices developed in other sectors and exploit them in our own business.	1 2 3 4 5 6 7
--	---------------

We recognize early on such technological changes that may have an effect on our business.	1 2 3 4 5 6 7
---	---------------

Continued on the next page

We are unable to take on unexpected opportunities.	1 2 3 4 5 6 7
We search for new practices all the time.	1 2 3 4 5 6 7
In uncertain decision making situations we prefer bold actions as to make sure that possibilities are exploited.	1 2 3 4 5 6 7
We allocate our resources continuously to new promising operation areas.	1 2 3 4 5 6 7

**Part II – Human capital** (Reed et al. 2006; Subramaniam & Youndt 2005; Wang & Chang 2005; Youndt et al. 2004)

The following statements pertain to the intellectual capital of your firm. To what extent do you agree with the following items describing your organization's intellectual capital?

1=You **strongly disagree** with the statement

7=You **strongly agree** with the statement

4=Neutrality

**Strongly Disagree / Strongly Agree**

Our employees are highly skilled.	1 2 3 4 5 6 7
Our employees are widely considered the best in our industry.	1 2 3 4 5 6 7
Our employees are creative and bright.	1 2 3 4 5 6 7
Our employees are experts in their particular jobs and functions.	1 2 3 4 5 6 7
Our employees develop new ideas and knowledge.	1 2 3 4 5 6 7

The following statement describes the employees' educational background in your company. What is the level of education among your company's employees? (Wang & Chang 2005)

1=You **strongly disagree** with the statement; most of our employees have **high school/vocational school** education

7=You **strongly agree** with the statement; most of our employees have **master's degree** and at least one has **doctoral degree**

4=Neutrality; most of our employees have degree from **university of applied science**

Our employees are highly educated.

1 2 3 4 5 6 7

**Part III – Degree of internationalization** (Kuivalainen et al. 2010; Kumar & Singh 2008; Ruigock & Wagner 2003; Saarenketo et al. 2004; George et al. 2005)

The following statements pertain to the extent that your firm is involved in international markets or international operations.

Please estimate the percentage of your company's total sales which are attributable to **foreign sales**.

☐ less than 5% ☐ 6-10% ☐ 11-24% ☐ 25-49% ☐ 50-74% ☐ over 75%

Please estimate the percentage of your company's profits which are attributable to **foreign profits**.

☐ less than 5% ☐ 6-10% ☐ 11-24% ☐ 25-49% ☐ 50-74% ☐ over 75%

Please estimate the percentage of your company's customers who are considered **foreign customers**.

☐ less than 5% ☐ 6-10% ☐ 11-24% ☐ 25-49% ☐ 50-74% ☐ over 75%

Please estimate the percentage of your employees that are located **outside of the company's home country**.

☐ less than 5% ☐ 6-10% ☐ 11-24% ☐ 25-49% ☐ 50-74% ☐ over 75%

**Part IV –Service innovation** (Cooper and Kleinschmidt 1987; Radulovich 2008; Song & Perry 1999)

The following statements pertain to the advantages of your firm's service innovativeness, such as competitive advantage, first-mover advantage and customer satisfaction. To what extent do the following statements describe the service(s) offered by your firm?

1=You **strongly disagree** with the statement

7=You **strongly agree** with the statement

4=Neutrality

**Strongly Disagree / Strongly Agree**

Our service(s) offer unique benefits to the customer, not offered by competitors.	1 2 3 4 5 6 7
---	---------------

Our service(s) rely on technology, which has never been used in the industry before. *	1 2 3 4 5 6 7
--	---------------

Our service(s) are not radically different from competitor services.	1 2 3 4 5 6 7
--	---------------

Our service(s) provide higher quality than the competitors.	1 2 3 4 5 6 7
---	---------------

Our service(s) are highly innovative, replacing a vastly inferior alternative.	1 2 3 4 5 6 7
--	---------------

Our service(s) offers solutions that are not possible to achieve with existing products. *	1 2 3 4 5 6 7
--	---------------

\*The second item was adopted from Song and Cooper (1999), and the sixth measure from Cooper and Kleinschmidt (1987).

