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BI Norwegian Business School - Thesis

**From David to Goliath:
Investigating the lack of global success
for Norwegian IT start-ups.**

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Summary

Norway scores very high on various parameters that contribute to the competitiveness in the Information Technology industry. However it has not produced many large global information technology firms, in particular, software firms. When the researchers started researching on the Norwegian IT industry, there was a clear pattern that could be identified. The pattern here was that Norwegian firms get acquired by foreign multinational corporations just when they reach a growth stage from where they could have been grown much bigger.

The researchers decided to find the root cause to this pattern through this research and also used interviews for their research. The researchers got to meet and interview some very interesting people from the software industry and the start-up eco-system. Secondary data was acquired from Orbis and Zephus databases for financial data on Norway and Sweden. The researchers analysed all the data that was gathered and came up with an interesting analysis with some recommendations to remove the obstacles to the growth of Norwegian IT firms.

Chapter-1: Introduction

Scientific advances and technological changes are important drivers of recent economic performance. A small number of firms create the majority of all net new jobs (Mason and Brown 2013). The ability to create, distribute and exploit knowledge has become a major source of competitive advantage, wealth creation and improvements in the quality of life. These ‘high-growth firms’ are important to employment growth, disseminate innovation throughout the wider economy, and create economic spillovers in their local areas (Anyadike-Danes et al. 2009);(Mason, Bishop, and Robinson 2009).Some of the main features of this transformation are the growing impact of information technology (IT) industry on the economy and on society; the rapid application of recent scientific advances in new products and processes; a high rate of innovation across countries, a shift to more knowledge-intensive industries and services; and rising skill requirements.

The Nordic region has become an attractive geography for venture capital investment by multiple standards of measurement. In the following six categories, including the “best countries to start a company”, the “global innovation index”, and the “global competitiveness index”, Nordic countries hold 43% percent of the top ten positions across each category, outpacing the rest of Europe (27%), Australasia (15%), and North America (10%) (Elatab 2012).

This research was born with the absence of global firms from Norway in the IT sector; more specifically, computer product software, which forced the researchers to question this absence even though the underlying entrepreneurship framework seems to be similar across its Nordic counterparts. Even with good level of start-up activity across the Nordic region and a relatively good share of young fast-growing gazelle firms, the region seems to struggle in successfully scaling up of young firms, so they would grow to large companies. The idea that a small proportion of firms are disproportionately important to the economy in terms of employment and revenue generation could be attractive to the policy makers. The policy makers can then focus on a few firms and reduce the ineffective and often expensive business support (Mole et al. 2009).

While Sweden and Finland have global firms like MySQL, Rdio, Spotify, Rovio to be proud about, similar firms in IT seem to be conspicuous in their absence in Norway. The greatest irony of it all is the fact that Norway has one of the biggest wealth funds and its entrepreneurs are vying for seed capital to get their start-ups through to the next level. Surprisingly though, this is the state of the firms belonging to the IT industry only. Shipping, Fishing and Oil sector related firms enjoy a handsome support from the government and private investors alike (NVCA 2014).

Contemporary research within the Nordic sector deals with similar challenge but is inclined more towards policy changes in taxes, financing and some educational reforms, as funding and management capabilities have been found to be important drivers of entrepreneurship. This research will focus on the financing aspect and understanding of various underlying features, which have made countries like Finland and Sweden technological hotspots. Furthermore, this understanding is important because entrepreneurship has been found to be a driver of innovation, productivity and jobs.

The research deals with the innovation and entrepreneurship and how a small nation like Norway can embody these traits. Even though, the researchers have looked at the IT industry in particular, the aim of the research is to understand the underlying dynamics of the eco-system that helps build new ventures. The research is part exploration of the current landscape, with regards to the historical settings. In addition, it is about arguments on how or whether a change can be made to bolster the prospects for the upcoming ventures. The research is organized around the various stakeholders that play a role in the process of development and operation of a healthy entrepreneurial eco-system. The key players that'll be focused on are the government, the financing institutions, the incubators and accelerators which have the job of nurturing future talent and global start-ups.

The researchers examine history and culture and its impact as has been done by Sogner, and other writers regarding the Nordic region. The researchers have interviewed the respective stakeholders regarding their views and recommendations and to find out the blind spot that exists among them, furthermore, the researchers have extracted data to compare countries and market segments to see the impact of one dominant industry on the fostering of other non-related industries. The researchers arrived at their research topic as students of

innovation, entrepreneurship and finance. One of us, Venkatesh Sudhandhiran has a background and vast experience in the IT industry combined with the knowledge of entrepreneurship as gained through academic studies. The other, Anant Raj, is also an engineer and a student of Finance and an enthusiast of understanding its role in furthering entrepreneurship. While our admiration of what Norway has contributed to and achieved in the IT industry at world level, was a major part of what motivated us to research this topic; the researchers will cover areas where Norway has fallen back compared to its counterparts. The prime focus in this regard will be concerned with the following research questions:

Why has the Norwegian economy not produced large software product firms and what are the constraints that are undermining the process of new venture creation?

Both these questions deserve an in-depth treatment that is beyond the scope of the master thesis as entire books have been and could be written about each. This research is our attempt to understand and explain the situation from an outsider's perspective.

1.1 Hypotheses:

H1: Access to finance is a significant obstacle to the success of gazelles and upcoming start-ups.

Firms might need external finance to achieve to commercialize innovation, enter new markets and achieve high growth. In a country like Norway where the primary financing institutions are the banks, getting external finance could be a big obstacle for the firms to overcome as has been already suggested in the research by (Sjögren and Zackrisson 2005) while comparing the financial systems between that of Sweden and the United States of America.

H2: Government involvement and policy set-up has a significant effect on the success of status and exits of gazelles.

Research has suggested that taxation and regulation may limit the number of high-growth firms (Henrekson, Johansson, and Stenkula 2010). Furthermore, the same research also suggests that regulation may affect high-growth firms as the firms may find it harder to launch new products into regulated markets. Regulation may

make firms reluctant to employ new staff. In addition, previous research has argued that higher taxation lowers growth rates by reducing both incentives to grow and whether the firm can use profits to finance continued growth (Michaelas, Chittenden, and Poutziouris 1999).

H3: Start-ups and Gazelles are likely to perceive recruitment and management as a significant obstacle to their success.

Two factors that matter here are the quality of the recruits in terms of knowledge and experience as well as the quantity. Specifically, in a country like Norway, dominant industry like Oil & Gas can be a factor in polarizing the top recruits towards a stable, low risk career compared to a start-up life which demands long hours and generally the outcome is binary in terms of success. Past research (Hambrick and Crozier 1986, 40) has concluded that, “recruitment and selection at all levels is a crucial but onerous task”. For the small firm on the high growth lane, this could be an acute barrier. Unless they are able to attract new staff, by definition, they would be unable to grow any further. Another problem in this domain is that the entrepreneurs suited to the creation of start-ups often lack the skills required for each subsequent stage of development and can be unwilling to bring in outside help (Fischer and Reuber 2003).

H4: Commercialization of research is an important enabler of new venture creation and growth.

Going from a provider of education and research to actively cooperate with actors in society has put new pressure on universities. New expectations have evolved of universities as ‘engines of innovation’ (Westnes et al. 2009) contributing to future economic growth. This new role has challenged ‘the Ivory tower’, a common metaphor for an isolated academia conducting “blue sky” research disconnected from practical use (Etzkowitz and Leydesdorff 2000).

Chapter-2: Literature Review

The research will mainly be focused on the financing, founder profiles, industry demographics and skill management in the Norwegian software product industry and will try to shed some light on the interesting aspects of the sector. The researchers believe that Norway has the potential to build a giant software product industry based on the factors which leading researchers have found to be relevant for the development. The findings suggest that entrepreneurs in developed countries have greater ease and incentives to incorporate a firm, both for the benefits of greater access to formal financing and labour contracts, as well as for tax and other purposes not directly related to business activities. The research aims to investigate the trends in Venture Capital investments, Initial Public Offerings and Mergers & Acquisitions because further improvement in this regard will validate the industry's merits and provide it with the necessary confidence boost. Previous research by the Nordic Growth Entrepreneurship Review, 2012 suggests that there has been a surge in the number of start-ups and "gazelles" (High-growth start-ups) in Norway.

The researchers referred to the existing body of knowledge for the industry analysis. In innovation studies there are two traditions encountered when examining sectors. One of the traditions is related to the industrial economics literature. "The structure conduct performance tradition, the transaction cost approach, sunk cost models, game theoretical models of strategic interaction and cooperation and economic industry studies have emphasized the differences across industries" (Malerba 2004, 11). The second tradition dealing with sectors is much more empirical. It is also heterogeneous, comprehensive and diverse. There are empirically rich evidence on the features and working of sectors, on their technologies, production, innovation and demand, and on the type and degree of change. An intermediate level between the industrial organization tradition and the case study approach exists and it is represented by empirical taxonomies. Examples for this approach are High R&D intensive and Low R&D intensive, Schumpeter Mark 1 and Schumpeter Mark 2, net suppliers of technology and users of technology. Malerba provides an integrated and dynamic view of the innovation in sectors (Malerba 2004, 12).

Some of the important literature on Innovation Systems is by Carlsson and Stankiewicz who gave a technological systems perspective to Innovation.

According to them, the most important features of a technological system are economic competence, clustering of resources and institutional infrastructure (Carlsson and Stankiewicz 1991). They focused on the network of agents for the generation, diffusion and utilization of specific technologies. Geels contributed by adding the aspect of diffusion and use of technology to the sectoral systems of innovation (Geels 2004). Geels also described how the various components of systems of innovation are linked with each other. In addition, he describes the transition from one system to another. However, the most important theoretical framework that captured the attention of the researchers was Malerba's components of Sectoral Systems of Innovation. This framework was used for the thought process of framing questions for interviews and for the discussion at a later stage.

For an in-depth analysis of the IT industry, the researchers relied on Knowledge-based IT and software (Andersen 2011). Dr. Andersen has described the historical development of the Norwegian IT industry and has analysed the market structure, competition and the impact of outsourcing on the software services industry in Norway. The researchers could clearly observe a growth pattern in all the case studies in the article. Just when companies like Fast and Trolltech were gaining global market share, they were acquired by foreign multi-national corporations. This is what provoked the researchers to think of the reasons for the pattern and to explore the possible obstacles for the Norwegian firms in their growth and global expansion.

