

Early Stages of Technology-Intensive Companies in Thailand and Finland

Matti Muhos*

Oulu Southern Institute, Micro-entrepreneurship research group
University of Oulu, Pajatie 5,
FI-85500 Nivala, Finland
e-mail: matti.muho@oulu.fi

Pekka Kess and Anyanitha Distanont

Department of Industrial Engineering and Management,
University of Oulu, Finland, P.O. Box 4610,
FI-90014 University of Oulu, Finland
e-mail: pekka.kess@oulu.fi
e-mail: anyanitha.distanont@oulu.fi

Kongkiti Phusavat and Sitthinath Sanpanich

International Program in Industrial Engineering, Department of
Industrial Engineering, Faculty of Engineering, Kasetsart University,
50 Paholyothin Road, Chatuchak,
Bangkok 10900, Thailand
email: sitthinath@gmail.com
email: fengkkp@ku.ac.th

*Corresponding author

Abstract: Numerous stage models have attempted to clarify management priorities during the early stages of companies. However, a need for more focused and context-specific studies exists. This study seeks to clarify the early stages of technology-intensive companies in Thai and Finnish contexts. To summarise the research questions, the authors ask: What early stages do technology-intensive companies face based on recent empirical literature? How do the experiences of managers in early-stage technology-intensive companies relate to assumptions of such stage framework? What viewpoints should be considered when using stage framework in Thai and Finnish contexts? To answer these questions, this study devises a four-stage framework describing early stages of technology-intensive companies and reflects it through ten case studies in the two contexts. The framework was found to be applicable in both contexts; moreover, an analysis of context-specific viewpoints is also provided. It is necessary to recognise these viewpoints when using this framework in the Thai and Finnish contexts.

Keywords: growth; stages of growth; stage models; growth process; management; Finland; Thailand; case study; Sequential Incident Technique; SIT; technology-intensive companies; entrepreneurship

Biographical notes

Dr. Matti Muhos is a Research Director at the Oulu Southern Institute at the University of Oulu. He has a Doctoral degree in Industrial Engineering and Management. He participates in the editorial processes of several international journals as an associate editor, quest editor and advisory board member. His primary research areas are growth and internationalization of technology intensive SMEs including configurations and management viewpoints, development of micro-companies and SMEs, technology intensive companies, agility, internationalization processes for SMEs and technology management from different perspectives. Muhos has worked on several international projects and has written more than 50 publications in the forms of journal papers, book contributions, refereed conference papers and technical papers.

Prof. Pekka Kess is the Head of the Department of Industrial Engineering and Management (DIEM) at the University of Oulu, Finland. He has extensive managerial experience from both universities and industrial enterprises. He is an active project evaluator and manager in international research and development projects. His research areas are strategic management, production organisations, knowledge management and quality management.

Anyanitha Distanont received a BBA (1st Class Honors) in Operations Management from Kasetsart University in 2005, and an MSc in Technology Management from Thammasat University in Thailand in 2008. Currently, she is pursuing a doctoral degree in the Department of Industrial Engineering and Management (DIEM) at the University of Oulu, Finland. Her research interests cover knowledge transfer, requirements engineering, and social network analysis in collaborative product development.

Dr. Kongkiti Phusavat is an Associate Professor and the Director of the International Graduate Programme in Industrial Engineering at Kasetsart University. He received his Doctoral degree in Industrial and System Engineering from the Virginia Tech in 1995. His current research interests include performance measurement, acquisition logistics, and management system analysis and modeling.

Dr. Sitthinath Sanpanich is a Senior Consultant at Frost & Sullivan (Thailand) Co., Ltd. He received his Ph.D. from Kasetsart University, Thailand and Master Degree in Industrial & Systems Engineering from Ohio University, United States and Bachelor Degree in Materials Science from Chulalongkorn University, Thailand. He has work experience as a senior consultant at Watson Wyatt (Thailand), Director of Consulting Division at Thailand Productivity Institute, AVP Production at Padaeng Poongsan Metals Co., Ltd. and Department Manager at Padaeng Industry Co., Ltd.. His field of interest are productivity and quality improvement, National Quality Award, and strategic staffing/man power planning.

Acknowledgements

The authors are grateful for the generous funding support from the Council of Oulu Region, the Kerttu Saalasti Foundation, the Haapavesi-Siikalatva sub-region, the Nivala-Haapajärvi sub-region, the Ylivieska sub-region, the Municipal Federation JEDU, the European Regional Development Fund and ASEM-DUO Fellowship Programme. We are particularly appreciative of the contribution of the companies and individuals involved in this study who shared their experiences.

1 Introduction

Firm growth and development have been studied extensively in the last decades, and the literature in this area includes many perspectives, such as the static equilibrium theories (see e.g. Coase 1937), stochastic models (see e.g. Gibrat 1931), transaction cost theories (see e.g. Williamson 1975), economics of growth theories (see e.g. Penrose 1959), resource-based theories (see e.g. Penrose 1959), evolutionary theories (see e.g. Nelson & Winter 1982), organisational ecology theories (see e.g. Hannan & Freeman 1977), strategic adaptation theories (see e.g. Sandberg & Hofer 1982), motivational theories (see e.g. McClelland 1961), and configuration theories (see e.g. Greiner 1972), among others.

Number of employees, sales and assets indicate business growth; however, management must focus on multiple dimensions in a growing company. While most of the perspectives presented above are concerned with the factors leading to growth, at least one perspective deals with the actual growth process. Researchers label this perspective: *stages of growth*, *company life-cycle* or *configuration* perspective (see e.g. Muhos et al. 2010, Muhos 2011). This study uses the term *configuration perspective*. Numerous models have attempted to clarify managerial challenges and priorities in the early stages of companies (See e.g. Churchill & Lewis 1983, Greiner 1972). This perspective relates to what growth brings to a company and how to manage a growing company (see Davidsson and Wiklund 2006, Wiklund 1998). Growth configuration literature reveals diverse managerial problem configurations specific to the different growth stages.

Of the many models developed to clarify the early stages of technology-intensive companies during the past decades, the models vary widely in type, level of empirical evidence, focus business, growth dimension and number of stages (see e.g. Siu and Kirby 1998). The need exists to synthesise the central findings of the recent empirically based stage models focusing on technology-intensive companies and to test the findings with more empirical cases in different cultural business contexts. Doing so will allow analysis of gaps between the reality and the stage models and will highlight potential paths for further development of these models. This study aims to describe the early development stages of technology-intensive companies in the Thai and Finnish contexts. The relatively broad cultural and geographical distance between the two selected contexts provides an opportunity to highlight the effects of business context on the early stages of technology-intensive companies.