## Part V - Performance

The following statements pertain to the performance of your firm during the past three years relative to companies in the same industry. **Please compare your firm over the past 3 years relative to the companies in the same industry on the following criteria:**

1= Our performance is **much worse** than the companies in the same industry.

7=Our performance is **much better** than the companies in the same industry.

4=Our performance is **equal** to the companies in the same industry.

### Much Worse/Much Better

**Profitability:** (Lu & Beamish 2001; Riahi-Belkaoui 1998; Ruigcock & Wagner 2003)

Return on equity (ROE). 1 2 3 4 5 6 7

Return on assets (ROA). 1 2 3 4 5 6 7

Return on sales (ROS). 1 2 3 4 5 6 7

### Absolute amount of total sales:

Total sales in 2010: \_\_\_\_\_

Total sales in 2012: \_\_\_\_\_

The following statements pertain to the performance of your firm during the past three years relative to companies in the same industry. **Please compare your firm over the past 3 years relative to the companies in the same industry on the following criteria:**

**1=** Our performance is **much worse** than the companies in the same industry.

**7=**Our performance is **much better** than the companies in the same industry.

**4=**Our performance is **equal** to the companies in the same industry.

**Growth:** (Dobbs & Hamilton 2007; Chandler and Hanks 1993)

Sales growth. 1 2 3 4 5 6 7

Growth in amount of employees. 1 2 3 4 5 6 7

Growth in market share. 1 2 3 4 5 6 7

The following statements pertain to the **international performance** of your firm during the past three years relative to companies in the same industry. **Please compare your firm over the past 3 years relative to the companies in the same industry on the following criteria:** (Autio et al. 2000; Cavusgil & Zou 1994; Knight 2001; Zahra & Garvis 2000)

Growth in international sales. 1 2 3 4 5 6 7

Growth in international profitability. 1 2 3 4 5 6 7

Creation of new foreign markets. 1 2 3 4 5 6 7

**Absolute amount of international sales:**

International sales in 2010:\_\_\_\_\_

International sales in 2012:\_\_\_\_\_

**Part VI - Industry**

Please check the category that best describes your company's primary area of business:

- ☐ Manufacture of computer, electronic and optical products  
☐ Wholesale of computers and other consumer electronics  
☐ Software publishing  
☐ Computer programming, consultancy and information service activities  
☐ Software services  
☐ Telecommunications  
☐ Repair of computers and personal and household goods  
☐ Other (Please Specify) \_\_\_\_\_

**Part VII - Company****Variables Related to the Firm:**

Approximately what are the annual total sales of your organization?

- |  |  |
|--|--|
| <input type="checkbox"/> under 50 000 €              | <input type="checkbox"/> 50 000 € - 99 999 €           |
| <input type="checkbox"/> 100 000 € - 249 999 €       | <input type="checkbox"/> 250 000 € - 499 999 €         |
| <input type="checkbox"/> 500 000 € - 999 999 €       | <input type="checkbox"/> 1 million € - 4.9 million €   |
| <input type="checkbox"/> 5 million € - 9.9 million € | <input type="checkbox"/> 10 million € - 24.9 million € |
| <input type="checkbox"/> 25 million € - 50 million € |  |

Approximately how many full-time employees does your company have?

- ☐ 1-10    ☐ 11-24    ☐ 25-49    ☐ 50-74    ☐ 75-99    ☐ 100-249

When was your company founded? \_\_\_\_\_

When did your company's internationalization start? \_\_\_\_\_

## Part VIII - Company Information

Please select no more than one item.