Entrepreneurship is now at the center of many policy questions related to science and technology, sustainability, poverty, human capital, endogenous resources, employment, regional and comparative advantages. Some of the initial researches that the researchers have utilized for understanding of entrepreneurship are published by global level institutions each different in its own right. Two such researches and data analyzed by the researchers are the Global Entrepreneurship Monitor report (Amorós and Bosma 2014) and World Bank Group entrepreneurship dataset (Group 2013). While the Global Entrepreneurship Monitor dataset captures early-stage entrepreneurial activity; the World Bank Group Entrepreneurship Survey dataset captures formal business registration. The magnitude of the difference between the datasets across countries is related to the local institutional and environmental conditions for entrepreneurs, after controlling for levels of economic development. The World Bank data measures

rates of entry in the formal economy, whereas GEM data are reflective of entrepreneurial intent and capture informality of entrepreneurship as compared and concluded by (Acs, Desai, and Klapper 2008).

Norway has had a long history and a proven track record in the IT industry with firms like FAST, Trolltech and Tandberg adding to its credentials. It has been the origin place of the Simula programming language the first of its kind to introduce modularity.

These firms have been acquired since then and there seems to be an absence of big names in this sector except for the ones that are IT firms but cater specifically to the Oil industry's needs. (Pe'er and Vertinsky 2008) suggest that exits of old firms increase entry and that on average new entrants are more productive. Using such researches as our reference, the researchers wish to bridge the gap (laid by the GEM and WB report) between the intentions of starting up and actually doing so. The researchers investigate the cultural, educational, and financial frameworks in place.

Another article that provided the researchers some historic perspective on the Norwegian Information Technology industry was written by Sogner (Sogner 2007). The research explores the impact of the growth in Oil Industry on the growth of the Information Technology industry. His analysis describes how the oil industry has encouraged the proliferation of specialized IT and software firms that cater to some niche demands of the oil industry.¹

Then, the researchers came across a report published by the economist about benchmarking the IT industry competitiveness (Unit 2007). This report lists six key attributes which were used to rank the IT competitiveness of countries. The attributes are 1. A stable and open business environment that encourages competition 2. Advanced IT and communications infrastructure 3. IT talent and skills development geared to the future 4. Robust protection of intellectual property rights 5. Strong support for innovation and 6. Carefully calibrated government support. Norway was ranked 14th in the world in 2007 which means

¹ This article was listed in Business History Review Journal. The Journal had an impact factor of 0.548 and was categorized under Business and History of Social Sciences Journals. The Journal was ranked 13 out of the 33 journals listed under History of Social Sciences category.

that it has reasonable advantages in those six key attributes taken into consideration.

Subsequently, the researchers read a report (Genome 2012) on the start-up ecosystem across the world. In spite of the absence of Norway in the list of ecosystems studied in the report, it gave the researchers some valuable knowledge on the parameters that are used to evaluate these ecosystems.

The Nordic Growth Entrepreneurship 2012 (Innovation 2012) is another research that provides an analysis of the young Nordic growth firms (gazelles) and the challenges that they face in accelerating growth at later stages. This study points to the fact that one of the primary challenges is the failure to attract and retain experienced management teams in young companies. This in turn leads to failure in obtaining later-stage venture capital. The report suggests entrepreneurial ecosystems as a possible stimulant for growth in the gazelles. The researchers gained some valuable knowledge on the job creation from these gazelles across the Nordic countries and understood that a closer look at mature gazelles will provide answers to many questions regarding the growth of software firms.

An academic course taken by one of the researchers gave him invaluable tools for analysis of sectoral systems of innovation, in this case, of the IT sector. A sector is composed of heterogeneous agents which are organizations or individuals. “They interact through processes of communication, exchange, cooperation, competition and command, and their interaction is shaped by institutions.” (Malerba 2004, 10) Malerba’s analysis (Malerba 2004, 17) lists three important components of ‘systems of innovation’ and it had a profound effect on the research strategy of the researchers. The three components are 1. Technologies and Knowledge 2. Actors and Networks 3. Institutions. ‘Sectoral systems have a knowledge base, technologies, inputs and demand’.

The researchers incorporated this framework in all their thought and brainstorming processes. The data collection process was designed keeping this framework in mind. All these components of sectoral systems of innovation are at work in the Norwegian start-up environment. Education software developed in Norway is gaining prominence with companies like Wewanttoknow AS and Kikora AS slowly making a mark. These companies are using advancement in user interface technology and knowledge from the gaming industry to create applications that make it easy and fun for children to learn their school curriculum. The various actors like IKT Norge and Kunnskapsforum, professional

networks, incubators and financiers make up the eco-system for nurturing the start-ups. Institutions like Innovation Norway and research centres provide valuable resources needed at various stages of growth of these start-ups. Wewanttoknow AS also collaborates with educational institutions in the U.S.A. In this research that the researchers have undertaken, technologies and knowledge could be the most important factors for foreign companies to merge or acquire Norwegian Start-ups. In the case of Trolltech, the researchers will discuss the probable reasons for being acquired by Nokia. Trolltech provided a cross-platform development environment for some of the software that was used in Nokia's mobile phones and this could have been an important factor in the decision. Networks that could lead to access to the Norwegian market could be another motive for the acquisition. Institutions, especially financial institutions, tax structures and governmental policies to encourage innovation shape the exit strategy of most companies. Overall, the researchers will discuss the impact of all three components on the exit strategy of Norwegian software start-ups. The history and organization of the software sector in Europe is also analysed in one of the chapters of the book and it helped the researchers organize their interview questions.

Michael Porter's five competitive forces that shape strategy (Porter 2008) was also a useful tool to analyze the industry. The researchers used not only the five forces (i.e.) Rivalry Among Existing Competitors, Bargaining Power of Buyers, Threat of New Entrants, Bargaining Power of Suppliers, Threat of New Entrants but also possible entry barriers in the industry while preparing the questions for interview. Porter's analysis is one of the most popular frameworks among management students.²

As aforementioned, economically advanced nations have an advantage of technological development which is supported by governmental research funding, the researchers take into consideration the cultural facet of entrepreneurship. (Brännback and Carsrud 2008) suggest that Nordic region has been low in

² Harvard Business Review is one of the most respected Journals in the world and in 2012 had an impact factor of 1.519. It is categorized under both business and management journals. It was ranked 45th out of a total of 116 journals in the business category.

entrepreneurship and this might be because of the cultural norms. The perception that being one's own boss is better than working for government isn't main-stream. Entrepreneurship is considered neither feasible nor desirable for the workforce despite extensive measures by policy makers. The same goes for business school graduates who see it as their last resort. This characteristic of the region will have to be taken into account before suggesting any recommendations because R&D expenditures, VC and PE related funding and other government related policies will not guarantee success unless the people's perspectives do not fit the entrepreneurial mould.

Chapter-3: Research Methodology

This section will describe the research methodology and strategy. It will discuss the available research approaches and the thought process behind the selection of the approach for the thesis.

3.1 Inductive method

According to David Kolb, learning might start inductively with the experience of an event or stimulus, which the individual then reflects upon in trying to make sense of it. This might lead to the generation of explanations of how or why what was observed actually happened in that way it did - explanations that can then be used to form an abstract rule or guiding principle that can be extrapolated to new situations similar to that already experienced (Gill and Johnson 2010, 41). In other words, the process of induction involves observation of the empirical world in order to build theory. The application of the inductive approach is best suited with the qualitative data and it exemplifies the effect of human beings which requires researcher to be an integral part of the whole research process (Saunders et al. 2011, 146).

3.2 Deductive method

Alternatively, for David Kolb, learning can start deductively at this point where such as abstract rule is merely inherited from other people by the learner, along with its web of explanations and expectations, and is subsequently applied by that learner and thereby practically tested out (Gill and Johnson 2010, 41). In simple words, the process of deduction is where a theory is tested through observation of the empirical world. In the research incorporating the deductive approach, the researcher remains independent of the research and the research question or hypothesis is tested through the assistance of the quantitative data (Saunders et al. 2011, 145).

3.3 The approach adopted by this research

In case of the research project the researchers are undertaking, they will not only be observing the empirical world in order to build theory, but they will also test some theories based on the interaction with the empirical world. The proposed research will adopt a combination of deductive and inductive approaches to

knowledge creation with more qualitative data collected through interviews. The researchers plan use questionnaires and to interview former employees of start-ups that were merged with large multinational corporations. The researchers will use quantitative analysis of secondary data from the Norwegian start-ups to test the theories on relationship between financing and growth of these firms.

3.4 Case Study

A case study explores a research topic or phenomenon within its context, or within a number of real-life contexts. (Yin 2009)(cited in (Saunders et al. 2011)) also highlights the importance of context, adding that, within a case study, the boundaries between the phenomenon being studied and the context within which it is being studied are not always clearly visible or understood (Saunders et al. 2011, 179).

There is a growing importance in the field of management of what is often termed a mixed methods approach: research that may integrate quantitative and qualitative methods of data collection within a single project (Gill and Johnson 2010, 224). The use of different research methods of data collection in the same study is presumed to have considerable benefits since any method has distinctive strengths and weaknesses and therefore research designs may benefit from counter-balancing strengths of one method with the weaknesses of others and vice versa (Gill and Johnson 2010, 225). Whilst different writers define the case study in various different ways, most seem to agree that a case study importantly involves empirical research that focuses on understanding and investigating particular phenomenon and their dynamics, within the context of a naturally occurring real life single setting, that uses multiple sources of evidence, usually using an array of qualitative and quantitative methods to collect that data (e.g.(Eisenhardt 1989);(Yin 2009); Hartley, 2004 in (Symon and Cassell 1998)) (cited in (Gill and Johnson 2010)). In other words, a case study can be an intensive study of an individual, a group, an organization or a specific process (Gill and Johnson 2010, 225). In this research project, the researchers will be using a combination of Qualitative and Qualitative methods and will use triangulation to reinforce the conclusion of the methods with each other.

The researchers chose to study Trolltech's sale to Nokia and investigate if the reasons for the sale can be generalized. The researchers used interviews in addition to some quantitative analysis to reinforce their research methods with

each other. The researchers selected a representative of each actor in the software eco-system for the interviews. Trolltech will be the “Protagonist” with Startup Lab representing incubators and Innovation Norway representing a financing institution and the government.