The research problem is condensed into the following research questions: What do early-stage technology-intensive companies face based on recent empirical literature? How do the experiences of managers in early-stage technology-intensive companies relate to assumptions of such stage framework? What viewpoints should be considered when using stage framework in Thai and Finnish contexts?

Finland and Thailand both have unique entrepreneurial environments in terms of architecture, market structure and incentives (Kantarelis 2009, Schramm 2004). Finland is categorised as innovation-driven, while Thailand is considered an efficiency-driven economy (Kelley et al. 2011). In innovation-driven economies, businesses are increasingly knowledge-intensive and have an expanding service sector, while efficiency-driven economies experience industrialization and an increased reliance on economies of scale; large, capital-intensive organizations are more dominant in this context (see Schwab & Porter 2005). Early-stage and overall entrepreneurial activity are among the highest in the world in Thailand, whereas Finland ranks near the middle or among the lower third of countries (Kelley et al. 2011, Stenholm et al. 2008). In Thailand, almost every second adult individual carries out some kind of entrepreneurial activity, but a large number of these activities are self-employment initiatives with low growth ambitions. In

contrast, Finland has relatively high employment entrepreneurship, but the share of growth-oriented early-stage entrepreneurial activity is consistently lower than in the reference countries' group (Kelley et al. 2011). Moreover, both contexts have a unique network of knowledge hubs (see e.g. Evers & Hornidge 2007) that affect the entrepreneurial environment.

The following definitions figure prominently in this analysis. We define an *early-stage technology-intensive firm* in three parts: first, a *technology intensive firm* is an independently owned research- and product development-intensive company whose continuous aspiration to valuable, rare and inimitable knowledge in technology leads to new or enhanced products and services (see Salonen 1995, Tesfaye 1997). Second, the term *early* refers to the newness of the firm; according to Storey & Tether (1998), a new firm is not more than 25 years old. Third, the term *stage* corresponds to a unique configuration of variables, e.g. strategies, problems and priorities that growing firms will likely face (see e.g. Coad 2007, Hanks et al. 1991, Miller et al. 1984). The term *configuration* applies to the clusters or frameworks of common variables used for analysis of stages.

This present research takes the form of a retrospective multiple case study. According to (Yin 1989, p. 23) 'a case study is an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.' The study analysed ten case companies located in Finland and Thailand using Sequential Incident Technique (SIT) and semi-structured interviews. Three managers were interviewed in each case company for triangulation purposes—one from company management, one from operations management, and one from marketing management.

This study addresses scholars interested in the process perspective on company growth and development. The study may also function as a useful guide for those responsible for company growth and development policies, those considering investing in a defined group of companies and the owners and managers of growing companies.

2 Early stages of technology-intensive companies: framework

The authors undertook an extensive review of the research focusing on the stages of development (Muhos et al. 2010, Muhos 2011) using meta-analytical methodology. The meta-analysis focuses on a collection of research results to integrate some of the findings (Glass 1976). This resulted in the forming of a four-stage reference framework (see Muhos 2011) based on a synthesis of fourteen recent empirically based models (see Table 1).

Table 1. Relation of the original stages and the synthesis

Author	Stage	0	1	2	3	4	5	6
Van de Ven et al. (1984)		0	1	2	3	4		
Smith et al. (1985)			1 - 2		3	4		
Kazanjian & Drazin (1990)			1	2	3	4		
McCann (1991)			1 - 2		3	4	5	
Hanks et al. (1991)			1 - 2		3	4	5	
Hanks et al. (1993)			1 - 2		3	4	5	6
Hanks & Chandler (1994)			1	2	3	4		
Poutziouris et al. (1999)			1	2	2	3		
Mitra & Pingali (1999)			1	2	3	4	5	
Abetti (2001)			1 - 2		3	4		
Swiercz & Lydon (2002)			1	-	3	4	-	6
Kaulio (2003)		0	1	2	3			
Garengo & Bernardi (2007)			1	2	3	4		
Stam (2007)			1	2	3	4	5	
A four-stage synthesis			1	2	3	4		

a single cell in the table = a single stage in the original model
 0, 1, 2, ... n = a related stage number in the synthetic self-evaluation framework
 0 = a stage prior to the establishment of a company

A central aim of this study intended to form a framework that could provide more accurate support for the new technology-intensive companies. Table 2 shows a condensed version of the four stages of self-evaluation framework.

Table 2. Early stages of technology-intensive companies—assumptions of the self-evaluation framework

Stage	Stage description/assumption codes
1. Conception and development <i>Cash flow falls into the red.</i>	Newly established firm is owner-dependent (1-A1). The objective is product and/or technology development (1-A2) and establishment of an early customer base (1-A3). The main activities relate to the business idea (1-A4), identification of a market (1-A5) and resource mobilisation (1-A6). Development of a working prototype is started (1-A7). The management is informal, flexible and creative (1-A8); communication is face-to-face (1-A9), and the owner makes the decisions (1-A10). Organisation functions as a product-development team (1-A11). Cash flow falls into the red due to lack of product at this point (1-A12).
2. Commercialisation <i>Amount of negative cash flow decreases.</i>	Stage begins with the early-reference customers (2-A1). Objective is creation of a business and commercialisation of the product (2-A2). Stage is characterised by early manufacturing (2-A3), marketing (2-A4) and initial technical challenges (2-A5). Company learns to make the product and to produce it (2-A6). Management style is participative (2-A7) and coordinative (2-A8). Owner and/or small number of partners dominate the nucleus of the administrative system (2-A9). Resource generation and survival are key issues (2-A10). Amount of negative cash flow decreases (2-A11).
3. Expansion <i>Positive cash flow</i>	At this stage, manufacturing and technical feasibility and market acceptance lead to high growth (3-A1) and constant change (3-A2). Main objective: manage the company toward growth and increase market share by marketing and manufacturing the product efficiently and in high volume (3-A3). Company needs to produce, sell and

<i>increases rapidly.</i>	distribute the product at an increasing volume (3-A4) while taking care of efficiency and effectiveness through structures and processes (3-A5). New customers and new market channels require constant attention (3-A6). Personnel problems result from high growth (3-A7). Owner and/or entrepreneurial team are central, though a sense of hierarchy increases (3-A8). Budgets are moderately used for communication (3-A9). More specialised functions considered and added (3-A10). Positive cash flow increases rapidly (3-A11).
4. Stability/ renewal <i>Growth of cash flow slows.</i>	Company faces a slowing growth rate (4-A1) and intense competition in maturing product market (4-A2). Effort needed to launch a second generation of the product and for effectiveness and efficiency issues (4-A3). Identification of new markets is essential for company renewal (4-A4). However, cost control and productivity become main concerns (4-A5). Resulting product generation and profitability improvements maintain growth and reasonable market share (4-A6). Owner usually supported by or replaced by a professional manager or a management team and professional management systems are added (4-A7). Strategies, rules, regulations and procedures are standardised and formalised (4-A8). Employees become specialised, non-risk-takers (4-A9). Specialised functions are added (4-A10). The stage is characterised by a decreasing growth of cash flow (4-A11).