**Business Status:**      Public\_\_\_\_      Private \_\_\_\_

## Part IX - For Respondent Only

**1. Gender?**              Male\_\_\_\_      Female\_\_\_\_

**2. Position in the company?**

CEO\_\_\_\_                      Financial managers\_\_\_\_  
COO\_\_\_\_                      Manager of international operations\_\_\_\_  
Other: What?\_\_\_\_\_

**3. Years of experience in current industry?**

Up to 1 year\_\_\_\_      2-4 years\_\_\_\_      5-7 years\_\_\_\_  
8-10 years\_\_\_\_      11-15 years \_\_\_\_      More than 15 years\_\_\_\_

**4. Years of international business experience?**

Up to 1 year\_\_\_\_      2-4 years\_\_\_\_      5-7 years\_\_\_\_  
8-10 years\_\_\_\_      11-15 years \_\_\_\_      More than 15 years\_\_\_\_

**5. Number of years with your firm?**

Up to 1 year\_\_\_\_      2-4 years\_\_\_\_      5-7 years\_\_\_\_  
8-10 years\_\_\_\_      More than 10 years \_\_\_\_



### **APPENDIX 3: Examples of R functions used**

#### **Cronbach's alpha**

```
library(psy)
EO1 <- as.matrix(cbind(Q1.1, Q1.4, Q1.7), nrow=3)
cronbach(EO1)
```

#### **MSA values**

```
Library(psych)
EO <- as.matrix(cbind(Q1.1, Q1.2, Q1.3, Q1.4, Q1.5, Q1.7, Q1.8, Q1.9 ),
               nrow=8)
KMO(EO)
```

#### **Moderating effect**

```
Library(QuantPsych)
fit_mod.growth <- moderate.lm(F6, F7, F10, data)
summary(fit_mod.growth)
bptest(fit_mod.growth)
```

#### **Structural Equation Modeling**

```
library(lavaan.survey)
model.reg <- '
    F6 ~ F1+F2+KAT_code+KOKT+KVKOK+PER_age
    F7 ~ F1+F3
    F7 ~ F4+F5
    F8 ~ F6'

fit.sem.reg <- sem(model=model.reg, data=data, std.ov=T, estimator="ML",
                  se="robust")
summary(fit.sem.reg, fit.measures=T)
```

#### APPENDIX 4: Descriptive analysis for all the items in the thesis

**Table 18:** Descriptive analysis for control variables

Variables	Num obs.	Missing	Mean	Std.dev	Skewness	Kurtosis
Industry	80	21	4.000	2.024	-0.476	3.241
Industry_classes	80	21	2.546	0.858	-1.766*	4.245*
Size_turnover	79	22	5.091	1.972	-0.292	2.189*
Size	78	23	1.818	1.053	1.513*	4.588*
Size_dummy	78	23	0.091	0.294	2.224*	5.947*
Established	77	24	1999.727	11.579	-2.504*	13.270*
Age	77	24	15.818	10.220	2.504*	13.270*
Internationalizat.	64	37	2004.571	11,901	-3.562*	19.216*
Company	79	22	1.955	0.2132	-2.895*	9.383*
Position	88	23	1.136	0.7102	1.917*	10.343
Industry exp.	78	23	5.546	0.8004	-1.430*	3.927
International exp.	77	24	4.273	1.723	-0.142	1.426*
Company exp.	79	22	3.227	1.602	0.545	1.834*
Gender	79	22	2.000	0.000	-3.587*	13.868*

**Table 19:** Descriptive analysis for EO

Variables	Num obs.	Missing	Mean	Std. dev	Skewness	Kurtosis
EO1	101		4.682	1.323	-0.658	2.684
EO2	101		4.955	1.362	-0.682	2.694
EO3	101		5.182	1.468	-1.002*	4.183*
EO4	101		4.636	1.399	-0.354	2.522
EO5	101		4.864	1.125	-0.690	3.005
EO6	101		4.273	1.723	-0.400	2.475
EO7	100	1	5.000	1.480	-0.636	3.843
EO8	100	1	4.727	1.203	-0.258	2.753
EO9	101		4.591	1.681	-0.830*	2.908