3.5 Primary Data from Interviews

The research interview is a purposeful conversation between two or more people, requiring the interviewer to establish rapport, to ask concise and unambiguous questions, to which the interviewee is willing to respond, and to listen attentively. Essentially, it is about asking purposeful questions and carefully listening to the answers to be able to explore these answers further. The use of interviews can help you gather valid and reliable data that are relevant to your research question(s) and objectives (Saunders et al. 2011, 372).

The researchers have used structured and semi-structured interviews for gathering primary data. Structured interviews use questionnaires based on a predetermined and ‘standardized’ or identical set of questions and researchers refer to them as interviewer-administered questionnaires (Saunders et al. 2011, 373).

The researchers chose Digia (Formerly Trolltech) as a case study and approached them for interviews. The reason for choosing Digia is that they are located in the same building as BI Norwegian Business School and it was easy to approach them without spending a lot of time and resource, considering the fact that access to information was the biggest risk to this thesis as mentioned in the preliminary thesis report. The researchers are international students and did not have an elaborate network in Norway. One of the former employees of Trolltech consented to give us an interview. She had played a variety of roles in Trolltech before its sale to Nokia. The interview took place on the 19th March 2014 in the office meeting room at Digia. The interviewee told the researchers upfront that she was not involved in most of the management decisions and would not be able to discuss the exit strategy of Trolltech. Her interview was useful to know the background about the company and its products. There was a follow-up interview on 2nd April 2014 to clarify certain answers.

Next, on 10th April 2014 the researchers interviewed a doctoral student who had done in-depth research on Trolltech as part of his research. The researchers used the same questions that they had asked the former Trolltech employee and they got a lot more descriptive and analytical answers. The researchers got an insight

into the software industry in Norway, its achievements, its pitfalls and some possible motives for the Norwegian software start-ups to sell their business to foreign multinationals.

Afterwards, the researchers met a representative of Startup Lab, an incubator located in Forskningsparken (Research Park) and requested for an interview with him and he consented to one of the author's request. The interview took place on 27th May 2014. The researchers asked him specific questions on the software industry and its challenges. It was quite an insightful conversation that the researchers had with him. The representative from StartupLab gave the researchers a contact with the former CEO of Trolltech and the researchers got in touch with him to get an appointment. The researchers feel that the meeting with the former CEO was the highlight of the data collection work for this research.

The researchers met the former CEO of Trolltech on 3rd June 2014 with questions modified to suit the interviewee since he was the only insider in the management team of Trolltech. He gave us the history, his entrepreneurial journey and its highs and lows. He also gave the researchers some clear and actionable hindrances to the growth of Norwegian software product companies.

The final interview was conducted with a representative of Innovation Norway that funds a lot of software start-ups on 10th June 2014. The researchers posed very specific questions building on the previous interviews. The researchers got the perspectives from a government organization that finances and fosters innovation.

After the data collection through interviews the transcripts of the interviews were analyzed and the key takeaways were identified and elaborated into six points in the analysis section. The secondary data was analyzed using Microsoft Excel; graphs were generated with the data and they were included as part of the discussion. The researchers came up with some recommendations which are not very in-depth following the advice of the supervisor that a very specific recommendation may not gain acceptance by the readers and stakeholders.

3.6 Secondary Data

Apart from the primary data collected through the interviews with the different stakeholders constituting an entrepreneurial eco-system, the researchers also collated data from global research institutions like Global Entrepreneurship

Monitor(GEM) and World Bank report, OECD report on innovation, competitiveness and tax regimes. This was an important exercise in the research process because the different reports handle the research question with a unique focus. As mentioned in the current text, reports from GEM try to gauge the public's inclination and incentives towards starting up a new venture while the World Bank report looks into the tangible data in the form of existing firms in the market and studying their growth trajectories. Furthermore, since the reports are global in context, too often the reader only gets an insight into the raw numbers and a subjective SWOT analysis of the economy. In the present research, by focusing on Norway, the researchers have tried to understand the problem, analyzed the raw numbers and also tried to suggest needful means to alleviate some of the problems. In doing so, the researchers have also collected data from another database called the Bureau Van Dijk. Using two of the databases available to them, Orbis (Dijk 2014a) and Zephyr (Dijk 2014b), the researchers have collected data on the feedback that the researchers have received from the interviewees.

Orbis contains comprehensive information on companies worldwide, with an emphasis on private company information. The researchers used it to research individual companies and analyzed companies. Orbis contains information on both **listed and unlisted companies**. Listed companies are in a more detailed format. Orbis has information on 120 million private companies.

For M&A and IPO related deal information, the researchers used Zephyr. As suggested by the Bureau Van Dijk website, Zephyr is the most comprehensive database of deal information - and it's updated hourly. Zephyr has been recognized by the award of 'Business Intelligence Publisher of the Year – UK' by Acquisition International as part of its M&A Awards. Zephyr was used to search by criteria and do a detailed analysis on a set of deals. The coverage on Zephyr increases daily - in June 2014 Zephyr covered approaching 1.2 million deals and rumors. An example of the search made on Zephyr is as follows:

SEARCH STRATEGY		Alert me	Save	Print	Clear all steps
					Step result Search result
<input checked="" type="checkbox"/>	1. Country: Sweden (SE) (Target)	24,879	24,879		
<input checked="" type="checkbox"/>	2. Time period: on and after 01/01/2009 and up to and including 31/12/2009 (completed-confirmed)	61,076	1,276		
<input checked="" type="checkbox"/>	3. Deal type: Acquisition, Merger	510,487	380		
<input checked="" type="checkbox"/>	4. NACE Rev.2 (primary codes): 62 - Computer programming, consultancy and related activities, 63 - Information service activities (Acquiror OR Target OR Vendor)	131,750	48		
Boolean search <input type="text" value="1 And 2 And 3 And 4"/> <input type="button" value="Refresh"/>					TOTAL : 48
<input type="button" value="Launch wizard"/> <input type="button" value="Summary records"/> <input type="button" value="View list of deals"/>					

*Collecting data to substantiate our research exposes it to the confirmation bias wherein, there is a tendency to favor the information that confirms with one’s hypothesis or beliefs. In the present case as well, collecting data based on our initial hypothesis could lead us to the problem in inclining ourselves to our preconceived notions. Instead, the researchers have collected data based on the conclusions that have been garnered from our interviewees. This way, the researchers have first been able to support or refute their arguments using the actual stakeholder’s point of view and finally see for themselves if what the interviewee state is actually true. Finally, the researchers collected the data regarding those conclusions and have attached them in the report for the reader to judge for himself if the outcome holds any truth.

Chapter-4: Interviews

4.1 a. Digia: An Introduction

Trolltech was founded in 1994 by Mr. Håvard Nord and Mr. Eirik Chambe-Eng, with the goal of creating a cross-platform tool-kit for developing graphical user interfaces using C++. Trolltech's "Qt" tool-kit was subsequently used as the basis of Linux's highly popular [KDE](#) desktop application environment, and has been released by the company under the [open source](#) GPL license (network 2008). The company was always tightly integrated with the open source community. The Trolltech team had to resort to software consultancy to sustain the company in its early days and its initial customers were influential on the design of Qt software.

The core team of designers at Trolltech started developing Qt in early 1990s, and the first commercial version of Qt was released in 1995. Since then, Trolltech has experienced rapid growth, and Qt was used in thousands of successful commercial software development projects worldwide (Langley 2007).

One claimed advantage is that, from a single source code-base, Qt applications run natively on Windows, Linux and Macintosh. In other words, once they have learned the Qt application programming interface, developers can produce applications that will run unchanged on all major operating systems (Langley 2007).

Qt had influential users such as Adobe, Hewlett-Packard, IBM and mobile phone manufacturer Motorola — there is an embedded edition, Qtopia, for hand-held devices. Customers include aerospace companies, computer aided design suppliers, film animators and Google Earth. Qt is a hybrid of open source and commercial software. Its creator, Trolltech, had a dual [licensing](#) model, which offers "the advantages of open source in a commercially supported, proven framework" (Langley 2007).

In 2000, Trolltech introduced Qtopia, a small-footprint, embeddable version of Qt that targets Linux-based devices. Trolltech, the originator of Qt, which forms the basis of the Linux KDE desktop environment, was acquired by Nokia in 2008, the world's number-one mobile phone vendor. Nokia expected its acquisition of Trolltech to accelerate its cross-platform software strategy for mobile devices and desktop applications, and to enhance its Internet services business.

Nokia reportedly offered NOK 16-about US\$2.94-per share in cash for Trolltech's stock. The company had about 52 million shares outstanding, so Nokia's offer amounts to around \$153 million (US dollars). Trolltech said its board of directors had unanimously recommended that its shareholders accept Nokia's offer, and holders of approximately 66.43 percent of Trolltech's issued shares and votes had already approved the offer (network 2008).

According to Trolltech, Nokia's software strategy for devices is based on cross-platform development environments, enabling the development of applications across the Nokia device range. Trolltech's cross-platform Qt and Qtopia toolkits will enable Nokia and third party developers to develop applications that work in the Internet, across Nokia's device portfolio, and on PCs (network 2008).

Trolltech said Nokia planned to continue the development of the existing Trolltech products, for both desktop and mobile applications, and will provide support for both new and existing customers. Commenting on the acquisition, Trolltech CEO and founder Mr. Håvard Nord told DeviceGuru.com, "When we founded Trolltech 14 years ago, Eirik and I wanted to create a software development framework that would make life easier for software developers. We came up with a vision of 'Qt Everywhere,' where our technology would enable efficient development and deployment of applications across a wide range of operating systems and devices. With the announcement today, our 'Qt Everywhere' can become a reality." (network 2008).

At a time when Google's Android platform which as part of the Open Handset Alliance was gathering support from mobile handset makers and Apple's introduction of iPhone had revolutionized the smart phone business, Nokia made a very strategic move by acquiring Trolltech to check the momentum gained by its rivals, despite being very conservative in its approach to software acquisitions in the past.