The above described framework functions as a reference framework for this study. The authors use this framework to reflect and analyse the experiences of managers during the stages of early growth.

3 Method

This retrospective, multiple case study uses a holistic strategy (Saunders et al. 2007, Yin 1989). Figure 1 presents the research process.

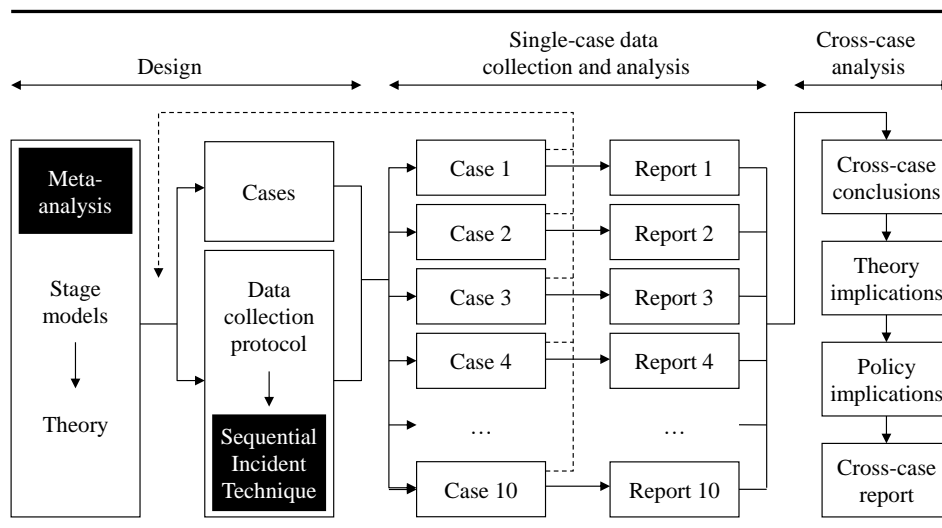


Figure 1. Research process.

The research process started with an extensive meta-analysis, which formed the theoretical presumptions tested in this analysis (see Table 2). Sequential Incident Technique (SIT), a specific form of Critical Incident Technique (CIT), was selected as data-collection protocol. Flanagan (1954) originated CIT, for which several definitions exist (see e.g. Edvardsson and Roos 2001, Flanagan 1954). This study uses the practical definition by Fisher and Oulton (1999): ‘Critical incident is an extreme behaviour, either outstandingly effective or ineffective with respect to attaining the general aims of the activity.’

In an overview of CIT methods, Gremler (2004) recognises several variants of CIT including SIT, created to take the sequential character of the process studied into account (see Stauss and Weinlich 1997). Case studies using SIT clarify the main sequences of the process under analysis prior to the collection of the data. This is advantageous if the process has already been defined empirically. In this study, the critical incidents are reflected in the sequential framework presented in the theoretical part. The case reports are based on ten separate case studies.

The main criteria for selecting case companies consist of private ownership, newness (25 years old or less), technological intensity, business context (Thai/Finnish), and growth (past/current). The number of cases was limited to ten in order to achieve an in-depth understanding of the early development stages in the selected companies. For highlighting the business context specific issues, five of the cases were studied in Finland and five in Thailand. Table 3 presents the interviews conducted in ten early-stage technology-intensive companies.

Table 3. Characteristics of the case companies

Case	Context	Age	Technology	Number of Employees	Sales	Assets
A	Thai	9	ICT	55	140M฿	70M฿
B	Thai	8	Mechanical technology	23	33M฿	29M฿
C	Thai	4	Mechanical technology	15	24M฿	13M฿
D	Thai	25	Electronics technology	350	840M฿	550M฿
E	Thai	14	Food process technology	120	300M฿	150M฿
F	Finnish	8	Information technology	118	16,6M€	13,4M€
G	Finnish	14	Medical technology	90	13,1M€	12,3M€
H	Finnish	8	Information technology	15	2,2M€	1,3M€
I	Finnish	12	Information technology	14	0,6M€	2,2M€
J	Finnish	14	Information technology	3	0,7M€	0,5M€

Various data collection techniques can be employed in case studies, and are likely to be used in combination with one another (Saunders et al. 2007: 139). In addition, both qualitative and quantitative evidence can be shown in a case study (Yin 1989); in fact, Yin (1989) encourages using both. In keeping with this guideline, a combination of qualitative and quantitative evidence was collected in this study. The empirical evidence consists of 30 semistructured interviews. An extensive literature review forms the basis of the data collection instrument (see Appendix 1; Muhos et al. 2010). The main part of the semistructured interview was conducted in a qualitative manner. The managers interviewed (Appendix 2) were selected based on their position in the company. Participants held responsible positions in strategic management, operations management and marketing management and possess up-to-date knowledge on the topics discussed. The questionnaires were sent in advance and the interviews were recorded and transcribed.

4 Stages in Finnish and Thai contexts

The authors analysed critical incidents to detect parallel and contradictory aspects in relation to the assumptions of a synthesised stage framework (table 2). As the incidents of each case were compared with the framework, both similarities and contradictions were pointed out. A total of 365 separate viewpoints emerged.

4.1 Parallel experiences from ten cases

A vast majority of the aspects parallel the framework, as the authors considered all viewpoints, including stage vice viewpoints. As such, the cases provide support for the framework. Table 4 reveals a rewritten framework (assumptions) to show the share of the cases supporting assumptions with parallel aspects:

Table 4. Share of parallel aspects among cases related to the stage-framework

Stage	The share of parallel aspects (bold = assumption supported by every case, <i>bold italic</i> = assumption supported by majority of the cases, normal = assumption supported by minority of the cases, <i>italic</i> = assumption not supported).
-------	---

1	<i>Newly established firm is owner-dependent. Objective is product and/or technology development and establishment of an early customer base. Main activities relate to the business idea, identification of a market and resource mobilisation. Development of a working prototype is started. Management is informal, flexible and creative, communication is face-to-face, and owner makes the decisions.</i> Organisation functions as a product-development team. Cash flow falls into the red due to lack of product at this early stage.
---	---

2	<i>Stage begins with early-reference customers. Objective is creation of a business and commercialisation of the product. Stage is characterised by early manufacturing and marketing and initial technical challenges. Company learns to make the product and to produce it.</i> Management style is participative and coordinative. Owner and/or a small group of partners dominate the nucleus of the administrative system. Resource generation and survival are key issues. Amount of negative cash flow decreases.
---	---