Continued on the next page

**Table 20:** Descriptive analysis for HC

<b>Variables</b>	<b>Num. obs.</b>	<b>Missing</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Skewn ess</b>	<b>Kurtosis</b>
HC1	98	3	6.091	0.972	-1.351*	5.405*
HC2	97	4	5.409	1.469	-0.778*	4.267*
HC3	98	3	5.864	0.774	-0.546	3.738
HC4	97	4	6.182	0.665	-0.782*	3.850
HC5	98	3	5.546	1.184	-0.627	3.502
HC6	98	3	4.955	1.430	-0.841*	3.319

**Table 21:** Descriptive analysis for DOI

<b>Variables</b>	<b>Num. obs.</b>	<b>Missing</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Skewn ess</b>	<b>Kurtosis</b>
DOI1	96	5	2.500	1.921	1.001*	2.532
DOI2	95	6	1.773	1.602	1.688*	4.772*
DOI3	96	5	2.091	1.688	1.202*	3.064
DOI4	96	5	1.636	1.469	1.503*	3.899

**Table 22:** Descriptive analysis for SI

<b>Variables</b>	<b>Num. obs.</b>	<b>Missing</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Skewn ess</b>	<b>Kurtosis</b>
SI1	95	6	5.455	0.858	-0.885*	3.615
SI2	94	7	4.227	1.572	-0.302	2.238*
SI3	95	6	4.955	1.327	-0.347	2.264*
SI4	95	6	5.227	1.152	-0.440	2.800
SI5	95	6	5.091	1.377	-0.468	2.893
SI6	95	6	5.227	0.973	-0.918*	3.632

Continued on the next page

**Table 23:** Descriptive for performance

<b>Variables</b>	<b>Num obs.</b>	<b>Missing</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Skewn ess</b>	<b>Kurtosis</b>
P1	74	27	4.000	1.448	-0.185	2.427
P2	74	27	4.000	1.543	-0.332	2.472
P3	73	28	4.409	1.368	-0.474	2.909
P4	77	24	4.636	1.787	-0.295	2.430
P5	77	24	3.682	1.359	0.248	2.675
P6	76	25	4.318	1.644	-0.203	2.381
P7	75	26	3.727	2.164	-0.007	1.676*
P8	75	26	3.455	1.945	0.166	2.105*
P9	75	26	3.591	2.039	-0.073	1.730*

## APPENDIX 5: Factor correlations

**Table 24:** Factor and control variable correlations

	EO1	EO2	EO3	HC1	HC2	DOI	SI	P1	P2	P3	Size	Sector	Index.	Intex.	Age
EO1	1.000														
EO2	0.102	1.000													
EO3	0.295	0.172	1.000												
HC1	0.183	0.224	0.385	1.000											
HC2	0.205	0.082	0.240	0.098	1.000										
DOI	-0.171	0.419	0.148	0.011	0.110	1.000									
SI	0.484	0.206	0.444	0.423	0.316	-0.044	1.000								
P1	0.163	-0.103	0.134	0.010	0.020	-0.295	-0.053	1.000							
P2	0.284	0.332	0.339	0.183	0.258	0.535	0.331	-0.123	1.000						
P3	0.215	0.049	0.290	-0.001	0.098	-0.038	0.067	0.406	0.225	1.000					
Size	-0.100	-0.121	-0.101	-0.194	0.188	0.144	0.018	0.018	0.126	-0.047	1.000				
Sector	0.108	-0.180	0.055	0.104	0.304	-0.229	0.249	0.184	-0.116	0.046	0.174	1.000			
Index.	0.171	-0.052	-0.034	0.185	0.184	-0.047	0.266	0.031	0.027	0.072	0.061	-0.017	1.000		
Intex.	0.072	0.275	0.048	0.033	0.185	0.478	0.130	-0.083	0.288	0.062	0.254	-0.220	0.401	1.000	
Age	-0.063	0.132	-0.241	-0.020	-0.287	-0.035	-0.278	0.006	-0.075	-0.180	0.165	-0.483	-0.177	0.127	1.000