In September of 2010 Nokia announced that Stephen Elop will take its CEO position. Soon after taking over the position, Elop officially announced that the new strategy for Nokia was to shift from their in-house mobile operating system to Microsoft's Windows operating system. This change of direction left the former Trolltech team and its technology irrelevant for Nokia. In August 2012 Digia, a Finnish software powerhouse acquired the Qt software technologies and Qt business from Nokia. According to Digia's press release in August 2012, since they acquired the Qt commercial licensing business from Nokia in 2011, the

operation has continued to be successful and has grown substantially (Plc 2012). In 2014 Digia claimed that Qt is being used by over 500,000 developers worldwide (Plc 2014).

KDE is an open source international community that is dedicated to providing free, open source software for desktop and portable computing. The community has developed a variety of applications for communications, work, education and entertainment. Trolltech collaborated with KDE and developed a symbiotic relationship which gave it the credibility in the open source community and eventually paved the way for selling its commercial license to customers.

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Open Source Software is computer software in which the source code could be studied, changed and distributed by the copyright holder. Most open source software is community based in which each member contributes to the betterment of community by adding and refining software in a public and collaborative manner.

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Licensing

Trolltech had two types of licensing. One was the open source GNU Public License in which all software developed using Trolltech's product were also open source. The open source community will contribute to the bug tracking and fixing of these products. The other type was a commercial license in which the software developed would be proprietary for the customers of Trolltech and these commercially licensed products would be supported and maintained by Trolltech.

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4.1 b. Digia Interview

Please refer to [appendix 1](#) for the questions that were put forth to the interviewee. The founders of Trolltech were searching for a cross-platform development tool for windows and UNIX but could not find one and so started developing their own tool named Qt. Over the years they expanded to Mac OS X, embedded systems and mobile devices. That is the reason why Nokia got interested in acquiring the company. The technologies that were consumed were the C++ compilers, editors, change management and bug tracking software. The Qt source code was open for all software developers to customize and improve. The company had a lot of tacit

knowledge. They had wikis to maintain their explicit knowledge. Trolltech did not have much process documents, guidelines or check lists that are typically found in companies that adopt software engineering frameworks like ISO or CMMi. Quality comes from the open source way and there is a lot of ownership in every task the developers undertook. There were not many checks and controls to verify and validate the artifacts produced by the developers. The developers were also well connected to research institutes and universities and were part of the open source community. Some of the most important actors were tool developers and the open source community. Financial institutions were critical to the growth stage of the company. When reminded about the role of educational institutions she mentioned them as more of customers.

According to the interviewee, competitors to Qt were dependent on the target market. If one considers Microsoft windows as a platform then the Microsoft development tools like Visual studio were all competitors to Qt and if cross platform tools are considered, Java programming language was a competitor. Customers of Qt include some of the large companies in the animation, automotive, embedded systems and medical industries.

The interviewee was of the opinion that the reason why Trolltech was sold to Nokia was that the founders and shareholders saw that the acquisition as a good fit for the company's goals and helped Qt reach a larger market share. Another factor taken into consideration for the decision was the fact that the company's financial situation was not great. Many of the employees had stock option plans. According to her, the offer from Nokia was too good to refuse. The pattern for software start-ups to sell to foreign companies is that the founders would like to make money and start a new venture all over again. The primary hindrance to software companies in Norway is insufficient understanding of the underlying technology for the investors. The value of a software company is mostly based on its intellectual property and only a good understanding of the technology being developed could help investors make a good valuation.

When asked about skill shortage in the Norwegian software industry, she said that the company faced problems recruiting developers and had to overcome a lot of bureaucracy to bring in international employees. Trolltech kept English as the working language and did not mandate employees to learn the Norwegian Language. She added that the process of recruiting foreigners has become easier now. According to her, the oil industry in Norway drives a lot of innovation and

could have had a positive impact on the software industry. This view that the software industry could have synergies with the oil and gas industry is in contrast with Prof. Sogner's opinion that the oil industry depletes the resources and talent pool of the software industry in Norway.

4.2 Interview with Dr. Gard Paulsen

Dr. Gard Paulsen clearly told the researchers at the beginning of the interview that he was only providing his opinion on the events that occurred in Trolltech from an outsider's perspective. Trolltech created a product called Qt. Qt is a framework for easier software development which is a set of prescriptions, rules and software technologies that produce software products which can run on various software platforms. This concept, in the software terminology is called platform independence. Their starting point was in a period that was dominated by a few operating systems for computers like Windows, MacOS, Linux and other UNIX variants. Qt helps the programmer code once and the software application will run on all the operating systems. Qt is also a neat and organized way of programming if the programmers code for one specific platform. Qt caught on with the open source community. They developed it in-house and distributed it in the open source community for non-commercial use and licensed it for commercial use.

One of the major success stories during its early days was that Qt was the chosen development framework for a specific graphical user interface for Linux called KDE. KDE had a very distributed developer base and had major hotspots in Germany. They attracted a lot of German developers to use Qt.

A company that creates programming tools has to know how people program and also how to solve the specific problem of creating software that runs almost natively on various platforms. The knowledge base for creating Qt came from solving very specific problems for specific customers. Early customer like Vingmed which produced medical equipment played a large role in the evolution of the Qt product. The founders' knowledge came from their education at NTNU and experience from UNIX programming and open source technologies. Knowledge in C++ language was a pre-requisite for the creation of Qt.

Trolltech received some funding from the founders' wives who enabled the founders to start the company without having an initial income and was listed in the stock market in 2006 – 12 years after it was funded. Most of the employees had stock options. The competitors would have be all companies producing cross

platform development environment like Borland and IBM. Java language was also a competitor to Qt but the difference from Java was that Qt was producing C++ code that was more native to all the platforms that they would run on.

Customers fell into two categories. Specific challenges were posed by large Norwegian firms and Trolltech solved those with some technical consulting. Other customers were very global and some of the early users of Qt were single user customers and small customers from around the world. Trolltech's later customers were a mixture of companies of all sizes including Google, Adobe and IBM.

It might be difficult to argue that the possible reasons for the sale of Trolltech to Nokia could be attributed to the lack of funding, bigger possibility to grow through the acquisition or some barriers to internationalization. At the time of the acquisition, it is more logical to explain along the lines of technical challenges. The two companies were working on quite complex set of challenges. At the time, Trolltech tried to address the multi-platform challenge in the mobile devices or different kind of software platforms in desktops. That made it interesting to get involved with the largest producer of handsets, particularly if the acquiring firm was interested because it was having similar multi-platform problems. Nokia was also looking for operating systems for future smart phones and tablets. Nokia's decision was strange due to the fact that it was acquiring a firm that also supplied software for other competing firms. For Trolltech, they had to consider the amount of work to reach to the place they were and the industry was changing and that their customers would be completely different from the previous periods of growth. It was a feeble position not because of lack of growth opportunities but they were thinking of addressing an industry that had a completely different language.

On the sale of Trolltech to Nokia Dr. Gard Paulsen was of the opinion that unlike the case of the sale of Fast to Microsoft which was a case of being acquired by a bigger player, Trolltech's sale was a case of a firm being bought by another with a different line of business. They stayed on and sustained Qt by giving away open source licenses. Nokia's needs at the time were difficult to understand and Trolltech were caught inside a company in disarray. Probably, the first two years in Nokia may have been decent but the whole framework fell apart particularly after Microsoft was involved.

If one looks at the pattern of Norwegian IT firms that make exit because of acquisition, there are only a few large ones like Fast and Tandberg and mostly small and medium companies which are very local. These small and medium firms cater to Norwegian customers and they have a due date when it comes to growth. Trolltech was a peculiar case in that it was not producing end user products and they cater to customers that produce software similar to their own. Very few large firms would be interested in acquiring a technology firm like Trolltech. It is difficult to argue that there is a pattern that is Norwegian.

Firms in Norway are closer to the institutional framework and the Norwegian customers. It is difficult to develop born global firms in Norway because it was a very specific industry sector that moved Norwegian start-ups towards customers in oil and gas and general engineering and moved them away from large global markets. That creates a pattern, where software firms are shaped by the interaction with customers and the customers are more local and then there are large amount of software firms that cater to very specific Norwegian needs like book keeping, tax software (e.g.) superoffice where the menu is in Norwegian and the revenue and tax standards are catered for.

Regarding skill shortage Dr. Gard Paulsen's analysis is that the problem might be to do with how Norway uses its educational resources. He compares software engineers from Norway with other parts of the world and says that in countries like India where students are more formally trained and mathematically inclined. Skill shortage is hard to quantify in Norway since the only data that is readily available is the head count of software developers. He opines that in general, fewer engineers in Norway study software than other branches of engineering.

The last point that the researchers queried the interviewee was the impact of the Norwegian Oil industry on the software industry and he opined that the oil industry had partly fostered the software industry in its early days. Norsk Hydro had the largest IT department when it was acquired by Statoil. It is due to the fact that the work from the IT department was an integral part of the company and not outsourced and the company did not spin out its IT operations. Most of the IT teams were involved in solving their own company specific problems.

4.3 a. Introduction to Startup Lab (Incubator)

Startup Lab is an incubation space located at Forskningsparken which houses about 60 start-ups. Startup Lab engages in start-up companies early on and they

invest typically USD 100k in equity. Depending on the Start-up company's level of experience, Startup Lab can provide companies with working capital and a base salary from the point at which the companies take their first step. In addition to their skill-set and their money, Startup Lab has a large on- and off-site network of people who can help companies with everything from financial and legal assistance, to business workshops and accounting services. This lets the company focus on what they are best at. They also facilitate the right match between companies and potential investors. Startup Lab also facilitates networking events for entrepreneurs to form professional and informal networks. These networks could be crucial for the start-ups in acquiring knowledge, capital, talent and markets.

4.3 b. Interview with Mr. Odd Utgård of Startup Lab

Mr. Odd Utgård says that Startup lab facilitates knowledge sharing by conducting events and encouraging interaction between first time entrepreneurs including students and veteran entrepreneurs. If a start-up requires help with contacting research institutes for help with technology the incubators help them with networking.