3	<i>At this stage, manufacturing and technical feasibility and market acceptance lead to high growth and constant change. Main objective: manage the company toward growth and increased market share by marketing and manufacturing the product efficiently and in high volume. Company needs to produce, sell and distribute the product at an increasing volume while minding efficiency and effectiveness through structures and processes. New customers and new market channels require constant attention. Personnel problems result from high growth. Owner and/or entrepreneurial team remain central, though a sense of hierarchy increases. Budgets are moderately utilised for communication.</i> More specialised functions considered and added. Positive cash flow increases rapidly.
---	--

4	The company faces a slowing growth rate and intense competition in a maturing product market. Effort needed to launch a second generation of the product and for effectiveness and efficiency issues. Identification of new markets essential for company renewal. However, cost control and productivity become main concerns. Growth and reasonable market share maintained by resulting product generation and profitability improvements. Owner usually supported by or replaced by a professional manager or a management team and professional management systems added. Strategies, rules, regulations and procedures become standardised and formalised. Employees become specialised, non-risk takers. Specialised functions added. Stage is characterised by a decreasing growth of cash flow.
---	---

This study found similarities related to every assumption of the framework, except assumption A3.9. The similarities are the aspects that provide support for the framework and for the details related to these aspects. These parallel aspects provide direct support for the framework presented.

Despite the fact that the majority of the viewpoints paralleled the framework, we found many contradictory aspects, and these beg further analysis. As we see the contradictions as potential fresh viewpoints for the framework, we analysed the contents of the contradictions further on a case-by-case basis.

4.2 Fresh viewpoints from Thai context

This section describes fresh viewpoints to the stage framework provided by the *Thai cases*.

In case A at *stage 1*, the born-dependent business model led to an absence of customer base, absence of an independent business model and a market identified and controlled by customers. Further, the win-win partnership brought in positive survival cash flow. At *stage 2*, customer dependency led to lack of time for broadening the customer base and customer-controlled market and marketing. The firms avoided initial technical challenges through technology collaboration with customers, and this further increased cash flow. However, the relationship failure between the owner-manager and the agent forced a total business model change. At *stage 3*, growth was achieved through a new independent business model with a growth strategy, and expansion was speeded up with ready-for-market technology and processes adopted through an earlier partnership. Growth had positive effects on personnel in terms of feelings of empowerment and the firm's improved attractiveness as an employer. Further, it enabled hiring, training, and overall personnel improvement. Contrary to the framework, the company had no time for organising specialised functions. At *stage 4*, contradictions related to achieving the top position in the selected market. The competition decreased dramatically and the company seemed to have more opportunities. The company aimed to renew business in the same market through growth as a partner and by building partnerships with strong marketing partners. No cost and productivity issues were highlighted as the company had a top brand, win-win-supply chain and orders for coming years. The employees were not characterised as risk-avoiders, but rather as loyal to the successful company.

In case B at *stage 1*, due to the single-customer based contract manufacturing business model—aimed at development of manufacturing capability—the company did not seek to generate a broader customer base, outsourced the market control to customers and focused on manufacturing challenges and implementation of production. The company had organised as an external production unit rather than as a product-development team. Constant orders from a single customer provided rapid sales growth. At *stage 2*, the contradictions also related to the contract manufacturing business model. Due to the business model, the company focused on a single customer, aimed to grow through increasing demand of this customer and developed manufacturing capability instead of product-development capabilities. The company could not maintain growth momentum in the later part of *stage 3*. It added no specialised functions during this stage. At *stage 4*, the contradictions related partly to the continued contract manufacturing business model. The company did not develop own new-product generation but kept focusing on contract manufacturing business. Further, the company did not replace or support the owner-manager with professional management. Company remained owner-dependent and owner-manager remained responsible for all the important decisions.

In case C at *stage 1*, the contradictions related to the selected business model: contract manufacturing business. Due to the business model, the company had no product or prototype development objective, and it focused on development of manufacturing capability. Further, due to the business model, the company faced bumpy sales and profit growth as early as this stage. At *stage 2*, some contradictions also related to the selected business model. The company did not own the product and the company generated capability solely for contract manufacturing business. Further, common employee problems arose as early as this stage including difficulty of work, high pressure, constant overtime work, adaptation problems and resignations. At *stage 3*, the contradictions related to overall economic downturn and the positive influences of growth to employees. The overall economic downturn hindered growth, and the company failed to achieve its

full potential. Positive effects of growth on employees included an improved reputation as a growth company (leading to hiring of experienced employees who learned quickly), faster training and more interesting and variable tasks. The company had not reached *stage 4* by the end of the examination period.

In case D at *stage 1*, the company did not need a broader customer base due to a partnership with a large public organisation. In the beginning of *stage 2*, the company did not broaden the customer base, and high dependency on the state-owned customer caused risk of total failure. Further, the company faced the challenges of volume production early. Instead of initial technical challenges, the company faced the more advanced challenges of manufacturing as early as this stage. In *stage 3*, the positive effects of growth to employees included improved attractiveness, high-quality staff with teamwork skills, training and capability development and professional human resource management. Performance and ability of the top-management team was questioned. Instead of added specialisation, the company showed improved responsiveness through decreased hierarchy and simplicity. Further, it allocated resources toward improvement of products, new product development and diversification of products as early as this stage. The company had not reached *stage 4* by the end of the examination period.

In case E at *stage 1*, contradictions related to the spin-off origin. The company had a predetermined business model, inherited market-ready product and customer base, a well-established market channel and a top brand. However, inability to find time for organisation development in the beginning led to a stagnant organisation. Management was characterised as stagnant and dependent. Stagnant environment and built-in mistake avoidance led to communication challenges. At *stage 2*, the company refined its existing customer base through business model change. The company controlled and improved the existing well-established supply chain, powerful co-chain and extensive network. The company already had a well-established market channel, success in detecting new market channels and a well-known brand that decreased need for marketing efforts. Company growth revealed the weaknesses of the original management style and system inherited from the parent organisation. The company had sufficient revenue as early as this stage. The company reached growth in selected market channels and a dominant position in the key market segment as early as this stage. Employees had major adaptation problems and frequent conflicts due to increased tasks and constant pressure as early as this stage. The company had not reached *stage 3* by the end of the examination period.

4.3 Fresh viewpoints from the Finnish context

This section describes the fresh viewpoints to the stage framework provided by the Finnish cases.

In case F at *stage 1*, we found no contradictions. At *stage 2*, the contradictions related to the parallel service business generated. The company created a successful service business simultaneously with its own product business. Further, the company received some early income through added service business with new service concepts. At *stage 3*, a stimulating and aggressive growth strategy, including acquisitions and opportunistic expansion to new markets, led to a market leadership position in the Nordic countries. Market share increased aggressively through customer-centred product development and acquisitions in a recently opened market. Due to aggressive expansion, structures and processes for maintaining efficiency and effectiveness lagged behind. Growth affected employees positively due to their increased efficiency and effectiveness, more variable career opportunities, positive stress and tightened community spirit. Employees considered it enjoyable to work in a successful organisation. Early formalised communication decreased transparency and hidden problems popped up unexpectedly. At

stage 4, older customers required a great deal of attention—long-term customer relationships helped the company sell its products. Simultaneously, with formalisation, the company faced the challenge of remaining agile as the organisation slowed and resisted change. Employee resistance threatened specialisation and functionalisation goals, since employees felt forced to function according to predetermined roles.

In case G at *stage 1*, owner-dependency decreased due to the support of the board. Large orders of the first product enabled early manufacturing at this stage. At *stage 2*, the company's own product business failed and was discontinued. The company failed to make its own product and produce it in a slow-reacting medical technology market and did not reach market approval. The company focused on total service projects and contract manufacturing and kept design service. An internal administrative system was supported with a very good board with great strategic skills. At *stage 3*, the opposite effects of building structures and processes led to hurried organisation building and harmful competition between processes. The company acted as a team builder in the supply network, establishing strategic key supplier relationships with customers and suppliers. Growth had positive effects on employees, including growth and education of existing employees, hiring of good employees, a reward system and multiple career opportunities. Good employees and teams enabled good results. Investors affected decision making significantly, until a sudden, strategy-threatening crisis occurred involving management and investors. The crisis clarified the role of the management team. At *stage 4*, sharpened strategy by a new board enabled maintaining a high growth rate in spite of market stabilisation. The company received a sufficient volume of orders from existing customers and reached its targets by marketing with reasonable resources. Its growth was based on stable relationships with customers. Further, the company geared itself to a total manufacturing service business and based its growth on a tight focus on manufacturing-service business, stable relationships with customers, eagerness to serve customers, investments according to customer needs and patient quality improvement. The role of the original owner and management team was recentralised due to increased independency from the board. As an opposite effect of standardisation and formalisation, the company lost agility. Employees proved loyal even in the face of layoffs, given the low turnover of employees rooted in a long-sighted staff policy and prioritisation of employee needs.

In case H at *stage 1*, an increased number of employees led to increased complexity of management. The characteristics of the company did not follow along the lines of a product-development team organisation. The company employed too many individuals, and, with no customers in the pipeline, personnel easily lost motivation. In the early part of *stage 2*, the company had to accept orders not directly related to core business and not very profitable. The nucleus of the administrative system was not in the total control of the owner-manager and two partners, as assumed by the framework. The company faced challenging power issues as a venture capitalist was willing to slow down the business. In *stage 3*, in addition to producing, selling and distributing the product in higher volumes, the company succeeded in creating stabilised and more efficiently managed system products, making routine subcontracting possible. Hence, the company could utilise good and reliable products as a competitive advantage instead of price. The company could not give enough attention to new customers and market channels and lacked sufficient time to find new customers, to make new deals or to sell new things as old customers took up most of the available time. The company came close to running out of sales resources in some product areas and required a more organised process with reasonable resources. Third, in addition to problems caused by growth, the employees felt many positive effects. Career development was enabled by growth within the company—the employees trusted management and themselves more because of proven growth and good financial status. Employees had an opportunity to work in a more challenging environment with

diverse customers. The company had not reached *stage 4* by the end of the examination period.

In case I, the only contradiction at *stage 1* related to accelerated growth as news of the technology accelerated quickly. At *stage 2*, we found no contradictions. At *stage 3*, the UK market as such did not provide sufficient growth yet, and the company needed more customers. Much relied on future growth potential. The company expected rapid growth to begin a negotiated partnership with a leading application service provider—it expected the partnership to open the market. In the public health care sector, changes were considered excessively slow due to a high resistance to change. There was no certainty when the market opened—however, the company prepared for potentially fast change. It aimed to reach an agreement and generate high growth with a global market leader. The identification of a so-called killer application, including the latest technology and tested service concepts, led to a promising win-win situation with a global player in the market. Instead of concrete production, sales and distribution in volume, the company prepared for these. The platform and the software were ready for high growth and a mature product had scalability potential. Employees were empowered through success in development of new applications important for people and society and motivated by the possibility of working with the latest technology. Potential high growth and success through negotiations with a global player led to improved motivation and trust in the future. Most of the employees were very committed to the company. Organisation was still very thin, especially in terms of sales and network management. The personnel preferred a flexible organisation (including administration, research and development and marketing) with low hierarchy. No specialised functions were added. The so-called death-valley situation in a cash flow curve at the beginning of the stage caused uncertainty and fear among the interest groups. The company had not reached *stage 4* by the end of examination period.

In case J at *stage 1*, the company functioned in a subcontracting business, in addition to its own product business, to generate essential revenue and financial resources. At *stage 2*, in addition to a straightforward focus on commercialisation, the company carried out a successful structural business model change to a network-based model functioning with an extremely thin organisation. The company created a strong cooperative partnership network and gained some positive net cash flow from a subcontracting business to generate resources for its own product business. At *stage 3*, the achieved growth was not fully concrete—output growth was slower than input growth. The risk of failure grew due to dependency on one segment. Slower-than-expected growth caused frustration throughout the company and among the investors. The market niche proved conservative and slow to change. As business was profitable and direction upwards, the company had no need for urgent changes and had more time to develop business. Production in volume was not a central issue—each customer order functioned as a customised project and financing during the project set up a key challenge. Positive human resource issues did arise during this stage. The company had resources of an estimated 50 employees available through outsourcing, and very cost-efficient recruiting of human resources was becoming possible via the international network. Information technology brought new positive challenges into the monotonous work. A first documented company strategy was created and used for communication; growth would not have been possible without the well-functioning strategy. Time was spent on unnecessary tasks before the implementation of the business strategy. The company had unbalanced inputs and outputs. It was sometimes difficult to convince investors of the company's good health, as the company had seemingly absurd key economical figures because of its unique business model. The company had not reached *stage 4* by the end of the examination period.