One of the reasons according to Mr. Odd Utgård for not having large Norwegian software companies is that these companies do not cater to the needs of the global consumer and they cater to a few large Norwegian customers in Oil or Government. He also mentions a lack of incentives for people in Norway to work for start-ups since the salaries in established larger companies are very high and it is easy for smart Norwegians to get a job in well-established software companies. According to him, employees of start-ups may not get good salaries or pension plans and have to work harder than their counterparts in large companies. Another challenge that software start-ups face is the small size of the home market and they have to become global very early in their life. It is harder to become global staying in Norway and software companies need to move to Silicon Valley as soon as possible. Norway does not have a history of technology start-ups unlike Sweden where they had Erickson. Sweden also had global consumer retail chains like H&M and IKEA and had the experience of setting up business operations all over the world, this experience could be handy for new software firms in their journey to become a global business. Consequently Sweden has a lot of venture investments but Norway does not have a well-developed Venture Capital industry.

Sweden and Finland have overcome the problem of a small home market by developing the networks in the technology industry and finance firms. The number of angel investors in Sweden is much bigger than in Norway. However there is money and investment in Norway. Most of the investment goes into real estate due to tax policies in Norway.

Mr. Odd Utgård opines that there are benefits for Norwegian software companies that sell to large foreign companies such as access to more resources like distribution channels, talent and market. According to him, Norwegian software start-ups score high on the technical competence; however, the strength of start-ups in terms of employees is low when compared to Silicon Valley and Germany. This gives an edge to the Silicon Valley and German start-ups since they have a lot more ability in terms of marketing, sales and business management.

Skill shortage in the software sector was another topic that the researchers discussed with Mr. Odd Utgård. While the quality of engineers is high relative to other developing eco-systems, very few engineers take the leap. Furthermore, the ecosystem lacks graduates with business education, who can help commercialize the tools created by the engineers. A comparison was made with the German ecosystem which has more business graduates starting up ventures but lacks quality engineers who can help develop the business plans to successful products. The interviewee said that the lack of companies that have developed consumer software products and retail consumer products is a problem. As a result access to resources and networks becomes more difficult for newer software start-ups. The government does not make serious effort to develop the software eco-system since this is a very risky and low return investment for the tax payer.

When asked for some remedies to bolster the start-up ecosystem in Norway, Mr. Odd Utgård recommended that getting smart business and technology people together is one of the key factors and incubators like Startup Lab and MESH are key players. He also added that tax incentives for investments in the start-up eco-systems should be implemented by the Government.

4.4 Interview with Håvard Nord (Entrepreneur & Investor)

Mr. Håvard Nord completed his masters in NTNU. His thesis was about cross platform development framework. A solution that could be used to build software that can run on UNIX, Linux and Macintosh. After he finished his degree he wanted to build a company out of his thesis together with Mr. Eirik Chamber.

They grew the company very slowly for six years. Both the wives of the founders were working and they could provide for the family. After a year or so they got into software consulting work and they used the product that they build to provide services for their customers. The first customer was NCR. They started getting more consultancy work and hired seven people and were nine employees in total by end of the nineties. They were profitable even during the early years because of positive cash flow. At the end of the year 1999 there was the boom time for the high technology industry. VCs were investing money after software companies and Trolltech's founders were pursued by American investor. Mr. Håvard Nord went to Salt Lake City to negotiate a million dollar investment. This was in Oct 1999 to June 2000. This enabled the company to grow quickly and they went from eleven people to 44 people. Trolltech established offices in Australia, Japan and China and Mr. Håvard Nord went to the U.S.A and lived in Paulo Alto for eight years. In 2000 they had 30 percent of their business in North America and they grew that to 50 percent and it was quite significant. The first phase of Trolltech was primarily about the establishment of Qt as a development platform even when it was very strong in the Linux community and the company gained a lot of attention. The money that they raised was to fund the expansion into consumer electronics. From being a primarily a desktop development system, Trolltech moved into the space of consumer electronics, mobile phones, PDAs, embedded systems and internet of things. The vision was for Qtopia becoming a mainstream platform and even the number one platform for mobile devices development. Mr. Håvard Nord visited Nokia in 2003 to have collaboration and Nokia had Symbian for their mobile phones. Nokia wanted to build their own operating system for smart phones. So the talks did not yield any results. Meanwhile Trolltech made some business deals with Sharp, Motorola and Panasonic. In 2007 came the iPhone. The iPhone was not a threat to Qt since it was proprietary and may have made Qt more interesting since it raised the bar for what mobile devices can do. Then Google introduced the Android platform for smart phones. Google wanted to give Android away for free so that they could control people's access to internet. When Google pumped hundreds of millions of dollars into Android the future looked very gloomy in Trolltech since they will lose all their licensing fees from mobile makers. They had to make one of two strategic choices then, either to find a strong partner to help them Qt stronger or they could go for niche markets where Android could not penetrate. Around 2007 Nokia approached Trolltech

after giving up their project to develop their own operating system for smart phones and Nokia realized that Qt could be the development platform for them. In the end Nokia wanted to buy Trolltech. Trolltech chose to partner with Nokia which was the largest handset manufacturer at the time to compete with the Android platform. Mr. Håvard Nord stayed in Nokia for ten months and he formally resigned from there since he did not like the way the company was being run. Qt was supposed to be centrepiece of Nokia's development but they did not execute that strategy. Nokia got Stephen Elop as their CEO and he changed directions of the company and they sold Qt to another Finnish company called Digia.

Another reason for not remaining independent was the limited industrial setting in Norway and being a large company, it was difficult to recruit people from Norway. Trolltech had to recruit people from outside of Norway which was a cumbersome process. Computer graduates got high salaries from the Oil industry and they were risk averse and did not want to work with a relatively smaller company like Trolltech. The bigger problem is the financial community. When they went IPO in Oslo stock exchange, they sold the message that Trolltech would be future platform for mobile devices. Trolltech predicted that they will deliver negative results and when they actually did, the media and the investor community felt disappointed about the results. Investors could not value a technology company and saw Trolltech as a 'brick and mortar' company. Investors have a herd mentality in Norway and there are very few investors that are tech savvy. Mr. Håvard Nord told that there is only one Venture Capitalist in Norway and their investments are in the tune of ten million NOK. According to Mr. Håvard Nord, comparatively, Swedish investors understand what it takes to build a company. There is also a problem of Wealth Tax which says one percent of all liquid assets are taxable. If investors buy property there is no tax on them. Mr. Håvard Nord opines that investment in real estate will not foster innovation, creates jobs and economic growth and he recommends that the government should give incentives to investors who invest in shares of start-ups.

The hindrances to growth for software start-up are the financial markets in Norway, the real estate tax and wealth tax and the investors in Norway not having an understanding of the technology industry.

When asked about his contribution to remedy the situation in the Norwegian software eco-system he said he is working for Oslo Business Region with a vision

to make Oslo the city of talents. They want to attract people and to make it easier to start businesses in Oslo. He wants to be closer to the politicians and have a voice in the policy decisions.

Mr. Håvard Nord also explained that there is a large funding gap between seed funding and venture capital. He said that the start-ups have to accelerate from a cliff and are expected to cross a chasm and that chasm is hard to cross. To bridge that gap, they have to create an investment culture and politicians are the key to driving this culture.

When probed about the difference in start-up eco-systems between Norway and Sweden, he said that he does not see the Swedes a less risk averse but the financial community is smarter about start-ups and investment in technology. Sweden has a lot of technology companies coming from Erickson but Norway has easy money from the oil industry and the technology eco-system did not develop and mature similar to Sweden. Even Finland he says has produced companies after the disintegration of Nokia.

Mr. Håvard Nord explained his efforts to remedy the situation of the eco-system in Norway. He said that he tried raising some funds along with three other people and he called it Betafund. He also added that the cost of setting up a software company has reduced drastically but the investors still want to invest large sums of money into these start-ups. His fund will invest in start-ups in smaller amounts of money over many stages of growth and lower the threshold to start companies so that more people can commercialize their own ideas. Mr. Håvard Nord also created a mentor-ship program for the start-ups with experts from Silicon Valley. He added that he ran into some criticism from Innovation Norway over the Beta fund.

4.5 a. Introduction to Innovation Norway (Govt. Agency)

Innovation Norway is a state-owned company that was started in 2004. The goal of Innovation Norway is to promote nationwide industrial development with focus on both business economy and Norway's national economy. It also has the goal of releasing the potential of the different districts and regions in Norway by contributing to innovation, internationalization and promotion. Innovation Norway has offices in all the Norwegian counties, with the head office in Oslo.

They have more than 500 employees worldwide and have supported maritime transportation, biotechnology, thin film, alternative fuel, and many other types of projects.

Innovation Norway contributes to enhancing innovation in Norwegian enterprises and industry, building competitive Norwegian enterprises at both domestic and international markets, promoting Norwegian enterprises, promoting Norway as an attractive tourist destination, securing development in rural areas, transforming ideas into successful business cases and promote interaction between enterprises, knowledge communities and R&D institutions (Norway 2014).

4.5 b. Interview with Mr. Pål Næss

Innovation Norway goes very early to a start-up to finance them. Most of them do not have revenue and even if they do have, then revenues are insignificant. Innovation Norway inspects those companies after a couple of years to check if the company has grown in revenues, customer base or other assets like intellectual property. Building the customer base is probably a better result than having good revenue.

When asked if Innovation Norway keeps track of the falling costs for starting a software company, Mr. Pål Næss answered in the affirmative. He said that the organization has just come up with a revised funding model. Prior to the revision, the establishment fund provided by Innovation Norway used to match the NOK 300,000 that the entrepreneur needed to raise on his own. But now they have reduced that funding to NOK 150,000 and the entrepreneur need not raise any funds on his own. If the entrepreneur is able to prove customer traction with his product or service he will be funded with NOK 800,000. The funding model is revised when there is a drastic change in the macro economic climate in the country.

He also added that statistics bureau keeps track of the exits and is able to measure the efficacy of the funding model of Innovation Norway. He opined that the statistics suggest that the grants given by Innovation Norway have benefited many start-ups and the society.

Mr. Pål Næss was of the opinion that it is more risky to invest in start-ups than in real estate. He also said that there are discussions to encourage investors to get involved in start-ups. These discussions are not coherent and some people have expressed their wish for the government to match at least part of their investments

in start-ups. Denmark has got a proposal of some tax relief on investments in early start-ups. There are some decisions on shared ownership that needs to be finalized by the government.

On the hindrances to growth for start-ups Mr. Pål Næss thought that the national market is very tiny and companies have to be global very early in their growth. He added that it should be easier for products and services produced in Norway to be sold in the local consumer market and governments. Norway does not have many success stories to prove that thinking big will pay off in the long run. Sweden has Skype and Spotify that provide role models for new software entrepreneurs. Skill shortage is not a problem for the software start-ups according to Mr. Pål Næss but the hesitancy for employees to work for a start-up might be a problem. People are very happy working for large software consulting firms since they get paid well and have a better work life balance.