4.4 Summary of the fresh viewpoints in the Finnish and Thai contexts

The following four tables summarise the stage-specific fresh viewpoints; these following viewpoints should be considered as *stage 1*:

Table 5. Stage 1: Conception and development—fresh viewpoints

Fresh viewpoints	
<i>No shared viewpoints</i>	
Thai context	Finnish context
Company may have access to market-ready product, technology or business idea through personal relationship (family, friendship or other) with the stakeholder such as main customer, parent company or main supplier. Trust and dependency in the relationship network lead, e.g. to a single-customer business model, inherited customer base and to the business environment predefined and/or fully controlled by the trusted stakeholder. New business establish itself as an additional unit for a business owned by a family member. Business model may change rapidly given an attractive opportunity through a personal relationship. Business established in such a network of trust may enjoy sales growth and positive cash flow as early as this stage. On the other hand, mistake avoidance reported may lead to dependent and stagnant management and organisational structure as early as the first stage.	The Finnish cases delivered only a few fresh viewpoints. The impact of personal network was not highlighted in the same sense in Finnish cases. In the Finnish business context with low hierarchy, owner dependency may actively decrease with the support of the board and the management team as early as this stage. Management may well be characterised as complicated if the company hires too many employees to organise as a product-development team. With market-pull product, early manufacturing may take place as early as this stage.

The following viewpoints should be considered at *stage 2*:

Table 6. Contradictory viewpoints to the commercialisation stage

Fresh viewpoints specific to both contexts	
In both contexts, some businesses may have no product-business objective due to a focus on contract manufacturing business. The main objective may be a business-model change due to the collapse of the first business model or new business opportunity.	
Thai context	Finnish context
Due to a relationship-boosted business model, the focus may be on a main customer or on redefinition of an inherited customer base, marketing channel, supply chain and network. Early technical challenges may be avoided through a technology partnership and, simultaneously, a company may have high production volumes as early as this stage, generating more advanced challenges. Company may achieve growth and dominant position as early as this stage while generating positive cash flow. On the other hand, relationship dependency may lead to market and marketing controlled by customer and	Company may seek to ensure or support its own-product business by additional service and/or subcontracting business. On one hand, company may receive positive cash flow from a parallel support business. On the other hand, potential failure of the risky own-product business may lead to a total and rapid business model change to a contract manufacturing or service business. On one hand, an administrative system may be positively supported by an experienced board or venture capitalist. On the other hand, this may lead to a situation of unnecessary control over management.

capability development limited to single-customer contract manufacturing. Moreover, a management system unfit (e.g. inherited-formal) to advance growth may cause serious personnel problems as early as this stage.	
--	--

The following viewpoints should be considered at *stage 3*:

Table 7. Contradictory viewpoints to the expansion stage

Fresh viewpoints specific to both contexts	
In both contexts high growth may be reached by means contradictory to the framework. Moreover, high growth may not be reached due to variable internal and external factors. In multiple cases in both contexts many positive effects of growth to the employees were reported.	
Thai context	Finnish context
Company may face a need for simplification of organisation to update and improve responsiveness of inherited organisational structures and may simply have no need to add more specialised functions. Performance and ability of management team questioned due to stagnancy resulting from mistake avoidance. Moreover, due to boosted development, a company may focus on improvement of products, new product development and diversification as early as this stage.	Variable business models related to fresh viewpoints reported. Instead of rapid but organic growth with a single product, market share may dramatically increase through acquisitions, partnership with a market leader and/or new products/system products. One company may generate high volumes by scalable platform while another company may focus on large and customised projects. Company may face hurried structure and process development and harmful competition between processes or function with an extremely thin organisation (networked business model) with no need for added functions. One company may function as an active team builder in the entire supply network and another may just focus on (an) existing customer/s. In some cases investors affected decision making needlessly, leading to serious power imbalance. Strategy was seen as main tool for communication, and communication was formalised as early as this stage. A so-called death-valley situation in a cash flow curve or serious imbalance between inputs and outputs may occur.

The following viewpoints should be considered at *stage 4*:

Table 8. Contradictory viewpoints to the stability/renewal stage

Fresh viewpoints specific to both contexts	
In both contexts companies may focus on contract manufacturing/total manufacturing instead of new products as a strategy for renewal. Moreover, companies may seek growth/renewal through the current market with no intention to identify new markets. In both contexts, loyalty of employees may increase instead of risk-avoidance.	
Thai context	Finnish context
A company may, with the support of a strong network, achieve a dominant position in the niche market. This may decrease competition dramatically and open more opportunities as	Some companies grew steadily in spite of market stabilisation. In other cases, growth and market share were maintained through flexible business model. As opposed to the assumption,

the company can redefine its own market. The company may have a top brand and top supply chain and orders for coming years. In this situation, the company faces no urgent cost or productivity issues. The company, especially a family business, may also remain tightly owner-dependent still at this stage and longer.	a company may recentralise power to the original owner and a management team by management buyout, if, e.g. investors became a problem in the earlier stages. Specialisation and functionalisation attempts may lead to resistance among employees. Company may face serious challenges to remain agile.
--	--

5 Discussion

This study intended to clarify the early stages of technology-intensive companies in Thai and Finnish contexts. The authors did this by a meta-analytical synthesis of recent empirically based stage models and by testing the synthesis involving ten cases in Thai and Finnish business contexts. The key findings result from three research questions: What early stages do technology-intensive companies face based on the recent empirical literature? How do the experiences of managers in early-stage technology-intensive companies relate to assumptions of such stage framework? What viewpoints should be taken into account when using stage framework in Thai and Finnish contexts?

We answered the first research question using a meta-analysis of recent empirically based stage models. As a result of the analysis, we formed a four-stage synthesis of the early stages of technology-intensive companies. The stages include: *conception and development*, *commercialisation*, *expansion* and *stability/renewal*. Table 2 presents these stages in detail. This study used the synthesis as a set of assumptions to test on ten case studies.

Using the ten case studies, the authors answered the second research question using SIT. We analysed ten cases from Thailand and Finland to test how the experiences of the managers related to the assumptions of the framework. Table 4 presents the results of the analysis. We found more parallel than contradictory viewpoints. Parallel experiences we found related to every assumption of the framework with one exception. These viewpoints provide direct support for the framework presented.