Information technology companies that cater to the oil industry also foster innovation and have had a beneficial effect on the software industry in Norway. These companies still divert investments from real estate and create economic growth and prosperity.

Chapter-5: Analysis of data and Discussion

The Norwegian computer software industry has the potential to be large and could be an important driver of economic growth and job creation and could be a critical component of a knowledge economy in the next decades. Encouraging and fostering the software industry is important for the transition from the current economy that is dominated oil and gas industry to the future where the role of oil and gas in the economy will be significantly diminished. The researchers see a healthy number of software start-ups in Norway, however those number do not translate to significant number of large global software companies from Norway. When the researchers investigated this problem through interviews, they received great insights and recommendations from the interviewees. It is hard to pin-point the root causes of this problem due to the complexity of the problem as well as the intertwining of the causes. For the sake of an analysis we have classified the cause into these categories.

5.1 Tax Regime: The property tax in Norway is levied by the local authorities in the urban areas. The tax may vary from 0.2 to 0.7% of the taxable fiscal value of the property. Each municipality is free to decide whether or not to levy property tax (KPMG 2009).

Resident individual taxpayers are also subject to net wealth tax on their worldwide assets, provided they are resident 1 January in the relevant fiscal year. This tax is 0.7% for a net wealth of over 470,000 NOKs. From the income year 2008 the full market value of shares registered in the stock exchange are the shareholder's wealth, whereas unlisted shares are valued based on the company's taxable wealth (KPMG 2009).

According to Mr. Håvard Nord, the property tax in Norway is lower than the wealth tax and so investors safely park their money in property, which is risk free. He also added that investing in property is not good for the economy since it will not stimulate innovation, job creation and growth.

As aforementioned, in Norwegian context, a lot of taxes are saved by investing in real estate instead of stocks or start-ups. This can be explained by the following

example: Let's say one has 10 million NOK of capital that could be invested and wishes to choose where to invest. If the person wishes to invest in stocks he/she has to pay a tax for being wealthy equal to 0.5% of his or her wealth and also 28% on capital gains made from the investment. Instead, if the individual invests the capital in property the property is not valued to the sales sum but a lower valuation, so one has to pay wealth tax on only 5 million. And as long as the individual lives one year in that house/apartment, the capital gains when he/she sells are all his/hers. No taxes are levied in the process. If a similar model of investment could be applied to the start-up community, taking some cues from the re-investment scheme as in Italy and a deferring the tax as in the UK case, the local start-ups will have ample investments for growth. This could be beneficial to the system when the deferred tax is levied on the much higher sum when the firm has grown in proportions at global level.

Following is a table of the angel tax incentives as has been aggregated by the (Wilson 2011) OECD research team:

Summary of national angel tax incentives in selected countries

Country	Tax deduction on Investment	Tax relief on capital gains	Roll over or carry forward of capital gains	Roll over or carry forward of losses
France	25% (with cap of EUR 20 000-40 000/year) + 75% wealth tax reduction (with a cap of EUR 50 000/year) *Also applies to investments in other EU member states			
Ireland				
Israel	Treated as capital loss			Yes, but with limits
Italy		If reinvested in start-ups within 24 months		
Japan				
Portugal	20% (not to exceed 15% of income)			
United Kingdom	30% on a max of GBP 500 000 (to increase to GBP 1 million in 2012)		Can be deferred if invested in qualified EIS company	

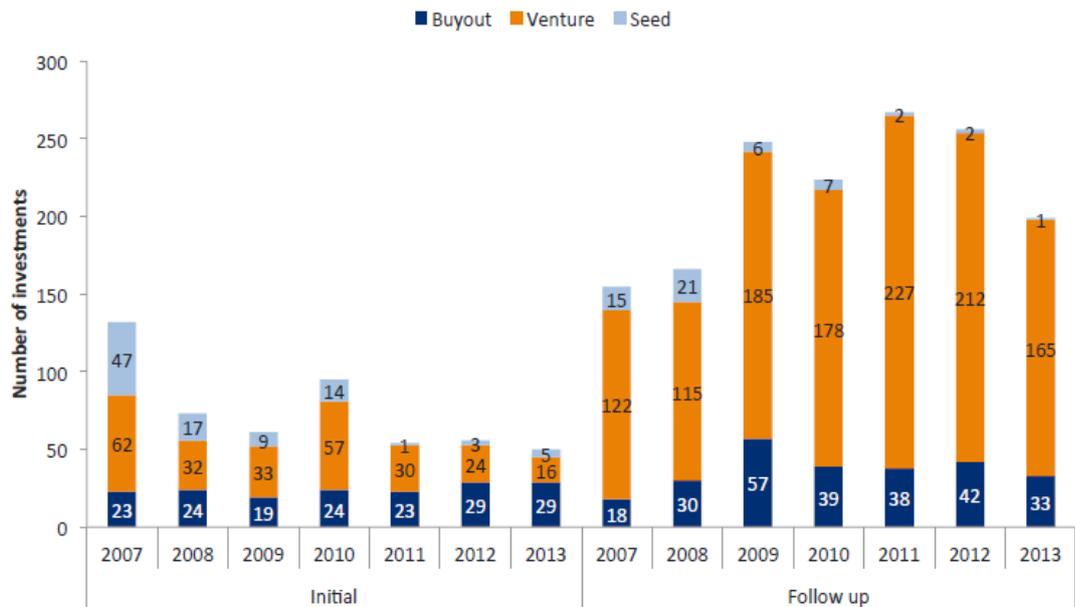
Note: This table does not represent a comprehensive review of all programmes globally.

A combination of tax incentives on similar lines can be implemented to wean the citizens off the conventional form of investment and venture into uncharted waters. Propagating such a strategy can also help increase the risk appetite of the investors which could pay off in the later stages because risk-taking is one of the key ingredients in building a high growth entrepreneurial ecosystem.

From the KPMG report, wealth tax seems to be a major obstacle for the growth of tech start-ups. The researchers agree with Mr. Håvard Nord’s opinion that the Tax structure could be one of the obstacles to growth of IT companies in Norway. This problem is also interwoven with the problems of lack of financing during early growth stage and investments being prioritized to the oil and fishing sectors in Norway. The situation calls for the effort of the government in order to overcome this obstacle to growth. The government could provide incentives to the investors who finance start-ups in the information technology sector to give it a boost.

5.2 Very little financing during early growth stage:

Number of initial and follow up investments in Norwegian enterprises by Norwegian and foreign PE firms



Source(NVCA 2014)

Amount invested in Norwegian Enterprises made by Norwegian and foreign PE firms by sector and phase in 2013(Mill. NOK)

Phase Type of investment/Total	Seed			Venture		
	Initial	Follow up	Total	Initial	Follow up	Total
Business related products and industry products	2		2	8	6	13
Business related services and industry services				4		4
Chemicals and materials					1	1
Cleantech	5		5		117	117
Communication				25	48	73
Construction						
Financial services						
Fishery and aquaculture					15	15
IT		2	2	6	88	94
Life Science	1		1	32	104	136
Other energy sources				0	3	3
Petroleum				23	39	62
Retail /consumer services and products						
Total	8	2	10	98	421	519

Source: (NVCA 2014)

One of the obstacles to growth of software start-ups pointed out by Håvard Nord in his interview was that there is a funding gap between the early seed funding and mezzanine financing in Norway. He also stated that the Norwegian Venture Capital industry do not make a lot of seed or first round investment to start-ups. According to the activity report prepared for Norwegian Venture Capital and Private Equity Association (NVCA) in March 2014, there were fewer and bigger deals in 2013 and the highest level of buyout investment by Norwegian PE firms, and the lowest number of initial and follow-on investments since 2007. Another comprehensive study (Grünfeld and og Grimsby 2010) suggests that “While they found that overall angel investment is higher than VC, the segment of angel investors focused on high technology-based firms is smaller than VC”. Both these statistics substantiate the statement made by Håvard. The report also states that 2013 had the highest level of initial investments in Norwegian Portfolio companies by foreign P/E firms ever.

Investigating on the amount of funding invested by Norwegian PE firms in the IT industry the researchers found that only 2 million NOKs were invested as seed funds, 94 million NOKs in the Venture stage and 450 million NOKs in the buyout stage. Even in the venture funding only 6 million NOKs were initial investment. This is a clear indication that the Norwegian Venture Capitalists are only

interested in the buyout stages of IT firms where the risk is at its lowest and early investment is virtually non-existent. There are other actors in the seed funding stage. The most notable of those actors is Innovation Norway which funds quite a lot of software start-ups. As a result of this situation, a lot of software start-ups that begin their journey through the help of friends and family, angel investors or Innovation Norway are stranded during early growth stage without financing. This situation can be remedied through the Norwegian Government by providing investors in early growth start-ups some incentives or tax shields. Creating a good network with venture capitalists from the Silicon Valley for the sake of acquiring knowledge on the due diligence processes that VCs use to filter the good start-ups from the bad ones would be crucial.