The study's third research question clarifies the contradictory (fresh), context-specific viewpoints of the stage framework from Finnish and Thai perspectives. Tables 5, 6, 7 and 8 describe the stage-specific fresh viewpoints. At the *first stage*, the personal relations (family, friendship) network characterised with trust and dependency seemed to affect fresh viewpoints of the Thai cases the most. Trust led to successful single-customer business models with sales growth and positive cash flow already as early as this stage, while dependency led to predefinition and/or control of the products and/or market. The Finnish business context did not highlight effects of personal networking. Owner-dependency may already be actively decreased to ensure continuity of the business. At the *second stage*, in both contexts, the focus may not be on own-product business due to collapse of the original business model or concentration on contract manufacturing. In the Thai context, the relationship-boosted business model may lead to avoidance of early technical challenges, high production volumes and growth/dominant market position as early as this stage. Finnish businesses may seek to insure continuity by additional service and/or subcontracting with businesses with some positive cash flow. A board may support or negatively control management. At the *third stage*, the most important fresh viewpoint is the positive effect of growth on employees reported in both contexts. Relationship-boosted Thai companies may face some challenges of the fourth stage already here. Moreover, companies may need to update and improve inherited organisations where mistake avoidance has increased. Fresh viewpoints from the Finnish context relate to multidimensional growth strategies including, for example, growth

through acquisitions, partnership, networking and scalability. At the *fourth stage*, the companies in both contexts may seek new growth from existing markets or by an other-than-own-product business model. In the Thai context, dominant market position may decrease competition dramatically and enable redefinition of own market—a company with top brand, top supply chain and orders for coming years may not face cost and productivity issues. In the Finnish context, firms may maintain growth and market share through flexible business models. Recentralisation of power to the original owner may occur in case of power-sharing problems at the earlier stages. Attempts to add bureaucracy may lead to resistance among employees.

To conclude, this study formed and preliminarily tested a four-stage framework describing the early stages of technology-intensive companies. The ten cases evaluated mostly supported the assumptions of the framework, and the framework found support from both contexts. Therefore, the empirically based stage framework forms an effective tool for reflecting on and predicting challenges faced during the early stages. Moreover, this study revealed a number of context-specific viewpoints contradictory to the framework: companies in different countries face culture- and context-specific issues in their early growth. The contradictory viewpoints mostly differed in these two business contexts. Growth is a multidimensional phenomenon and each early technology-intensive company is unique to an extent.

This study's case-study strategy using SIT proved effective for open-ended analysis of early growth taking the sequential character of the process into account. The construct validity of the study is based on a sound research plan, multiple sources of evidence, synergy between quantitative and qualitative data and an established chain of evidence. Analytic generalisation, generalisation to a theory, is possible in the case of building context-specific frameworks applicable to the Finnish and Thai contexts. The findings of the study cannot be generalised to other countries or business contexts, and they depend on the time of data collection. Reproducing the same case study in the same environment later would change some of the findings. In addition, researchers' viewpoints may affect the findings. However, case-study protocol was followed and a database established allowing further testing of the findings.

This study takes a step toward a deeper understanding of context-specific issues related to early stages of technology-intensive companies in different business contexts. Through additional case studies in the Finnish and Thai contexts, more details could be provided. Additionally, these findings could be further empirically tested (for examples of such tests see Hanks & Chandler 1994, Kazanjian & Drazin 1989). Anyhow, the results of this analysis do not apply to other business contexts. Opening other business contexts to a similar methodology would offer a broad range of opportunities for framework testing and for pointing out context-specific issues. It would be interesting to compare the results of similar analyses in other countries. Moreover, the role of intermediaries in this challenging area requires a closer look.

References

- Abetti, P. (2001) 'Accelerated growth: helping companies get and stay on the fast track'. *International Journal of Manufacturing Technology and Management*, Vol. 3, No. 1, pp. 15-30.
- Churchill, N. C. and Lewis, V. L. (1983) 'The five stages of small business growth'. *Harvard business review*, Vol. 61, No 3, pp. 30-50.
- Coad, A. (2007) 'Firm Growth: A Survey'. *Max Planck Institute Papers on Economics and Evolution*, pp. 1-72.

- Coase, R. H. (1937) 'The Nature of the Firm'. *Economica*, Vol. 4, No. 16, pp. 386-405.
- Davidsson, P. and Wiklund, J. (2006) '3. Conceptual and empirical challenges in the study of firm growth'. In: Davidsson, P., Delmar, F. and Wiklund, J. (eds.) *Entrepreneurship and the Growth of Firms*. Cheltenham: Edward Elgar Publishing. pp. 39-61.
- Edvardsson, B. and Roos, I. (2001) 'Critical incident techniques'. *International Journal of Service Industry Management*, Vol. 12, No. 3, pp. 251-268.
- Evers, H. D. and Hornidge, A. K. (2007) 'Knowledge hubs along the Straits of Malacca'. *Asia Europe Journal*, Vol. 5, No. 3, pp. 417-433.
- Fisher, S. and Oulton, T. (1999) 'The critical incident technique in library and information management research'. *Education for Information*, Vol. 17, No. 2, pp. 113-125.
- Flanagan, J. (1954) 'The critical incident technique'. *Psychological Bulletin*, Vol. 51, No. 4, pp. 327-358.
- Garengo, P. and Bernardi, G. (2007) 'Organizational capability in SMEs: Performance measurement as a key system in supporting company development'. *International Journal of Productivity and Performance Management*, Vol. 56, No. 5-6, pp. 518-532.
- Gibrat, R. (1931) *Les inégalités économiques*. Paris: Recueil Sirey.
- Glass, G. (1976) 'Primary, secondary, and meta-analysis of research'. *Educational Researcher*, Vol. 5, No. 10, pp. 3-8.
- Greiner, L. (1972) 'Evolution and revolution as organisations grow'. *Harvard Business Review*, Vol. 50, No. 4, pp. 37-46.
- Gremler, D. (2004) 'The Critical Incident Technique in Service Research'. *Journal of Service Research*, Vol. 7, No. 1, pp. 65-89.
- Hanks, S., Watson, C. and Jansen, E. (1991) 'Toward a configurational taxonomy of the organization life cycle'. In: Hills, G. and LaForge, R. (eds.) *Research at the Marketing/Entrepreneurship Interface*, Chicago: University of Illinois Press.
- Hanks, S. and Chandler, G. (1994) 'Patterns of Functional Specialization in Emerging High Tech Firms'. *J Small Bus Manage*, Vol. 32, No. 2, pp. 23-37.
- Hanks, S., Watson, C., Jansen, E. and Chandler, G. (1993) 'Tightening the Life-Cycle Construct: A Taxonomic Study of Growth Stage Configurations in High-Technology Organizations'. *Entrepreneurship: Theory and Practice*, Vol. 18, No. 2, pp. 5-29.
- Hannan, M. T. and Freeman, J. (1977) 'The Population Ecology of Organizations'. *The American Journal of Sociology*, Vol. 82, No 5, pp. 929-964.
- Kantarelis, D. (2009) 'Entrepreneurship in the USA: architecture, market structure and incentives'. *International Journal of Entrepreneurship and Innovation Management*, Vol. 9, No. 3, pp. 191-203.
- Kaulio, M., (2003) Initial conditions or process of development? Critical incidents in the early stages of new ventures. *R&D Management*, Vol. 33, No. 2, pp. 165-175.
- Kazanjian, R. K. and Drazin, R. (1989) 'An empirical test of a stage of growth progression model'. *Management Science*, Vol. 35, No. 12, pp. 1489-1503.
- Kazanjian, R. and Drazin, R. (1990) 'A stage-contingent model of design and growth for technology based new ventures'. *Journal of Business Venturing*, Vol. 5, No. 3, pp. 137-150.
- Kelley, D., Singer, S. & Herrington, M. (2011) GEM 2011 - Global Report. Retrieved April 2: 2012. <http://www.gemconsortium.org/docs/2200/gem-2011-global-report-extended>
- McCann, J. (1991) 'Patterns of growth, competitive technology, and financial strategies in young ventures'. *Journal of Business Venturing*, Vol. 6, No. 3, pp. 189-208.
- McClelland, D. C. 1961. *The achieving society*. Princeton, Van Nostrand.