Venture Capital Investment Norway Vs. Sweden Y.o.Y

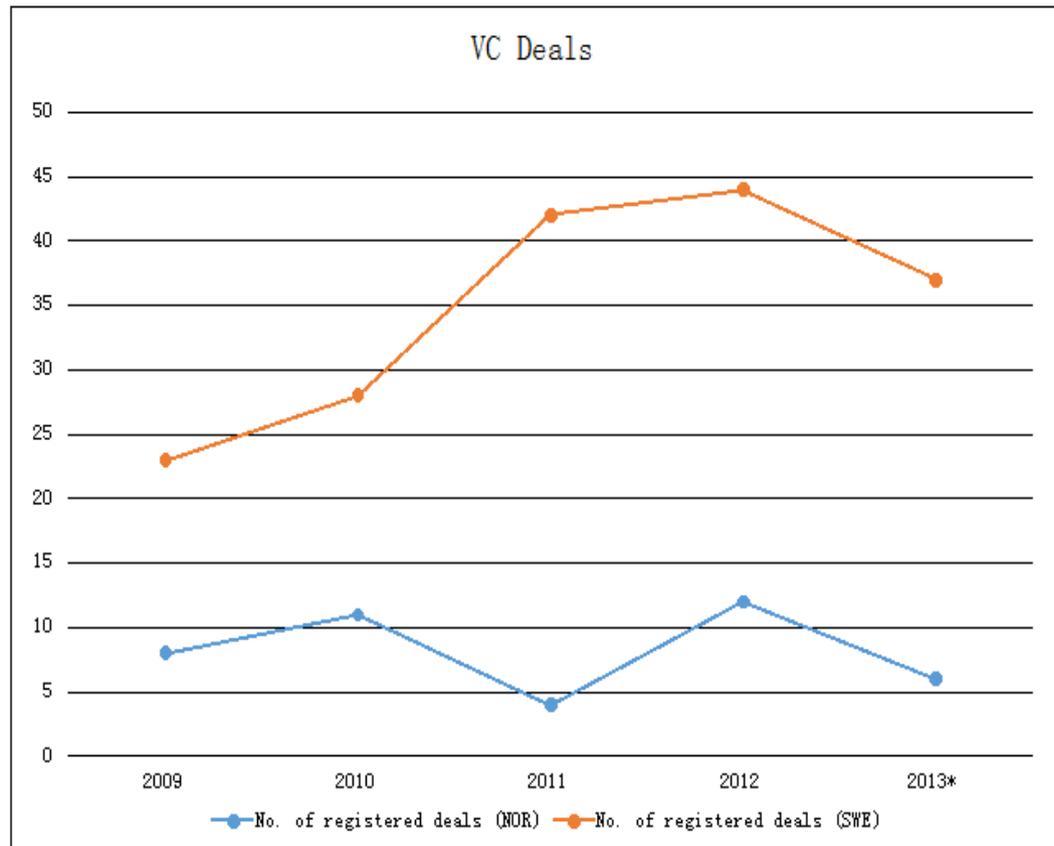
Norway					
	2009	2010	2011	2012	2013*
No. of registered deals (NOR)	8	11	4	12	6
Deals in IT	1	2	1	5	4
Average Investment	€ 4,304.8	€ 1,904	€ 1,346.4	€ 1,503.9	€ 2,085
M&A Deals in IT	13	38	31	26	30

Sweden					
	2009	2010	2011	2012	2013*
No. of registered deals (SWE)	23	28	42	44	37
Deals in IT	8	15	16	26	24
Average Investment	€ 1,017.2	€ 1,303.7	€ 1,769.9	€ 1,876.9	€ 1,139.6
M&A Deals in IT	48	58	61	78	71

*2013 being the most recent year, all the deal data might not be registered.

The aforementioned table shows the trend of venture capital investment in terms of no. of deals and average deal value in Norway compared to Sweden. The comparison stems from the initial arguments which suggest that other Nordic

countries have been more successful in attracting venture capital to their economy and also produce global brands in software products.



From the table, it is clearly visible that Norway has been a laggard in attracting the funds to scale up the high growth firms. The no. of registered deals on the Bureau Van Dijk database has been less than half of the number of deals taking place in Sweden. One can take solace from the fact that the average funding is higher than Sweden in 3 of the 5 years studied since the financial crisis. A high funding level indicates a higher valuation which in effect signals that firm has robust growth prospects. Therefore, one could be tempted to suggest that although the number of deals taking place in Norway is less compared to Sweden and even lesser in the field of IT, the quality and sustainability is better. The only problem with this conclusion is the fact that the quantity of firms receiving funding is too small and there is a chance of survival bias which in turn would mean that there's more number of firms dying/ turning inactive due to lack of growth fund in Norway than in Sweden and this could be one determining factor due to which Norway might be lacking in global names when it comes to software product firms.

5.3 Risk-Averse employment culture

When the researchers interviewed Håvard Nord he spoke about the problem he faced during his days at Trolltech where he could not find Norwegian software programmers to join the company and he had to bring people from outside of Norway. The reason he gave was that the Norwegian programmers find it very easy to get a job in established software consultancy firms which cater to the oil industry or the government and the salaries are very high in those firms. Håvard also mentions a risk-averse nature of Norwegian employees to join start-ups. When the researchers spoke to Odd Utgård from Startup Lab and Pål of Innovation Norway, they had expressed a similar opinion. Odd Utgård mentioned the employees in a start-up work longer, for lesser salaries and pension plans than employees of large firms. Start-up employees do receive ownership or sweat equity in the firm but the monetization of that equity is prone to a lot of uncertainty. Employees who work for many years may be able to benefit from the equity if the company grows quickly and gets acquired or gets listed in the stock exchange. Odd Utgård also added that only employees with high motivation will work for start-ups and they may eventually have to relocate to foreign countries that are their target markets. Håvard told the researchers that he had problems recruiting developers who are generally in the lower age group. This problem could be exacerbated in case of employees in the management cadre since the risk appetite of individuals will decrease with their advancement in the corporate hierarchy. This problem could be remedied by inculcating people with the sense of pride in being involved in innovation and educating them that there are factors to employment satisfaction other than just the monetary benefits.

5.4 Small home market and challenges to internationalization

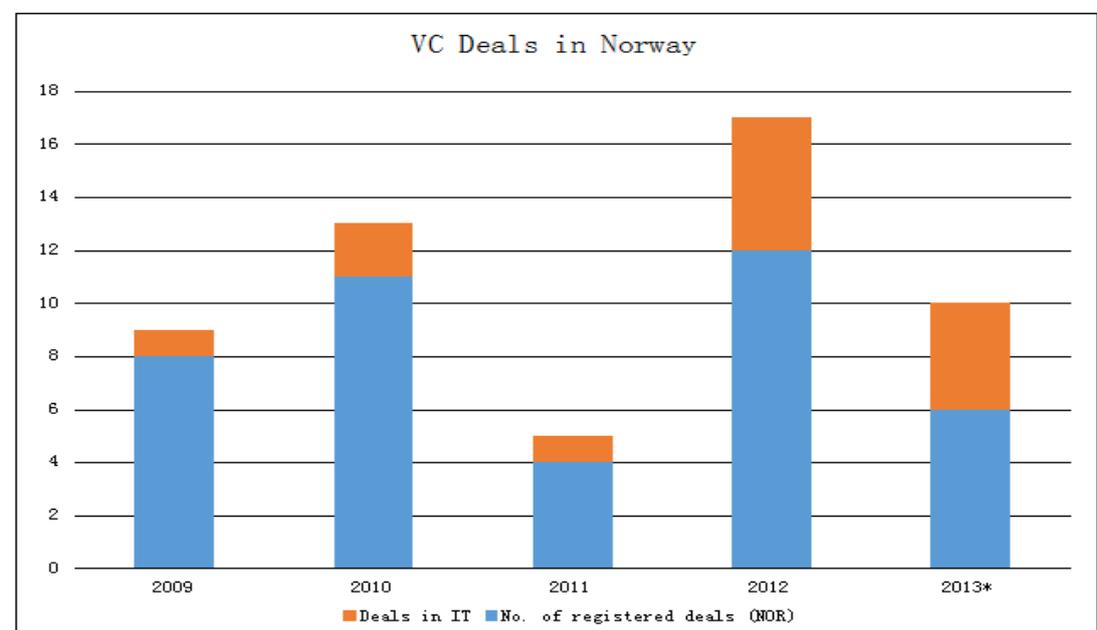
Norway is home to 5 million people and this is considered a small market for the computer software industry. Odd Utgård from Startup Lab stated that Norway can only be a test sample for software products; however he says it is a very good test sample. People in Norway are well educated and sophisticated users of IT products with a lot of disposable income. As a result of the small size of the home market Norwegian software start-ups have to be either 'born global' or internationalize very early to enter their target markets. Some of the obstacles to growth of Norwegian software start-ups are the challenges to internationalization. Usually software companies target the largest software market which is the United

States of America. Companies like Opera Software and Trolltech were successful only because of their smooth entry into their global target markets. They might have to fight a lot of competition in the new markets. There might also be some exogenous factors that the Norwegian firms will not have any control over. It is important to build a network for a smooth internationalization process and incubators and accelerators could build the bridge to new markets. Innovation Norway also helps start-ups in this process. Building a good reward system for employees of institutions like Innovation Norway could be a good step in helping Norwegian firm in reaching out the global market.

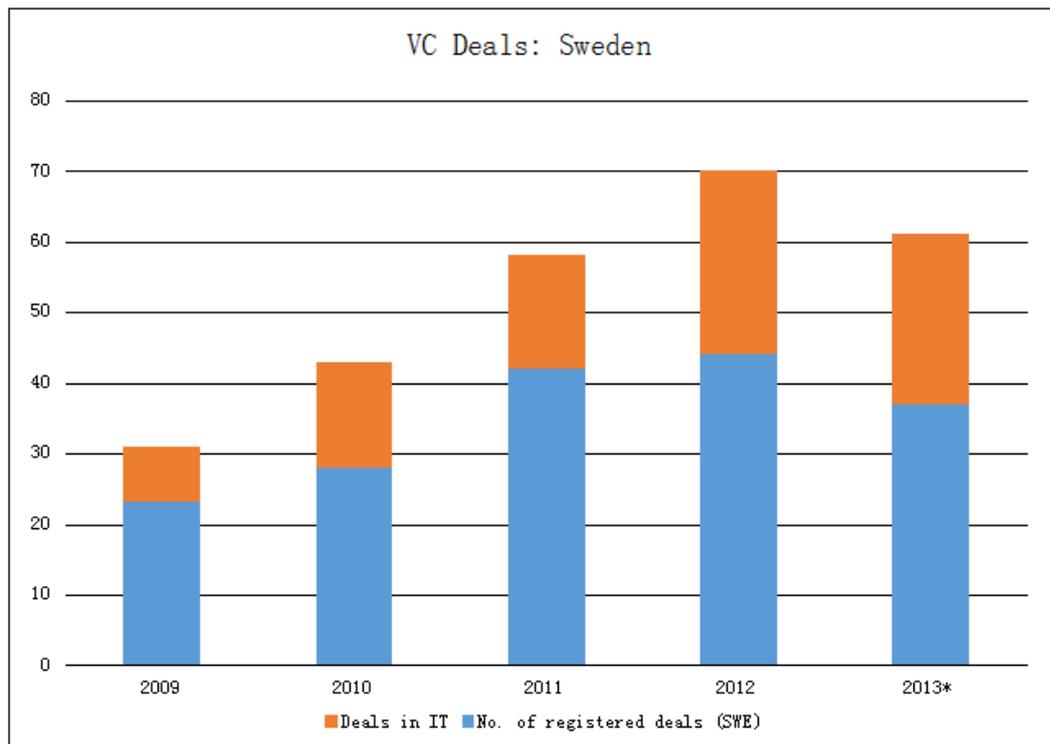
5.5 Dominant Oil and Gas Industry

The Information Technology industry in Norway is suffering due to the dominance of the Oil and gas industry in the country. The Oil and Gas industry takes away a lot of resources, especially people and investment, from other industries.