- Miller, D., Friesen, P. and Mintzberg, H. (1984) *Organizations: A Quantum View*. Englewood Cliffs: Prentice-Hall.
- Mitra, R. and Pingali, V. (1999) 'Analysis of Growth Stages in Small Firms: A Case Study of Automobile Ancillaries in India'. *Journal of Small Business Management*, Vol. 37, No. 3, pp. 62-63.
- Muhos, M. (2011) *Early stages of technology intensive companies*. Early stages of technology intensive companies. Acta Universitatis Ouluensis, C 381, University of Oulu.
- Muhos, M., Kess, P., Phusavat, K. and Sanpanich, S. (2010) 'Business growth models: review of past 60 years'. *International Journal of Management and Enterprise Development*, Vol. 8, No. 3, pp. 296-315.
- Nelson, R. R. and Winter, S. G. (1982) *An evolutionary theory of economic change*. Cambridge: Belknap Press.
- Penrose, E. T. (1959) *The theory of the growth of the firm*. New York: John Wiley & Sons.
- Poutziouris, P., Binks, M. and Bruce, A. (1999) 'A problem-based phenomenological growth model for small manufacturing firms'. *Journal of Small Business and Enterprise Development*, Vol. 6, No. 2, pp. 139-152.
- Salonen, A. (1995) *International growth of young technology-based Finnish companies*. Helsinki: Finnish Academy of Technology.
- Sandberg, W. R. and Hofer, C. W. (1982) 'A strategic management perspective on the determinants of new venture success'. In Vesper, K. H. (eds.) *Frontiers of Entrepreneurship Research*. Wellesley: Babson College, pp. 204-237.
- Saunders, M., Lewis, P. and Thornhill, A. (2007) *Research methods for business students*. London: Financial Times/Prentice Hall.
- Schramm, C. J. (2004) 'Building entrepreneurial economics'. *Foreign Aff.* Vol. 83, No. 4, pp. 104-115.
- Siu, W. and Kirby, D. (1998) 'Approaches to small firm marketing'. *European Journal of Marketing*, Vol. 32, No. ½, pp. 40-60.
- Smith, K., Mitchell, T. and Summer, C. (1985) 'Top Level Management Priorities in Different Stages of the Organizational Life Cycle'. *The Academy of Management Journal*, Vol. 28, No. 4, pp. 799-820.
- Stam, E. (2007) 'Why Butterflies Don't Leave: Locational Behavior of Entrepreneurial Firms'. *Economic Geography*, Vol. 83, No. 1, pp. 27-50.
- Stauss, B. and Weinlich, B. (1997) 'Process-oriented measurement of service quality'. *European Journal of Marketing*, Vol. 31, No. ½, pp. 33-55.
- Storey D. J. and Tether B. S. (1998) New technology-based firms in the European Union: an introduction. *Research Policy* Vol. 26, No. 9, pp. 933-946.
- Schwab, K. and Porter, M. E. (2005) *Global Competitiveness Report 2004-2005*. Oxford: Oxford University Press.
- Swiercz, P. and Lydon, S. (2002) 'Entrepreneurial leadership in high-tech firms: a field study'. *Leadership and Organization Development Journal*, Vol. 23, No. 7, pp. 380-389.
- Stenholm, P., Pukkinen, T., Heinonen, J. and Kovalainen, A. (2008) *Global Entrepreneurship Monitor 2007 Report, Finland*. Turun kauppakorkeakoulu. TSE Entre.
- Tesfaye, B. (1997) 'Patterns of Formation and Development of High-Technology Entrepreneurs'. In: Jones-Evans D & Klofsten M (eds) *Technology, Innovation and Enterprise - The European Experience*. London: MacMillan, pp. 61-106.
- Van de Ven, A., Hudson, R. and Schroeder, D. (1984) 'Designing New Business Startups: Entrepreneurial, Organizational, and Ecological Considerations'. *Journal of Management*, Vol. 10, No. 1, pp. 87.

- Wiklund, J. (1998) *Small firm growth and performance: Entrepreneurship and beyond*. Dissertation. Jönköping, Jönköping University, Jönköping International Business School.
- Williamson, O. E. (1975) *Markets and hierarchies: analysis and antitrust implications: a study in the economics of internal organization*. New York: Free Press.
- Yin, R. (1989) *Case study research: Design and methods*. Beverly Hills: Sage Publications.

Appendix 1

The data collection instrument

Section number	Section title
A	The written form
A1	Interviewee related information
A2	Company related information
B	The interview
B1	The reference model for the early growth of technology intensive company
B2	The growth story and the critical incidents

Appendix 2
The respondent characteristics

Company Position	Managerial viewpoint	Experience in the company (years)	
A	Chief Executive Officer (CEO)	Strategic	9
	Executive Vice President	Operations	5
	Marketing Manager	Marketing	5
B	CEO	Strategic	9
	Production Manager	Operations	6
	Chief Executive Officer	Marketing	9
C	Managing Director	Strategic	5
	Production/Marketing manager	Operations	4
	Production/Marketing manager	Marketing	4
D	General Manager	Strategic	10
	Division Manager	Operations	4
	Marketing Manager	Marketing	13
E	CEO	Strategic	6
	Executive Vice President	Operations	3
	Sales division manager	Marketing	3
F	Vice President	Strategic	4
	Vice President	Operations	4
	Marketing manager	Marketing	1
G	CEO	Strategic	15
	Production manager	Operations	8
	Marketing manager	Marketing	11
H	CEO	Strategic	9
	CEO	Operations	9
	Development manager	Marketing	9
I	CEO	Strategic	10
	Technical Officer	Operations	5
	Special adviser Tech. / Mark.	Marketing	4
J	CEO	Strategic	15
	Operative/marketing manager	Operations	15
	Operative/marketing manager	Marketing	9