According to the activity report prepared for Norwegian Venture Capital and Private Equity Association (NVCA) the Petroleum industry receives 3.019 billion kroners from private equity firms in comparison with 547 million kroners for the Information Technology industry. Mr. Håvard Nord also told us that engineering students prefer branches related to the Oil and Gas industry. There is a clear pattern where resources and people are being polarized towards the dominant oil and gas industry. This problem has to be fixed in the long-term with Government's policy decisions to reduce the existing dependency of Norway on the Oil and Gas industry.



As is evident from the chart above and the one that follows, IT sector investment in Norway is less than 1 in 3 when it comes to the number of deals while in Sweden the number of VC deals in IT as a ratio to the total deals is about 1 in 2. This is an important result because it is the venture capital which takes the form of an acquisition or an IPO in the later stages. The lower the activity, lower will be the diffusion of technical skills and capital in the ecosystem and so the complete cycle will suffer in the long run.



5.6 Lack of collaboration between industry and academia

When the researchers quizzed Odd Utgård of Startup Lab on the interaction between start-ups and academic or research institutions he told us that such interactions are not very frequent and are initiated on a specific need basis. Moreover, none of the interviewees could think of any concrete instances of a strong relationship between start-ups and research institutions. All those responses confirm that the academic and research institutions in Norway are not very tightly integrated with the industry (Andersen 2011: 6). According to Dr. Andersen, contributing to the industry is against the culture of many academics and the universities and colleges do not recruit faculty with entrepreneurship in their mind. This situation took the researchers by surprise due to the fact that some of the most well-known innovations in Silicon Valley such as Google search and

Mosaic web browser are a result of students from universities taking their ideas to form companies and later succeed as entrepreneurs. Even the faculty of most technical and management schools is either involved in new venture creation directly or in encouraging their students in building new ventures. Universities in Norway could create their own incubators or collaborate with established incubators and play a crucial role in the development of early start-ups. One of the researchers had personally met team of students from NTNU in the summer of 2013 that had founded a start-up and were developing it from Startup Lab. This culture has to gain more momentum to churn out large software companies in the long run.

When the researchers look at all the data collected from the interviews, on the problems afflicting the Norwegian software industry, through the lens of Malerba's sectoral systems of innovation the researchers have strong reasons to argue that the weakest component among the three is the institutions built around the industry.

While technology and knowledge in the software product market is getting easier and cheaper to acquire with the advancement of cloud computing, open source software and various professional forums sprouting and thriving on the internet. Cloud computing enables even small firms to buy computer hardware, software and platforms as a service. Important Actors and Networks have also emerged in the software industry in Norway, however their growth and maturity is limited by the policies and institutions put in place by the government. The third component of Malerba's framework seems to be the weakest link in the start-up value chain. As pointed out earlier financing institutions, education institutions and government institutions should rise to the demands of a start-up ecosystem to fulfill the vast potential of the software industry in Norway.

5.7 Generalizability of Trolltech case

Considering all the factors that lead to the sale of Trolltech to Nokia, this case could be generalized to other most software firms in Norway and the trend of Norwegian software firms getting acquired by foreign corporations could continue until changes take place to fix these problems that are elaborated in this analysis. It would not be surprising if Opera Software got acquired by software Multi-national Corporation in the next five to ten years. The IT industry in Norway can be divided into firms that cater only to Norwegian customers and those that cater

to global customers. The former category of firms has consolidated themselves into firms like Visma and Evry ASA. The latter category of firms will eventually get acquired by foreign firms.

Chapter-6: Conclusion

6.1: Scope for further research

The researchers were really engrossed in the topic during the data collection and they realized that they have to limit their scope of the research due to the limited time and resources at hand. But it would have been logical to pursue one of the hindrances to the growth of the software start-ups in Norway and to provide more specific recommendations to fix that particular problem. The researchers thought of approaching the Ministry of Finance for an interview to understand their perspective on the tax structure once Håvard Nord mentioned it in his interview. However the lack of time was the main constraint that the researchers encountered. In addition to the time constraints, the research supervisor advised the researchers not to get into the domain of political decisions like tax. Hence, one of the possibilities for furthering this research is to focus on the problems afflicting the early stage financing more in-depth and specific remedies and guidelines to the stakeholders could be published.

6.2: Final Thoughts

The researchers discuss the four hypothesis questions that were put forth in the introduction section before their concluding remarks on the research topic.

H1: Access to finance is a significant obstacle to the success of gazelles and upcoming start-ups.

Access to finance is a significant challenge to the IT industry in Norway. Evidence from NVCA clearly suggests that the seed stage and venture capital stage investments in Norway are very insignificant and the focus is more on the buyout stage. The risk factor involved at a later stage of growth for a start-up is quite low and this might be a factor in the fact that the investors are involved only at the buyout stage. Most IT start-ups are strapped for cash at quite an early stage in Norway. As mentioned earlier in the discussion, finance being an obstacle to

the success of gazelles is very much related to the tax structure in Norway and the dominance of oil and gas industry in the country's economy. The researchers have recommended a change in the tax structure to discourage investors from parking their money safely in real estate and to encourage the practice of investing in early stage start-ups especially in the information technology sector.

H2: Government involvement and policy set-up has a significant effect on the success of status and exits of gazelles.

Government is a significant player in innovation and entrepreneurship for a country due to the fact that it sets up and monitors institutions that play a large role in the commercialization of research. Institutions like Innovation Norway, tax office have a say in how the innovation process operates. The government in Norway has to come up with strategies to encourage investments and resource distribution to new industries in order to diversify the economy to reduce its dependence on oil and gas. The government also could play an important role in Norwegian companies reaching out to global customers.

H3: Start-ups and Gazelles are likely to perceive recruitment and management as a significant obstacle to their success.

The researchers have discussed the risk averse employment culture and this is inter-related to the dominance of Oil and Gas in the economy. Most employees get recruited by either the Oil industry or government and both employers are good paymasters in Norway. It is a challenge for IT start-ups to attract talent since prospective employees are attracted to the high salaries and benefits offered by the established consulting firms. As mentioned in the literature review, a report by the Nordic Innovation concludes that start-ups in Norway have challenges acquiring late stage venture capital due to lack of experienced management team (Nordic Innovation 2012). Hence, it is clear that all the problems mentioned in the discussion are very much inter-related. Education could play a role in inculcating a sense of entrepreneurship and pride in getting involved in innovation.

H4: Commercialization of research is an important enabler of new venture creation and growth.

In Norway the government invests in a lot of resources for university research projects. However, these investments have not translated into research based

companies that have grown and come up with products and services in the commercial market. There have not been many software products from Norway that have reached the global consumers. Opera software is one of the few exceptions to this pattern. Industry-Academia collaboration is one area that needs to be strengthened in Norway.

Norway has the potential to create a large computer software industry. However, the recent trend indicates that high growth start-ups are acquired by foreign multinational corporations. The researchers have clearly identified some of the reasons for the pattern, the obstacles to growth and have given some recommendations to remove them in order to build an eco-system to nurture future software giants. The researchers hope their contribution can trigger a thought process in the Norwegian software industry on how the industry can become a significant player at the global stage and even dominate the industry in the future.

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Appendices

Appendix 1: Interview Questions

Roles and Responsibilities of the interviewee

1. Please describe your role and your responsibilities in the Organization
2. Please describe your career in Trolltech/ Nokia and Digia so far.

Knowledge and technologies

1. Please describe the technology that you developed and those that you simply consumed.
2. Do you classify your knowledge as mostly knowledge that is institutionalized through work experience? Why do you think so?
3. Did you have a knowledge management system in the company? Please describe the system.
4. Did you exchange knowledge with other organizations (e.g.) Universities, Research institutions? Can you please describe the process?

Actors and Networks

1. What were the knowledge networks that you were part of?
2. Were you part of professional networks and forums as well?

Institutions

1. What were the institutions that you were associated with?
2. How could they have helped you better?

Generic Questions

1. Please describe your competitors.
2. How was your supplier network? Did you have enough bargaining powers with them?
3. Who were your customers and how was the market structured?
4. Why did you sell the business?

-
5. Do you see a pattern in the reason for sale of software start-ups in Norway?
 6. How is the competitiveness of the Norwegian software start-ups at the global stage?
 7. What do you see as the strengths and weaknesses of the Norwegian software start-ups?
 8. Do you see any skill shortage among the labour force? Will a better immigration policy help remedy the situation?
 9. What other policy decisions can help?
 10. Has oil exploration had an impact on other industries especially the software?
 11. What is your success parameter and what is the threshold?

Appendix 2: sample email request for an interview

Hi Haavard,

I am a student of Master of Science on Innovation and Entrepreneurship at BI Norwegian Business School. I am doing my Master Thesis on why Norwegian software companies get sold off to foreign Multinationals and Trolltech is our case study. I would like to understand the reasons for the sale of Trolltech to Nokia. We spoke to an employee of Digia who was with Trolltech and she directed me to contact you to get an interview with you. It would be fantastic if I can meet you for half an hour on this subject.

Warm Regards,

Venkatesh

Appendix 3: Interview List

Name	Role	Date	Location
Hanna Linnae	Former Product Manager in Trolltech	19.03.2014 and 02.04.2014	At Digia Office
Gard Paulsen	Doctoral Researcher on Trolltech	10.04.2014	At BI Norwegian Business School
Odd Udgård	Startup Lab	27.05.2014	At Startup Lab
Håvard Nord	Co-founder of Trolltech	03.06.2014	Wayne's Coffee, Klingenberg
Pål Næss	Innovation Norway	10.06.2014	Innovation Norway Office